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 (Cluster) – MINOR MINERAL – CLUSTER –

PATTA LAND- EXISTING QUARRY

THIRU. P. SENNIYAPPAN ROUGH STONE AND GRAVEL QUARRY

Cluster Extent – 6.06.9Ha

Project Proponent

Thiru. P. Senniyappan
S/o. Palanisamy Gounder
No. 2/154, Poomalur Village, Palladam Taluk, Tiruppur District,
TamilNadu State – 641 663.

PROJECT LOCATION	PROPOSED PRODUCTION
S.F.Nos. 302/1A, 303/2A1, 303/2A2B(Part) & 302/1B **Extent: 1.19.5Ha** of Poomalur Village, Palladam Taluk, Tiruppur District.	**Reserves:** 62,430m^3 of Rough Stone, 3,344m^3 of Gravel Peak Production = 13,900m^3 of Rough Stone Proposed Depth = 42m bgl

ToR obtained vide

Lr No.SEIAA-T.N/F.No.10177/SEAC/1(a)ToR-1528/2023 Dated:09.08.2023

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
GLOBAL LAB AND CONSULTANCY SERVICES
S.F.NO:92/3A2, Geetha Nagar, Alagapuram Pudur,
Salem – 636 016, Tamil Nadu, India.

Baseline Monitoring Period

October to December2023

DECEMBER 2023

UNDERTAKING

I Thiru. P. Senniyappan given undertaking that this EIA & EMP report prepared for our Rough stone and Gravel quarry situated in S.F.No. 302/1A, 303/2A1, 303/2A2B(Part) & 302/1B over an extent of 1.19.5 Ha in Poomalur Village, Palladam Taluk, Tiruppur District based on the ToR issued by the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu vide Lr No. SEIAA-T.N/F.No.10177/SEAC/1(a)ToR-1528/2023 Dated:09.08.2023

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

P. Senniyappan

Place: Tiruppur
Dated:

DECLARATION

I Dr. M.Ifthikhar Ahmed – EIA Coordinator declare that the EIA & EMP report prepared for our Rough stone and Gravel quarry situated in S.F.No. 302/1A, 303/2A1, 303/2A2B(Part) & 302/1B over an extent of 1.19.5 Ha in Poomalur Village, Palladam Taluk, Tiruppur District has been prepared by Geo Exploration and Mining Solutions, Salem, Tamil Nadu.

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

Signature of the EIA Coordinator

Dr. M. Ifthikhar Ahmed

Managing Partner

M/s. Geo Exploration and Mining Solutions

Place : Salem
Dated:

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

PROPOSED QUARRY					
CODE	**Name of the Owner**	**Village**	**S.F. Nos**	**Extent in Ha**	**Status**
P1	**Thiru. P. Senniyappan**	Poomalur	302/1A, 303/2A1, 303/2A2B(Part) & 302/1B	1.19.5	**Lr No.SEIAA-T.N/F.No.10177/SEAC/1(a)ToR-1528/2023 Dated:09.08.2023**
	TOTAL EXTENT			**1.19.5**	
EXISTING QUARRIES					
CODE	**Name of the Owner**	**Village**	**S.F. Nos**	**Extent in Ha**	**Status**
E-1	Thiru.K.V.Velusamy	Poomalur	303/1(P)	1.29.0	EC granted Lr.No.SEIAA-TN/F.No.7741/(a)/EC.No:5350/2022 dated :10.10.2022
E-2	Thiru.B.S. Mohanraj	Poomalur	304/2(P), 303/2A2A	1.74.5	EC granted Lr.No.SEIAA-TN/F.No.7737/(a)/EC.No:5067/2021dated :23.05.2022
E-3	Tmt.G.Vijayalakshmi	Poomalur	305/1 (P), 307/1 (P), 307/2 (P)	1.83.90	EC granted Lr.No.SEIAA-TN/F.No.7366 /EC.No:5169/2022 dated :26.07.2022
	TOTAL EXTENT			**4.87.4**	
ABANDONED / EXPIRED QUARRIES					
NIL					
	TOTAL CLUSTER EXTENT			**6.06.9Ha**	

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

TERMS OF REFERENCE (ToR) COMPLIANCE

Lr No. SEIAA-T.N/F.No.10177/SEAC/1(a)ToR-1528/2023 Dated:09.08.2023

TOR ADDITIONAL CONDITIONS		
1	The proponent shall give an Affidavit before the issuance of ToR from SEIAA-TN stating that the mining operations will remain suspended till they obtain the EC granted by the SEIAA after the reappraisal process as per MoEF &CC OM F.No. IA3-22/11/2023-IA.III (E-208230), dated. 28.01.2023.	Noted and agreed
2	For the existing quarry, the PP shall obtain a letter from the concerned AD(Mines) which include the following information: i. Original pit dimension of the existing quarry 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 carried out if an) vi. Non-compliance/Violation in the quarry- during the past working. vii. Quantity of material mined out outside the mine lease area (or) in the adjacent quarry/land. viii. Existing condition of Safety zone/benches ix. Details of any penalties levied on the PP for any violation in the quarry operation.	Existing Pit Dimension Pit I -105m (L) x 74m (W) x 28m(D) Bgl Year wise Production for 5years 62,430 m^3 42m Bgl EC certificate : Letter No DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018 Non Violation
3	The project proponent shall submit a Certified Compliance Report as per the MoEF&CC O.M dated.08.06.2022 for the previous EC obtained from DEIAA.	Noted and agreed
4	The Project Proponent shall furnish the revised EMP based on the study carried out on impact of the dust & other environmental impacts due to proposed quarrying operations on the nearby agricultural lands for remaining life of the mine in the format prescribed by the SEAC considering the cluster situation.	Noted and agreed
5	The PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall for the preparation slope stability action plan. By involving any one of the reputed Research and Academic institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NlRM/Bangalore, Division of Geotechnical Engineering-llT-Madras, NIT-Dept of Mining Engg. Surathkal, and Anna University Chennai- CEC Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	Noted and agreed
TOR ANNEXURE-1		
1	ln the case of existing/operating mines. a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following:	Existing Pit Dimension Pit I -105m (L) x 74m (W) x 28m(D) Bgl

	(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.	Year wise Production for 5years 62,430 m^3 42m Bgl EC certificate : Letter No DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018 Non Violation during the past working this quarry.
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	VAO letter stating the details of habitations, temples etc., is encloses as Annexure
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants. whether it belongs to the owner (or) not places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.	110m Shed 110m Crusher Shed, 140m Shed, 160m Weaving mill, 180m Mines office & Store Room, 200m Farm House 230m Garments & Labour Shed, 240m Water Pumping Shed, 290m Cattle Shed Details in Chapter-3 socioeconomic environment
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tank, etc are located within 1 km of the proposed quarry.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 4
5	The Proponent shall carry out Bio diversity study though reputed institution and the same shall be included in EIA Report.	Biodiversity study has been carried out by Functional Area Expert by the NABET accredited consultant. The detailed study is given in the Chapter No.3
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	Vayappadi R.F – 32 km - NorthEast
7	ln the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad. NIRM/Bangalore, Division of Gmtechnical Engineering-llT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy	It is a fresh lease application but, the applied area has been considered quarrying operation earlier. The quarry lease was previously granted in favour of Thiru. P.Senniyappan (Same applicant), over an extent of 0.68.5 Hectares of Patta lands in S.F.Nos. 302/1A and 303/2A1 of Poomalur Village, Palladam Taluk, Tiruppur District vide District Collector's Proceedings Rc.No.440/Mines/2016, Dated: 28.03.2018 for the period of five years from 28.03.2018 to 27.03.2023 for quarrying of Rough Stone and Gravel. The applicant has obtained Environmental Clearance from the District Level Environment Impact Assessment Authority, Tamil

	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.	Nadu vide letter No. DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018
8	However, in case of the fresh/virgin quarries, 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.	For the first five years plan period the mining operation is proposed to carry out upto the depth of 42m bgl. It is ensured that the slope stability will be carried out after 30m bgl. The Blasting will be carried out by controlled blasting adopting muffle blasting and line drilling. The cost for the controlled blasting is allotted in the EMP, Chapter No.10 Table No. 10.10 Page No.133
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.	Proponent given Affidavit stating that the blasting operation will be caried out by the competent person as per the MMR 1961.
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	Noted and agreed
11	The EIA Coordinates shall obtain and furnish the details of quarry /quarries operated by the PP in the past, either in the same location or elsewhere in the state with video and Photographic evidences.	Noted and agreed. There are three quarries including this proposal in the cluster belongs to the Proponent Thiru.K.V.Velusamy and Thiru.B.S. and Mohanraj and Tmt.G.Vijayalakshmi
12	lf 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	Letter No DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	Existing Proposal Lease
14	Quantify of minerals mined out A. Highest production achieved in any one year B. Detail of approved depth of mining. C. Actual depth of the mining achieved earlier. D. Name of the person already mined in that leases area. E. lf 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.	Peak Production per year 13,900 m^3 Proposed Depth of Mining 42m Bgl Existing: Pit I -105m (L) x 74m (W) x 28m(D) Bgl Letter No DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018
15	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 2, Figure No.2.2, , Page No.11. Geomorphology of the area is given in Chapter No 2, Figure No.2.9, Page No.21 Land use pattern of the project area is tabulated in the Chapter No.2. Table no 2.3, Pg.No.18

		Land use pattern of the Study area is tabulated in the Chapter No.2, Table no 2.3, Pg.No.17.
16	The PP shall carry out Drone video survey covering the cluster, Green belt, fencing etc.,	Drone video survey covering the Cluster, Greenbelt and fencing will be submitted during appraisal.
17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	The area has been fenced and the photographs are given in the Chapter No.2, Figure No.2.1 Page No.11 No trees within the proposed excavation area, no transplantation is required. Water bodies near to the project site is given in the Chapter No.2 Table No.2.13 Page No.26
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.	The Total Mineable Reserves of Rough stone is 1,08,990 m^3 Production for the five-year plan period is 1,08,990m^3 of Rough stone Peak production capacity is 21,910 m^3 of Rough stone Details of Reserves and methodology of mining is given in the Chapter No.2
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 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. Detailed under Chapter 6.
20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and 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.	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 of open wells and borewells within 1km radius along with water level is given in the 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.	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 to assess the cumulative impact of the proposed project on the environment is prepared. The details of Baseline study 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 air pollution, water pollution. & Health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	The Cumulative impact study due to mining operations is explained in Chapter No.7,

23	Rain water harvesting management with recharging details along with water balance (both) monsoon & non-monsoon) be submitted.	The rain water will be collected in the mine pit at the lower point later it will be utilized for the haul road maintenance, Greenbelt development etc.,
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 Cother ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use Land cover study within the radius of 10km is detailed in the Chapter No. 3 Page No.30 to 33.
25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use. R&R issues, if any. should be provided.	Not applicable, There is no wastages anticipated, the entire quarried out Rough stone material will be utilized.
26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required. clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	The area is not declared as Critically polluted area, No court case pending against the project. Proponent obtained Precise area communication letter, Approval for the Mining plan. The Details are enclosed as Annexure.
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.	The rain water collected in the pits after spell of rain will be used for greenbelt development and dust suppression.
28	Impact on local transport infrastructure due to the Project should be indicated.	There is no group of Houses, Schools in the proposed transportation route. Proposed Transportation route with mitigation measures is given in the 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.	The Flora study in the core zone has been carried out and the details are given in the Chapter No.3
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	The mine closure plan is detailed in the Chapter No.4 Page No.49 The budget for the mine closure is included in the Environmental Management plan in Chapter No.10 ,Table:10.10
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.	The Flora and Fauna study around the vicinity of the site is carried out by the Functional area experts along with Local School Students.
32	The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO. State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall	The plantation in the project site will be carried out using native and mixed plantation. The recommended species for the plantation is given in the Chapter No.4 Table No.4.10

	trees alternating with shrubs should be planted in a mixed manner.	
33	Taller/one year old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.	Noted and Agreed. The plantation in the project site will be carried out using native and mixed plantation. The recommended species for the plantation is given in the Chapter No.4 Table No.4.10
34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan is detailed in the Chapter No.7
35	A Risk Assessment and management Plan shall be prepared and included in the ELA/EMP Report.	A Risk Assessment and management Plan detailed in the Chapter No.7
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts of the project with mitigation measures are detailed in the Chapter No.7 Details of Periodical Medical Examination given in the Chapter No.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.	The details of the population in the impact zone (within 500m radius) is detailed in the Chapter No.3, Page No.76
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.	Socio Economic study covering 10 km radius is detailed in the Chapter No.3
39	Details of litigation pending against the project, if any, with direction. /Order passed by any Court of Law against the Project should be given.	No court case and litigation pending against the project.
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc	It is explained in Chapter -3- socio economic study
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.	Not applicable, the project is Existing proposal.
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.	The EMP has been prepared for the entire life of the mine. Proponent given affidavit stating the EMP will be submitted during the appraisal after completion of Public hearing.
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of	Noted & agreed.

	the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	

ADDITIONAL CONDITIONS-Annexure-B		
Cluster Management committee		
1.	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Cluster management committee has been formed with mutual agreement with the proponents including Existing and Proposed quarry at present are framed.
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling. tree plantation, blasting etc..	As per the committee agreement proponents will coordinates for the Greenbelt development, Water sprinkling and tree plantation activities combinedly.
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	The formation of committee with list of members has been submitted to the AD mines office, Karur and the same will be update in every year
4	Detailed operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	As per the committee agreement the blasting frequency will be discussed and carryout by the Mines Manager appointed by the proponents and the same will be updated in the committee minutes. Transport details in chapter-2
5	The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan	Details discussed in chapter 7 of Draft EIA report
6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	Details discussed in chapter 6 of Draft EIA report
7	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	Noted & agreed
8	The committee shall furnish the Emergency Management within the cluster.	Details discussed in chapter 7.
9	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.	Details discussed in chapter 10.
10	The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.	Noted & agreed
11	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	Detailed discussed in chapter 7.
Impact study of mining		
12	Detailed study shall be caried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise arca communication order issued from reputed research institutions on the following	Details of Soil health is given in Chapter No 3 and biodiversity is given in Chapter No 3. The project will not cause any significant changes in the climate

	a) Soil health & bio-diversity b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature' & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health' e) Agriculture, Forestry & Traditional practices. 1) Hydrothermal/Geothermal effect due to destruction in the Environment' g) Bio-geochemical processes and its foot prints including environmental stress' h) Sediment geochemistry in the surface steams.	Climatic changes and GHG are described in Chapter No 4. Details of water contamination and impact on aquatic ecosystem is given in Chapter No 4. Hydrothermal/ Geothermal effects due to destruction in the environment, Bio geochemical process and sediment geo chemistry given in the Chapter No 7.
Agriculture & Agro-Biodiversity		
13	Impact on surrounding agricultural fields around the proposed mining Area.	Detailed discussed in chapter 4.
14	Impact on soil flora & vegetation around the project site.	Detailed discussed in chapter 4.
15	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	The area is Existing proposed Lease & Few trees present with in lease.
16	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora. fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Details in Chapter 3
17	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted & agreed
18	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands. Horticulture, Agriculture and livestock .	The project area is bounded by Existing quarries on the East and west side. Proponent proposed to erect green mesh along with fencing on the South side besides, Budgetary allocation given in the Chapter No. 10.
Forest		
19	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	Vayappadi R.F – 32 km – Northeast there is no impact.
20	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	Ecology and Biodiversity environment deals in Chapter-3
21	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	Ecology and Biodiversity environment deals in Chapter-3
22	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
23	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks. canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect Groundwater. Necessary data and documentation	Hydro-geological study considering the contour map of the water table detailing Chapter-3

	in this regard may be provided, covering the entire mine lease period.	
24	Erosion Control measures.	Noted & agreed
25	Detailed study shalt be carried out in regard to impact of mining around the proposed mine lease area on the nearby villages, water-bodies/ Rivers. & any ecological fragile areas.	Details in Chapter 2
26	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	Details in Chapter 2 and 4 impact of bio diversity
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural Environment by the activities.	Noted & agreed
28	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	Noted & agreed. Detailed under Chapter 3.
29	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil, physical, chemical components and microbial components.	Details in Chapter 3 Soil environment.
30	The Environmental impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Odai 250m- SW Canal 430m- NW Odai 800m- SW Impact assessment details in chapter-4
Energy		
31	The measures taken to control Noise. Air, Water. Dust Control and steps adopted to efficiently utilize the Energy shall be furnished.	Details in Chapter 3 environmental monitoring details.
Climate Change		
32	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mtigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	Details of carbon emission and mitigation activities are given int the Chapter No.4
33	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Details in Chapter-3 for metorological and climate/weather data representation of graphs.
Mine Closure Plan		
34	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Details in Chapter 2 mine closure plan
EMP		
35	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Detailed under Chapter 10
36	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	Project Cost = Rs. 30,50,000/- CER Cost = Rs 5,00,000/ Disaster Management plan & mine closure plan is discussed in chapter no.4 & 7
Risk Assessment		
37	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Detailed under Chapter 7

Disaster Management Plan		
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Details in Study 7.3 Disaster Management Plan in Chapter -7
Others		
39	The project proponent shall furnish VAO Certificate with reference to 300m radius regard to approved habitations. schools. Archaeological sites. Structures. railway lines, roads. Water bodies such as streams, odai, vaari, canal, channel. river, lake pond, tank etc.,	Noted & agreed. Detailed under Chapter 4
40	As per the MoEF& CC office memorandum tr.No.22-65/2017-lA.lll dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	Noted and agreed
41	The project proponent shall study 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.	Details of carbon emission and mitigation activities are given int the Chapter No.4
STANDARD TERMS OF REFERENCE		
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came in to force, w.r.t. the highest production achieved prior to 1994.	**Not applicable.** This is not a violation category project. This proposal falls under B1 Category
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The applied land for quarrying is a Patta Land. Document is enclosed along with Approved Mining Plan as Annexure Volume 1.
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All documents will be furnished after Public hearing and enclosed Final EIA/EMP report.
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Map showing – Project area is with adjacent quarries details is enclosed in Figure No1.1 Project area boundary coordinates superimposed on Toposheet – Figure No. 1.1A Toposheet of the project area covering 10km radius – Figure No. 1.2 Geology map of the project area covering 10km radius - Figure No. 2.11
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	**Map showing –** Geology map of the project area covering 10km radius - Figure No. 2.11 Geomorphological features are incorporated in the Toposheet map covering 10km radius around the project area Figure No. 2.12
6	Details about the land proposed for mining activities should be given with information as to	The applied area was inspected by the officers of Department of Geology along with revenue officials

	whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	and found that the land is fit for quarrying under the policy of State Government.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent has framed their Environmental Policy and the same is discussed in the Chapter No 10.1.
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90^0 bench angles. Quarrying activities will be carried out under the supervision of Competent Persons like Mines Manager, Mines Foreman and Mining Mate. Necessary permissions will be obtained from DGMS after obtaining Environmental Clearance.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	The study area considered for this study is 10 km radius and all data contained in the EIA report such as waste generation etc., is for the Life of the Mine / lease period.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	There is no waste anticipated during this quarry operation. The entire quarried out rough stone will be transported to the needy customers. No Dumps is proposed outside the lease area.
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Vayappadi R.F – 32 km – NorthEast The proposed project area is a Patta land. Approved Mining Plan is enclosed as Annexure Volume 1.
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project	**Not Applicable.**

	including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	The proposed project area does not involve any Forest Land.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	**Not Applicable.** The project doesn't attract Recognition of Forest Rights Act, 2006.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Vayappadi R.F – 32 km - NorthEast
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	**Not Applicable.** Vayappadi R.F – 32 km - NorthEast.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 KM of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	**Not Applicable.** Around 48 km – NW (Sathyamangalam Tiger Reserve Sanctuary)
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3. There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	**Not Applicable.** Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	**Not Applicable.** The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While	**Not Applicable.**

	preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
22	One season (non-monsoon) [i.e., March-May (Summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for Post monsoon Season (Oct 2023-Dec2023) as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.
23	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD Model. Details in Chapter No. 4,
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Water for dust suppression, greenbelt development and domestic use will be obtained from accumulated rainwater/seepage water in mine pits. Drinking water will be sourced from the approved water vendors, No 2, Table No 2.13.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Drinking water will be sourced from the approved water vendors, No 2, Table No 2.13.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	The rain water collected in the pits after spell of rain will be used for greenbelt development and dust suppression.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Quality discussed in Chapter No. 4.

28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The ground water table is at 78-73m below ground level. The ultimate depth of this projects is 42m from the general ground profile. Maximum depth is proposed in this EIA project is 42m.
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Odai 250m- SW Canal 430m- NW Odai 800m- SW
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	Highest elevation of the project area is 382m AMSL Ultimate depth of the mine is 42m AMSL Water level in the area is 78m to 73m BGL
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Progressive greenbelt development plan has been prepared and discussed along with Recommended Species details are given in the Chapter 4, Table No.4.9
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	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.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	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.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Details in Chapter 10.
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with	Occupational Health impacts of the project with mitigation measures are detailed in the Chapter No.7 Details of Periodical Medical Examination given in the Chapter No.10

	required facilities proposed in the mining area may be detailed.	
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	The details of the population in the impact zone (within 500m radius) are detailed in the Chapter No.3 and Chapter-4
37	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Socio Economic study covering 10 km radius is detailed in the Chapter No.3
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Detailed in chapter-10
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The outcome of public hearing will be updated in the final EIA/EMP report
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The proposed capital cost for Environmental Monitoring Programme is Rs 3,80,000/- and the recurring cost is Rs 76,000/- per annum. Details in Chapter 6
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Details in Chapter 7.
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Details in Chapter.8.
44	**Besides the above, the below mentioned general points are also to be followed: -**	
A	Executive Summary of the EIA/EMP Report	Encloses as separate volume
B	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
C	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are given properly.
D	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC / NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Baseline monitoring reports are enclosed with mining plan
E	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
F	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Will be enclosed along with Final EIA /EMP Report.
G	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF & CC vide O.M. No. J-11013/41/2006-IA. II(I) Dated: 4th August,	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) Dated: 4th August, 2009 are followed.

	2009, which are available on the website of this Ministry, should be followed.	
H	Changes, if any made in the basic scope and project parameters (as submitted in Form-1 and the PFR for securing the TOR) should be brought to the attention of MoEF & CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	Noted & agreed.
I	As per the circular no. J-11011/618/2010-IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable.
J	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Surface Plan – Figure No. 2.2. Geological Plan – Figure No 2.9. Working Plan – Figure No 2.9. Closure Plan – Figure No.2.10.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.INTRODUCTION

1.0 PREAMBLE

Project History: -

The project proponent Thiru. P. Senniyappan applied for Rough stone and Gravel quarry over an extent of 1.19.5Ha in S.F.No. 302/1A, 303/2A1, 303/2A2B(Part) & 302/1B of Poomalur Village, Palladam Taluk, Tiruppur District.

- Proponent applied for Rough stone and Gravel quarry lease on 14.12.2020 and 23.07.2021
- Precise area communication letter was issued by the District Collector vide Rc.No.1604/Mines/2020, Dated: 01.03.2023.
- The Mining plan has been prepared by the Qualified person and got approval vide Letter Rc.No. 1604/Mines/2020 Dated: 15.03.2023.
- The Mining plan has been approved for the quantity of 62,430m^3 of Rough stone, 3,344m^3 of Gravel upto the depth of 42m 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 3 Exiting quarries forming Cluster Category {Total Extent of the Cluster is 6.06.9Ha}- 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/434911/2023 dated 28.06.2023.and the ToR Was Granted vide **Lr No. SEIAA-TN/F.No.10177/SEAC/1(a)ToR-1528/2023 Dated:09.08.2023**

Based on the ToR Baseline Monitoring study has been carried out for one season i.e., **October - December 2023** and this EIA and EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) to minimize those adverse impacts.

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

1.1 PURPOSE OF THE REPORT

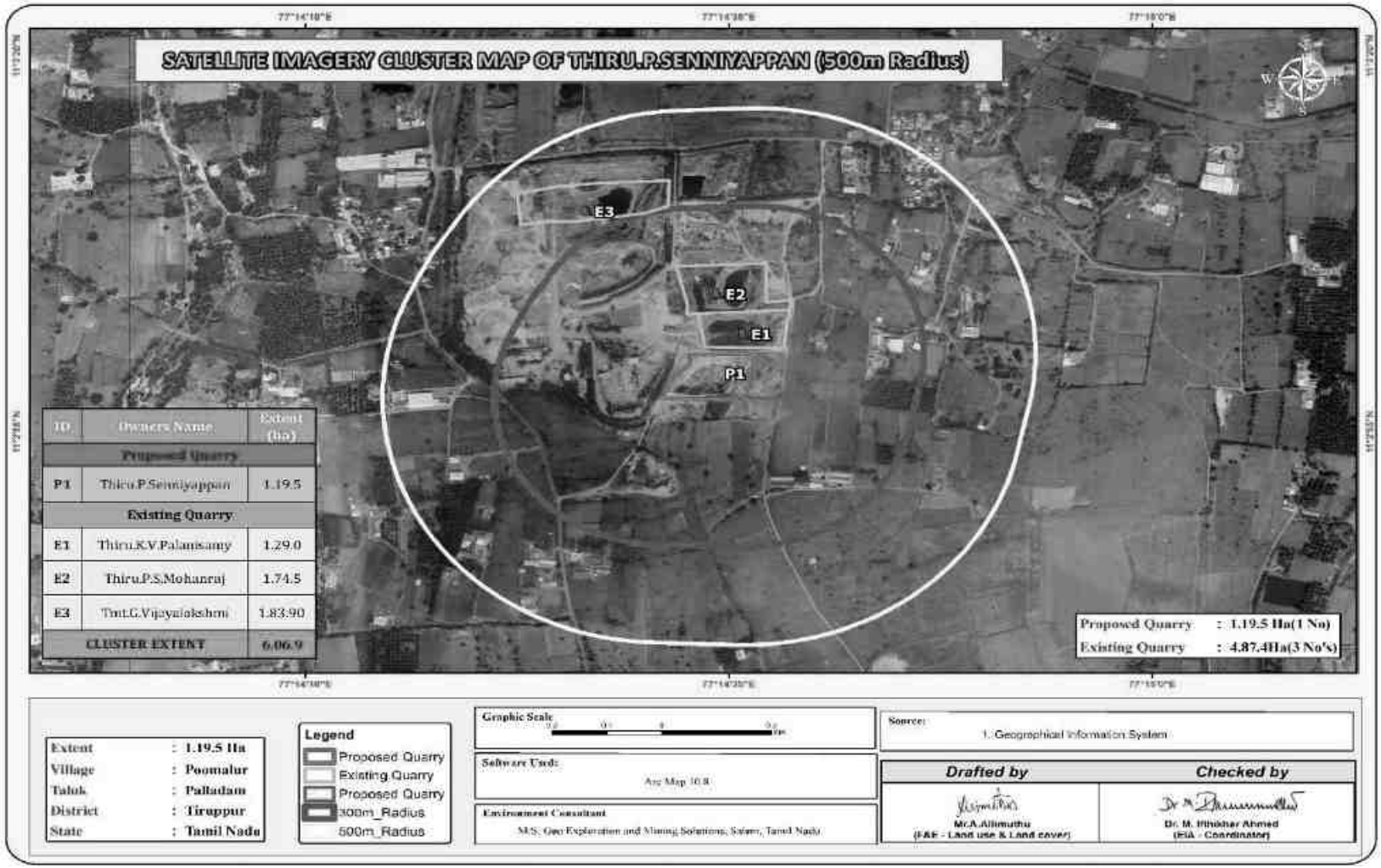
The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 1889 of 20thApril 2022, Mining Projects are classified under two categories i.e. A (> 250 Ha) and B (≤ 250 Ha), and 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 PROPONENTS

1.2.1 Identification of Project Proponent

TABLE 1.1: DETAILS OF PROJECT PROPONENT

Name of the Project Proponent	Thiru. P. Senniyappan
Address	S/o. Palanisamy Gounder No. 2/154, Poomalur Village, Palladam Taluk, Tiruppur District, TamilNadu State – 641 663
Mobile	+91 9788864531 and +91 98652 22453
Email	Prakashjp.jp39@gmail.com
Status	Individual

1.2.2 Identification of Project

TABLE 1.4: SALIENT FEATURES OF THE PROPOSED PROJECT

Name of the Project	Thiru. P. Senniyappan Rough stone and Gravel quarry	
S.F. No.	302/1A, 303/2A1, 303/2A2B(Part) & 302/1B	
Extent	1.19.5 ha	
Village Taluk and District	Poomalur Village, Palladam Taluk, Tiruppur District.	
Land Type	Proponent own patta land	
Land Ownership	It is a Patta land, registered name of the applicant (Thiru.P.Senniyappan) Vide patta No 1084,652 & 3240	
Existing quarry operation	It is a fresh lease application but, the applied area has been considered quarrying operation earlier. The quarry lease was previously granted in favour of Thiru. P.Senniyappan (Same applicant), over an extent of 0.68.5 Hectares of Patta lands in S.F.Nos. 302/1A and 303/2A1 of Poomalur Village, Palladam Taluk, Tiruppur District vide District Collector's Proceedings Rc.No.440/Mines/2016, Dated: 28.03.2018 for the period of five years from 28.03.2018 to 27.03.2023 for quarrying of Rough Stone and Gravel. The applicant has obtained Environmental Clearance from the District Level Environment Impact Assessment Authority, Tamil Nadu vide letter No. DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018 (Refer Annexure No. VII). Now the applicant has applied a quarry lease on 23.07.2021 for the period of five years over an extent of 1.19.50 Ha.	
EC certificate	Letter No DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018	
Explosive certificate	S.S & CO EXPLOSIVES E/SC/TN22/648 (E88325)	
Toposheet No	58 - E/04	
Latitude between	**11°02'57.06"N to 11°03'00.21"N**	
Longitude between	**77°14'31.04"E to 77°14'36.63"E**	
Elevation of the area	382m AMSL	
Lease period	5 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	42m Bgl	
	Rough Stone in m^3	Gravel m^3
Geological Resources	2,48,656	6,032
Mineable Reserves	62,430	3,344
Year wise Production	62,430	3,344
Peak Production	13,900	3,344
Ultimate Pit Dimension	Pit I : 123m(L) x 78m(B) x 42m(D) Bgl	
Existing Pit Dimension	Pit I -105m (L) x 74m (W) x 28m(D) Bgl	
Water Level in the region	78-73 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives	

Topography	The lease applied area is a Plain terrain. The area has gentle sloping towards Northeastern side and altitude of the area is 382m (max) above from Mean Sea level. The area is covered by 2m thickness of Gravel, 3m thickness of weathered rock and followed by Massive Charnockite which is clearly inferred from the existing quarry pit.	
Machinery proposed	Jack Hammer	2 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 Nos
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	21 Nos	
Project Cost	Rs. 51,99,000 /-	
EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs. 30,50,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Odai	250m- SW
	Canal	430m- NW
	Odai	800m- SW
Greenbelt Development Plan	Proposed to plant 600Nos 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	410m – North East	
Nearest Reserve Forest	Vayappadi R.F – 32.0km – NE Sathiyamangalam Tiger Reserve – 48.6km - NW	
Nearest Wild Life Sanctuary	Vellode birds sanctuary – 49.0km - NE	

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 5.0m bench height and 5.0m bench width by deploying Jack Hammer Drilling & Slurry Explosive during blasting. Hydraulic Excavator and tippers are used for Loading and transportation. Rock Breakers are deployed to avoid secondary blasting.

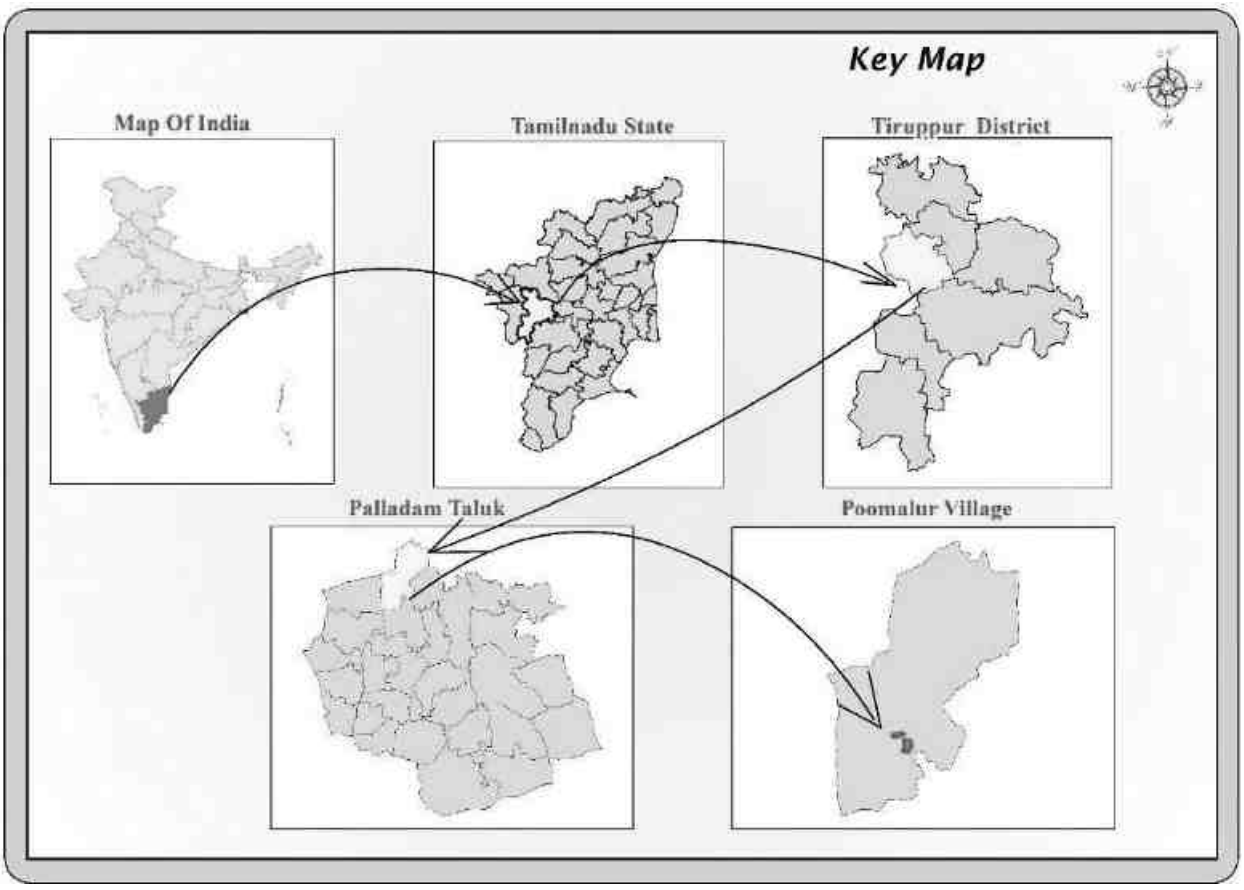
The peak production of Rough stone is 13,900$m^{3,}$ and 3,344m^3 of Gravel maximum in a year (46m^3 per day/ 6-7 -8Tippers per day considering 6m^3 per load). The depth of the mining is 42bgl.

1.3.2 Location of the Project

- The project site is located in Poomalur Village, Palladam Taluk, Tiruppur District.
- The lease applied area is located about 12km Southwest side of Tiruppur, 7km Northwest side of Palladam and 2km Northeast side of Poomalur Village.

	14km		10km		3km	
Tiruppur	→	Palladam	→	Poomalur	→	Lease applied area
	Southwest		Northwest		Southeast	

FIGURE 1.2 LOCATION MAP OF THE PROJECT SITE



Source: Survey of India Toposheet 58-E/04,E/08,58F/01, 58F/05

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

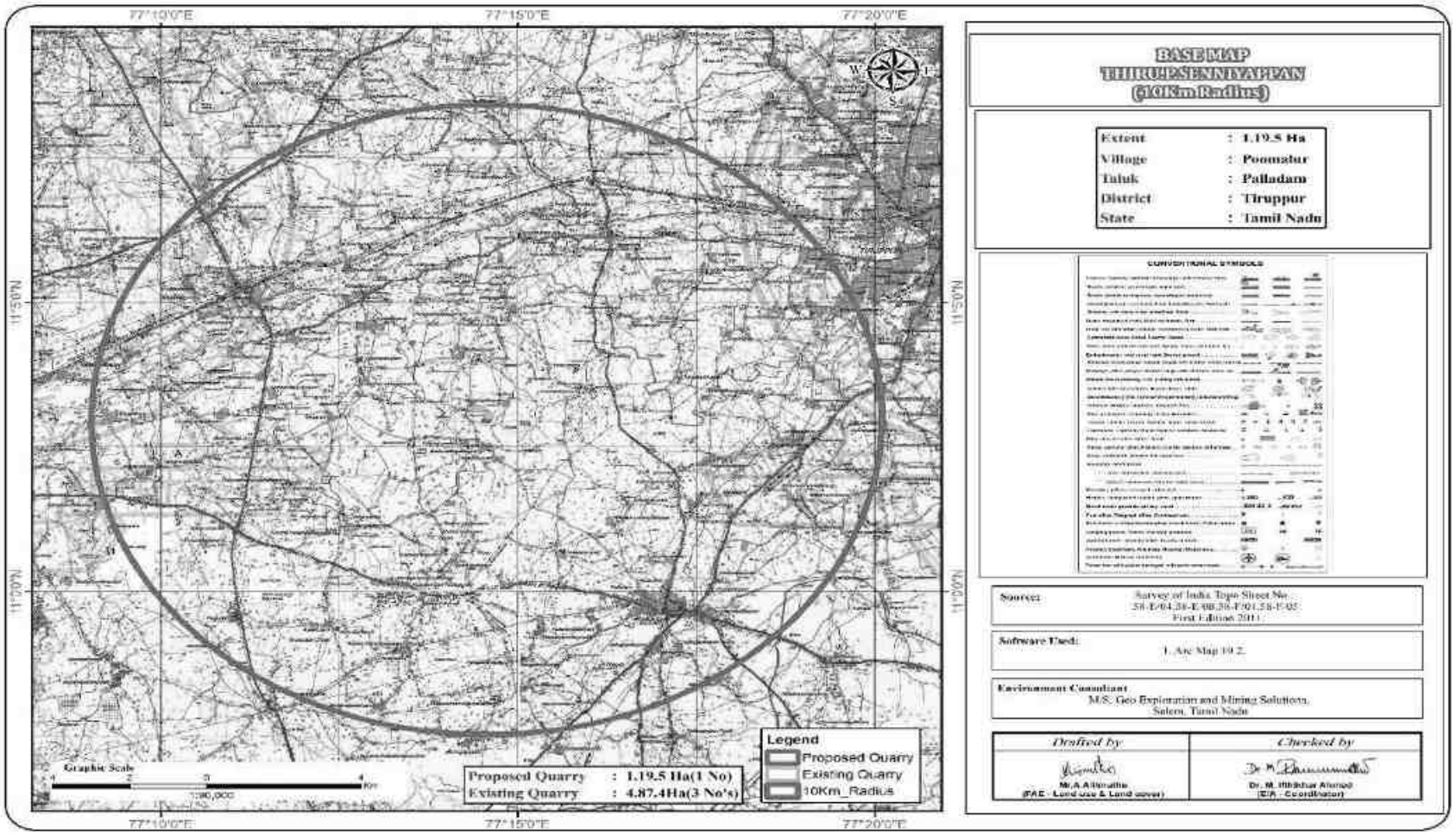
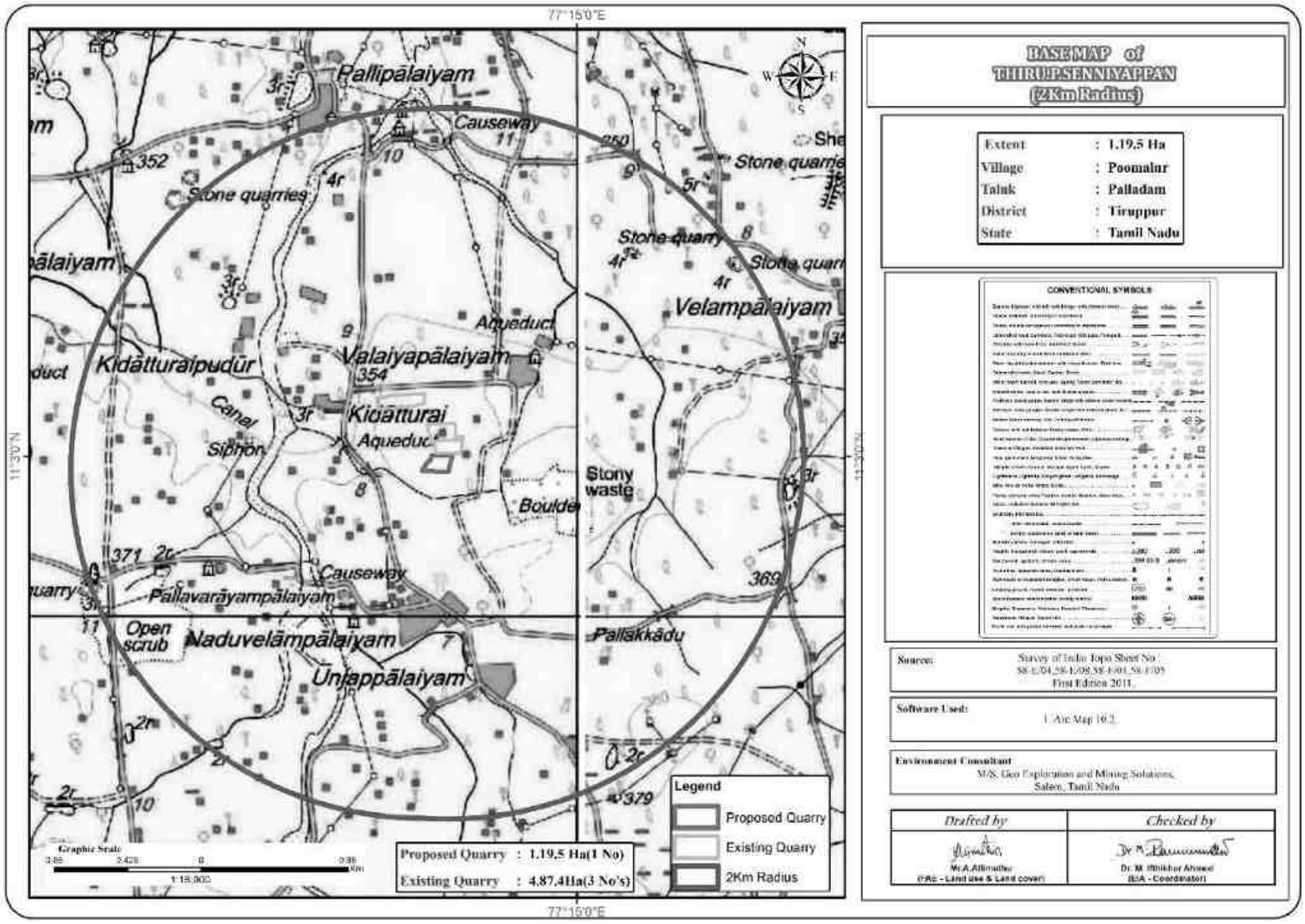


FIGURE 1.4: TOPOSHEET MAP OF THE STUDY AREA 2KM RADIUS



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 Rough stone and Gravel quarry lease on 14.12.2020 and 23.07.2021
- Precise area communication letter was issued by the District Collector vide Rc.No.1604/Mines/2020, Dated: 01.03.2023.
- The Mining plan has been prepared by the Qualified person and got approval vide Letter Rc.No. 1604/Mines/2020 Dated: 15.03.2023.
- 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/434911/2023 dated 28.06.2023.

SCOPING:

- The proposal was placed in 395th SEAC meeting held on 27.07.2023 and the committee recommended for issue of ToR.
- The proposal was considered in 646th SEIAA meeting held on 09.08.2023, issued ToR vide **Lr No.SEIAA-T.N/F.No.10177/SEAC/1(a)ToR-1528/2023 Dated:09.08.2023**

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 **Lr No.SEIAA-T.N/F.No.10177/SEAC/1(a)ToR-1528/2023 Dated:09.08.2023**. The Details of the ToR Compliance is given in the Page No. 5-20

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 summer season (October 2023 to December 2023) for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

TABLE 1.3: 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 all Proposed Quarries

- Application for Quarrying Lease as per Tamil Nadu Minor Mineral Concession Rules, 1959.
- Obtained Precise Area Communication Letter as per Tamil Nadu Minor Mineral Concession Rules, 1959 for Preparation of Mining Plan and obtaining Environmental Clearance.
- The Mining Plan has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959.
- ToR vide **Lr No.SEIAA-TN/F.No.10177/SEAC/1(a) ToR-1528/2023 Dated:09.08.2023**

****

2. PROJECT DESCRIPTION

2.0 GENERAL

The Proposed Rough Stone Quarry require Environmental Clearance. There are 3 proposed, and 5 existing quarries forming a cluster; calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 6.06.9 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 involving splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pithead to the needy crushers and rock breakers to avoid secondary blasting.

2.2 LOCATION OF THE PROJECT

The lease applied area is located about 12km Southwest side of Tiruppur, 7km Northwest side of Palladam and 2km Southwestern side of Poomalur Village.

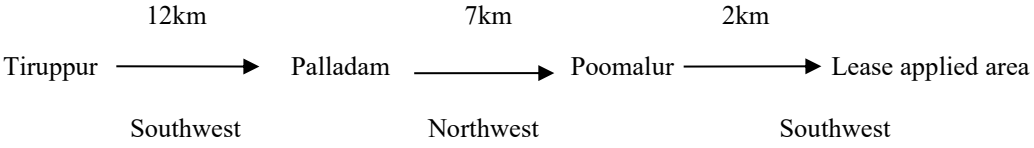


TABLE 2.1: SITE CONNECTIVITY

Nearest Roadway	NH (81) - Coimbatore – Karur - 5.0 km – South SH (166) - Puliampatii – Palladam Road- 620km –West
Nearest Village	Naduvelampalayam– 930m- SE
Nearest Town	Palladam - 7.0 km – SE
Nearest Railway Station	Tiruppur - 12.0 km – NE
Nearest Airport	Coimbatore– 22 km –SouthWest
Seaport	Kochi– 165km – SW

Source: Survey of India Toposheet

TABLE 2.2: CO-ORDINATES – PROJECT BOUNDARY

Corner Nos.	Latitude	Longitude
1	11° 02' 57.22"N	77° 14' 31.04"E
2	11° 02' 58.59"N	77° 14' 31.72"E
3	11° 02' 59.41"N	77° 14' 32.67"E
4	11° 03' 00.06"N	77° 14' 32.70"E

5	11° 03' 00.21"N	77° 14' 36.63"E
6	11° 02' 57.06"N	77° 14' 35.93"E
Datum: UTM-WGS84, Zone 43 North		

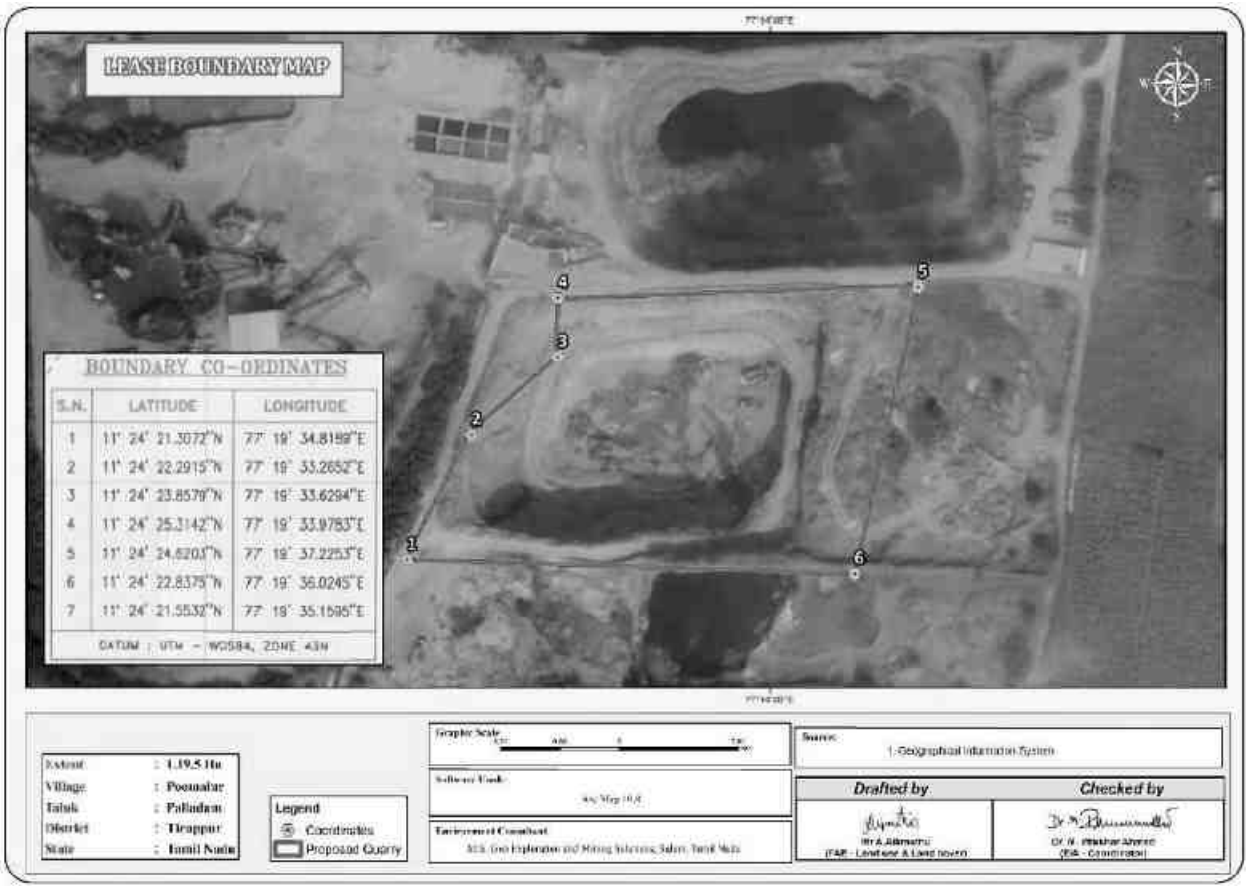
Source: Approved Mining Plan

FIGURE 2.1: TOPOGRAPHICAL VIEW OF PROJECT AREA

Project Site

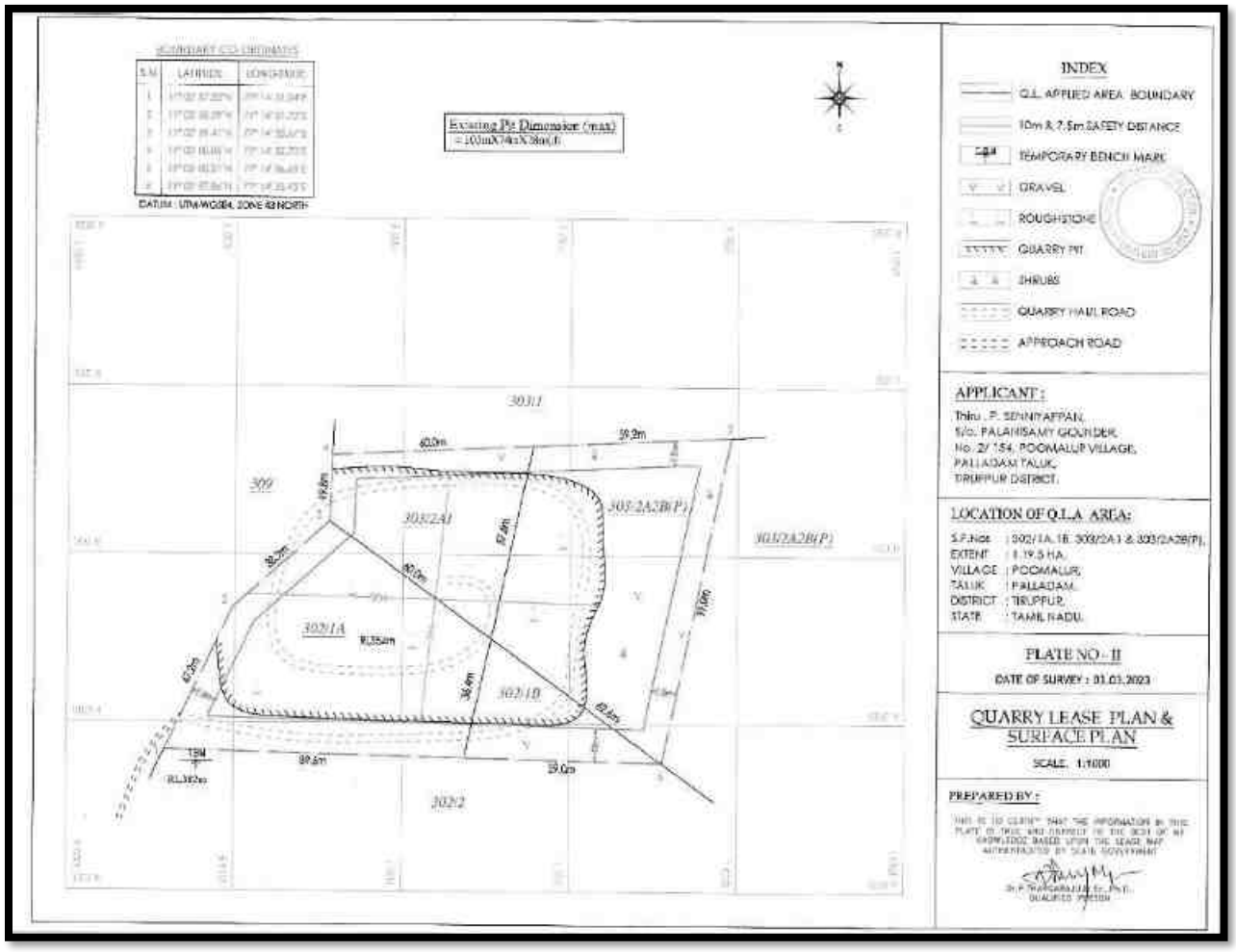
Fencing at Project site

FIGURE 2.2: GOOGLE IMAGE OF THE PROJECT AREA



Source: Google Earth Imagery

FIGURE 2.3: QUARRY LEASE PLAN / SURFACE PLAN



Source: Approved Mining Plan

FIGURE 2.4: VILLAGE MAP SUPERIMPOSED ON GOOGLE EARTH IMAGE

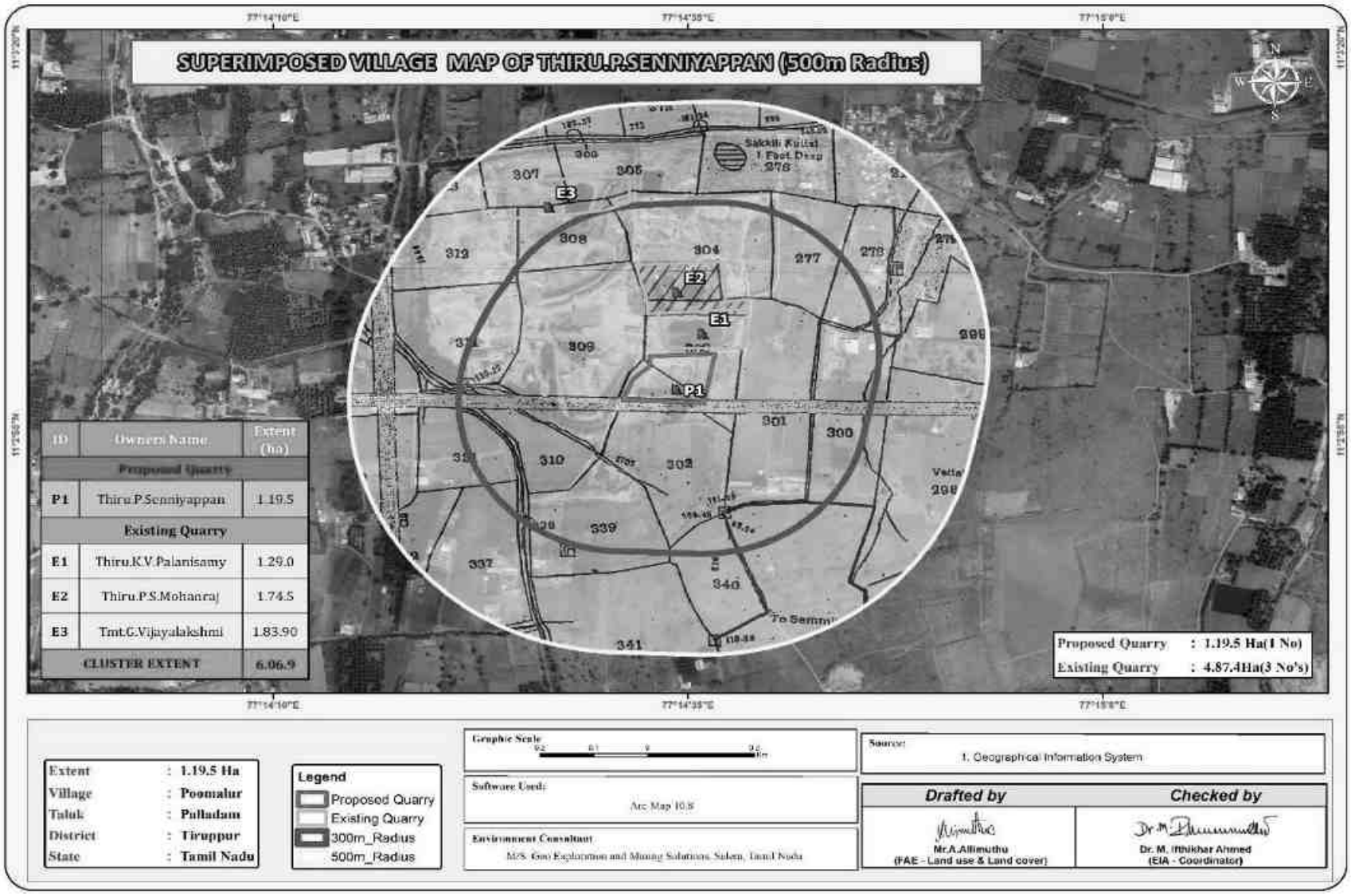


FIGURE 2.5: IMAGE SHOWING SURFACE FEATURES AROUND 10 KM RADIUS

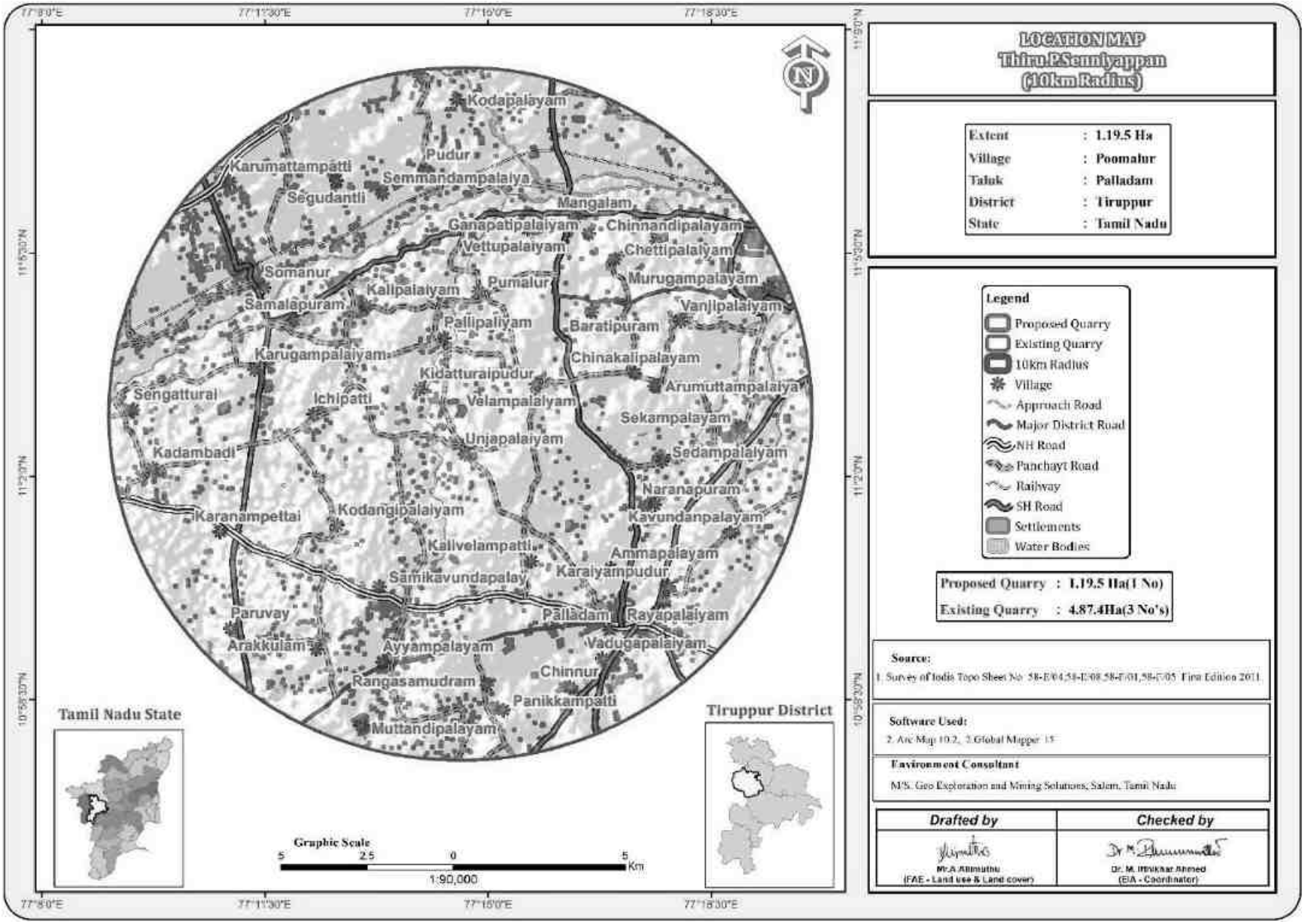
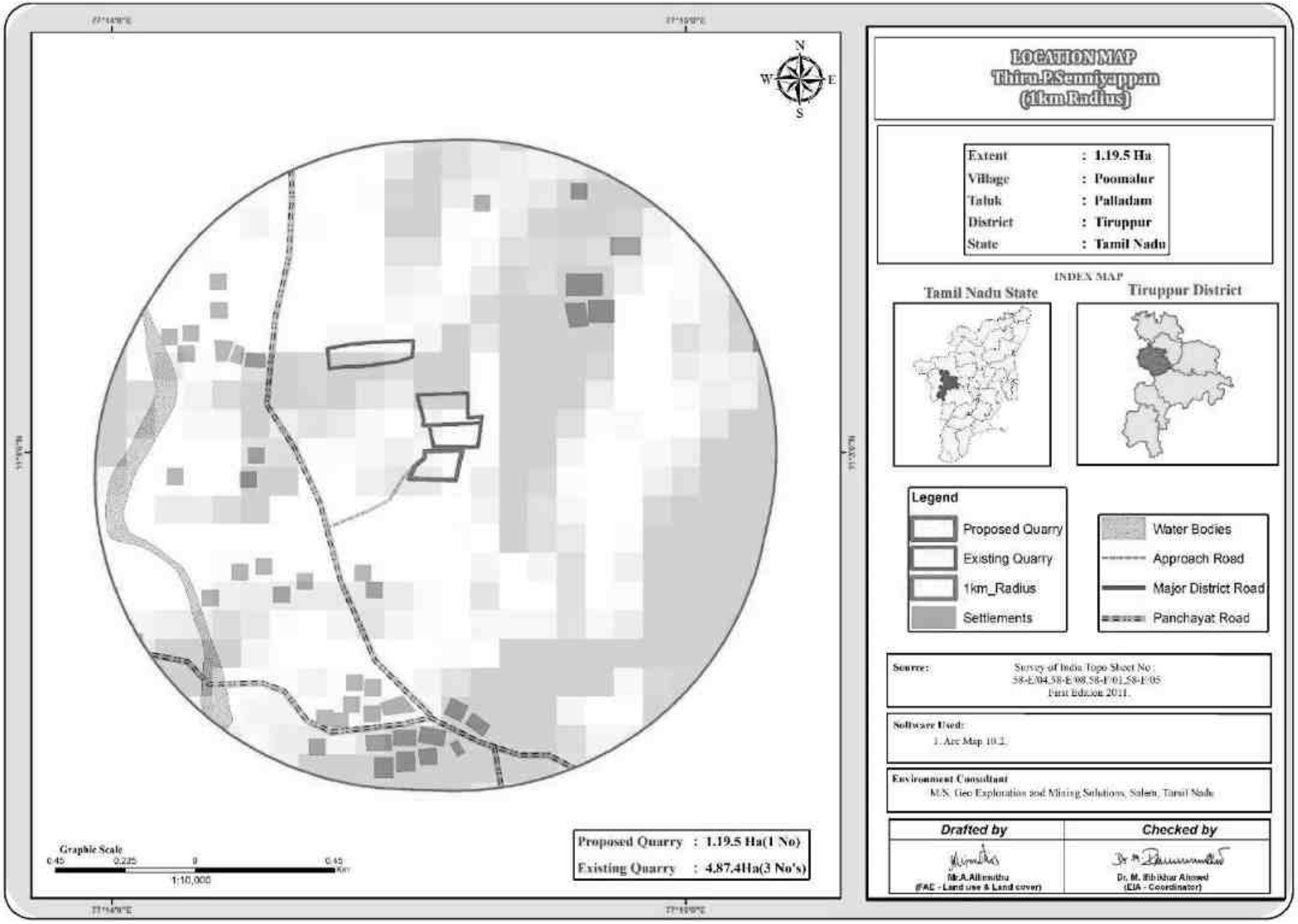


FIGURE 2.6: IMAGE SHOWING SURFACE FEATURES AROUND 1 KM RADIUS



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 projects and is devoid of major vegetation and trees.

TABLE 2.3: LAND USE PATTERN

Description	Present area (Ha)	Area at the end of this quarrying period (Ha)
Quarrying Pit	0.72.6	0.92.0
Infrastructure	Nil	0.01.0
Roads	0.02.0	0.02.0
Green Belt	Nil	0.10.0
Unutilized Area	0.44.9	0.14.5
Grand Total	**1.19.50**	**1.19.50**

Source: Approved Mining Plan

2.2.2 Size or Magnitude of Operation

TABLE 2.4: RESOURCES AND RESERVES

PARTICULARS	DETAILS	
	Rough Stone	Gravel in m^3 (1 year)
Geological Resources	2,48,656	6,032
Mineable Reserves	62,430	3,344
Production for five-year plan period	62,430	3,344
Peak Production	13,900	3,344
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	42	11
No of Lorry loads ($12m^3$ per load)	3	1
Total Depth of Mining	42m below ground level	

Source: Approved mining plan.

2.3 GEOLOGY

2.3.1 Regional Geology

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

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

Stratigraphy of the area

Age	Group	Lithology
Holocene		Block cotton soil/clay±gypsum
Cenozoic		Kankar/calc-tufa
Neoproterozoic	Acid intrusives	Quartz veins Pegmatite Pink Granite
	Sivamalai syenite Complex	Nepheline-syenite
	Chalk Hills (Basic Intrusives)	Pyroxenite/Dunite
Archaean – Palaeoproterozoic	Peninsular Gneissic Complex (II) PGC (II)	Pink Granite Gneiss Hornblende Biotite gneiss
Archaean	Charnockite Group	Charnockite (Unclassified) Pyroxene Granulite Banded Magnetite Quartzite

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

Hornblende-Biotite gneiss is well foliated, medium to coarse grained, pale grey and exposed as sheets and small knolls. Pink Granite gneiss occurs as thin bands and lensoidal bodies. It is a medium grained rock composed of alternating bands of mafic (mainly of biotite and hornblende) and felsic (Feldspar and Quartz) minerals. It is well recognized in Avinasi area.

Basic intrusives such as pyroxinite/dunite occurs as Outcrop and lensoidal bodies in the country rock and mostly concordant to the regional foliation. Many basic intrusive are reported in south and south-east of Tiruppur town. The trend of these bodies is east-west.

Nepheline syenite is a leucocratic, coarse-grained rock and composed mainly of Feldspar with Nepheline and shows pitted appearance due to removal of Nepleline. This alkaline rock is available in and around Sivanmalai area only. Acid intrusives comprising pink granite, pegmatite and quartz veins are traversed country rocks in micro (cm wide-meter long) to meso-scale (few meters wide and several meter long) extend. Granite is exposed around 9 km SW of Avanashi. Small scale pegmatite and quartz veins are noticed almost in all the rock types. Acid intrusives are overlain by sediments of Quaternary age, represented by Kankar and black cotton soil with Gypsum. Most of the area is covered by brown and red brown soil. Some part of the area covered with black cotton soil contains Gypsum as lumps. Black cotton soil covers south-western part of the district.

Source: District Survey Report for Minor Minerals Tiruppur District – May 2019
https://cdn.s3waas.gov.in/s3d1f255a373a3cef72e03aa9d980c7eca/uploads/2019/05/2019052585.pdf

2.3.2 Local Geology: -

The lease applied area is a Plain terrain. The area has gentle sloping towards Northeastern side and altitude of the area is 378m (max) above from Mean Sea level. The area is covered by 2m thickness of Gravel, 3m thickness of weathered rock and followed by Massive Charnockite which is clearly inferred from the existing quarry pit.

Peninsular gneiss forms the oldest rock formations, in which the massive formation of Charnockite lies over with rich accumulation of recent quaternary formation. On regional scale of the Charnockite body is N40°E – S40°W with dipping towards SE60º.

The general geological sequences of the rocks in this area are given below:

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

2.3.3 Hydrogeology

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

Quaternary - Laterites, Sands and Clays

Tertiary - Sandstone, Gravels and Clays

Cretaceous - Limestone, Calcareous Sandstone and Clay unconformity.

Archaean - Charnockites, Gneisses, Granites, Dolerites and Pegmatite

- The major part of the area is covered by metamorphic crystalline rocks of charnockite, granitic gneiss of Archaean age intruded by dolerite dykes and pegmatite veins. These rocks are highly metamorphosed and have been subjected to very severe folding, crushing and faulting.
- Ground Water occurs under the phreatic condition and wherever there are deep seated fractures, it occurs under semi-confined to confined conditions.
- Occurrence of Ground Water in hard rock depends upon the intensity and depth of weathering, fractures and fissures present in the rocks.
- 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 250m^3 /day and in bore well between 260 and 430 m^3 /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 Tiruppur District. The alluvium consists of unconsolidated sands, gravelly sands, clays and clayey sands. The thickness of the sands ranges between 15 and 25 m 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 Tiruppur District.

In Sedimentary formations, the presence of primary inter granular porosity enhances the transmitting capacity of groundwater where the yield will be appreciable. The sedimentary area which occupies the eastern part of the district along the coastal tract is more favourable for groundwater recharge. Ground Water occurs both in semi

confined and confined conditions. A brief description of occurrence of groundwater in each formation is furnished below.

Alluvial Formations

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

Tertiary Cuddalore sandstone

Tertiary formations are represented by Cuddalore Sandstone and characterised as fluvial to brakish 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 15 m to 40 m below ground level. The inter granular Porosity is essentially dependent on the intensity and degree of weathering and fracture development in the bed rock. As discussed earlier deep weathering has developed in Gneissic formations and moderate weathering in charnockite formations. The range of aquifer parameters in hard rock and sedimentary formations are given below:

TABLE 2.5: RANGE OF AQUIFER PARAMETERS

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

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

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

FIGURE 2.7: GROUND WATER LEVEL VARIATIONS OF TIRUPPUR DISTRICT

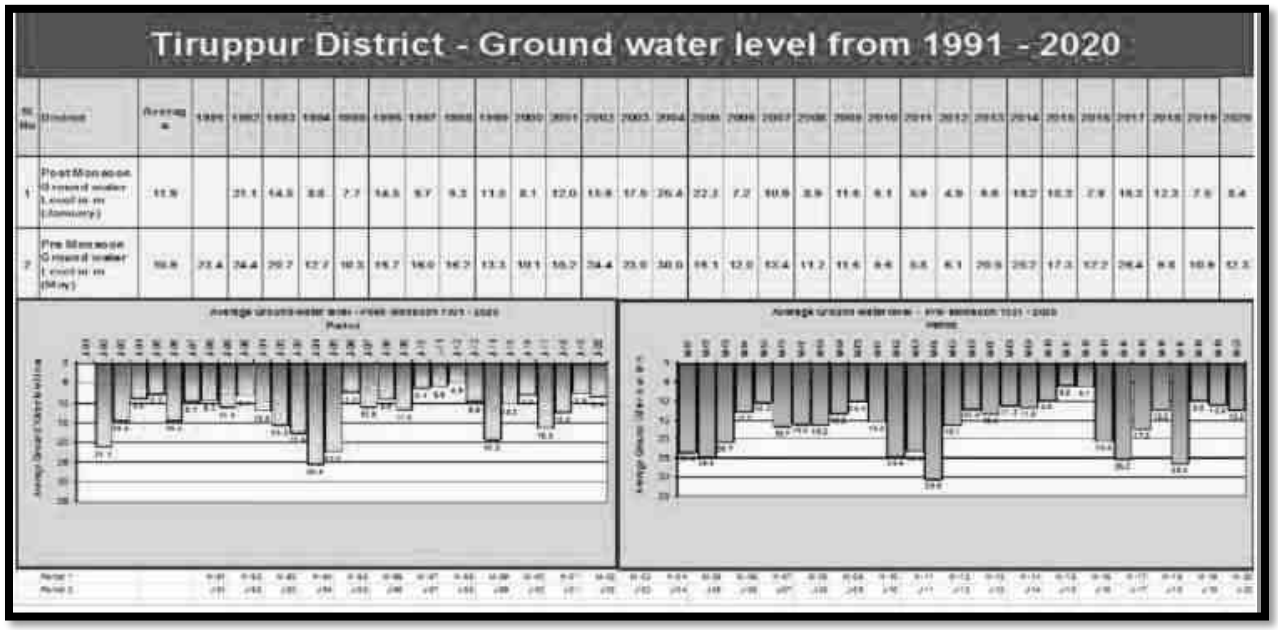


TABLE 2.6: GROUND WATER LEVEL VARIATIONS OF TIRUPPUR DISTRICT

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

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

FIGURE 2.8: REGIONAL GEOLOGY MAP

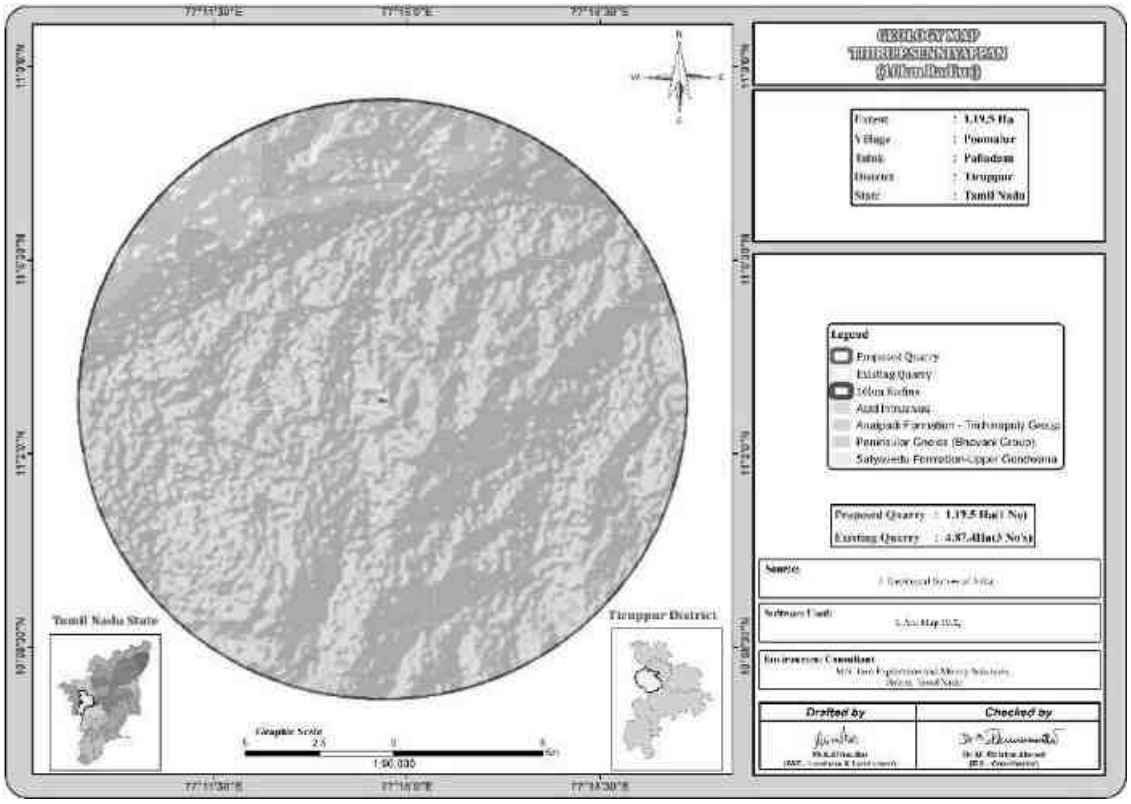
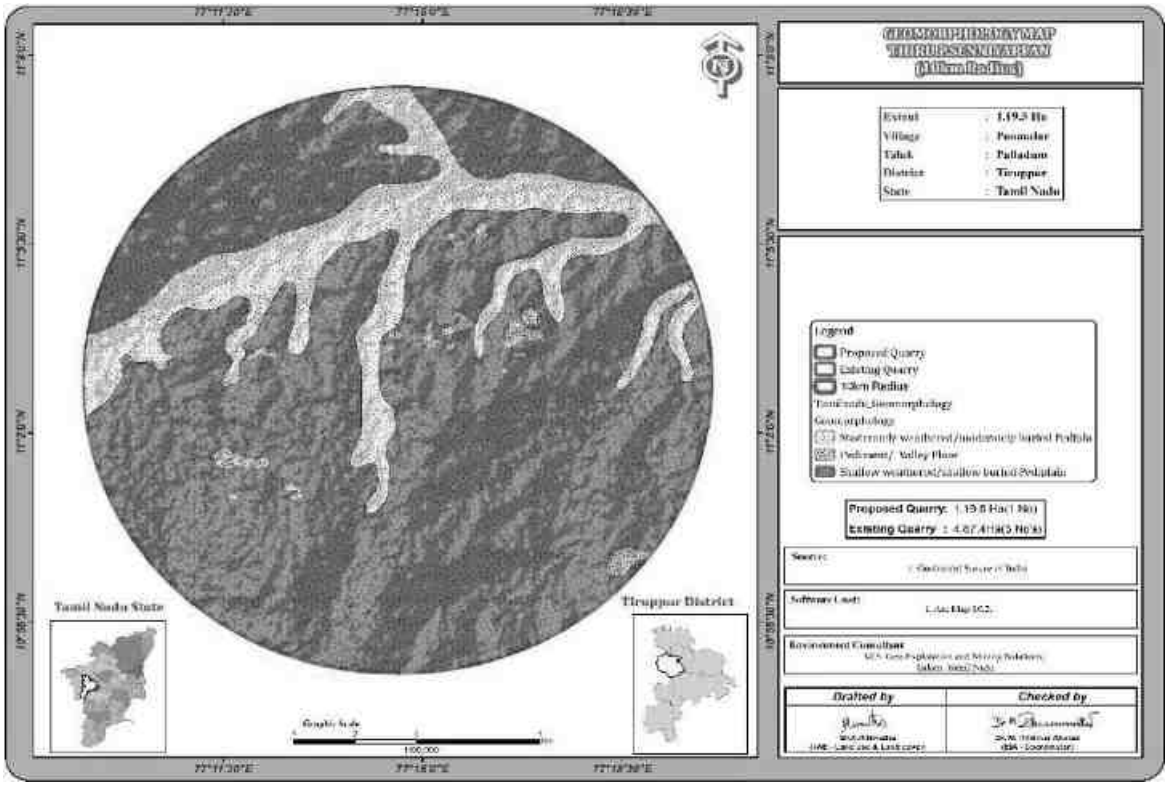


FIGURE 2.9: GEOMORPHOLOGY MAP



2.4 RESOURCES AND RESERVES

The Resources and Reserves of Rough Stone and Gravel were calculated based on Cross-Section Method by plotting sections to cover the maximum lease area. Based on the availability of Geological Resources the Mineable Reserves are calculated by considering excavation system of bench formation and leaving essential safety distance of 7.5 m (Safety Barrier all around the applied area) and safety distance as per precise area communication letter and deducting the locked up reserves during bench formation (Also called as Bench Loss) and the Mineable Reserves is calculated considering there is no waste / overburden / side burden (100% Recovery Anticipated).

TABLE 2.5: RESOURCES AND RESERVES

Description	Rough Stone m^3	Gravel m^3
Geological Resource in m^3	2,48,656	6,032
Mineable Resource in m^3	62,430	3,344
Year wise production for five-year plan period	62,430	3,344

Source: Approved Mining Plan

TABLE 2.6: YEAR-WISE PRODUCTION PLAN

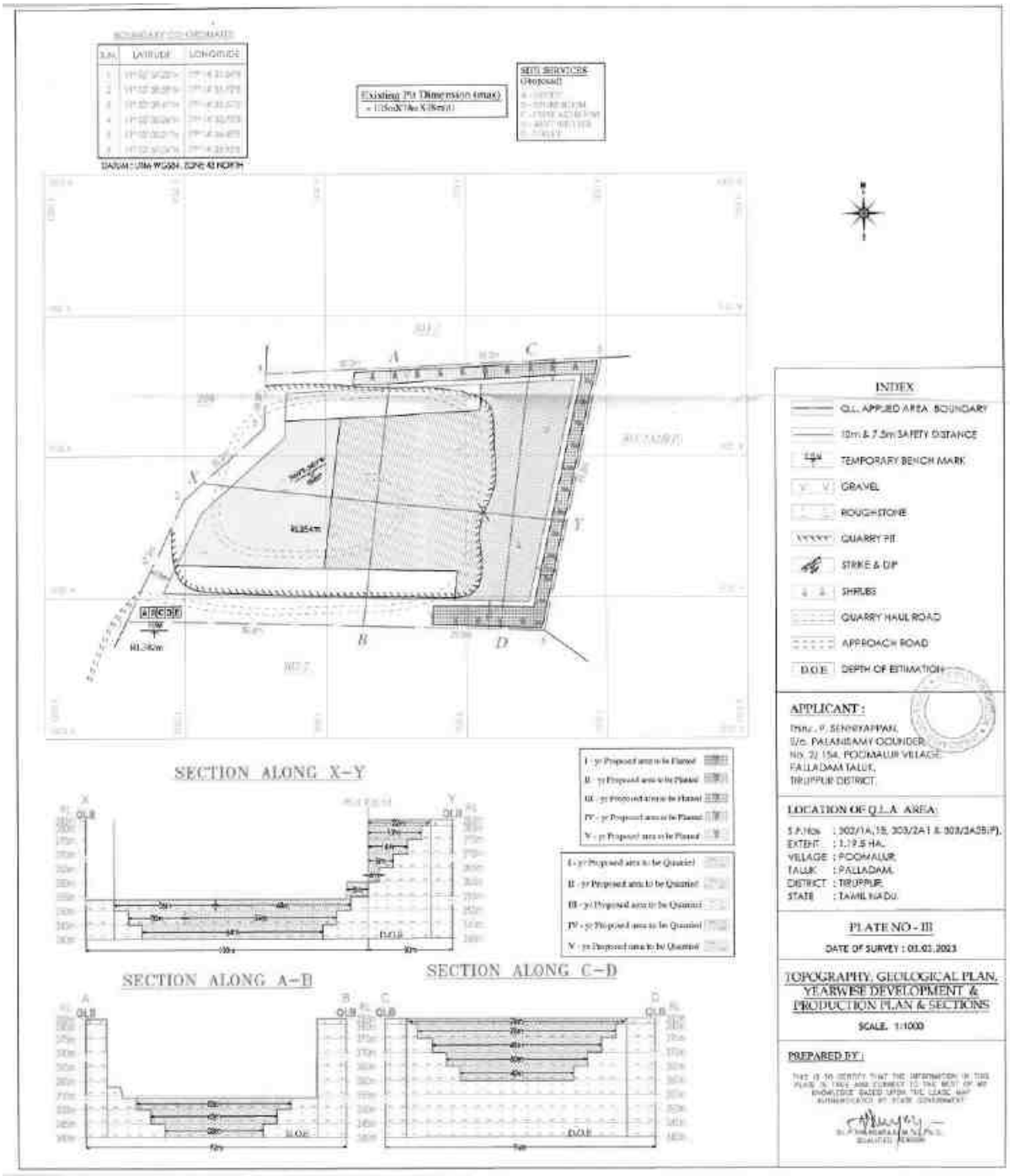
Year	Rough Stone (m^3)	Gravel (m^3)
I	13,900	3,344
II	12,760	-
III	12,420	-
IV	12,150	-
V	11,200	-
Total	**62,430**	**3,344**

Source: Approved Mining Plan

Disposal of Waste

The overburden in the form of Gravel is about 3,344m3 up to depth 2m. The quarried-out Gravel will be directly loaded into tippers for the filling and levelling of low-lying areas.

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



Source: Approved Mining Plan

Conceptual Mining Plan/ Final Mine Closure Plan

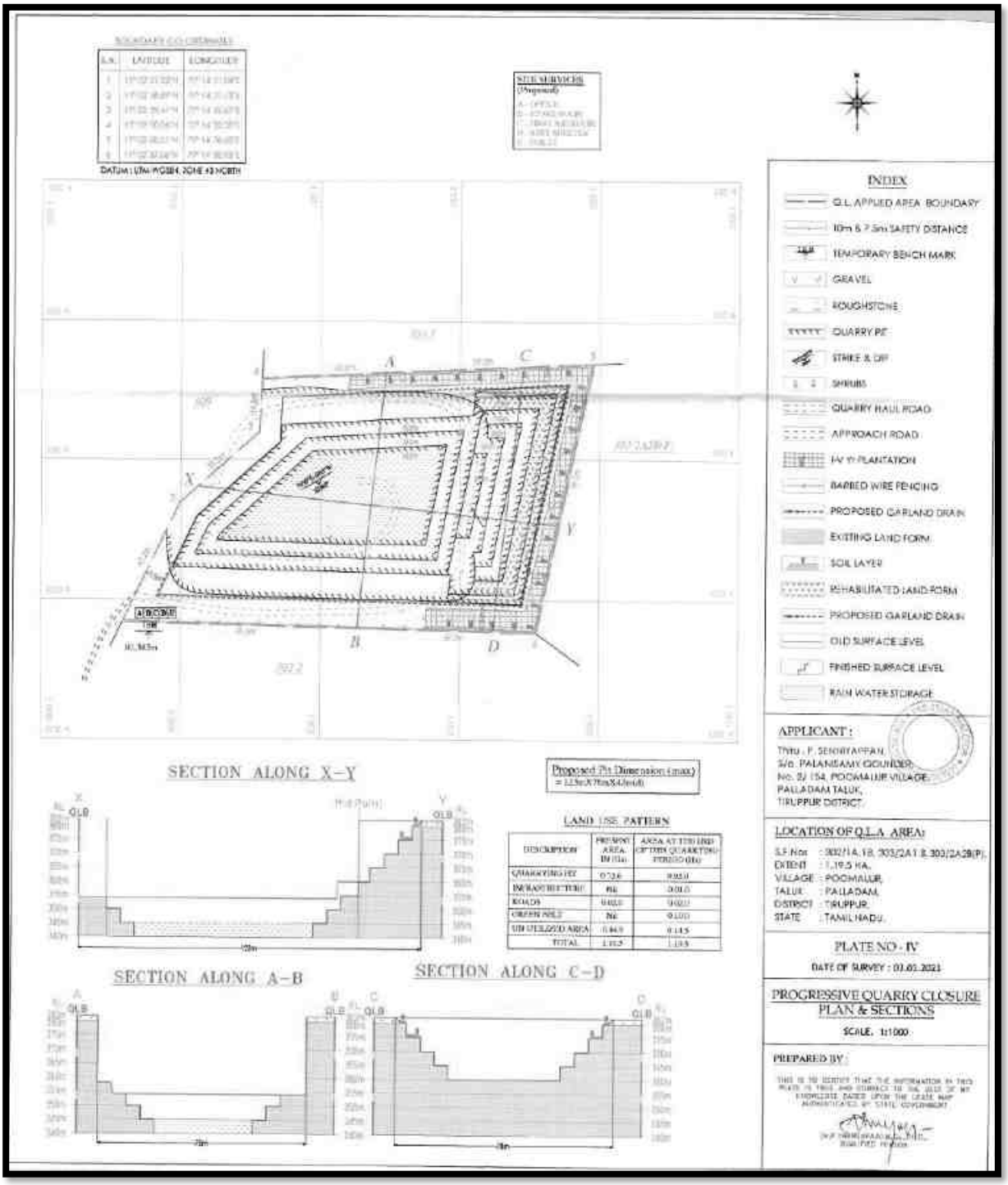
The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc.

TABLE 2.7: ULTIMATE PIT DIMENSION

Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	123	78	42m bgl

Source: Approved Mining Plan

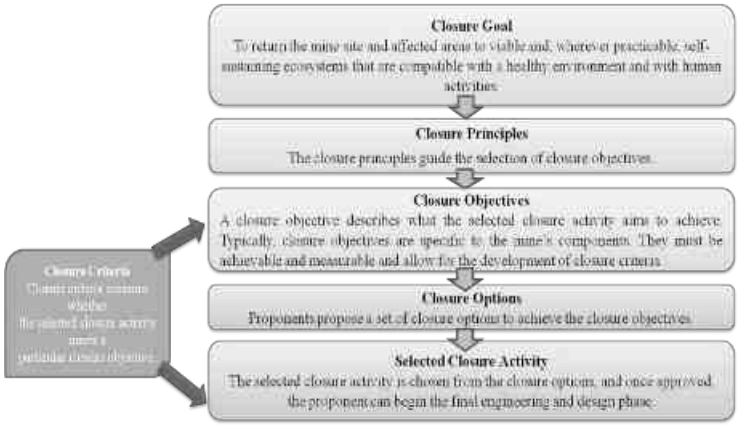
FIGURE 2.11: CLOSURE PLAN AND SECTIONS



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

Opencast Mechanized Mining Method is proposed by formation of 5.0-meter height bench with a bench width not less than the bench height. Bench slope will be maintained as 60^0.

The Rough Stone is a batholith formation and the splitting of rock mass of considerable volume from the parent rock mass will be carried out by deploying jackhammer drilling and Slurry Explosives will be used for blasting. Hydraulic Excavator attached with rock breaker/ bucket with tipper combination will be involved for the excavation/breaking of Rough stone after blasting. Hydraulic excavators attached with bucket unit will be deployed for loading the Rough Stone into the tippers and then the stone is transported from pithead to the nearby crushers.

It is recommended to obtain necessary statutory permission from the Department of Geology and Mining for Using Heavy Earth Moving Machineries, Blasting and appointment of Mines Manager etc.,

2.5.1 Drilling & Blasting Parameters

Drilling will be carried out using Jack hammer and compressor, the depth of the hole will be maximum 1.5m Drilling & Blasting will be carried out as per parameters given below: -

Spacing	–	1.2m
Burden	–	1.0 m
Depth of hole	–	1.5 m
Charge per hole	–	0.50 – 0.75kg
Powder factor	–	6.0 tonnes/kg
Diameter of hole	–	32 mm
Peak production Capacity	=	$46m^3$ of Rough stone per day
Spacing X Burden X Depth	=	1.2m X 1.0m X 1.5m = $1.8m^3$
	=	$1.8m^3$ X 2.6 (Bulk Density) = 4.6Ts per hole

hence for the peak production per day of $46m^3$ (120Ts) = 36 Nos of holes to be drilled per day

Explosives per hole = ½ kg hence 18 kg of Explosives will be utilized maximum considering the peak production

Type of Explosives to be used –

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

Storage of Explosives –

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

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

2.5.2 Extent of Mechanization

TABLE 2.8 PROPOSED MACHINERY DEPLOYMENT

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	2	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket and Rock Breaker	2	300 HP	Diesel Drive
4	Tippers	2	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 Rough Stone is proposed to be transported mainly through

Traffic density measurements were performed at two locations

1. Pallipalayam Road to Palladam Road – Major District Road
2. Samalapuram to Pallipalayam Road -Major District 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.2.9: TRAFFIC SURVEY LOCATIONS

Station Code	Road Name	Distance and Direction	Type of Road
TS1	Pallipalayam Road to Palladam Road	3 km-NW	Major District Road
TS2	Samalapuram to Pallipalayam Road	2 km-SE	Major District Road

Source: On-site monitoring by GEMS FAE & TM

TABLE 2.10: EXISTING TRAFFIC VOLUME

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	200	600	150	150	200	100	850
TS2	250	750	150	150	250	125	1025

Source: On-site monitoring by GEMS FAE & TM

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

TABLE 2.11: ROUGH STONE & GRAVEL HOURLY TRANSPORTATION REQUIREMENT

Transportation of Rough Stone & Gravel per day		
Capacity of trucks	No. of Trips per day	Volume in PCU
20 tonnes	4	12

FIGURE.2.12: MINERAL TRANSPORTATION ROUTE MAP

Proposed Transportation Route:

1. The Rough stone will be transported to the Crusher which is located 70m West side of the project site.
2. Existing approach road is located on the south side this road connecting in the Pallipalayam road (Total Stretch of the approach road = 284m)
3. Pallipalayam – Palladam road connecting in the Major District Road (882) at a distance of 3km the total Stretch of the Transportation route is about 250m-W from the project site
4. No Major Habitation, Schools in the proposed transportation route.

TABLE 2.12: 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 – 1960guidelines

Pallipalayam Road to Palladam Road-Major District Road	850	12	862	1500
Samalapuram to Pallipalayam Road- Major District Road	1025	12	1037	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 2.13: WATER REQUIREMENT FOR THE PROJECT

Purpose	Quantity	Source
Dust Suppression	0.5KLD	From the existing pit or from the water vendors
Green Belt	0.3KLD	From the existing pit or from the water vendors
Sanitation & Drinking	0.2KLD	From the existing pit or from the water vendors.
Total	**1.0 KLD**	

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

One Excavator will excavate 25m^3 of Broken up Rough stone per hour and 60m^3 of Gravel per hour.

Peak production of Rough stone = 46m^3

Peak production of Gravel = 11m^3

Peak production for the overburden (Gravel) = 11

Type of machinery	Working hours	Average Diesel consumption/ Hour	Quantity of Diesel in Ltrs
Working hours of Excavator (Aprx)	46m^3/20m^3=2hrs (Rough stone)	18 Ltrs	36
	11/60m^3 = 1-2 Hrs	18 Ltrs	18
Compressor	Working hours per day 2 Hrs	8 Ltrs	16

Tippers, Motor pumps to drain water	Occasionally		20
Total Diesel Consumption			**90**

The Maximum diesel consumption is around 90 Ltrs per day considering the peak production.

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 30.50 Lakhs.

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 2.14: PROPOSED MANPOWER DEPLOYMENT

Designation	No of persons
Mines Manager/Mines Foreman	1
Mate/Blaster	1
Jack hammer operator	6
Excavator Operator	2
Tippers driver	2
Helper	4
Cleaner & Co-operator	4
Security	1
Total	**21**

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 2.15: EXPECTED TIME SCHEDULE

Sl.No.	Particulars	Time Schedule (In Month)					Remarks if any
		1st	2nd	3rd	4th	5th	
1	Environmental Clearance						
2	Consent to Operate						
3	Execution of Lease deed						
4	Permission from DGMS						
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 Oct 2023 to Dec 2023 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 Global Lab and Consultancy Services, – 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 Post monsoon season i.e., Oct 2023 to Dec 2023.

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, PM_{10} and SO_2, NO_X with gaseous attachments & Fine Dust Samplers (FDS) for $PM_{2.5}$ and other parameters as per NAAQ norms and analysed for primary air pollutants to work out the existing status of air quality.
- The Noise level measurements were also made at various locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.
- Baseline biological studies were carried out to assess the ecology of the study area to study the existing flora and fauna pattern of the area.

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

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

TABLE 3.1: MONITORING ATTRIBUTES AND FREQUENCY OF MONITORING

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land-use Land cover	Land-use Pattern within 10 km radius of the study area	Data's from census handbook 2011 and from the satellite imagery	Study Area	Satellite Imagery Primary Survey
*Soil	Physio-Chemical Characteristics	Once during the study period	6 (1 core & 5 buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	6 (2 surface water & 4 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Automatic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
*Ambient Air Quality	PM10 PM2.5 SO2 NOX Fugitive Dust	24 hourly twice a week (December 2020 – February 2021)	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 Global Lab and Consultancy Services, in association with GEMS

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

3.1 LAND ENVIRONMENT

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

3.1.1 Land Use/ Land Cover

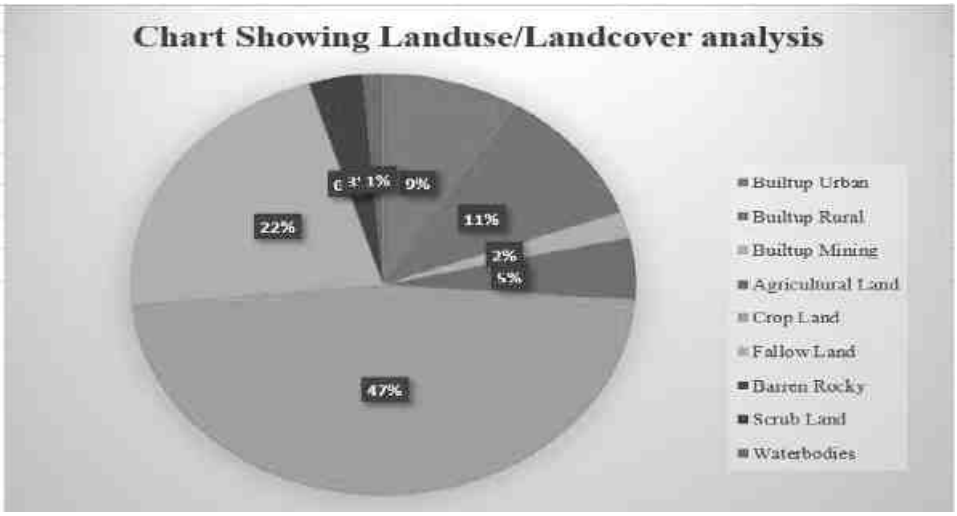
A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through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

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

S.No	CLASSIFICATION	AREA_HA	AREA_%
BUILTUP			
1	Builtup Urban	2825.81	8.86
2	Builtup Rural	3369.75	10.56
3	Builtup Mining	629.44	1.97
AGRICULTURAL LAND			
4	Agricultural Land	1519.11	4.76
5	Crop Land	15100.00	47.33
6	Fallow Land	6939.32	21.75
BARREN/WASTE LANDS			
7	Barren Rocky	34.82	0.11
8	Scrub Land	1073.54	3.36
WETLANDS/ WATER BODIES			
9	Waterbodies	412.22	1.29
TOTAL		31904.02	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) 73.84% followed by Built-up Lands – 19.42%, Scrub land – 3.36%, and Water bodies 1.29%.

The total mining area within the study area is 629.44 ha i.e., 1.97%. The cluster area of 6.06.9ha contributes about 0.96% 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 project area is almost plain terrain having gentle slope towards South side, the North and North western side of the area is existing Rough stone quarry. The Western side of the area is side casted up to the maximum 0.5m to utilize temporary storage of Crushed materials.

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

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

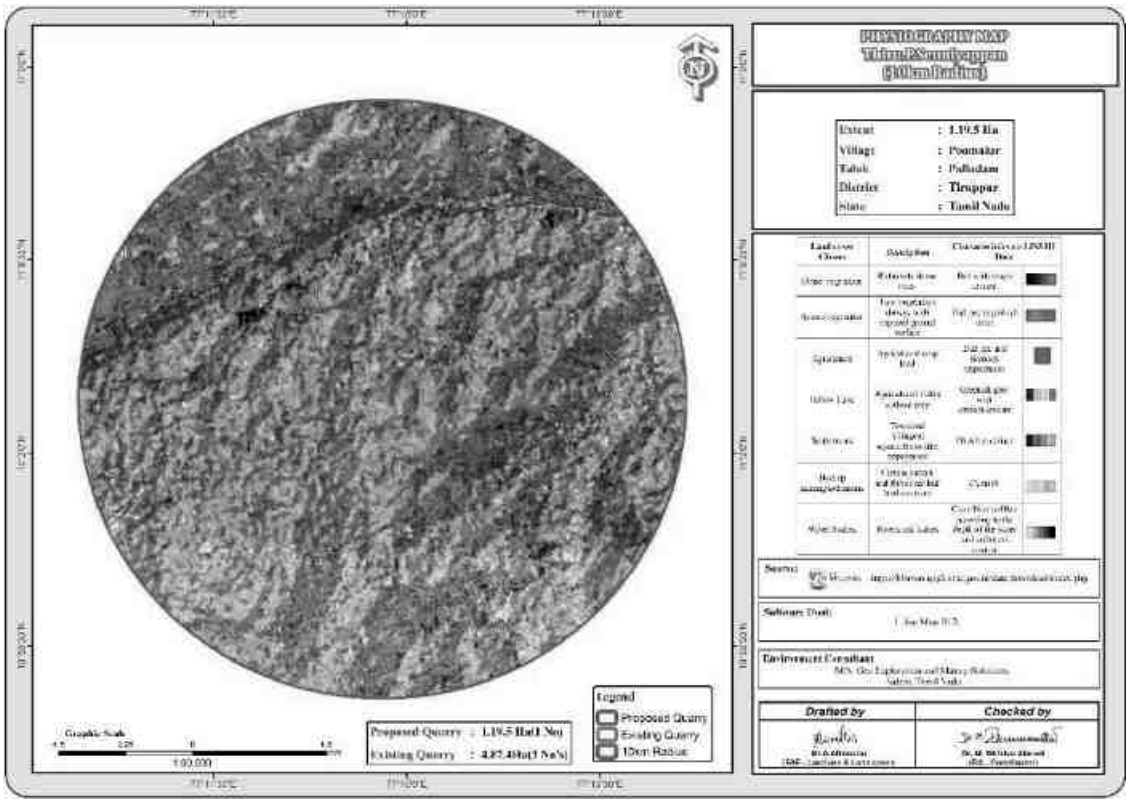


FIGURE 3.3: LAND USE LAND COVER MAP 10KM RADIUS

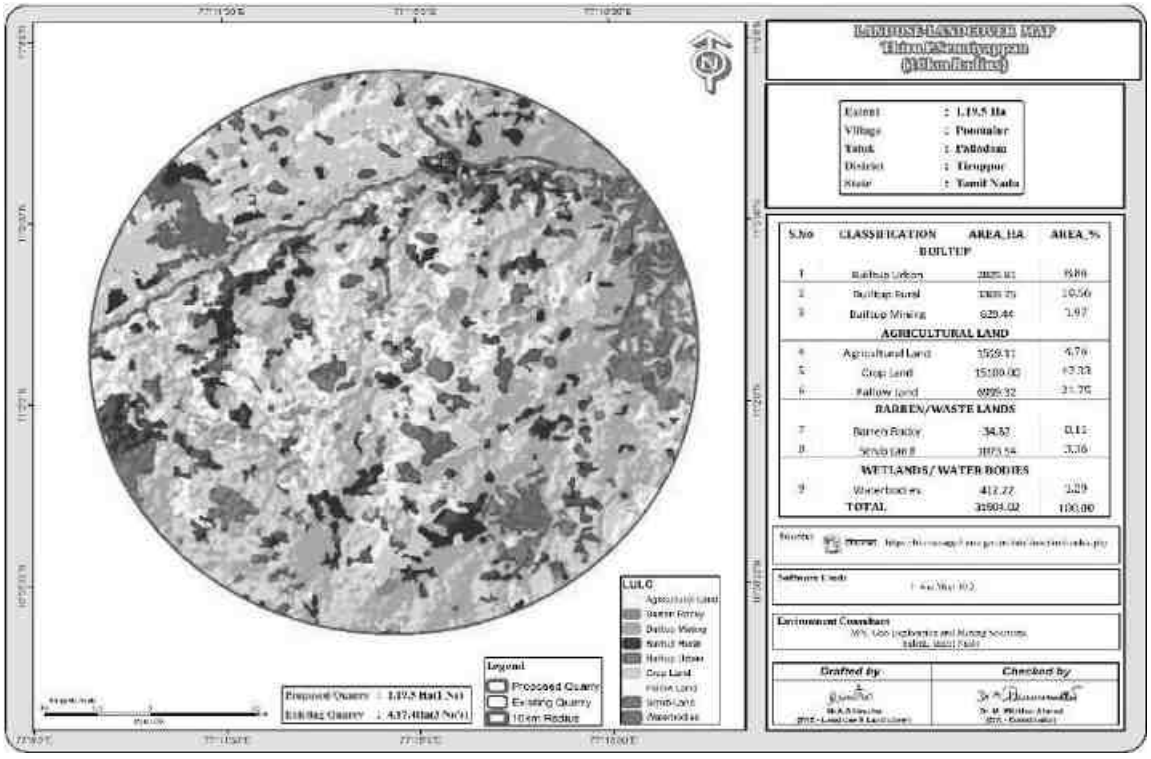


TABLE 3.3: DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE CLUSTER

Sl.No	Sensitive Ecological Features	Name	Arial Distance in km from Cluster
1	National Park / Wild life Sanctuaries	Vellode Bird Sanctuary	49km-NE
2	Reserve Forest	Vayappadi R.F –	32 km - NorthEast
3	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	Sathyamangalam Tiger Reserve Sanctuary	48km-NW
4	Critically Polluted Areas	Coimbatore - SIDCO Industrial Estate	Around 30 km- SouthWest
5	Mangroves	None	Nil within 10km Radius
6	Mountains/Hills	None	Nil within 10km Radius
7	Notified Archaeological Sites	None	Nil within 10km Radius
8	Industries/ Thermal Power Plants	None	Nil within 10km Radius
9	Defence Installation	None	Nil within 10km Radius

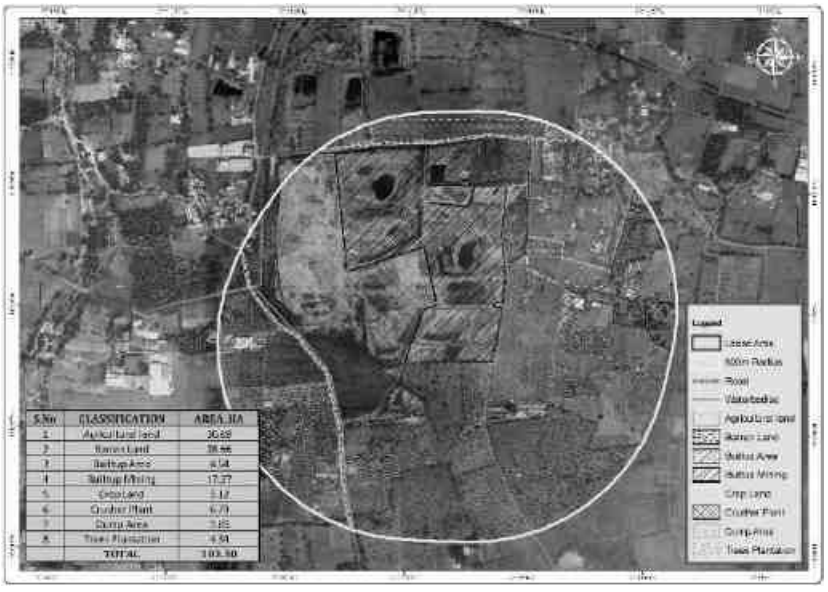
Source: Survey of India Toposheet

TABLE 3.4: NEARBY WATER BODIES FROM THE PROPOSED PROJECT SITE

Sl.No	NAME	DISTANCE & DIRECTION
1	Odai	230m_SW
2	Canal	430m_NW
3	Odai	810m_SW
4	Noyyal River	5.5Km_NW
5	Chinnandipalayam Lake	8Km_NE

Source: Village Cadastral Map and Field Survey

FIGURE 3.4: LAND USE LAND COVER MAP 500m RADIUS



Land use Landcover of the area within 500m radius were studied in detailed that the majority of the land within 500m is Agriculture land (30.69ha) followed by Barren land and Builtup 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° 3'0.05"N 77°14'36.46"E
2	S-2	Valayapalayam Village	520m NE	11° 3'9.03"N 77°14'52.76"E
3	S-3	Kodangipalayam	4.5Km South West	11° 1'24.12"N 77°12'39.56"E
4	S-4	Thevarampalayam	6km NW	11° 3'0.31"N 77°11'6.20"E
5	S-5	Sengilipalayam	3.2km East	11° 3'6.73"N 77°16'25.41"E
6	S-6	Kalivelampatti	4.5Km South	11° 0'44.42"N 77°15'32.18"E

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

Methodology –

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

TABLE 3.6: METHODOLOGY OF SAMPLING COLLECTION

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

Source: On-site monitoring/sampling by 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

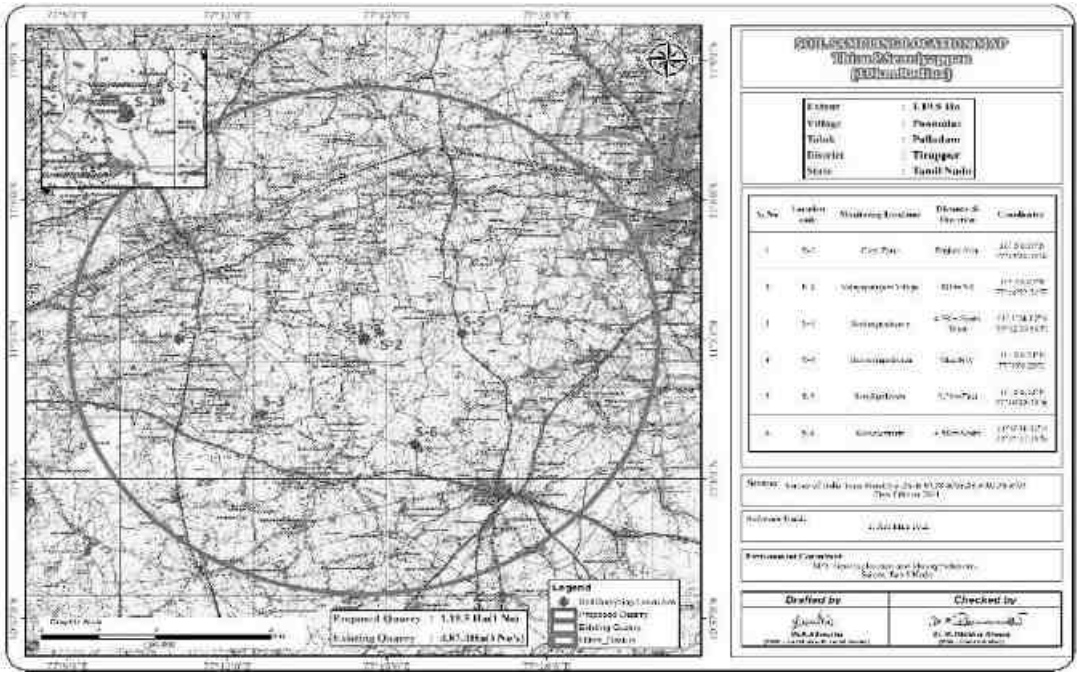


FIGURE 3.6: SOIL MAP

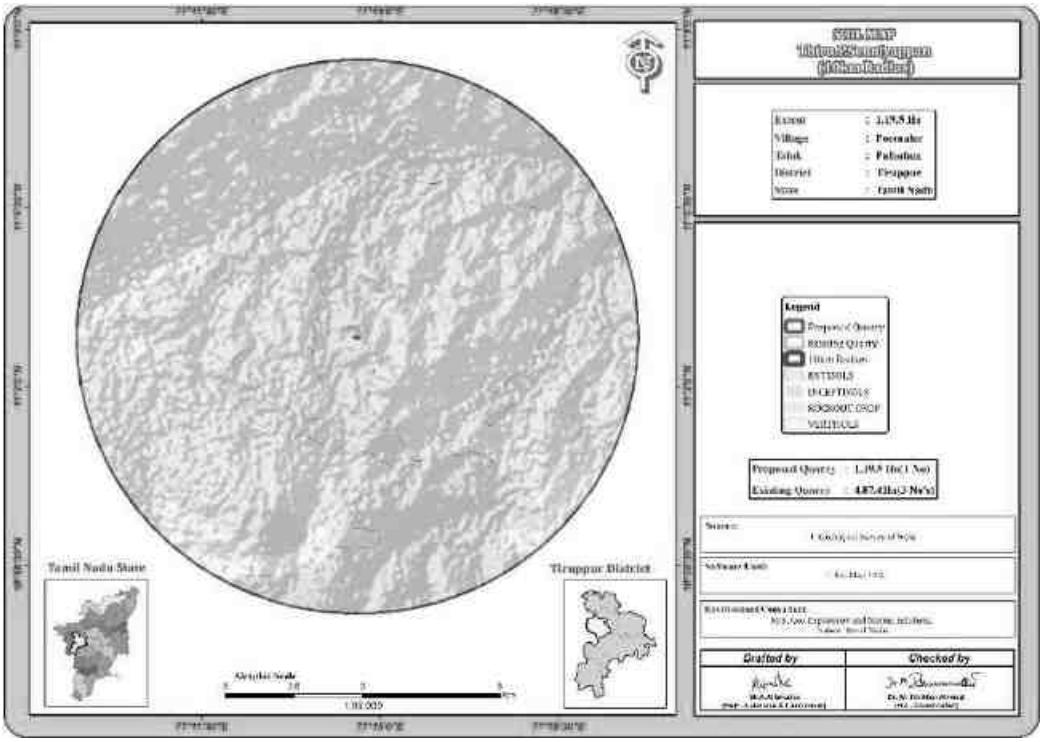


TABLE 3.7: SOIL QUALITY OF THE STUDY AREA

Sl. No	TEST PARAMETERS	TEST METHOD	UNIT	S-1 Core Zone	S-2 Valayapalayam Village	S-3 Kodangipalayam	S-4 Thevarampalayam	S-5 Sengilipalayam	S-6 Kalivelampatti
1	Organic Matter	GLCS/SOP/S/003	%	1.97	1.36	1.50	2.25	1.85	2.06
2	pH	IS 2720 (Part 26)	-	8.07	8.22	8.16	8.45	8.59	8.19
3	Specific Electrical Conductivity	IS 14767	µS/cm	380.9	400.1	410.2	500.4	425.4	419.8
4	Available Phosphorous	GLCS/SOP/S/005	mg/kg	14.0	13.8	13.0	13.7	7.3	10.3
5	Available Potassium	GLCS/SOP/S/026	meq/l	1.31	1.41	1.49	1.25	1.34	1.19
6	Exchangeable Calcium (as Ca)	GLCS/SOP/S/020	meq/100g	6.2	5.6	5.2	6.0	6.6	7.4
7	Exchangeable Magnesium (as Mg)	GLCS/SOP/S/021	meq/100g	4.6	3.4	4.6	4.4	4.8	4.8
8	Sulphate as SO_4	GLCS/SOP/S/009	mg/100g	6.88	10.1	12.06	1.54	5.02	11.06
9	Chloride	GLCS/SOP/S/004	meq/l	3.1	3.4	3.2	2.8	2.5	2.9
10	Cation Exchange Capacity	GLCS/SOP/S/024	meq/100g	18.7	19.2	18.3	17.2	17.4	18.7
11	Bulk Density	GLCS/SOP/S/017	g/cc	1.04	1.024	1.039	1.071	1.055	1.04
12	Texture: Sand	GLCS/SOP/S/015	%	34.40	44.58	39.70	30.81	36.80	39.59
13	Texture: Slit	GLCS/SOP/S/015	%	42.11	32.55	37.16	46.92	40.11	37.32
14	Texture: Clay	GLCS/SOP/S/015	%	23.49	22.88	23.14	22.26	23.09	23.09
15	Water Holding Capacity	GLCS/SOP/S/016	%	51.8	51.2	50.2	51.8	51	49.8
16	Available Nitrogen as N	GLCS/SOP/S/029	kg/hc	363.77	388.86	401.4	338.69	439.04	313.6
17	Permeability	By Permeameter	%	41.7	42.3	42.9	43.6	42.1	45.5
18	Exchangeable Manganese	USEPA Method	mg/kg	10.97	9.89	14.49	13.68	9.99	BDL(DL:0.5)
19	Exchangeable Zinc	USEPA Method	mg/kg	23.89	23.49	23.91	25.13	28.73	28.19
20	Cadmium as Cd	USEPA Method	mg/kg	14.14	15.58	16.42	8.21	11.99	11.13
21	Chromium as Cr	USEPA Method	mg/kg	11.94	19.04	18.11	17.42	22.23	23.49
22	Copper as Cu	USEPA Method	mg/kg	BDL (DL:0.5)	12.36	6.28	5.22	4.25	18.79
23	Lead as Pb	USEPA Method	mg/kg	0.73	0.74	BDL (DL:0.5)	1.00	1.00	0.99
24	Iron as Fe	USEPA Method	mg/kg	10.72	12.11	16.91	40.06	2.50	31.15
25	Organic Carbon	USEPA 6010D	mg/kg	1.14	0.79	0.87	1.31	1.07	1.20
26	Boron as B	GLCS/SOP/S/003	%	1.71	2.97	5.80	3.23	3.50	BDL(DL:0.5)

Source: Sampling Results by Global Lab and Consultancy Services Private Limited.

FIGURE 3.7: SOIL SAMPLE COLLECTION

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 (22.26 % 23.49%) to Sandy Loam Soil and Bulk Density of Soils in the study area varied between 1.04– 1.071 g/cc. The Water Holding Capacity is found to be medium i.e., ranging from 49.8 – 51.8 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 8.07 to 8.59
- The available Nitrogen content range between 313.6 to 409.04 mg/kg
- The available Phosphorus content range between 7.3to 14.0 mg/kg
- The available Potassium range between 1.19 mg/kg to 1.49 meq/l

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:

Noyyal 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	Samalapuram	5Km North West	11° 4'20.69"N 77°11'59.91"E
2	SW-2	Near Velayudhampalayam	5Km North West	11° 5'50.50"N 77°13'35.38"E
GROUND WATER				
3	WW-1	Near Project Area	160m East	11° 3'8.59"N 77°14'41.83"E
4	WW-2	Kallampalayam	5km SE	11° 1'48.78"N 77°17'2.97"E
5	BW-1	Poomalur	3Km North East	11° 4'47.77"N 77°14'51.49"E
6	BW-2	Kodangipalayam	4.8Km South West	11° 1'21.14"N 77°12'34.04"E

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

FIGURE 3.8: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS

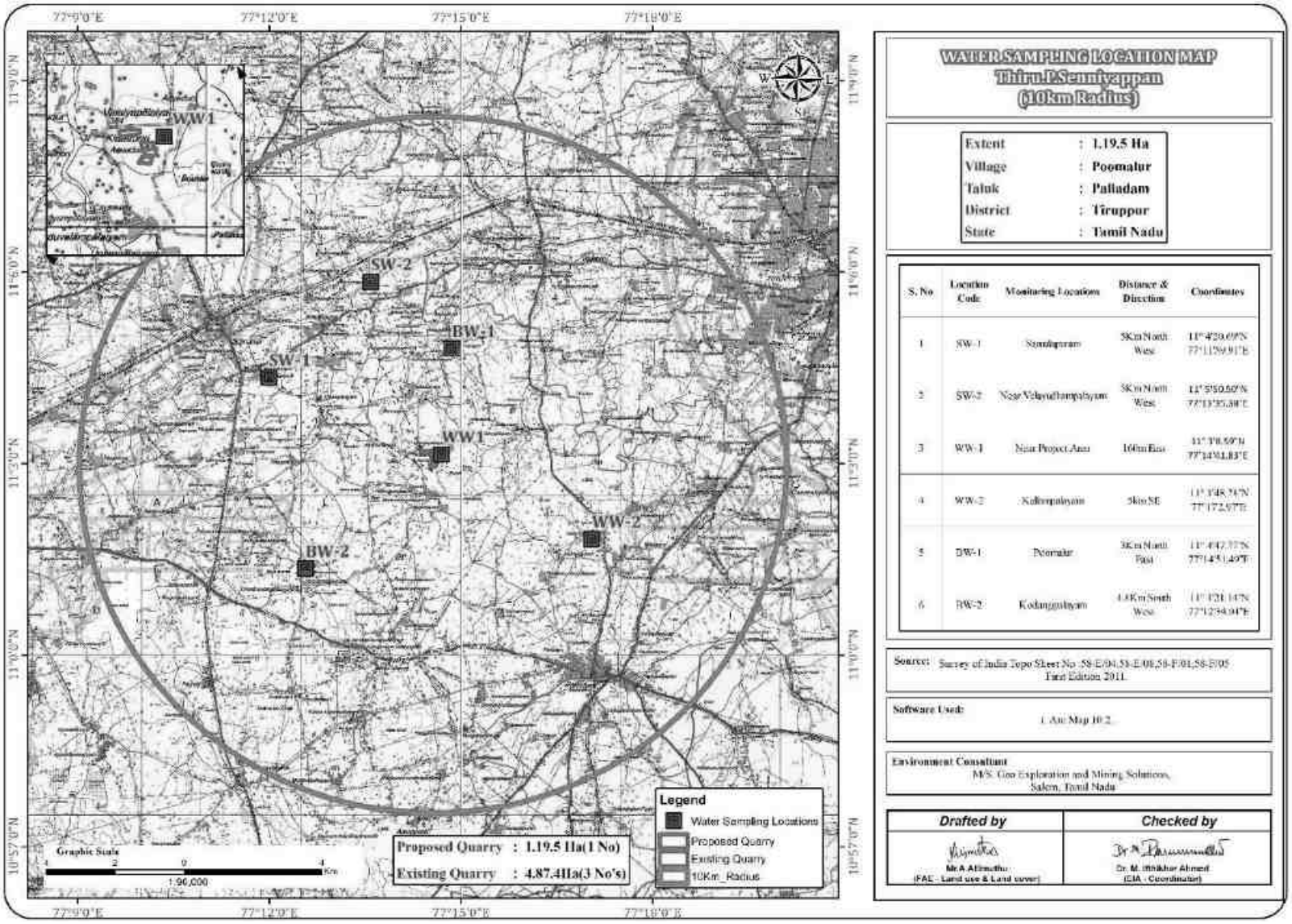


TABLE 3.9: GROUND WATER SAMPLING RESULTS

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	WW1-Near Project area	WW2-Kallampalayam	BW1- Poomalur	BW2-Kodangipalayam
1	Color	IS 3025 PART 4	Hazen	< 5	< 5	< 5	< 5
2	Odor	IS 3025 PART 5	-	Agreeable	Agreeable	Agreeable	Agreeable
3	pH	IS 3025 PART11	-	7.74	7.16	6.97	7.51
4	Conductivity	IS 3025 PART14	µs/cm	1186	1254	1110	11.28
5	Turbidity	IS 3025 PART10	NTU	<1	<1	<1	<1
6	Total Dissolved Solids	IS 3025 PART16	mg/l	700	740	655	666
7	Total Alkalinity as $CaCO_3$	IS 3025 PART 23	mg/l	304	316	256	272
8	Total Hardness as $CaCO_3$	IS 3025 PART 21	mg/l	322.32	338.64	277.64	289.68
9	Calcium as Ca	IS 3025 PART40	mg/l	55.60	68.68	50.69	65.41
10	Magnesium as Mg	IS 3025 PART 46	mg/l	44.65	40.68	36.71	30.76
11	Chloride as Cl^-	IS 3025 PART 32	mg/l	151.77	175.42	149.80	147.83
12	Sulphate as SO_4^-	IS 3025 PART24	mg/l	19.28	31.47	20.13	19.47
13	Iron as Fe	IS 3025 PART 53	mg/l	BDL(DL:0.1)	BDL(DL:0.1)	0.12	0.125
14	Boron as B	IS 3025 PART 57	mg/l	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:1.0)	BDL(DL:0.1)
15	Free Residual Chlorine as Cl_2	IS 3025 PART 26	mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)
16	Fluoride as F	GLCS/SOP/W/015	mg/l	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)
17	Manganese as Mn	IS 3025 PART 59	mg/l	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)
18	Nitrate as NO_3	IS 3025 PART 34	mg/l	BDL(DL :2.0)	BDL(DL :2.0)	BDL(DL:2.0)	BDL(DL:2.0)
19	Total Suspended Solids	IS 3025 PART 17	mg/l	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)
20	Phenolic Compounds	IS 3025 PART 43	mg/l	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)
21	Anionic Detergents	IS 13428	mg/l	BDL(DL:0.05)	BDL(DL:0.05)	BDL(DL:0.05)	BDL(DL:0.05)
22	Cyanide	IS 3025 PART 27	mg/l	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)
23	Sulphide	GLCS/SOP/W/66	mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)
24	Copper as Cu	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)
25	Mercury (Hg)	GLCS/SOP/W/62	mg/l	BDL(DL:0.002)	BDL(DL:0.002)	BDL(DL:0.002)	BDL(DL:0.002)
26	Cadmium as Cd	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)
27	Selenium	GLCS/SOP/W/62	mg/l	BDL(DL:0.002)	BDL(DL:0.002)	BDL(DL:0.002)	BDL(DL:0.002)
28	Aluminium as Al	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)
29	Lead as Pb	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)
30	Zinc as Zn	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)
31	Total Chromium as Cr	GLCS/SOP/W/62	mg/l	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)	BDL(DL:0.1)
32	Barium as Ba	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)
33	Molybdenum as Mo	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)
34	Arsenic as As	GLCS/SOP/W/62	mg/l	BDL(DL:0.002)	BDL(DL:0.002)	BDL(DL:0.002)	BDL(DL:0.002)
35	Ammonia as NH_3	IS 3025 PART 34	mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)
36	Total Coliforms	IS 15185	Per 100ml	Absent	Absent	Absent	Absent
36	*Escherichia coli*	IS 15185	Per 100ml	Absent	Absent	Absent	Absent

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

TABLE 3.10: SURFACE WATER SAMPLING RESULTS

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	SW-1 Samalapuram	SW-2 Near Velayudhampalayam
1	Color	IS 3025 PART 4	Hazen	10	10
2	Odor	IS 3025 PART 5	-	Agreeable	Agreeable
3	pH	IS 3025 PART11	-	7.85	7.17
4	Conductivity	IS 3025 PART14	µs/cm	1161	1088
5	Turbidity	IS 3025 PART10	NTU	7.8	8.6
6	Total Dissolved Solids	IS 3025 PART16	mg/l	685	642
7	Total Alkalinity as $CaCO_3$	IS 3025 PART 23	mg/l	276	232
8	Total Hardness as $CaCO_3$	IS 3025 PART 21	mg/l	286.84	265.2
9	Calcium as Ca	IS 3025 PART40	mg/l	68.0	44.15
10	Magnesium as Mg	IS 3025 PART 46	mg/l	28.49	37.70
11	Chloride as Cl^-	IS 3025 PART 32	mg/l	173.44	155.71
12	Sulphate as SO_4^-	IS 3025 PART24	mg/l	27.04	24.75
13	Iron as Fe	IS 3025 PART 53	mg/l	0.24	0.27
14	Boron as B	IS 3025 PART 57	mg/l	BDL(DL:0.1)	BDL(DL:0.1)
15	Free Residual Chlorine as Cl_2	IS 3025 PART 26	mg/l	BDL(DL:1.0)	BDL(DL:1.0)
16	Fluoride as F	GLCS/SOP/W/015	mg/l	0.22	0.14
17	Manganese as Mn	IS 3025 PART 59	mg/l	BDL(DL:0.1)	BDL(DL:0.1)
18	Nitrate as NO_3	IS 3025 PART 34	mg/l	BDL(DL:2.0)	BDL(DL :2.0)
19	Dissolved Oxygen	IS 3025 PART 38	mg/l	4.7	4.5
20	Bio-Chemical Oxygen Demand	IS 3025 PART 44	mg/l	8.4	14.4
21	Chemical Oxygen Demand	IS 3025 PART 58	mg/l	28.33	52.62
22	Ammonia as NH3	IS 3025 PART 34	mg/l	BDL(DL:1.0)	BDL(DL:1.0)
23	Total Suspended Solids	IS 3025 PART 17	mg/l	13.0	11.0
24	Phenolic Compounds	IS 3025 PART 43	mg/l	BDL(DL:0.1)	BDL(DL:0.1)
25	Anionic Detergents	IS 13428	mg/l	BDL(DL:0.05)	BDL(DL:0.05)
26	Cyanide	IS 3025 PART 27	mg/l	BDL(DL:0.02)	BDL(DL:0.02)
27	Sulphide	GLCS/SOP/W/66	mg/l	BDL(DL:1)	BDL(DL:1)
28	Copper as Cu	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
29	Mercury (Hg)	GLCS/SOP/W/62	mg/l	BDL(DL:0.002)	BDL(DL:0.002)
30	Cadmium as Cd	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
31	Selenium	GLCS/SOP/W/62	mg/l	BDL(DL:0.002)	BDL(DL:0.002)
32	Aluminium as Al	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
33	Lead as Pb	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
34	Zinc as Zn	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
35	Total Chromium as Cr	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
36	Barium as Ba	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
37	Molybdenum as Mo	GLCS/SOP/W/62	mg/l	BDL(DL:0.01)	BDL(DL:0.01)
38	Arsenic as As	GLCS/SOP/W/62	mg/l	BDL(DL:0.002)	BDL(DL:0.002)
39	Total Coliforms	IS 1622	MPN/100ml	17	14
40	*Escherichia coli*	Total Coliforms Organism MPN/100ml shall be 50 or less	MPN/100ml	<2	<2

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 7.17 to 7.85 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 642 to 685mg/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 155.71 –173.44mg/l. Nitrates varied from BDL (DL 2.0), while sulphates varied from 24.5 to 27.04 mg/l.

Ground Water

The pH of the water samples collected ranged from 6.97 to 7.74 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. Total Dissolved Solids were found in the range of 655– 740mg/l in all samples. Total hardness varied between 277.64– 338.64mg/l for all samples.

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

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by hard rock formation fissured and fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-80 Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth between 78-73m. The maximum depth proposed out of proposed projects is 42m (2m Gravel 40m Rough stone) 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 eight open well and 8 borewells.

The average water level in the open well is varies from = 11.35m to 11.95m bgl

The water level in the bore well is varies from = 56.52to 57.12m 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 55m 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: POST MONSOON SEASON WATER LEVEL OF OPEN WELLS 1 KM RADIUS

S.NO	LABEL	LONGITUDE	LATITUDE	OCT-23	NOV-23	DEC-23
1	OW-1	11° 02' 40.67"N	77° 14' 36.06"E	11	11.6	12.2
2	OW-2	11° 02' 35.03"N	77° 14' 27.09"E	11.3	11.9	12.5
3	OW-3	11° 02' 49.74"N	77° 14' 16.08"E	11.1	11.7	12.3
4	OW-4	11° 03' 05.75"N	77° 14' 10.93"E	11.2	11.8	12.4
5	OW-5	11° 03' 12.39"N	77° 14' 07.11"E	11.5	12.1	12.7
6	OW-6	11° 03' 26.94"N	77° 14' 47.74"E	11.7	12.3	12.9
7	OW-7	11° 03' 15.11"N	77° 14' 56.21"E	11.4	12	12.6
8	OW-8	11° 02' 53.53"N	77° 14' 46.55"E	11.6	12.2	12.8

Source: Onsite monitoring data

FIGURE 3.9: OPEN WELL CONTOUR MAP (OCT- DEC 2023)

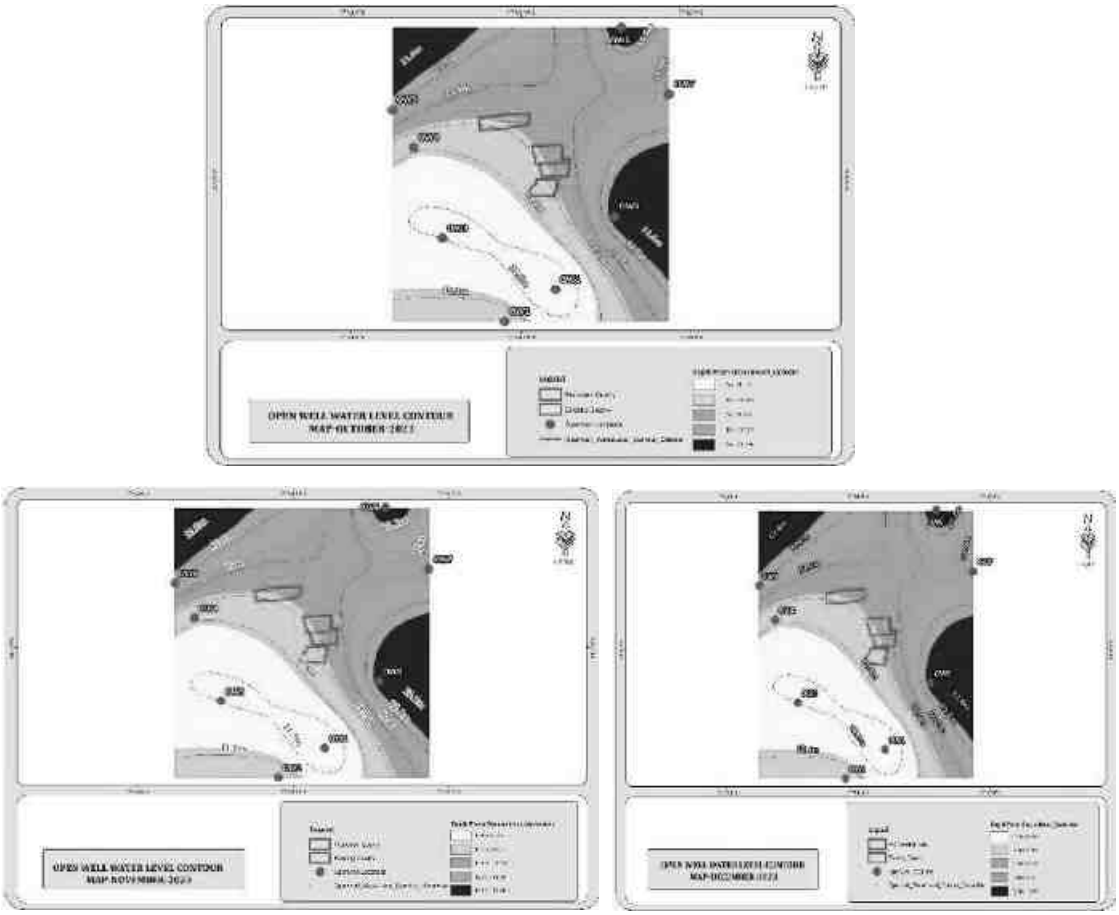


TABLE 3.12: POST MONSOON SEASON WATER LEVEL OF BOREWELLS 1 KM RADIUS

S.NO	LABEL	LONGITUDE	LATITUDE	OCT-23	NOV-23	DEC-23
1	BW1	11° 03' 00.81"N	77° 14' 25.81"E	56	56.6	57.2
2	BW2	11° 03' 09.72"N	77° 14' 12.69"E	56.2	56.8	57.4
3	BW3	11° 03' 25.25"N	77° 14' 38.31"E	56.4	57	57.6
4	BW4	11° 03' 12.81"N	77° 14' 47.12"E	56.1	56.7	57.3
5	BW5	11° 02' 59.82"N	77° 14' 55.25"E	56.5	57.1	57.7
6	BW6	11° 02' 31.86"N	77° 14' 40.62"E	56.8	57.4	58
7	BW7	11° 02' 34.73"N	77° 14' 17.08"E	57	57.6	58.2
8	BW8	11° 02' 54.09"N	77° 14' 06.38"E	57.2	57.8	58.4

Source: Onsite monitoring data

FIGURE 3.10: BOREWELL CONTOUR MAP (OCT-DEC 2023)

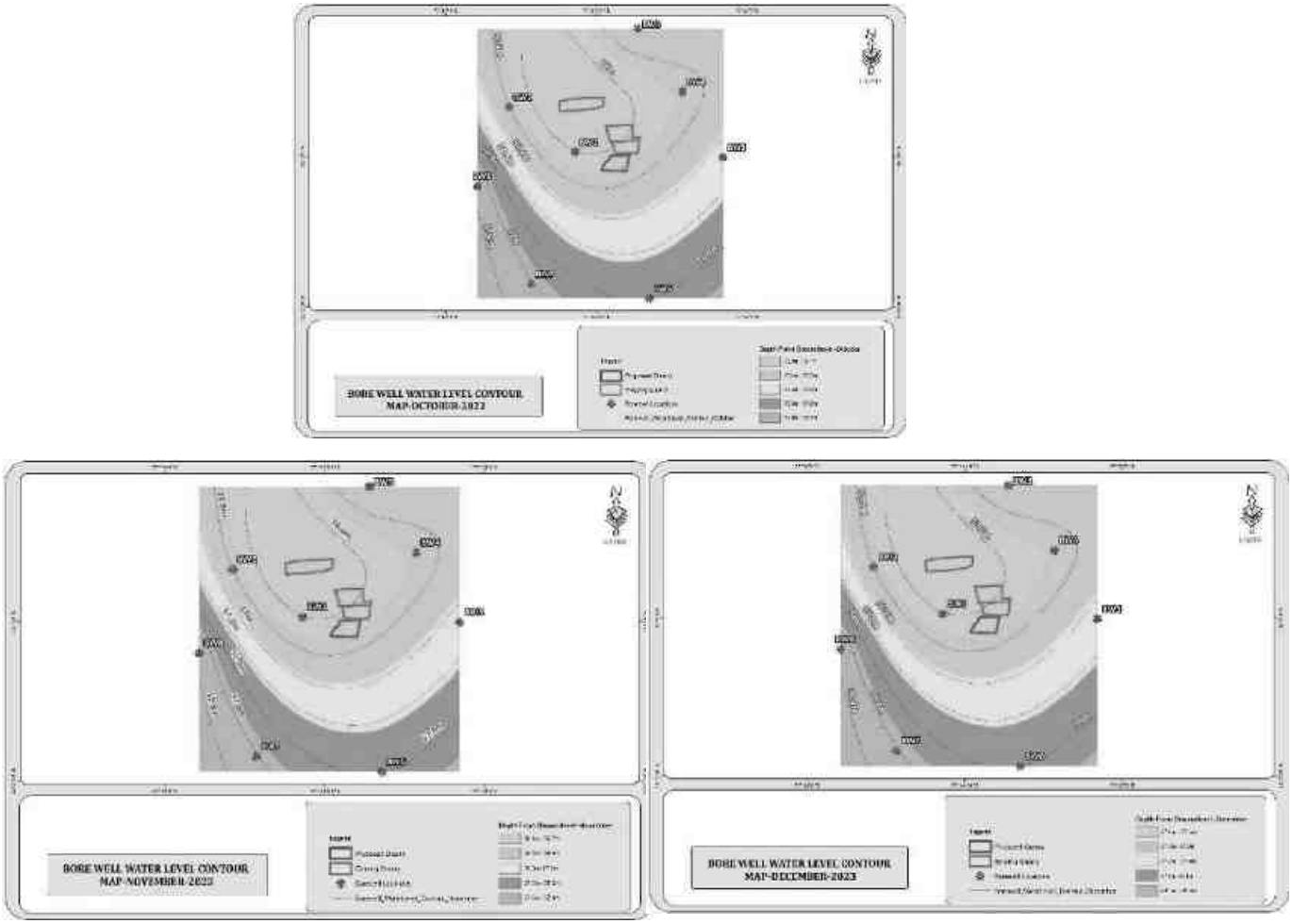
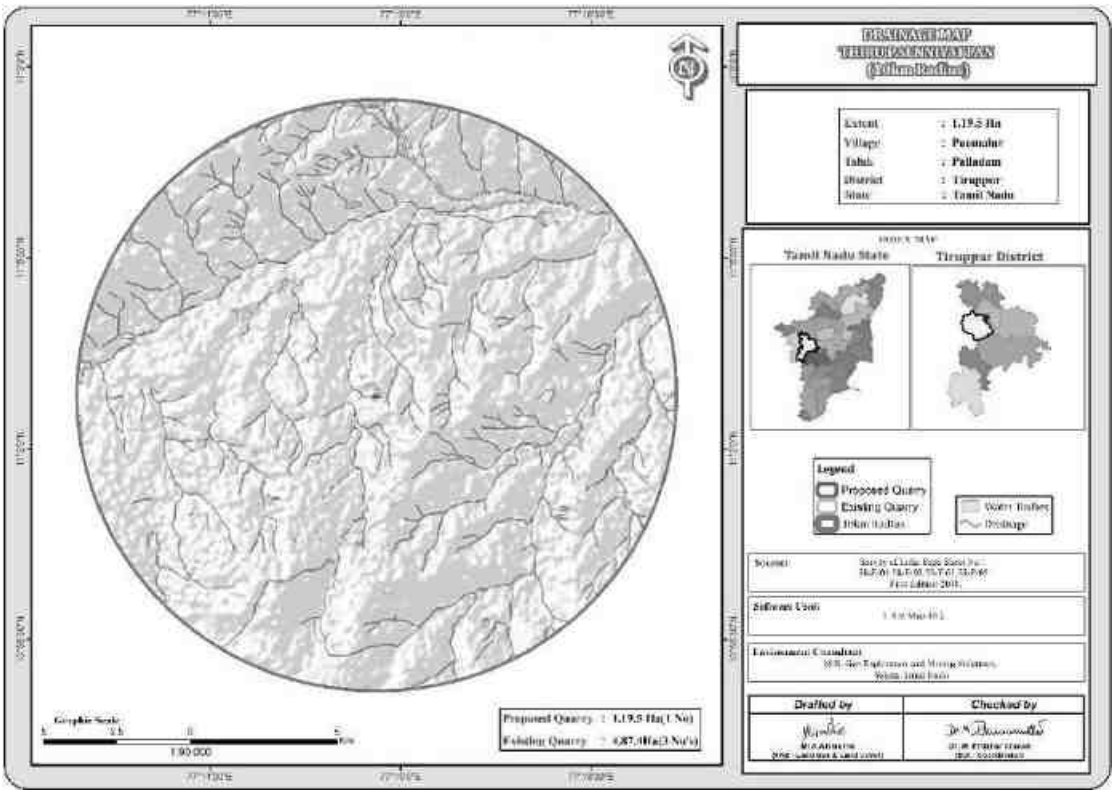
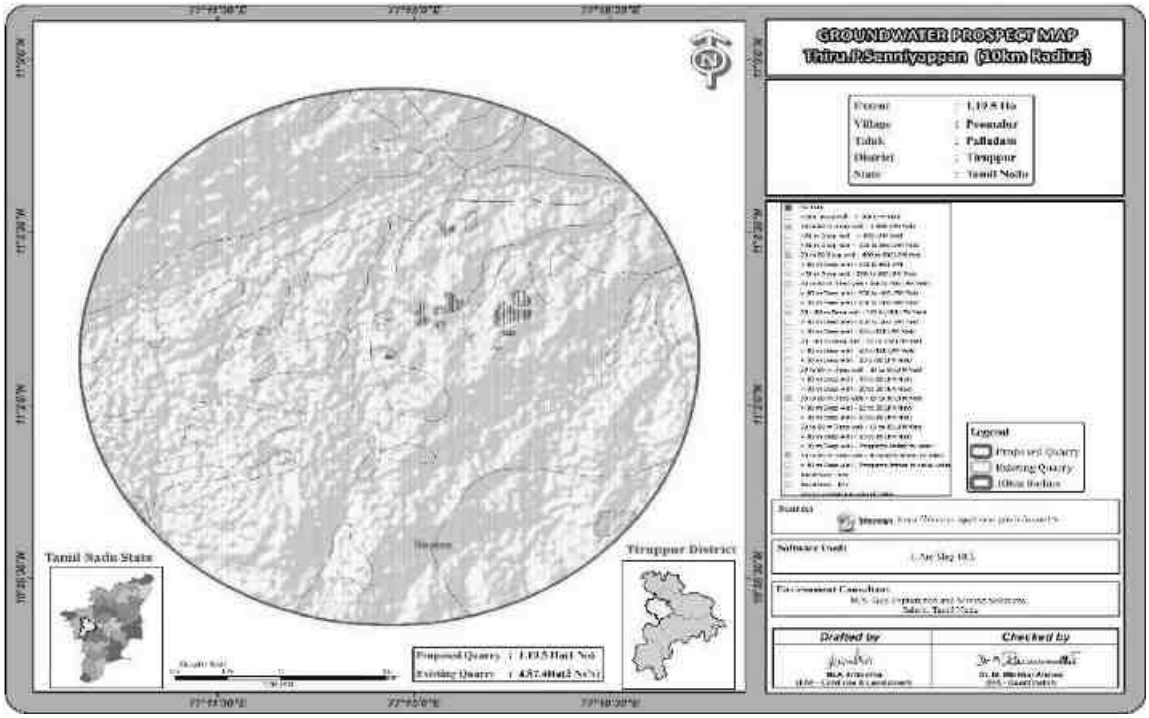


FIGURE 3.11: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE



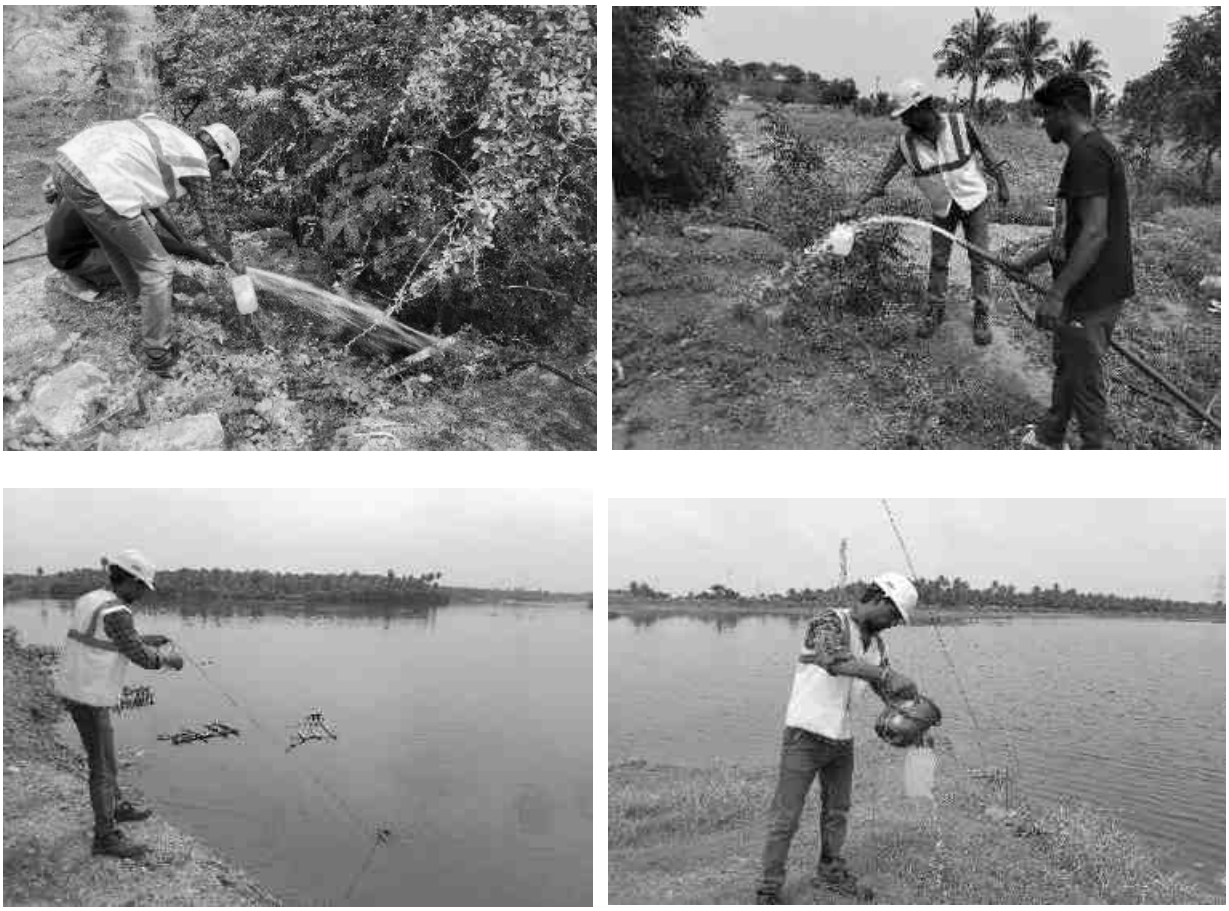
Remarks : it is inferred that the area is dendritic to sub dendritic pattern

FIGURE 3.12: GROUND WATER PROSPECT MAP



Remarks : Water table in the area is 80m as per the Bhuvan Data

FIGURE 3.12: WATER QUALITY MONITORING PHOTOGRAPHS



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 farm of Pseudo-section that gives an approximate of the subsurface resistivity. This technique is used for the inversion of Schlumberger VES data to predict the layer parameter namely layer resistivity and Geo electric layer thickness. The main goal of the present study is to search the vertical in homogeneities that is consistent with the measured data.

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

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

ΔV = potential difference between receiving electrodes

G = Geometric Factor.

Rocks show wide variation in resistivity ranging from 10-8 more than 10+14 ohmmeter. On a broad classification, one can group the rocks falling in the range of 10-8 to 1 ohmmeter as good conductors. 1 to 106 ohmmeter as intermediate conductors and 106 to 1012 ohmmeter as more as poor conductor. The resistivity of rocks and subsurface lithology, which is mostly dependent on its porosity and the pore fluid resistivity is defined by Archie's Law,

$$\rho_r = F\rho_w = a\,Ø^m\rho_w$$

ρr = Resistivity of Rocks

ρw = Resistivity of water in pores of rock

F = Formation Factor

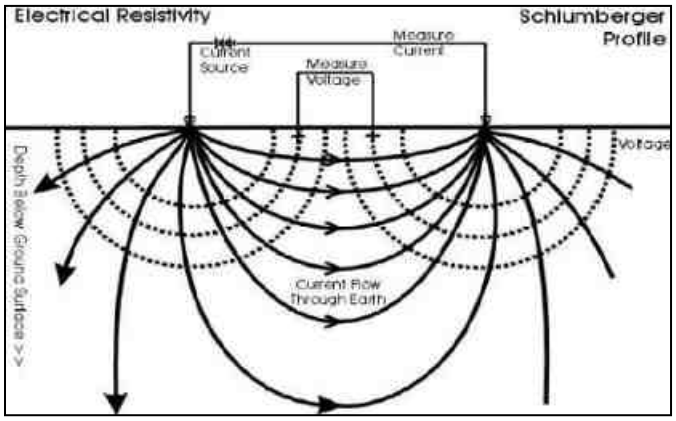
Ø = Fractional pore volume

A = Constants with values ranging from 0.5 to 2.5

3.2.5.2 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 nose ration can be enhanced by √N where N is the number of stacked readings. This SSR meter in which running averages of measurements [1, (1+2)/2, (1+2+3)/3 … (1+2...+16/16)] up to the chosen stacks are displayed and the final average is stored automatically, in memory utilizing the principles of stacking to achieve the benefit of high signals to noise ratio. Based on these above significations the signal stacking resistivity meter was used for (VES) Vertical Electric Resistivity Sounding.

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 78-73m. The maximum depth proposed out of proposed projects 42m BGL. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area.

3.2.5.4 Geophysical Data Interpretation

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

It is inferred that the existing quarries in the surrounding area reaches maximum of 78m 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. In Tiruppur, the precipitation during summers is significantly higher in comparison to winters. This location is classified as Aw by Köppen and Geiger. In Tiruppur, the average annual temperature is 26.4 °C | 79.6 °F. Approximately 943 mm | 37.1 inch of rainfall occurs on a yearly basis.
- Due to its proximity to the equator, it is quite challenging to precisely delineate summers in Tiruppur. The period of January, February, March, June, July, August, September, October, November, December is widely regarded as the peak season for visitation.
- The month with the least amount of precipitation is January exhibiting a mere 13 mm | 0.5 inch rainfall. The maximum quantity of rainfall is observed during the month of October, exhibiting an average value of 209 mm | 8.2 inch.
- The month of April boasts the highest average temperature, with a recorded maximum of 30.0 °C | 86.0 °F. During the month of December, there is a notable drop in temperature, with an average low of approximately 23.7 °C | 74.7 °F.

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

Rainfall

TABLE 3.13: RAINFALL DATA

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

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

TABLE 3.14: METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Oct–2023	Nov–2023	Dec-2023
1	Temperature (^{0}C)	Max	29.57	26.9	26.95
		Min	25.51	24.5	22.85
		Avg	27.54	25.7	24.9
2	Relative Humidity (%)	Avg	72	81.56	77.87
3	Wind Speed (m/s)	Max	5.96	3.89	3.7
		Min	1.26	1.44	1.68
		Avg	3.61	2.66	2.69
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		E,W	ENE,E	E,ENE

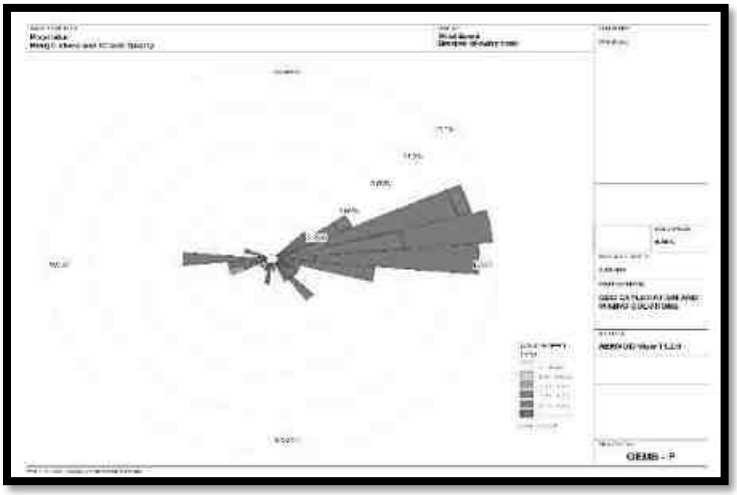
Source: On-site monitoring/sampling by Global Lab and Consultancy Services Private Limited in association with GEMS

Correlation between Secondary and Primary Data

The average rain fall over the period of five years is 606.8mm. The meteorological data collected at the site is almost similar to that of secondary data collected from IMD Tiruppur_Agro. A comparison of site data generated during the three months with that of IMD, Tiruppur_Agro

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

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 E,W,ENE,E
2. Wind velocity readings were recorded between 0.50 to 5.70m/s
3. Calm conditions prevail of about 0 % of the monitoring period
4. Temperature readings ranging from 22.85 to 29.57 °C
5. Relative humidity ranging from 72- 81.56%
6. The monitoring was carried out continuously for three months.

3.3.2 Methodology and Objective

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

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

3.3.3 Sampling and Analytical Techniques

TABLE 3.15: METHODOLOGY AND INSTRUMENT USED FOR AAQ ANALYSIS

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

Source: Sampling Methodology followed by Global Lab and Consultancy Services 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/m3)	Annual Avg.* 24 hours**	50.0 80.0	20.0 80.0
2	Nitrogen Dioxide (µg/m3)	Annual Avg. 24 hours	40.0 80.0	30.0 80.0
3	Particulate matter (size less than 10µm) PM10 (µg/m3)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
4	Particulate matter (size less than 2.5 µm PM2.5 (µg/m3)	Annual Avg. 24 hours	40.0 60.0	40.0 60.0

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

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

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

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at eight (8) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period Oct – Dec 2023. The baseline data of ambient air has been generated for PM_{10}, $PM_{2.5}$, Sulphur Dioxide (SO_2) & Nitrogen Dioxide (NO_2) 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° 2'57.41"N 77°14'31.57"E
2	**AAQ-2**	Valayapalayam Village	480m NE	11° 3'11.75"N 77°14'47.77"E
3	**AAQ-3**	Kodangipalayam	4.5Km South West	11° 1'22.95"N 77°12'37.65"E
4	**AAQ-4**	Poomalur	3.3Km North East	11° 4'54.08"N 77°15'2.86"E
5	**AAQ-5**	Thevarampalayam	6km NW	11° 3'0.86"N 77°11'5.65"E
6	**AAQ-6**	Kallampalayam	5km SE	11° 1'51.21"N 77°17'9.83"E
7	**AAQ-7**	Sengilipalayam	3.2km East	11° 3'10.47"N 77°16'23.80"E

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

FIGURE 3.14: AIR QUALITY MONITORING PHOTOGRAPHS




FIGURE 3.15: AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

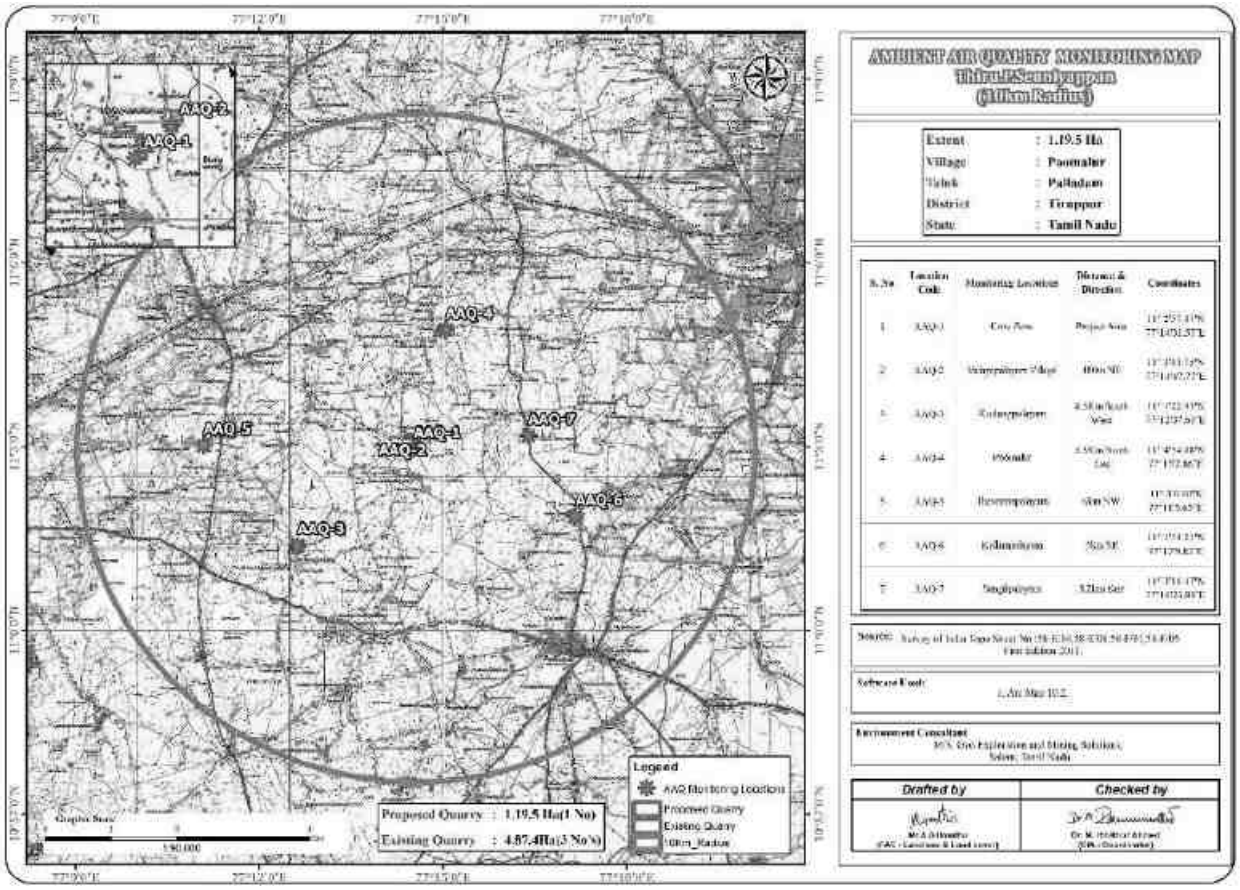


TABLE 3.18: SUMMARY OF AAQ 1 to AAQ 7

PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	43.8	42.4	42.5	42.2	43.0	43.0	42.6
Minimum	41.9	39.9	40.2	39.9	40.2	40.1	40.3
Maximum	46.5	45.1	45.0	44.7	46.3	44.5	44.2
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	18.0	18.4	18.2	18.4	43.0	42.6	18.1
Minimum	16.6	17.0	17.0	16.6	16.6	16.6	15.0
Maximum	20.0	19.5	19.4	20.2	19.5	19.1	19.5
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	6.0	5.8	5.6	6.1	6.1	6.0	6.0
Minimum	4.7	4.2	4.2	4.7	4.1	4.4	4.2
Maximum	7.4	7.2	7.7	7.4	8.5	8.4	7.9
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	19.9	19.9	20.0	19.6	19.7	19.7	19.3
Minimum	15.4	14.8	16.9	15.1	16.6	16.6	14.5
Maximum	22.2	22.1	22.2	21.6	22.3	21.6	23.9
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0

TABLE 3.19: ABSTRACT OF AMBIENT AIR QUALITY DATA

1	Parameter	PM10	PM2.5	SO_2	NO_2
2	No. of Observations	260	260	260	260
3	98th Percentile Value	46.0	20.0	8.4	22.3
4	Arithmetic Mean	43.3	18.4	6.3	20.2
5	Geometric Mean	43.2	18.4	6.2	20.2
6	Standard Deviation	1.6	0.9	1.2	1.3
7	Minimum	41.0	17.0	4.7	18.0
8	Maximum	46.0	20.0	8.4	22.3
9	**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

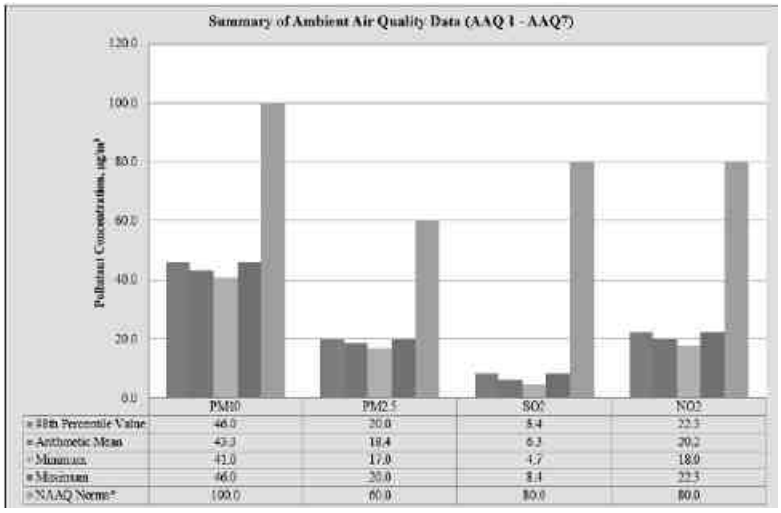


FIGURE 3.17: BAR DIAGRAM OF PARTICULATE MATTER $PM_{2.5}$

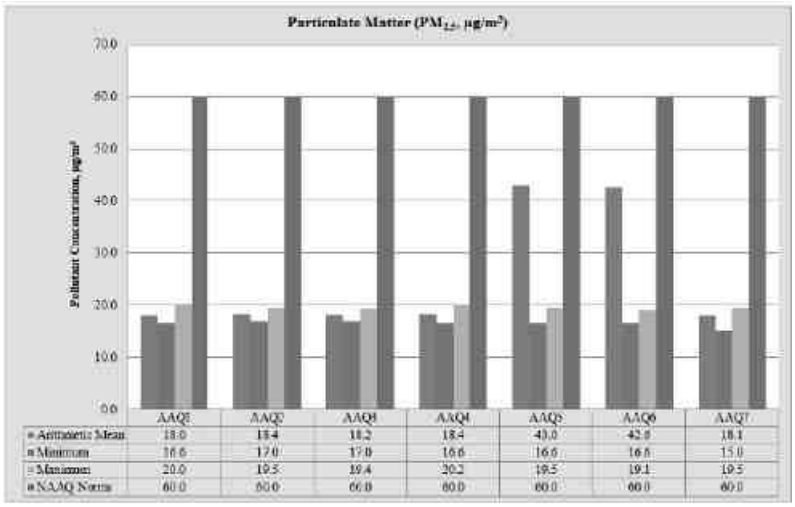


FIGURE 3.18: BAR DIAGRAM OF PARTICULATE MATTER PM_{10}

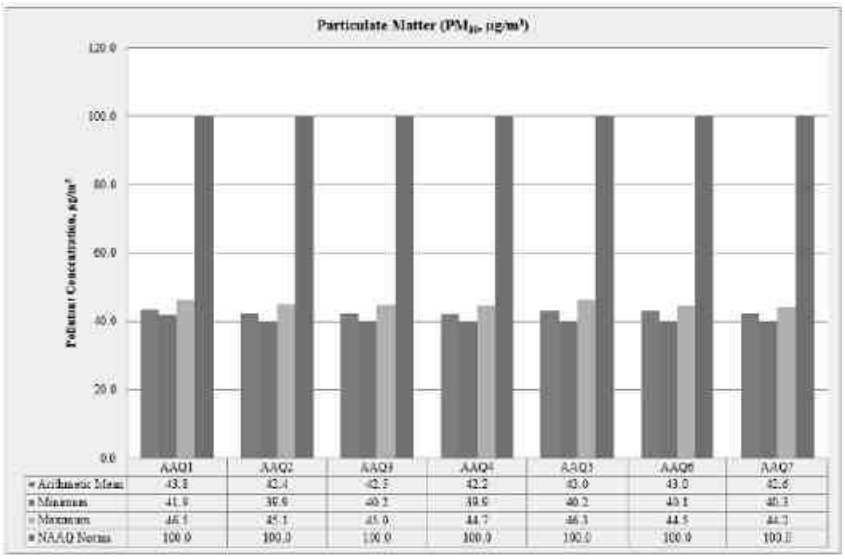


FIGURE 3.19: BAR DIAGRAM OF GASEOUS POLLUTANT SO_2

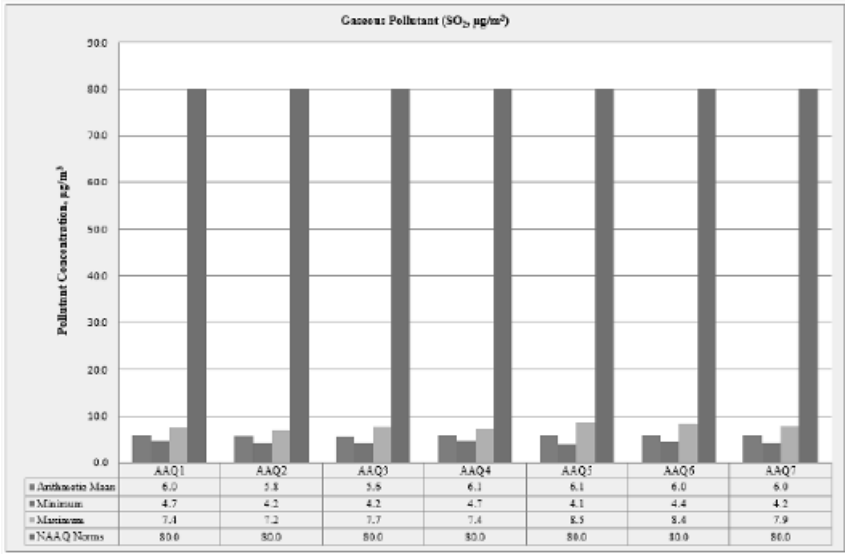
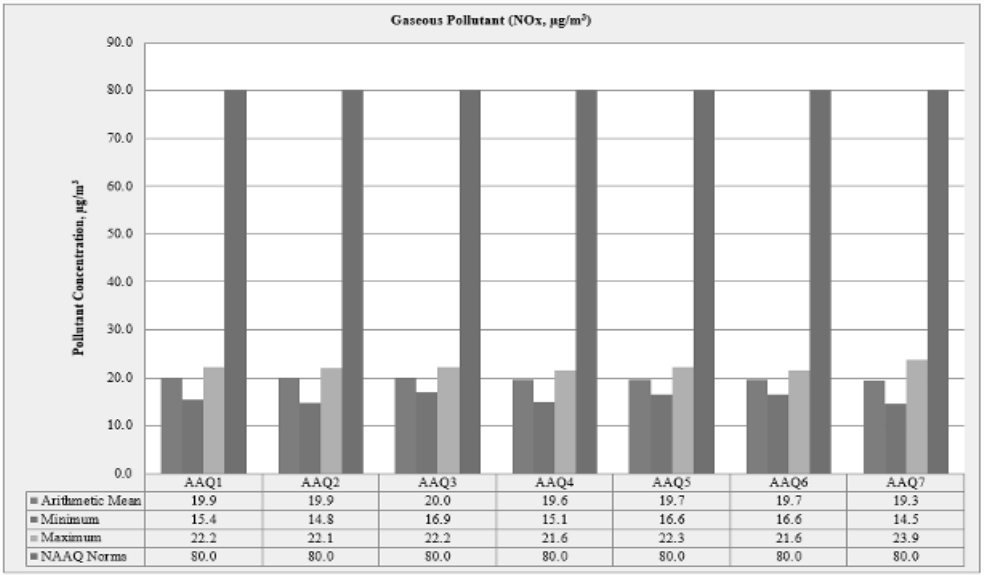


FIGURE 3.20: BAR DIAGRAM OF GASEOUS POLLUTANT NO_x



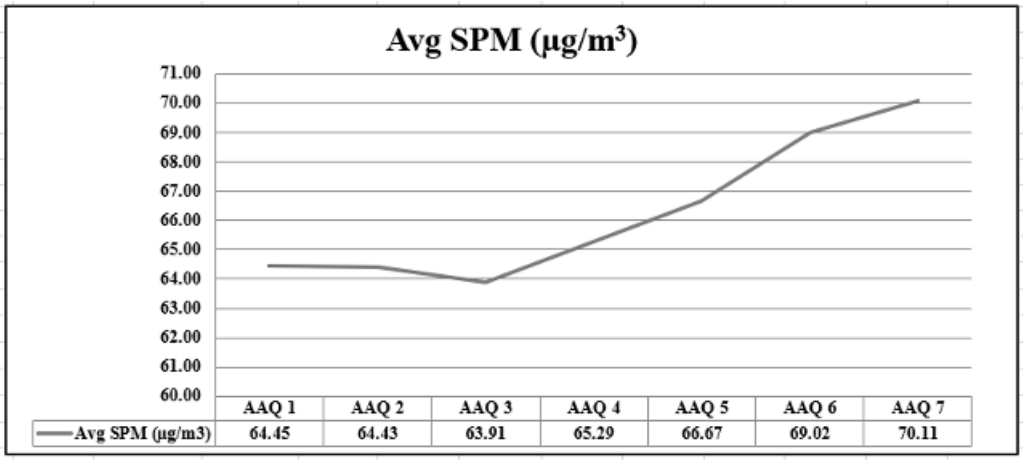
3.3.7 FUGITIVE DUST EMISSION –

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

TABLE 3.20: FUGITIVE DUST SAMPLE VALUES IN µg/m³

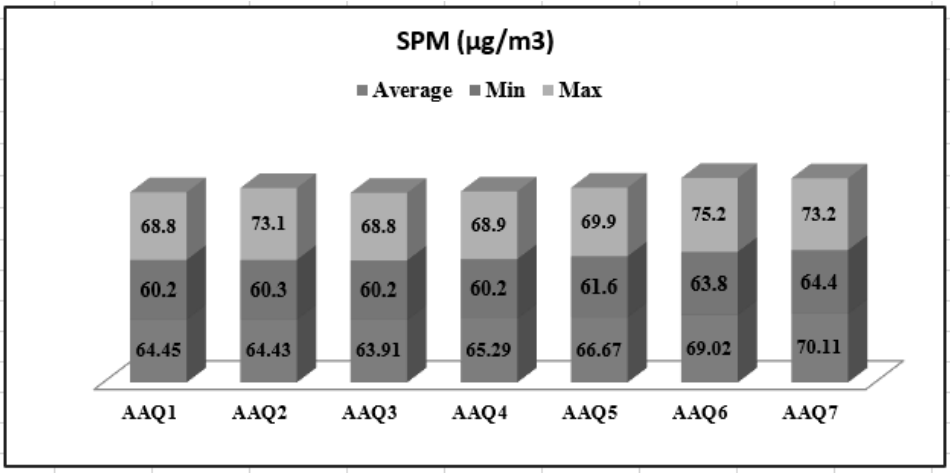
SPM (µg/m³)	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Average	64.45	64.43	63.91	65.29	66.67	69.02	70.11
Min	60.2	60.3	60.2	60.2	61.6	63.8	64.4
Max	68.8	73.1	68.8	68.9	69.9	75.2	73.2

FIGURE 3.21: LINE DIAGRAM OF AVERAGE SPM VALUES



Source: Calculations from Lab Analysis Reports

FIGURE 3.22: BAR DIAGRAM OF SPM VALUES



3.3.6 Interpretations & Conclusion

As per monitoring data, PM_{10} ranges from 39.85 µg/m^3 to 46.5 µg/m^3, $PM_{2.5}$ data ranges from 14.97 µg/m^3 to 20.2 µg/m^3, SO_2 ranges from 4.12µg/m^3 to 8.5µg/m^3 and NO_2 data ranges from 14.49 µg/m^3 to 23.9 µg/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 3.21: DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Core Zone	Project Area	11° 2'57.35"N 77°14'32.28"E
2	N2	Valayapalayam Village	480m NE	11° 3'11.51"N 77°14'48.28"E
3	N3	Kodangipalayam	4.5Km South West	11° 1'23.19"N 77°12'37.84"E
4	N4	Poomalur	3.3Km North East	11° 4'53.38"N 77°15'2.65"E
5	N5	Thevarampalayam	6km NW	11° 3'0.58"N 77°11'5.78"E
6	N6	Kallampalayam	5km SE	11° 1'51.38"N 77°17'9.89"E
7	N7	Sengilipalayam	3.2km East	11° 3'10.18"N 77°16'23.79"E

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

FIGURE 3.23: NOISE MONITORING PHOTOGRAPHS

3.4.2 Method of Monitoring

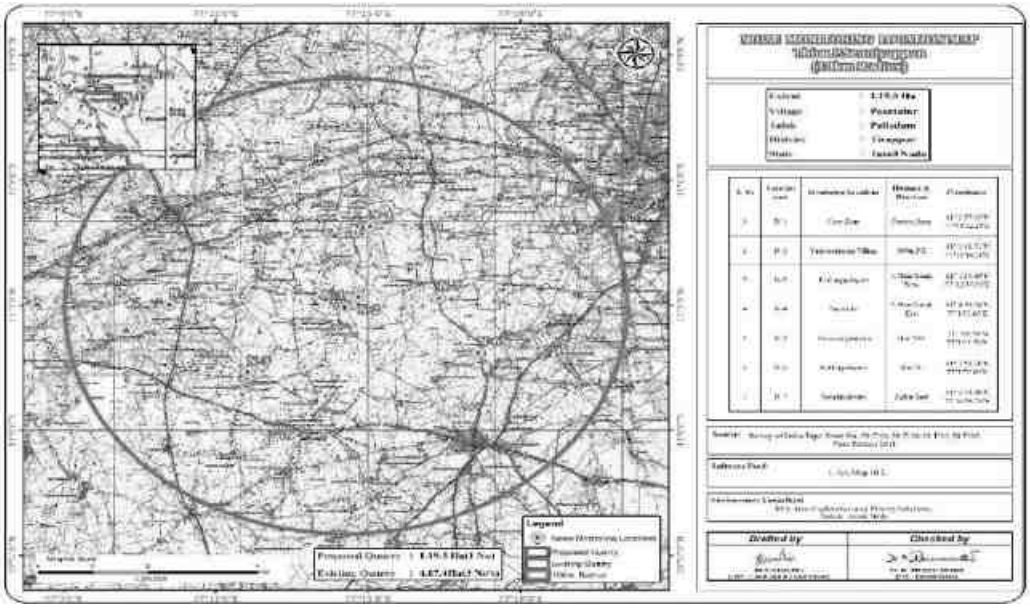
Digital Sound Level Meter was used for the study. All reading was taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring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

Leq = 10 Log L / T∑ (10Ln/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 3.22: AMBIENT NOISE QUALITY RESULT

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Core Zone	47.8	36.1	**Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)**
2	Valayapalayam Village	48.0	34.9	
3	Kodangipalayam	46.9	34.4	
4	Poomalur	47.2	34.1	
5	Thevarampalayam	47.5	35.0	**Residential Day Time– 55 dB (A) Night Time- 45 dB (A)**
6	Kallampalayam	48.2	36.6	
7	Sengilipalayam	47.1	35.2	

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

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

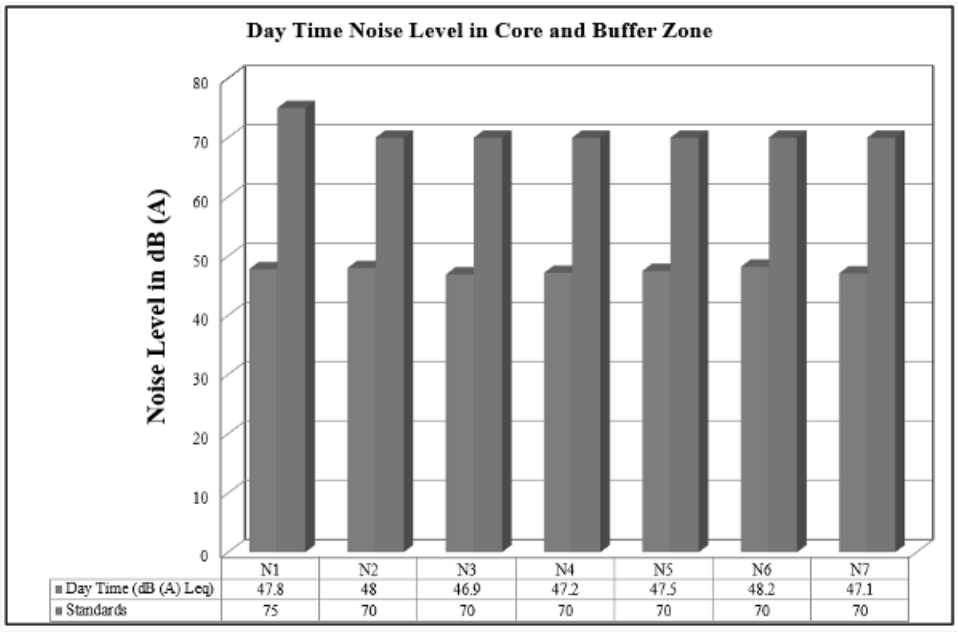
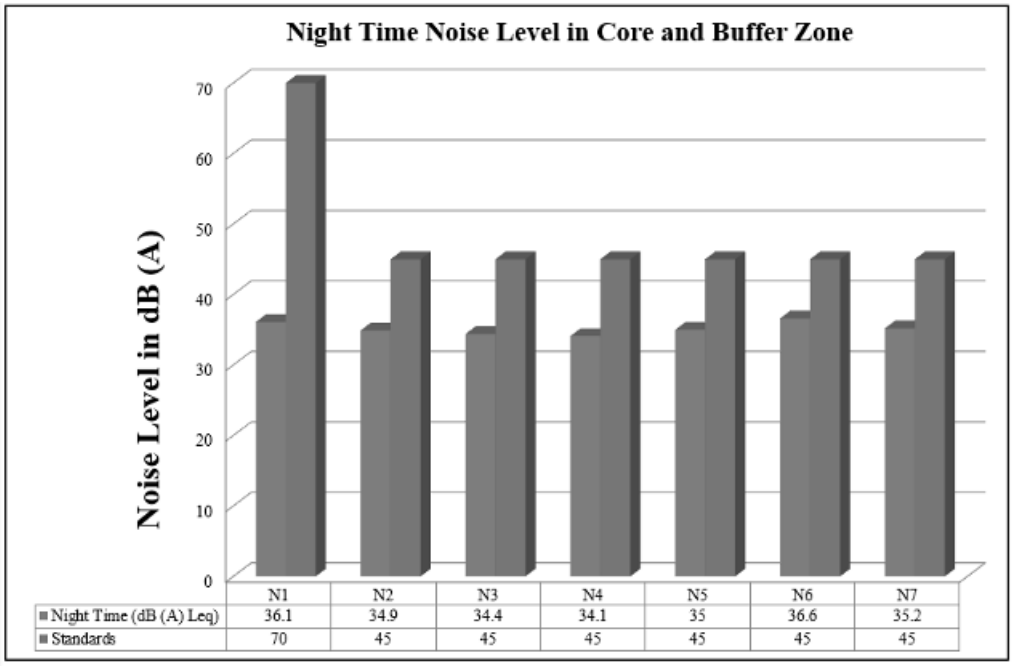


FIGURE 3.26: NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE



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 47.8 dB (A) Leq and during night time were from 36.1 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 46.9 to 48.2 dB (A) Leq and during night time were from 34.1 to 35.2 dB (A) Leq. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.5 BIOLOGICAL ENVIRONMENT

3.5.1.Study area Ecology

The core area extent of 1.19.5 Ha of has an impact on the diversity of flora and fauna of the surrounding area. But present work was carried out on the detailed study of the impacts of the Rough stone and gravel quarry on the ecology and biodiversity of the core lease area with the proper mitigation and sustainable management plan. The proposed mine lease area is situated on a plain terrain. The following methods were applied during the baseline study of flora, fauna and diversity assessment.

3.5.2. Objectives of Biological Studies

a) To study the likely impact of the proposed mining project on the local biodiversity and to suggest mitigation measures, if required, for vulnerable biota.
b) Undertake intensive field survey to assess the status of floral & faunal component in different habitats in the core and buffer areas of the project site.
c) Identification and listing of flora and fauna which are important as per the Wildlife (Protection) Act 1972.
d) Suggest Wildlife conservation (species specific/habitat specific) and management plan for the threatened (critically endangered & endangered species - schedule I) faunal species if any reported within the study area.
e) To identify the impacts of mining on agricultural lands and how it affects.
f) Proper collection of information about wildlife Sanctuaries/ national parks/ biosphere reserves of the project area.
g) Devise management & conservation measures for biodiversity.

3.5.3. Methodology of Sampling

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

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

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

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

3.5.3.1. Sampling

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

3.5.3.2. Sampling Size

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

3.5.3.3. Timing of Study

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

3.5.3.4. Observations from Sampling

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

3.5.3.5. Equipment/ References

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

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

3.5.4. Part I Field Sampling Techniques

3.5.4.1. Transect walk – Birds

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

3.5.4.2. Modified Pollard Walk – for Butterflies

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

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

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

3.5.4.4. Observational methods- Mammals

For the purpose of recording mammals, we used two different observational techniques: (1) direct observations, and (2) recording of occurrences like holes, markings, scats, hairs, and spines (Menon 2003). For

identification confirmations, photographs with a scale reference were used, and locations were recorded using a portable GPS device. Indigenous knowledge particularly that of the locals, was occasionally employed to compile a preliminary list of species and/or aid in the recognition of indicators.

3.5.4.5. Multiple Stage Quadrat – Vegetation

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

3.5.5. Flora

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

3.5.5.1. Flora Composition in the Core Zone

Taxonomically a total of 24 species belonging to 12 families have been recorded from the core mining lease area. It is exhibit plain topography. Based on habitat classification of the enumerated plants the majority of species were Herbs 11 (46%) followed by Shrubs 5 (21%), Trees 5 (21%), and Grasses 3 (12%). Details of flora with the scientific name were mentioned in Table No. 3.53. The result of the core zone of flora studies shows that Fabaceae and Poaceae and Lamiaceae are the main dominating species in the study area mentioned in Table No.3.53. No species were found as a threatened category (Table No. 3.23).

Table No: 3.23. Flora in the Core zone of Poomalur Village, Rough stone and Gravel quarry, Palladam Taluk, Tiruppur District.

SI. No	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Neem	Vembu	*Azadirachta indica*	Meliaceae
2.	Mesquite	Mullu maram	*Prosopis juliflora*	Fabaceae
3.	White Bark Acacia	Vela maram	*Vachellia leucophloea*	Fabaceae
4.	River tamarind	Savundal	*Leucaenaleucocephala*	Fabaceae
5.	Pala indigo	Pala maram	*Wrightia tinctoria*	Apocynaeceae
Shrubs				
1.	Milk Weed	Erukku	*Calotropis gigantea*	Apocynaceae
2.	Avaram	Avarai	*Senna auriculata*	Fabaceae
3.	Castor oil plant	Amanakku	*Ricinus communis*	Euphorbiaceae
4.	Thorn apple	Oomathai	*Datura stramonium*	Solanaceae
5.	Lantana	Uni chedi	*Lantana camara*	Verbenaceae
Herbs				
1.	Common leucas	Thumbai	*Leucas aspera*	Lamiaceae
2.	Devil‘s thorn	Nerunji	*Tribulus terrestris*	Zygophyllales

3.	Fish poison	Kolinchi	*Tephrosia purpurea*	Fabaceae
4.	Shameplant	Thottachenunki	*Mimosa pudica*	Fabaceae
5.	Pignut	Nattapoochedi	*Hyptis suaveolens*	Lamiaceae
6.	Asthma-plant	Amman pacharisi	*Euphorbia hirta*	Euphorbiaceae
7.	Indian Catmint Plant	Pei viratti	*Anisomeles malabarica*	Lamiaceae
8.	Indian doab	Arugampul	*Cynodon dactylon*	Poaceae
9.	Holy basil	Thulasi	*Ocimum tenuiflorum*	Lamiaceae
10.	Prickly chaff flower	Nayuruv	*Achyranthes aspera*	Amaranthaceae
11.	Coat buttons	Thatha poo	*Tridax procumbens*	Asteraceae
Grass				
1.	Eragrostis	Pullu	*Eragrostis ferruginea*	Poaceae
2.	Great brome	Thodappam	*Bromus diandrus*	Poaceae
3.	Nut grass	Korai	*Cyperus rotandus*	Poaceae

Sources: Species observation in the field study

a. Azadirachta indica

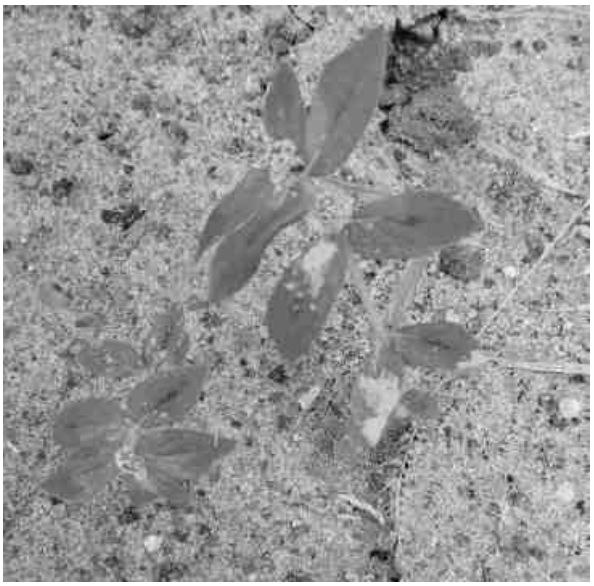
b. Calotropis gigantea

c. Leucaenaleucocephala

d. Hyptis suaveolens

e. Calotropis gigantea

f. Vachellia leucophloea



g.Tridax procumbens

h. Euphorbia hirta

i. Anisomeles malabarica

j. Mimosa pudica

K.Prosopis juliflora

l. Senna auriculata

Fig No: 3.27. Flora species observation in the Core zone area

Table No: 3.24 Flora in the Buffer zone Poomalur Village, Rough stone and Gravel quarry, Palladam Taluk, Tiruppur District

Sl.No.	English Name	Vernacular Name	Scientific Name	Resource use type *(E,M,EM)
Trees				
1.	Neem or Indian lilac	Vembu	*Azadirachta indica*	M
2.	Tamarind	Puliyamaram	*Tamarindus indica*	EM
3.	Asian Palmyra palm	Panai maram	*Borassus flabellifer*	E
4.	White Bark Acacia	Vela maram	*Vachellia leucophloea*	E
5.	Wild Date Palm	Pericham	*Phoenix sylvestris*	E
6.	Black plum	Navalmaram	*Sygygium cumini*	EM
7.	River tamarind	Savundal	*Leucaenaleucocephala*	E
8.	Lemon	Ezhumuchaipalam	*Citrus lemon*	EM
9.	Mango	Manga	*Mangifera indica*	E
10.	Banyan tree	Alamaram	*Ficus benghalensis*	E
11.	Gum arabic tree	Karuvelam	*Acacia nilotica*	NE
12.	Creamy Peacock flower	Vadanarayani	*Delonix elata*	M
13.	Mesquite	Sema Karuvelam	*Prosopis juliflora*	E
14.	Beauty leaf	Punnai	*Calophyllu inophyllum*	M
15.	Peepal	Arasanmaram	*Ficus religiosa*	M
16.	Castor oil plant	Amanakku	*Ricinus communis*	M
17.	Coconut	Thennai maram	*Cocos nucifera*	EM
18.	False ashoka	Asoka maram	*Polyalthia longifolia*	E
19.	Monkey pod tree	Thungumoonchi	*Samanea saman*	E
20.	Bitter Albizia	Arappu	*Albizia amara*	M
21.	Giant thorny bamboo	Perumungil	*Bambusa bambos*	M
22.	Wood-apple	Vilamaram	*Limonia acidissima*	M
23.	Orange jessamine	Venkarai	*Murraya paniculata*	E
24.	Madras Thorn	Kodukapuli	*Pithecellobium dulce*	E
25.	Eucalyptus	Eucalyptus	*Eucalyptus globules*	EM
26.	Custard apple	Seethapazham	*Annona reticulata*	E
27.	Copperpod	Iyal Vaagai	*copperpod*	E

28.	Acacia Nilotica	Karuvelam maram	*Vachellia nilotica*	M
29.	Indian gooseberry	Nelli	*Emblica officinalis*	EM
30.	Henna	Marudaani	*Lawsonia inermis*	EM
31.	Sacred fig	Arasan	*Ficus religiosa*	E
32.	Indian mulberry	Nuna	*Morinda tinctoria*	E
33.	Teak	Thekku	*Tectona grandis*	E
34.	Papaya	Pappali maram	*Carica papaya*	EM
35.	Chinese chaste tree	Nochi	*Vitex negundo*	E
36.	Banana Tress	Vazhaimaram	*Musa paradisiaca*	EM
37.	Millettia pinnata	Pongam oiltree	*Pongamia pinnata*	E
38.	Indian fir tree	Nettilinkam	*Polylathia longifolia*	E
39.	Guava	Koyya	*Psidium guajava*	EM
40.	Curry tree	Velipparuthi	*Murraya koenigii*	EM
41.	Bamboo	Moonghil	*Bambusa bambo*	E
42.	Drumstick tree	Murunga maram	*Moringa oleifera*	EM
43.	Indian almond	Padam maram	*Terminalia catappa*	EM
44.	Mesquite	Velikathan maram	*Prosopis juliflora*	M
45.	Portia tree	Poovarasan	*Thespesia populnea*	E
Shrubs				
1.	Lantana	Unnichedi	*Lantana camara*	M
2.	Night shade plan	Sundaika	*Solanum torvum*	EM
3.	Castor oil plant	Amanakku	*Ricinus communis*	M
4.	Thorn apple	Oomathai	*Datura stramonium*	E
5.	Rough cocklebu	Ottarachedi	*Xanthium strumarium*	M
6.	Triangular spruge	Chaturakalli	*Euphorbia antiquorum*	NE
7.	Indian jujube	Elanthai	*Ziziphus mauritiana*	M
8.	Coffee senna	Kattuttakarai	*Senna occidentalis*	M
9.	Rosy Periwinkle	Nithyakalyani	*Cathranthus roseus*	M
10.	Milk Weed	Erukku	*Calotropis gigantea*	M
11.	Avaram	Avarai	*Senna auriculata*	M
12.	Chinese chastetree	Nochi	*Vitex negundo*	M
13.	Indian mallow	Thuthi	*Abutilon indicum*	M

14.	Indian Oleander	Arali	*Nerium indicum*	M
15.	Shoe flower	Chemparuthi	*Hibiscu rosa-sinensis*	EM
16.	Puriging nut	Kattamanakku	*Jatropha curcas*	EM
17.	Columnar Cactus	Sappathikalli	*Cereus pterogonus*	M
18.	Bush Morning Glory	Neyvelik Kattamanakku	*Ipomoea carnea*	E
19.	Century plant	Anaikathalai	*Agave americana*	M
20.	Jackal jujube	Soorai pazham	*Ziziphus oenopolia*	M
21.	Tiger nail	Eli verandi	*Martynia annua*	M
22.	Flame of the Woods	Idlipoo	*Xoracoc cinea*	M
23.	Peacock Flower	Mayil Kontai	*Caesalpinia pulcherrima*	M
24.	Water spinach	Nalikam	*Ipomoea aquatica*	E
25.	Cassava	Maravalli kizhangu	*Manihot esculenta*	EM
26.	Hopbush	Virali	*Dodonaea viscosa*	E
27.	Paper flower	Kahitha poo	*Bougainvillea glabra*	M
28.	Datura metel	Uumaththai	*Datura metel*	NE
Herbs				
1.	Common leucas	Thumbai	*Leucas aspera*	M
2.	Tridax daisy	Veetukaayapoondu	*Tridax procumbens*	M
3.	Indian Copperleaf	Kuppaimeni	*Acalypha indica*	M
4.	Fish poison	Kolinchi	*Tephrosia purpurea*	
5.	Indian doab	Arugampul	*Cynodon dactylon*	E
6.	Copperleaf	Kuppaimeni	*Acalypha indica*	M
7.	Asthma-plant	Ammanpacharisi	*Euphorbia hirta*	M
8.	Cleome viscosa	Nai kadugu	*Celome viscosa*	M
9.	Porcupine flower	Shemmuli	*Barleria prionitis*	E
10.	Common Wireweed	Arivalmanai poondu	*Sida acuta*	M
11.	Carrot grass	Parttiniyam	*Parthenium hysterophorus*	NE
12.	Mexican prickly poppy	Kudiyotti	*Argemone mexicana*	M
13.	Indian Catmint Plant	Pei viratti	*Anisomeles malabarica*	M
14.	Prickly chaff flower	Nayuruv	*Achyranthes aspera*	M
15.	Licorice weed	Kallurukki	*Scoparia dulcis*	M
16.	Chay root	Chaaya ver	*Oldenlandia umbellata*	M

17.	Slender dwarf morning-glory	Vittunu-k-kiranti	*Evolvulus alsinoides*	M
18.	Spiny amaranth	Mullu keerai	*Amaranthus spinosus*	M
19.	Cracker plant	Tapas kaaya	*Ruellia tuberosa*	M
20.	Flannel Weed	Sida mutti	*Sida cordifolia*	M
21.	Green amaranth	Mulai keerai	*Amaranthus viridis*	M
22.	Marsh barbel	Neermulli	*Hygrophila auriculata*	M
23.	Yellow-fruit nightshade	Kandakathirika	*Solanum surattense*	M
24.	Common Purslane	Paruppu keerai	*Portulaca oleracea*	M
25.	Water willow	Kodakasalai	*Justicia procumbens*	M
26.	Threadstem carpetweed	Parpatakam	*Mollugo cerviana*	M
27.	Perennial Water Primrose	Muyalkathu Ilai	*Ludwigia perennis*	M
28.	Prostrate Globe Amaranth	-	*Gomphrena serrata*	M
29.	Node Flower	Kumattikkirai	*Allmania nodiflora*	M
30.	Sessile Joyweed	Ponnankanni	*Alternanthera sessilis*	M
31.	Fish poison	Kolinchi	*Tephrosia purpurea*	M
32.	Pignut	Nattapoochedi	*Hyptis suaveolens*	M
33.	Holy basil	Thulasi	*Ocimum tenuiflorum*	M
34.	Pink Blumea	Suvattru mullangi	*Blumea mollis*	M
35.	Madagascar Periwinkle	Nithykalyani Podi	*Catharanthus roseus*	E
36.	Asian spiderflower	Naaikaduku	*Cleome viscosa L*	M
37.	Digeria muricata	Thoiya keerai	*Digeria muricata*	EM
38.	Coat buttons	Thatha poo	*Tridax procumbens*	M
39.	Europeanblack nightshade	Manathakkali	*Solanumnigrum*	EM
40.	Mountain knotgrass	Thengaipoo kirai	*Aerva lanata*	M
41.	Bindii	Nerunchi	*Tribulus terrestris*	M
42.	Shameplant	Thottachenunki	*Mimosa pudica*	M
43.	Punarnava	Mukkirattai	*Boerhaavia diffusa*	EM
44.	East Indian globe thistle	Kottakaranthai	*Sphaeranthus indicus*	M
45.	Tomato	Thakkali	*Solanum lycopersicum*	EM
46.	False daisy	Karisalankanni	*Eclipta alba*	M
47.	Chilli	Milakai	*Capsicum annuum*	EM
48.	Red Spiderling	Mukirattai	*Boerhavia diffusa*	M

49.	Aloe	Katrazhai	*Aloe vera*	M
50.	Eggplant	Kathrikkai	*Solanum melongena*	EM
51.	Chrysanthemum	Samanthi Poo	*Chrysanthemum*	E
52.	Indian mint	Karpura valli	*Coleus amboinicus*	EM
53.	Aloe barbadensis	Katrazhai	*Aloe vera*	EM
Climber/ Creeper				
1.	Stemmed vine	Perandai	*Cissus quadrangularis*	M
2.	Wild bitter	Pavarkai	*Momordica charantia*	EM
3.	Pointed gourd	Kovakkai	*Trichosanthes dioica*	EM
4.	Ivy gourd	Kovai	*Coccinia grandis*	M
5.	Bottle Guard	Sorakkai	*Lagenaria siceraria*	EM
6.	Ground Spurge	Sithrapaalavi	*Euphorbia prostrata*	EM
Grass				
1.	Jungle rice	Kuthirai vaalKattu arusi	*Echinochloa colona*	NE
2.	Mauritian Grass	Moongil pul	*Apluda mutica*	NE
3.	Swollen Windmill Grass	Kondai Pul	*Chloris barbata*	NE
4.	Needle Grass	Thodappam	*Aristida adscensionis*	E
5.	Eragrostis	Pullu	*Eragrostis ferruginea*	E
6.	Needle Grass	-	*Aristida funiculata*	NE
7.	Windmill grass	Chevvarakupul	*Chloris barbata*	NE
8.	Sugarcane	Karumbu	*Saccharum*	E
Cactus				
1.	Prickly pear	Nagathali	*Opuntia dillenii*	M

Sources: Species observation in the field study and secondary data

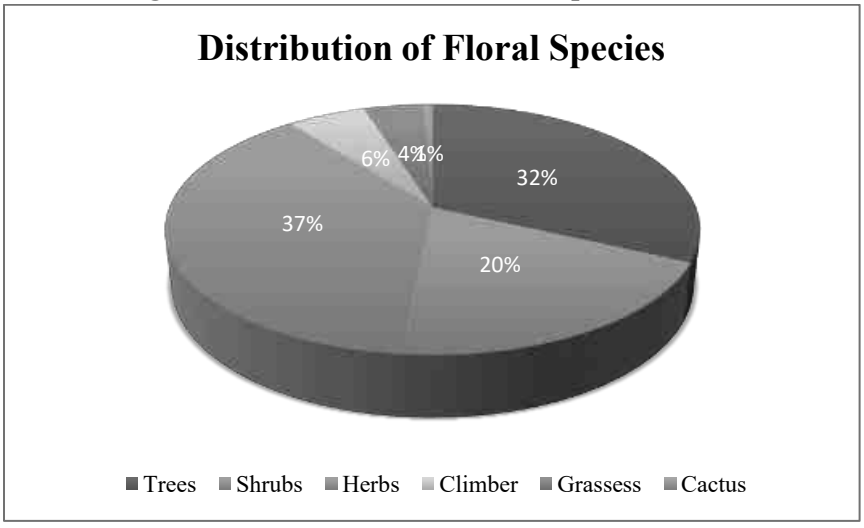
3.5.6. Flora Composition in the Buffer Zone

Similar habitats may be found in the buffer area as well, although there is a wider variety of plants there than in the core zone area. The proposed project site there are 141 species in the buffer zone study area in total, based on records. The floral (141) varieties among them Trees 45, Herbs 53, Shrubs 28, Climbers/ Creepers 6, Grasses 8, and Cactus 1 were identified. The result of the buffer zone of flora studies shows that Fabaceae and Cucurbitaceous, Euphorbiaceae is the main dominating species in the study area mentioned in Table No.3.54. There are no impacts due to this mining activity. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. Apart from the proposed project area, there is agricultural land. Horticulture and agricultural land are untouched. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. A list of floral species has been prepared based on primary survey (site observations) and discussion with local people. The total number of different plant life forms under trees, shrubs, herbs, and climbers is shown in Table 3.24 and their % distribution is shown in Figure 3.27.

Table 3.25: Number of floral life forms in the Study Area

S. No	Plant Life Form	Number of Species
1	Trees	45
2	Shrubs	28
3	Herbs	53
4	Climber/Creepers	6
6	Grasses	8
7	Cactus	1
Total No. of Species		141

Fig. No 3.28 Distribution of Flora Species




a. Hyptis suaveolens


b.Azadirachta indica


c. Borassus flabellifer


d. Prosopis juliflora


e. Ricinus communis


f.Annona reticulata


g. Tridax procumbens


h. Emblica officinalis


i. Lantana camara

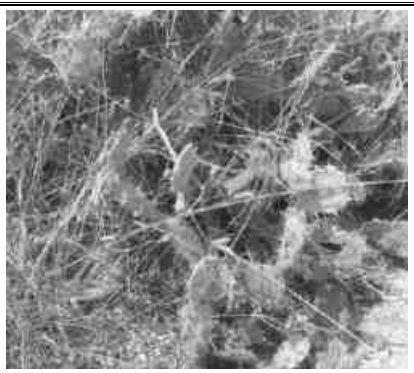

j. Musa paradisiaca


k.Jatropha curcas


l. Calotropis gigantea


m. Pithecellobium dulce


n. Coccinia grandis


o. Opuntia dillenii


p.Carica papaya L


q.Thespesia populnea


r. Euphorbia hirta


s. Phoenix sylvestris


t. Parthenium hysterophorus


u. Abutilon indicum


v.Solanum torvum


w.Datura stramonium


x. Morinda tinctoria

y.Hibiscu rosa-sinensis z.Cissus quadrangularis a.Mangifera indica

Fig No: 3.29. Flora species observation in the Buffer zone area

3.5.6.1. Major Agricultural Crops

Tiruppur district though an industrial district plays important role in Agriculture also. The food production required to be enhanced to provide food and nutritional security to the growing district population. In Tiruppur more than 80% of the farmers belong to small and marginal category and they play a key role in overall development in Agriculture. The total area of cultivation is around 2,28,556 hectares, mainly food and commercial crops. The chief food crops are paddy, millets and pulses. The non-food or commercial crops in the district are cotton, oil seeds and coconut. Details of the major crops are given in Table No: 3.26.

Table No: 3.26. Major crops in Tiruppur District

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

(**Source:** Agriculture Contingency Plan– Tiruppur-2013)

3.5.6.2. Horticulture

Major horticulture crops cultivated in this district are fruits crops like mango, banana, aonla, sapota and papaya, vegetables like bhendi, tomato, brinjal, onion, tapioca, moringa, spices and condiments like chillies and turmeric, plantation crops like cocoa, flower crops like jasmine, tube rose, marigold, cock's comb and medicinal plants like gloriosa and coleus. Details of major field crops and horticulture in Tiruppur district is given in Table No: 3.27

Table No: 3.27. Major Field crops & horticulture in Tiruppur District.

Sl.No	Common Name	Scientific Name	Family
Major Horticultural Crops			
1	Banana	*Musa*	Musaceae
2	Mango	*Mangifera indica*	Anacardiaceae
3	Jack	*Artocarpus heterophyllus*	Mulberry
4	Guava	*Psidium guajava*	Myrtle
5	Sapota	*Manilkara zapota*	Sapotaceae

6	Lemon	*Citrus × limon*	Rutaceae
Vegetables			
7	Onion	*Allium cepa*	Amaryllidaceae
8	Tapioca	*Manihot esculenta*	Spurges
9	Brinjal	*Solanum melongena*	Nightshade
10	Tomato	*Solanum lycopersicum*	Nightshade
11	Gourds	*Lagenaria siceraria*	Cucurbits
12	Bhendi	*Abelmoschus esculentus*	Mallows
13	Moringa	*Moringa oleifera*	Moringaceae
Medicinal and Aromatic Plants			
14	Gloriosa superba	*Colchicaceae*	Colchicaceae
15	Coleus	*Plectranthus scutellarioides*	Mints
Flowers			
16	Jasmine	*Jasminum*	Jasminaceae
17	Crossandra	*Crossandra infundibuliformis*	
18	Crysanthimum	*Asteraceae*	Asteraceae
19	Rose & Jathi	*Rosa*	Rosaceae
20	Tuberose	*Polianthes tuberosa*	Asparagus
Spices and Condiments			
21	Chillies	*Capsicum frutescens*	Solanaceae
22	Turmeric	*Curcuma longa*	Zingiberaceae
23	Tamarind	*Tamarindus indica*	Legumes
24	Curry leaf	*Murraya koenigii*	Rutaceae
Plantation Crops			
25	Cashew	*Anacardium occidentale*	Cashews
26	Cocoa	*Theobroma cacao*	Mallows

(**Source**: Statistical handbook of Tamil Nadu-2013)

3.5.6.3. Types of Irrigation

Irrigation is the artificial application of water to the soil for normal growth of plants. Water is an important determinant factor for production of crops in agriculture sector. Intensive and extensive cultivation of land depends mainly on the availability of water. Medium and minor irrigation schemes are implemented in the state for augmenting the water supply for agriculture. The various sources of irrigation are canals, tanks, tube wells, ordinary wells, springs and channels. The Following Table No: 3.58. Shows the area irrigated in Tiruppur District.

Table No: 3.28. Area irrigated in the district

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

3	Rain fed area	72.9

(**Source:** Statistical handbook of Tamil Nadu-2013)

Dug wells are the major source of water for irrigation in Tiruppur district, accounting for about 59.97 percent of the total area irrigated in this district. Tube wells accounting for about 9.48 percent of the total area irrigated in this district. Of the net area irrigated, the canal irrigated area is only 29.45 percent. The area irrigated under tank is 1.10 percent.

(**Source**: Statistical handbook of Tamil Nadu-2013)

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

There are neither reserved (RF) nor protected (PF) forests either in the mine lease area or in the buffer zone. Thus, no forest land is involved in any manner. Hence, no certificate from the Forest department is required. There are no impacts due to this mining activity.

There are no protected or ecologically sensitive areas such as National parks or Important Bird Areas (IBAs), or Wetlands or migratory routes of fauna or water bodies or human settlements within the proposed mine lease area. There are no Biosphere reserves or wildlife sanctuaries or National parks or Important Bird Areas (IBAs), or migratory routes of fauna. Thus, the area under study (Mine lease area and the 10 Km buffer zone) is not ecologically sensitive. It is away from the proposed project site. There are neither forests nor forest dwellers nor forest-dependent communities in the mine lease area. There shall be no forest-impacted families (PF) or people (PP). Thus, the rights of Traditional Forest Dwellers will not be compromised on account of the project.

3.6. Fauna

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

3.6.1. Fauna Composition in the Core Zone

A total of 16 varieties of species were observed in the Core zone of Poomalur Village, Rough stone and gravel quarry (Table No.3.59) among them numbers of Insects 5 (31%), Reptiles 2 (13%), Mammals 2 (12%) and Avian 7 (44%). A total of 16 species belonging to 13 families have been recorded from the core mining lease area. None of these species are threatened or endemic in the study area and surroundings. There is no Schedule I species and six species are under schedule IV according to the Indian wild life Act 1972. A total of 7 species of bird were sighted in the mining lease area.

There are no critically endangered, endangered, vulnerable and endemic species were observed. Details of fauna in core zone with the scientific name were mentioned in Table No. 3.59.

Table No: 3.29. Fauna in the Core zone of Poomalur Village, Rough stone and Gravel quarry, Palladam Taluk, Tiruppur District

SI. No	Common name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
Insects			
1.	Common Tiger	*Danaus genutia*	Schedule IV
2.	Mottled emigrant	*Catopsilia pyranthe*	NL

3.	Striped tiger	*Danaus plexippus*	Schedule IV
4.	Danaid egg fly	*Hypolimnasmisippus*	Schedule IV
5.	Red-veined darter	*Sympetrum fonscolombii*	NL
Reptiles			
1.	Garden lizard	*Calotes versicolor*	Schedule IV
2.	Common skink	*Mabuya carinatus*	Schedule IV
Mammals			
1.	Indian Field Mouse	*Mus booduga*	Schedule IV
2.	Common rat	*Rattus rattus*	Schedule IV
Aves			
1.	Common myna	*Acridotheres tristis*	Schedule IV
2.	Asian green bee-eater	*Meropsorientalis*	Schedule IV
3.	Black drongo	*Dicrurus macrocercus*	Schedule IV
4.	Koel	*Eudynamys*	Schedule IV
5.	House crow	*Corvussplendens*	Schedule IV
6.	Cattle egret	*Bubulcus ibis*	Schedule IV
7.	Common quail	*Coturnix coturnix*	Schedule IV

(Sources: Species observation in the field study)

3.6.2. Fauna Composition in the Buffer Zone

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

There are no Sanctuaries, National Parks, Tiger Reserve or Biosphere reserves or Elephant Corridor or other protected areas within 10 km radius of from the core area. It is evident from the available records, reports, and circumstantial evidence that the entire study area including the core and buffer areas were free from any endangered animals. There were no resident birds other than common bird species such as Red-whiskered Bulbul, Asian Koel, House crow, Black drangos, Crows, Pond heron etc.

The list of Mammals (*directly sighted animals & Secondary data) is given in table No.3.60. The list of bird species recorded during the field survey and literature from the study area are given in Table 3.61. The list of reptilian species recorded during the field survey and literature from the study area is given in Table 3.162. The list of insect species recorded during the field survey and literature from the study area are given in Table 3.63. The list of Butterflies species recorded during the field survey and literature from the study area are given in Table 3.64. It is apparent from the list that none of the species either spotted or reported is included in Schedule I of the Wildlife Protection Act. Similarly, none of them comes under the REET category.

Taxonomically a total of 70 species recorded were from the buffer zone area. Based on habitat classification the majority of species were birds 34, followed by Butterflies 12, Reptiles 10, Insects 5, Mammals 5, and Amphibians 4. There are five Schedule II species, two species are under the schedule III and fifty four species are under Schedule

IV according to the Indian Wildlife Act 1972. A total of 35 species of bird were sighted in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed. There are no impacts on nearby fauna species.

Dominant species are mostly birds, butterflies, and insects, and four amphibian was observed during the extensive field visit *Sphaerotheca breviceps, Euphlyctis hexadactylus, Bufomelanostictu*s, etc. There is no Schedule I Species in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

Table 3.30. List of Fauna & Their Conservation Status,

Mammals: (*directly sighted animals & Secondary data)

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

Table 3.31. Listed birds

SI. No	Common Name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
1.	Black kite	*Milvus migrans*	Schedule IV
2.	Jungle babbler	*Turdoides striata*	Schedule IV
3.	Indian robin	*Saxicoloides fulicatus*	Schedule IV
4.	Asian Koel	*Eudynamys*	Schedule IV
5.	Cattle egret	*Bubulcus ibis*	Schedule IV
6.	Rock pigeon	*Columbidae*	Schedule IV
7.	Common myna	*Acridotheres tristis*	Schedule IV
8.	House crow	*Corvussplendens*	Schedule IV
9.	Red Vented Bulbul	*Pycnonotus cafer*	Schedule IV
10.	Small Bee Eater	*Merops orientalis*	Schedule IV
11.	Purple sunbird	*Cinnyris asiaticus*	Schedule IV
12.	Common hawk-cuckoo	*Hierococcyx varius*	Schedule IV
13.	House sparrow	*Passer domesticus*	Schedule IV
14.	Brahminy myna	*Temenuchus pagodarum*	Schedule IV
15.	Small blue Kingfisher	*Alcedo atthis*	Schedule IV
16.	Rose-ringed parkeet	*Psittacula krameri*	Schedule IV

17.	The common woodshrike	*Tephrodornis pondicerianus*	Schedule IV
18.	Asian Palm Swift	*Cypsiurus balasiensis*	Schedule IV
19.	Common quail	*Coturnix coturnix*	Schedule IV
20.	Pond herons	*Ardeola grayii*	Schedule IV
21.	Black-headed Cuckooshrike	*Lalage sykesi*	Schedule IV
22.	Black drongo	*Dicrurus macrocercus*	Schedule IV
23.	Woodpecker bird	*Picidae*	Schedule IV
24.	Weaver bird	*Ploceus philippines*	Schedule IV
25.	Two-tailed Sparrow	*Dicrurus macrocercus*	Schedule IV
26.	Grey drongo	*Dicrurus longicaudatus*	Schedule IV
27.	Grey Francolin	*Francolinus pondicerianus*	Schedule IV
28.	Wood Sandpiper	*Tringa glareola*	Schedule IV
29.	Blue-Tailed Bee Eater	*Merops philippinus*	Schedule IV
30.	Indian Roller	*Coracias benghalensis*	Schedule IV
31.	Common Swallow	*Hirundo rustica*	Schedule IV
32.	Purple Rumped Sunbird	*Leptocoma zeylonica*	Schedule IV
33.	Common Tailor Bird	*Orthotomus sutorius*	NL
34.	Purple Sunbird	*Cinnyris asiaticus*	NL

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

Table 3.32. List of Reptiles either spotted or reported from the study area.

(*indicates direct observations & Secondary data)

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

Table 3.33. List of insects either spotted or reported from the study area

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

Table.3.34. List of Butterflies reported from the study area

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

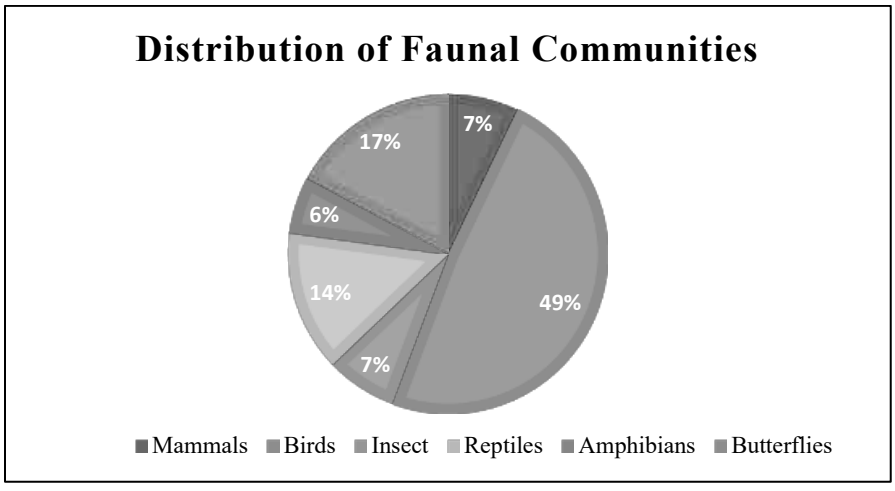


Fig No. 3.30 Diagram showing % distribution of faunal life forms

The study area is marked with moderate population of flora and fauna. With reference to the Wildlife Protection Act 1972 total number of wildlife tabulated in this study can be characterized as given in the Table 3.59.

Table No: 3.35. Characterization of Fauna in the Study Area (As Per W.P Act, 1972)

S.No	Schedule of Wildlife Protection Act 1972	No. of species	Remark
1.	Schedule I	0	-
2.	Schedule II	4	-
3.	Schedule III	2	-
4.	Schedule IV	54	-
5.	Schedule V	1	-
6.	Schedule VI	0	-

Fig No: 3.31. Schedule of Wildlife Protection Act 1972

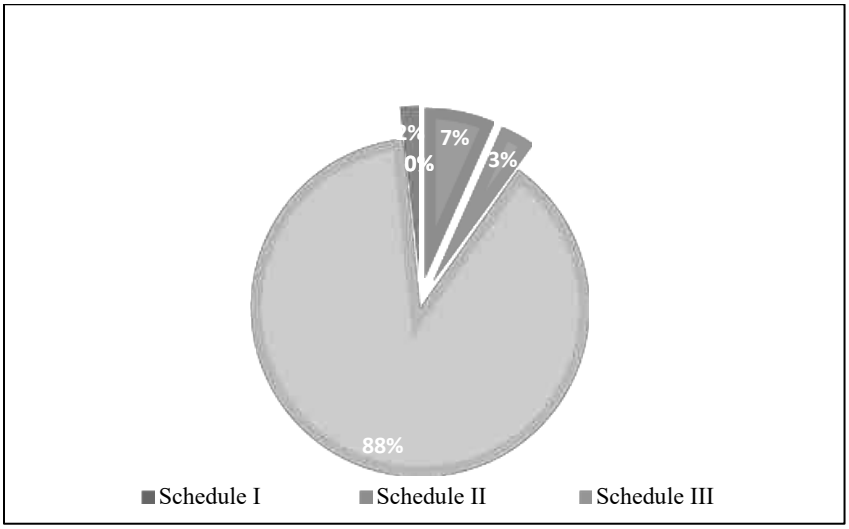


Table 3.36: Description of Flora & Fauna

S.No	Type of Species	Name	Local Name
Flora			
1.	Endangered species	None	None
2.	Threatened species	None	None
3.	Near Threatened species	None	None
4.	Vulnerable species	None	None
Fauna			
5.	Endangered species	None	None
6.	Threatened species	None	None
7.	Near Threatened species	None	None
8.	Vulnerable species	None	None

9.	Migratory Corridors & Flight Paths	No corridors & flight paths	-
10.	Breeding & Spawning grounds	None	-

A comprehensive Central Legislation namely Wild Life (Protection) Act was enforced in 1972 to provide protection to wild animals. Schedule-I of this act contains the list of rare and endangered species, which are completely protected throughout the country. The list of animals and their conservation status as per Wild Life Act (1972) presented in Table 3.66 are the species recorded/reported from the study area, out of which 4 species belongs to schedule-II, 2 species belongs to schedule-III, 1 species belongs to schedule-V and rest of the species belongs to schedule-IV of Wildlife protection Act, 1972.

3.6.3. Aquatic Ecology

Mining activities will not have an impact on aquatic ecosystems because no effluent discharge from the Limestone mine is planned. There are no natural perennial surface water bodies, such as marshes, rivers, streams, lakes, or agricultural sites, inside the mining lease area. The study region contains a few seasonal bodies of water. There is no aquatic flora and, aquatic faun. Hence, it does not harbour any significant aquatic life. Therefore, the project is not likely to affect the aquatic ecology. Aquatic weeds are found to be growing everywhere in 10 km radius area, in every water bog, pond, etc. Typha angustata can be found growing all along the drains of villages, small water-logged depressions, and agricultural fields lacking water but containing enough moisture to support its growth. And where water is present, Eichhornia crassipes has taken its roots and covers the entire water surface by its sprawl and invasion.

3.6.3.1. Objectives of Aquatic Studies

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

3.6.3.2. Macrophytes

The macrophytes observed within the study area are tabulated in Table 3.67

Table No.3.37 Description of Macrophytes

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

Sources: Species observation in the field study

3.6.3.3. Aquatic Faunal Diversity

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

Table no. 3.38. Amphibians Observed/Recorded from the Study Area

SI. No	Common Name/English Name	Scientific Name	Schedule list wildlife Protection act 1972
1.	Indian Burrowing frog	*Sphaerotheca breviceps*	Schedule IV
2.	Green pond frog	*Euphlyctis hexadactylus*	Schedule IV
3.	Indian Toad	*Bufomelanostictus*	Schedule IV
4.	Skipper	*Euphlyctiscynophlyctis*	Schedule IV

3.6.3.4. Other Aquatic Fauna

3.6.3.5. Fishes

The study area has low aquatic diversity, with few types of fish living. The species of fish reported during the primary visit are Rohu, Catla, Catfish, etc. Species of fish reported in the study area are given in Table No 3.69.

Table 3.39. Based on Actual Sighting, based on inputs from locals and Perused from Secondary Data

S.No	Common name	Scientific name	Family
1.	Ponthia	*Puntius sophore*	Cyprinidae
2.	Catla	*Catla Catla*	Cyprinidae
3.	Catfish	*Siluriformes*	-
4.	Rohu	*Labeo rohita*	Cyprinidae
5.	Eel fish	*Electrophorus electricus*	Gymnotidae

6.8. Findings/Results

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

Records of threatened species in the area

No threatened species were observed

Endangered Species as per Wildlife (Protection) Act

No Endangered fauna was recorded in the project area**.**

Endemic Species of the Project areas

No endemic species were observed in the project area.

Migratory species of the Project areas

No migratory fauna observed in project area.

Migratory corridors and Flight paths

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

Breeding and spawning grounds

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

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

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

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

3.9. Conclusion

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

3.6 SOCIO ECONOMIC ENVIRONMENT

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.

STRUCTURE STUDY IN 500m RADIUS

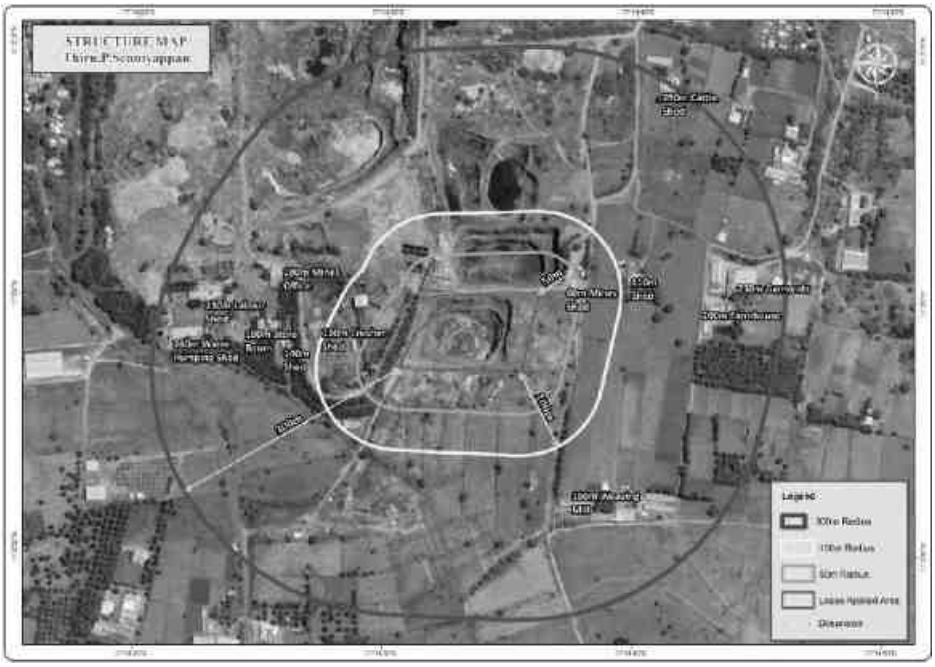
There are few structures within the radius of 500m from the project site, the details of the structures is given below:

TABLE 3.40: STRUCTURES IN 500m RADIUS

Distance	No of Structures	Structure belongs to owner	Structure not belongs to owner	Type of Structure
0 – 50m	1	1	-	1 – Mines Shed
50- 100m	-	-	-	-
100-200m	7	1	6	1 – 110m Shed, 1 – 110m Crusher Shed, 1 – 140m Shed, 1 – 160m Weaving mill , 2 – 180m Mines office & Store Room, 1 – 200m Farm House

200 – 300m	4	-	4	2 – 230m Garments & Labour Shed, 1 – 240m Water Pumping Shed, 1 – 290m Cattle Shed

FIGURE 3.32: STRUCTURE MAP 500m RADIUS



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.
- 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 Study area:

Tirupur is a municipal corporation in the Indian state of Tamil Nadu. It is situated as the capital of the newly declared Tirupur district. The city excels in the ready-made garment industry. Tirupur, the seventh largest city in Tamil Nadu, is a rapidly developing industrial city. Around 20 lakh people live in and around Tirupur. It is one of the major cities in Tamil Nadu. It is also the 7th largest city in Tamil Nadu.

Poomalur Village-Population

Poomalur is a large village located in Palladam Taluka of Tiruppur district, Tamil Nadu with total 2209 families residing. The Poomalur village has population of 7605 of which 3829 are males while 3776 are females as per Population Census 2011.

Sex Ratio of Poomalur Village -Census 2011

In Poomalur village population of children with age 0-6 is 786 which makes up 10.34 % of total population of village. Average Sex Ratio of Poomalur village is 986 which is lower than Tamil Nadu state average of 996. Child Sex Ratio for the Poomalur as per census is 1107, higher than Tamil Nadu average of 943.

Literacy of Poomalur Village

Poomalur village has lower literacy rate compared to Tamil Nadu. In 2011, literacy rate of Poomalur village was 67.49 % compared to 80.09 % of Tamil Nadu. In Poomalur Male literacy stands at 75.64 % while female literacy rate was 59.11 %.

Worker's profile of Poomalur Village

In Poomalur village out of total population, 3960 were engaged in work activities. 89.97 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 10.03 % were involved in Marginal activity providing livelihood for less than 6 months. of 3960 workers engaged in Main Work, 310 were cultivators (owner or co-owner) while 461 were Agricultural labourer.

TABLE 3.41: Population characteristics

Particulars	Total	Male	Female
Total No. of Houses	2,209	-	-
Population	7,605	3,829	3,776
Child (0-6)	786	373	413
Schedule Caste	1,797	880	917
Schedule Tribe	10	4	6
Literacy	67.49 %	75.64 %	59.11 %
Total Workers	3,960	2,612	1,348
Main Worker	3,563	-	-
Marginal Worker	397	166	231

Source: https://www.census2011.co.in/data/village/644809-poomalur-tamil-nadu.html

TABLE 3.42: POPULATION DATA OF STUDY AREA AROUND 10KM RADIUS

Sno	Name	TRU	No House Hold	Total Population	Male Population	Female Population	Child Population	Male Population	Female Population	SC Population	ST Population	Total Literacy	Male Literacy	Female Literacy	Illiteracy	Male Illiteracy	Female Literacy
1	Mangalam (CT)	Urban	4782	17699	8847	8852	2138	1064	1074	2666	4	12970	6907	6063	4729	1940	2789
2	Andipalayam (CT)	Urban	7010	25539	12773	12766	3216	1631	1585	2588	17	18682	9818	8864	6857	2955	3902
3	Iduvai (CT)	Urban	2183	8006	3984	4022	904	462	442	2243	11	5212	2837	2375	2794	1147	1647
4	Muruganpalayam (CT)	Urban	7475	26349	13438	12911	3279	1675	1604	2949	127	18366	10071	8295	7983	3367	4616
5	**Poomalur**	Rural	2209	7605	3829	3776	786	373	413	1797	10	4602	2614	1988	3003	1215	1788
6	velampalayam	Rural	971	3512	1789	1723	369	185	184	497	6	2101	1212	889	1411	577	834
7	Naranapuram	Rural	3862	14018	7047	6971	1674	871	803	2010	4	10117	5456	4661	3901	1591	2310
8	Sukkampalayam	Rural	1247	4420	2238	2182	408	210	198	1136	0	2947	1665	1282	1473	573	900
9	Ichipatti	Rural	2754	9527	4892	4635	1026	527	499	1426	16	6315	3577	2738	3212	1315	1897
10	Kodangipalayam	Rural	1961	6987	3494	3493	770	382	388	1207	0	4614	2568	2046	2373	926	1447
11	Anuppatti	Rural	606	2018	1006	1012	176	81	95	354	0	1336	760	576	682	246	436
12	Kasba Ayyampalayam	Rural	1024	3430	1728	1702	290	147	143	826	0	2451	1358	1093	979	370	609
13	Karadibavi	Rural	1040	3647	1809	1838	313	167	146	958	0	2479	1327	1152	1168	482	686
14	Paruvai	Rural	1098	3778	1909	1869	340	179	161	856	0	2682	1470	1212	1096	439	657
15	Samalapuram (TP)	Urban	5938	20691	10404	10287	2153	1086	1067	3201	44	14332	7879	6453	6359	2525	3834
16	Palladam (M)	Urban	12054	42225	21018	21207	4742	2416	2326	5862	9	31281	16592	14689	10944	4426	6518
	Total		**56214**	**199451**	**100205**	**99246**	**22584**	**11456**	**11128**	**30576**	**248**	**140487**	**76111**	**64376**	**58964**	**24094**	**28352**

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

TABLE 3.43: WORKERS PROFILE OF STUDY AREA

Sno	Name	Total Workers Population	Male Workers	Female Workers	Total Main Workers	Main Workers Male	Main Workers Female	Main Cultivation Workers	Main Agriculture Workers	Main_Household workers	Main Other Workers	Non-Worker Population
1	Mangalam (CT)	7393	5497	1896	7211	5399	1812	32	174	96	6909	10306
2	Andipalayam (CT)	11967	8119	3848	10981	7574	3407	63	192	136	10590	13572
3	Iduvai (CT)	3868	2558	1310	3593	2430	1163	151	305	151	2986	4138
4	Muruganpalayam (CT)	13127	8783	4344	11358	7920	3438	94	167	532	10565	13222
5	**Poomalur**	3960	2612	1348	3563	2446	1117	310	461	195	2597	3645
6	velampalayam	1873	1170	703	1852	1162	690	282	503	164	903	1639
7	Naranapuram	6577	4500	2077	6251	4363	1888	177	401	177	5496	7441
8	Sukkampalayam	2760	1560	1200	2290	1356	934	404	242	154	1490	1660
9	Ichipatti	4980	3290	1690	4825	3225	1600	223	484	582	3536	4547
10	Kodangipalayam	3595	2322	1273	3146	2109	1037	354	463	217	2112	3392
11	Anuppatti	889	634	255	882	631	251	67	188	7	620	1129
12	Kasba Ayyampalayam	1692	1110	582	1372	916	456	251	290	33	798	1738
13	Karadibavi	1842	1153	689	1678	1055	623	143	524	29	982	1805
14	Paruvai	1889	1249	640	1778	1233	545	312	378	188	900	1889
15	Samalapuram (TP)	10508	6858	3650	10021	6644	3377	416	367	326	8912	10183
16	Palladam (M)	18375	13277	5098	16914	12556	4358	140	717	293	15764	23850
	Total	**95295**	**64692**	**30603**	**87715**	**61019**	**26696**	**3419**	**5856**	**3280**	**75160**	**104156**

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

TABLE 3.44: EDUCATIONAL FACILITIES IN THE STUDY AREA

SI	Village Name	PPS		PS		MS		SS		SSS		DC		EC		MC		MI		PT		VTS		SSD	
		G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P	G	P
1	Mangalam (CT)	1	2	1	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	Andipalayam (CT)	1	2	1	2	1	2	1	2	2	2	2	2	2	1	2	1	2	1	2	2	2	2	2	2
3	Iduvai (CT)	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
4	Muruganpalayam (CT)	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	**Poomalur**	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
6	velampalayam	1	2	1	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
7	Naranapuram	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
8	Sukkampalayam	1	2	1	1	1	1	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2
9	Ichipatti	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	Kodangipalayam	1	2	1	2	1	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	2	2	2	2
11	Anuppatti	1	2	1	1	1	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	Kasba Ayyampalayam	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
13	Karadibavi	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
14	Paruvai	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
15	Samalapuram (TP)	1	2	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
16	Palladam (M)	1	1	1	1	1	1	2	2	2	2	2	1	2	1	2	2	2	2	2	1	2	2	2	2

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

TABLE 3.45: MEDICAL FACILITIES IN THE STUDY AREA

SI. No.	Village Name	CHC	PHC	PHSC	MCW	TBC	HA	HAM	D	VH	MHC	FWC	NGM-I/O
1	Mangalam (CT)	1	1	1	0	0	0	0	0	0	0	0	b
2	Andipalayam (CT)	1	1	1	0	0	0	0	0	0	0	0	b
3	Iduvai (CT)	0	1	1	1	1	0	0	1	0	0	1	
4	Muruganpalayam (CT)	0	1	0	0	0	0	0	0	0	0	0	c
5	**Poomalur**	0	0	0	0	0	0	0	0	0	0	0	c
6	velampalayam	0	0	1	0	0	0	0	0	0	0	0	c
7	Naranapuram	0	1	1	0	0	0	0	0	0	0	0	c
8	Sukkampalayam	0	0	1	0	0	0	0	0	0	0	0	a
9	Ichipatti	0	0	0	0	0	0	0	0	0	0	0	b
10	Kodangipalayam	0	1	1	1	1	0	0	1	0	0	1	
11	Anuppatti	0	0	1	1	0	0	0	0	0	0	0	a
12	Kasba Ayyampalayam	0	0	0	0	0	0	0	0	1	0	0	c
13	Karadibavi	0	0	1	0	0	0	0	0	1	0	0	c
14	Paruvai	0	0	1	0	0	0	0	0	1	0	0	c
15	Samalapuram (TP)	0	1	1	0	0	0	0	0	0	0	0	b
16	Palladam (M)	1	1	3	0	0	0	0	0	0	0	0	a

Abbreviations: CHC-Community Health Centre; TBC-TB Clinic; VH- Veternity Hospital; PHC-Primary Health Centre; HA-Aallopathic Hospital; FWC-Family Welfare Centre; PHSC-Primary Health Sub Centre ; HAM-Alternative Medicine Hospital; MH-Mobile Health Clinic; MCW-Maternity and Child Welfare Centre; D-Dispensary; NGM-I/O-Non Government Medical Facilities In & Out Patient
Note – 1 - Available within the village; 2 - Not available a-facility available at <5kms b-facility available at>10kms
Source: www.censusindia.gov.in - Tamilnadu Census of India – 2011

3.6.6 Recommendation and Suggestion

- The main activities in the area are agriculture, quarry operation and Crushing units there are 3Numbers of quarries operated in the region and now only 1 quarry is operating at present which will expire lease period in 2027 December. Hence starting up of new mine in this region is necessary at current scenario
- 4 number of Crushers operating within 1km and the demand of rough stone is high to the crushing units 100 Nos of peoples depending upon the crushing units in the area and crushers are meeting scarcity due to supply demand in the region.
- Due to the project about 21 Nos of peoples will benefitted directly due to employment and more than 20 Nos of peoples and Crushers will benefitted through this project
- As part of CER activities proponent intends to spend Rs 5 Lakhs for the improvement of School sanitation facilities, Greenbelt development and other needs.
- At the end of the life of the mine the mined-out pit will act as temporary reservoir, the collected rain water in the mine pit may utilized for the nearby agriculture lands.

Apart from the following general activities will be conducted

- 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.
- While developing an Action Plan, it is very important to identify the population who falls under the marginalized and vulnerable groups. So that special attention can be given to these groups with special provisions while making action plans.

3.6.7 Summary & Conclusion

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

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

- 0.92.0 Ha of the land will be under mining sine 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 causes the siltation of water course

4.1.2 Mitigation Measures

- The 0.92.0 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 benefitted by the supply of water
- About 600 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 sediment and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.
- Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season.

4.1.6 Waste Dump Management

There is no waste anticipated in this Rough Stone and gravel 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
- 1.4 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 setting tank of 15 m x 10m x 3m to remove suspended solids if any. This collected water will be judiciously used for dust suppression and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judicially utilize the rainwater as part of rainwater harvesting system.
- Periodic (every 6 month once) analysis of quarry pit water and ground water quality in nearby villages.
- Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits.
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes.
- De-silting will be carried out before and immediately after the monsoon season.

4.3 AIR ENVIRONMENT

4.3.1. Anticipated Impact

- During mining, at various stages activities such as excavation, drilling, blasting, and transportation of materials, particular matter (PM), gases such as Sulphur dioxide, oxides of Nitrogen from vehicular exhaust are the main air pollutants.
- Emissions of noxious gases due to incomplete detonation of explosive may sometimes pollute the air.
- The fugitive dust released from the mining operations may cause effect on the mine workers who are directly exposed to the fugitive dust.
- Simultaneously, the air-borne dust may travel to longer distances and settle in the villages located near the mine lease area.

4.3.1.1. Modelling of Incremental Concentration from all Proposed Projects

Wind erosion of the exposed areas and the air borne particulate matter generated by quarrying operation, and transportation are mainly PM_{10} & $PM_{2.5}$ and emissions of Sulphur dioxide (SO_2) & Oxides of Nitrogen (NOx) due to excavation/loading equipment and vehicles plying on haul roads are the cause of air pollution in the project area.

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

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

AERMOD Software.

Prediction of impacts on air environment has been carried out taking into consideration cumulative production all the quarries falls 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 Rough Stone. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 4-2.

4.3.2 Frame work of Computation & Model details

Suspended Particulate Matter (SPM) is the major pollutant occurred during quarrying activities. The prediction included the impact of Excavation, Drilling, Blasting (Occasionally), loading and movement of vehicles during transportation and meteorological parameters such as wind speed, wind direction, temperature, rainfall, humidity and Cloud cover.

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

TABLE 4.1: ESTIMATED EMISSION RATE

PM_{10}			
Activity	**Source type**	**Value**	**Unit**
Drilling	Point Source	0.057163476	g/s
Blasting	Point Source	0.000147641	g/s
Mineral Loading	Point Source	0.037230613	g/s
Haul Road	Line Source	0.002484835	g/s/m
Overall Mine	Area Source	0.041269987	g/s
So2	Point Source	0.000173413	g/s
Nox	Point Source	0.000004876	g/s

FIGURE 4.1: AERMOD TERRAIN MAP

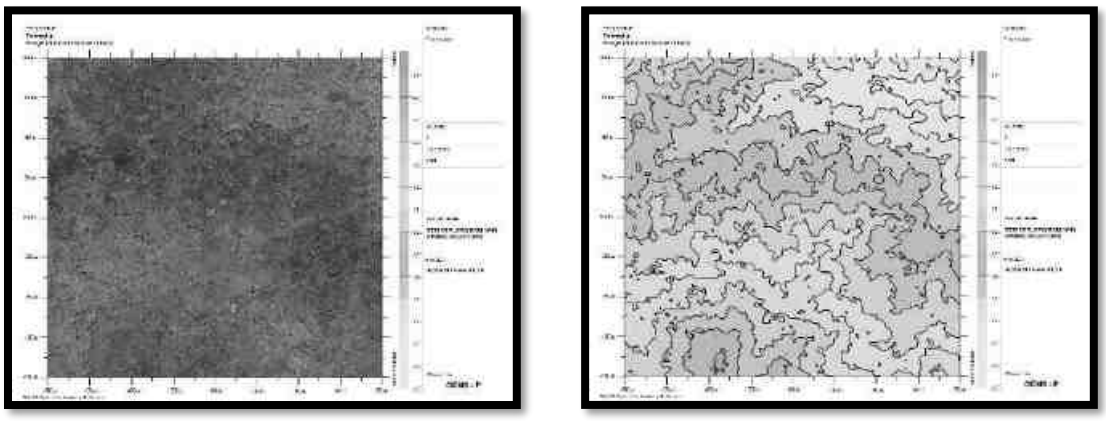


FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM_{10}

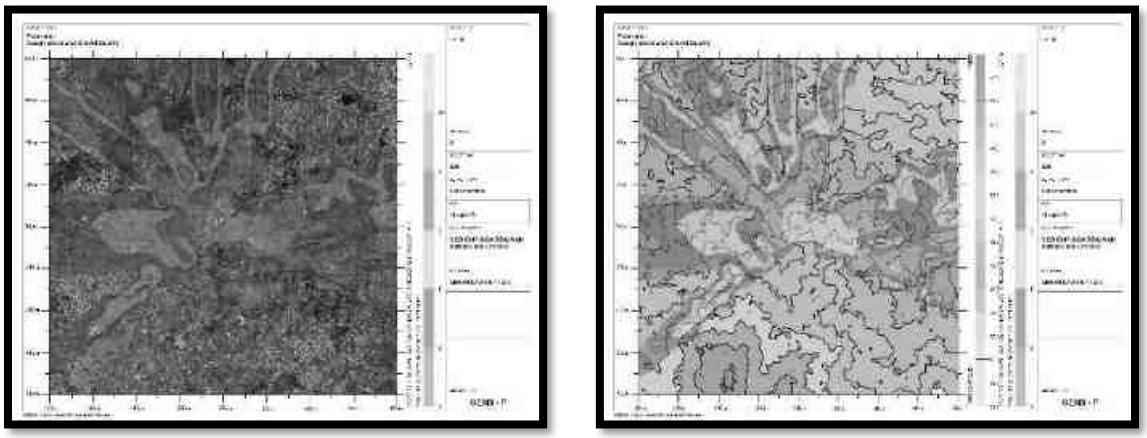


FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF PM_{25}

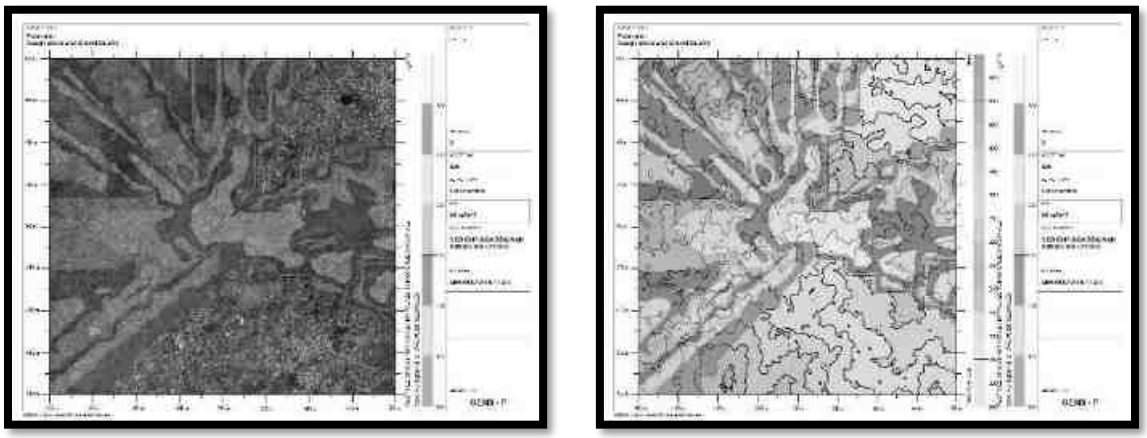


FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF NO_X

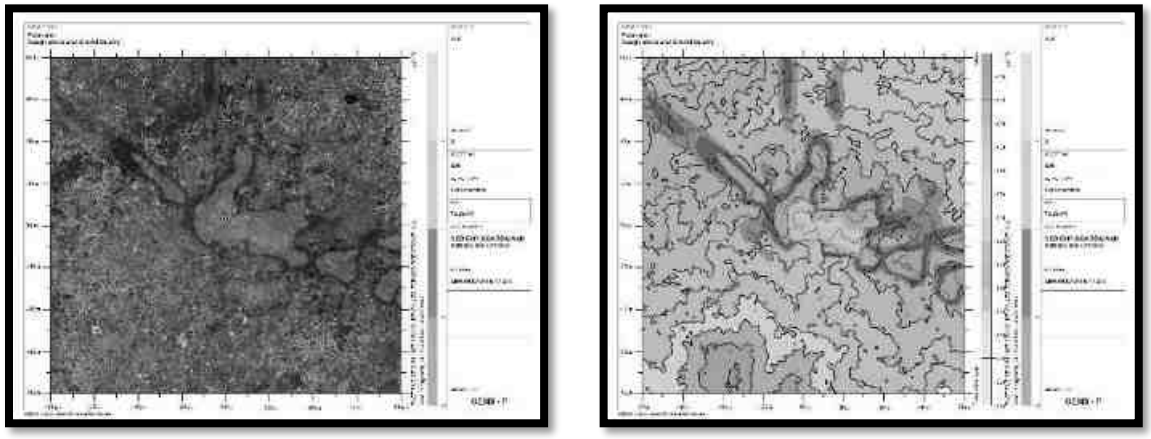


FIGURE 4.5: PREDICTED INCREMENTAL CONCENTRATION OF So2

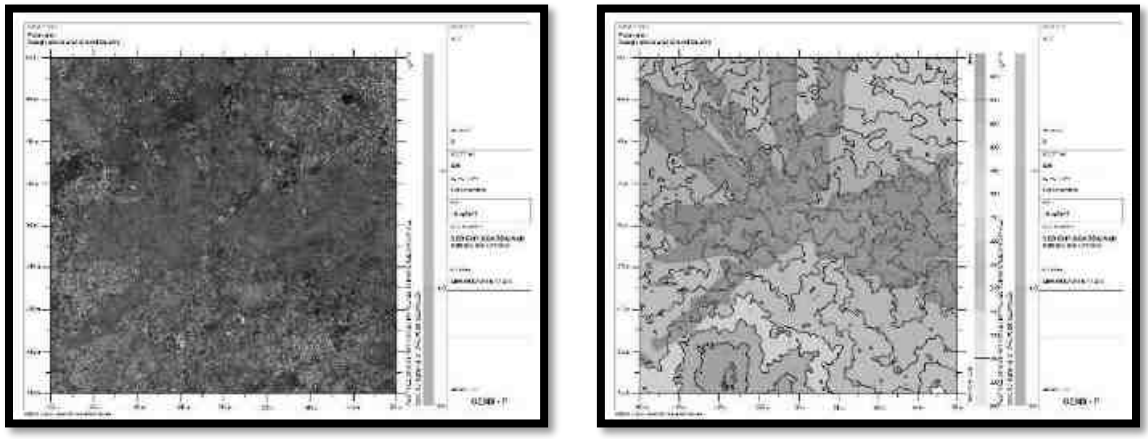
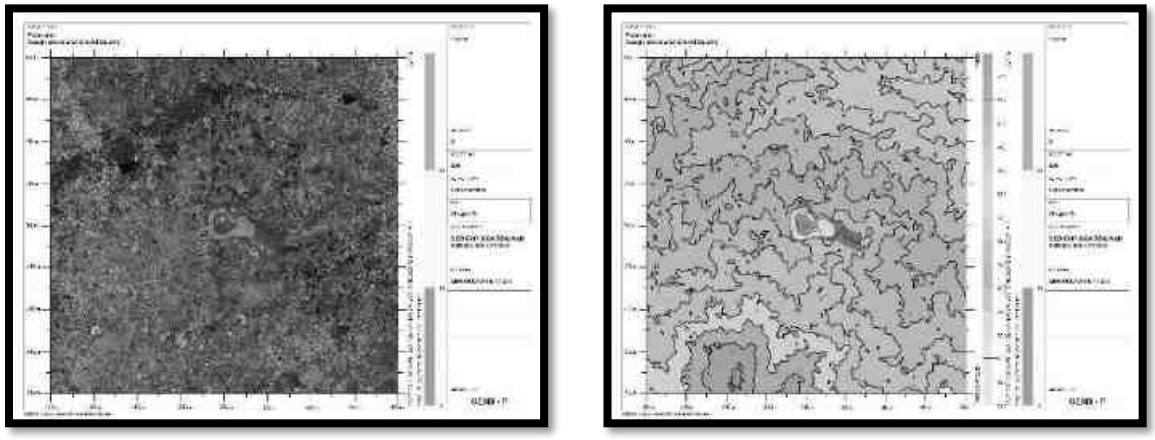


FIGURE 4.6: PREDICTED INCREMENTAL CONCENTRATION OF FUGITIVE DUST



4.3.2.1 Model Results

The post project Resultant Concentrations of PM_{10}, $PM_{2.5}$, SO_2 & NO_X (GLC) is given in Table below:

TABLE 4.2: INCREMENTAL & RESULTANT GLC OF PM_{10}

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM_{10} ($\mu g/m^3$)	Incremental value of PM_{10} due to mining ($\mu g/m^3$)	Total PM_{10} ($\mu g/m^3$)
AAQ1	11° 2'57.41"N 77°14'31.57"E	-79	-43	43.8	10.88	54.7
AAQ2	11° 3'11.82"N 77°14'47.74"E	412	402	42.4	0.76	43.2
AAQ3	11° 1'21.85"N 77°12'39.48"E	-3511	-2993	42.5	5.74	48.2
AAQ4	11° 4'57.44"N 77°15'13.05"E	1188	3669	42.2	9.43	51.6
AAQ5	11° 3'0.86"N 77°11'5.65"E	-6378	65	43.0	3.19	46.2
AAQ6	11° 1'51.21"N 77°17'9.83"E	4758	-2087	43.0	10.21	53.2
AAQ7	11° 3'8.99"N 77°16'36.57"E	3739	317	42.6	8.6	51.2

TABLE 4.3: INCREMENTAL & RESULTANT GLC OF PM2.5

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline $PM_{2.5}$ ($\mu g/m^3$)	Incremental value of $PM_{2.5}$ due to mining ($\mu g/m^3$)	Total $PM_{2.5}$ ($\mu g/m^3$)
AAQ1	11° 2'57.41"N 77°14'31.57"E	-79	-43	18.0	4.92	23.0
AAQ2	11° 3'11.82"N 77°14'47.74"E	412	402	18.4	1.22	19.6
AAQ3	11° 1'21.85"N 77°12'39.48"E	-3511	-2993	18.2	2.83	21.0
AAQ4	11° 4'57.44"N 77°15'13.05"E	1188	3669	18.4	3.9	22.3
AAQ5	11° 3'0.86"N 77°11'5.65"E	-6378	65	43.0	1.87	44.9
AAQ6	11° 1'51.21"N 77°17'9.83"E	4758	-2087	42.6	4.46	47.1
AAQ7	11° 3'8.99"N 77°16'36.57"E	3739	317	18.1	3.72	21.8

TABLE 4.4: INCREMENTAL & RESULTANT GLC OF SO2

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline SO_2 ($\mu g/m^3$)	Incremental value due to mining ($\mu g/m^3$)	Total SO_2 ($\mu g/m^3$)
AAQ1	11° 2'57.41"N 77°14'31.57"E	-79	-43	6.0	1.48	7.4
AAQ2	11° 3'11.82"N 77°14'47.74"E	412	402	5.8	0	5.8
AAQ3	11° 1'21.85"N 77°12'39.48"E	-3511	-2993	5.6	0.6	6.2
AAQ4	11° 4'57.44"N 77°15'13.05"E	1188	3669	6.1	1	7.1
AAQ5	11° 3'0.86"N 77°11'5.65"E	-6378	65	6.1	0.27	6.3
AAQ6	11° 1'51.21"N 77°17'9.83"E	4758	-2087	6.0	1.23	7.2
AAQ7	11° 3'8.99"N 77°16'36.57"E	3739	317	6.0	0.89	6.9

TABLE 4.5: INCREMENTAL & RESULTANT GLC OF NO_X

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline NOx ($\mu g/m^3$)	Incremental value due to mining ($\mu g/m^3$)	Total NOx ($\mu g/m^3$)
AAQ1	11° 2'57.41"N 77°14'31.57"E	-79	-43	19.9	7.69	27.6
AAQ2	11° 3'11.82"N 77°14'47.74"E	412	402	19.9	0	19.9
AAQ3	11° 1'21.85"N 77°12'39.48"E	-3511	-2993	20.0	1.49	21.5
AAQ4	11° 4'57.44"N 77°15'13.05"E	1188	3669	19.6	3.71	23.3
AAQ5	11° 3'0.86"N 77°11'5.65"E	-6378	65	19.7	0	19.7
AAQ6	11° 1'51.21"N 77°17'9.83"E	4758	-2087	19.7	6.14	25.8
AAQ7	11° 3'8.99"N 77°16'36.57"E	3739	317	19.3	3	22.3

TABLE 4.6: INCREMENTAL & RESULTANT GLC OF FUGITIVE DUST

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Fugitive ($\mu g/m^3$)	Incremental value due to mining ($\mu g/m^3$)	Total Fugitive Dust ($\mu g/m^3$)
AAQ1	11° 2'57.41"N 77°14'31.57"E	-79	-43	64.45	21	85.5
AAQ2	11° 3'11.82"N 77°14'47.74"E	412	402	64.43	0	64.4
AAQ3	11° 1'21.85"N 77°12'39.48"E	-3511	-2993	63.91	0	63.9
AAQ4	11° 4'57.44"N 77°15'13.05"E	1188	3669	65.29	0	65.3
AAQ5	11° 3'0.86"N 77°11'5.65"E	-6378	65	66.67	0	66.7
AAQ6	11° 1'51.21"N 77°17'9.83"E	4758	-2087	69.02	0	69.0
AAQ7	11° 3'8.99"N 77°16'36.57"E	3739	317	70.11	0	70.1

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

4.3.4. Mitigation Measures

Drilling – To control dust at source, wet drilling will be practiced. Where there is a scarcity of water, suitably designed dust extractor will be provided for dry drilling along with dust hood at the mouth of the drill-hole collar.

Advantages of Wet Drilling: -

- In this system dust gets suppressed close to its formation. Dust suppression become very effective and the work environment will be improved from the point of occupational comfort and health.
- Due to dust free atmosphere, the life of engine, compressor etc., will be increased.
- The life of drill bit will be increased.
- The rate of penetration of drill will be increased.
- Due to the dust free atmosphere visibility will be improved resulting in safer working conditions.

Blasting –

- Establish time of blasting to suit the local conditions and water sprinkling on blasting face
- Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas

- Controlled blasting includes Adoption of suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone and restricting blasting to a particular time of the day i.e. at the time lunch hours, controlled charge per hole as well as charge per round of hole
- Before loading of material water will be sprayed on blasted material
- Dust mask will be provided to the workers and their use will be strictly monitored

Haul Road & Transportation –

- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with taurpaulin
- 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-metaled 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 –

- 680 Nos 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 drilling & blasting and plying of trucks & HEMM. These activities will not cause any problem to the inhabitants of this area because there is no human settlement within 300m radius from the project site. Noise modelling has been carried out considering blasting and compressor operation (drilling) and transportation activities.

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

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

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

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

Where:

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

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

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

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	Yes	94
2	Jack Hammer	Yes	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 nose prediction modelling.

TABLE 4.8: PREDICTED NOISE INCREMENTAL VALUES

Location ID	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**
Maximum Monitored Value (Day) dB(A)	56.6	54.7	55.4	53.9	54.9	53.9	54.7
Incremental Value dB(A)	50.56	46.48	27.04	29.73	24.54	26.12	30.00
Total Predicted Noise level dB(A)	57.56	55.31	55.41	53.92	54.90	53.91	30.00

The incremental noise level is found within the range of 50.56 dB (A) in Core Zone and 24.54 – 46.48 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

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

4.4.3 Ground Vibrations

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

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

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

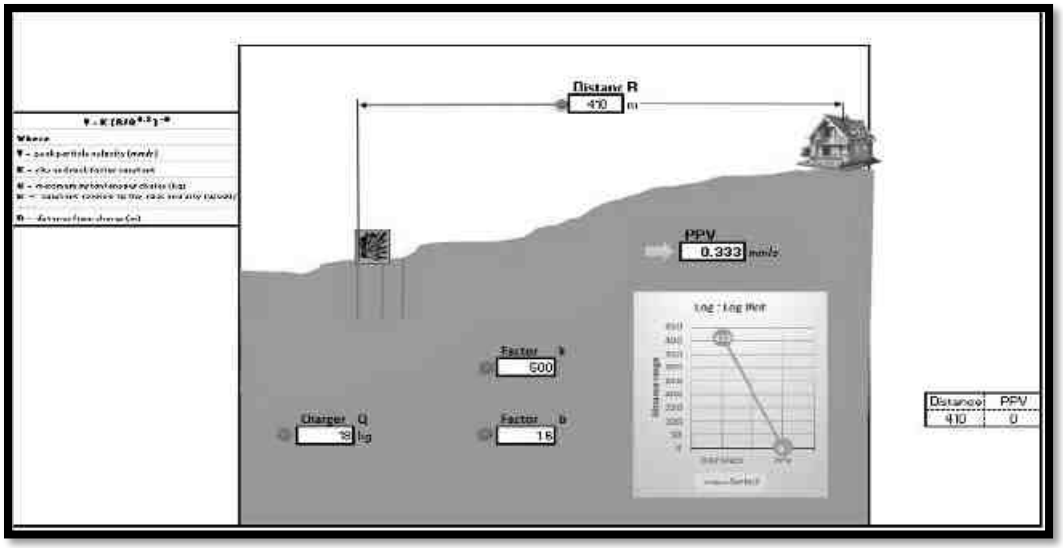
$$V = K\,[R/Q^{0.5}]^{-B}$$

Where –
V = peak particle velocity (mm/s)
K = site and rock factor constant
Q = maximum instantaneous charge (kg)
B = constant related to the rock and site (usually 1.6)
R = distance from charge (m)

TABLE 4.9: PREDICTED PPV VALUES DUE TO BLASTING

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	18	410-NE	0.333

FIGURE 4.6: GROUND VIBRATION PREDICTION



From the above graph, the charge per blast of 18 kg is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. But the all the project proponents ensure that the charge per blast shall be less than 85 kg and carry out blasting twice or thrice a day based on the onsite conditions under the supervision of competent person employed. However, as per statutory requirement control measures will be adopted to avoid the impacts due to ground vibrations and fly rocks due to blasting**.**

4.4.3.1 Mitigation Measures

- It is proposed to carry out blasting operation 20kg per round so that the vibration will be minimal
- The mining operation will be carried out without deep hole drilling, 25mm small dia cartridge will be utilized for the blasting
- The blasting operations in the project site without deep hole drilling and blasting using delay detonators, which reduces the ground vibrations;
- Proper quantity of explosive, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting;
- Adequate safe distance from blasting will be maintained as per DGMS guidelines;
- Blasting shelter will be provided as per DGMS guidelines;
- Blasting operations will be carried out only during day time;
- The charge per delay will be minimized and preferably a greater number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity will be temporarily stopped;
- Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast;
- A fully trained explosives blast man (Mining Mate, Mines Foreman, 2nd Class Mines Manager/ 1st Class Mines Manager) will be appointed.

- A set of shot firing rules will be drawn up and blasting shall commence outlining the detailed operating procedures that will be followed to ensure that shot firing operations on site take place without endangering the workforce or public.
- The detonators will be connected in a predetermined sequence to ensure that only one charge is detonated at any one time and a NONEL or similar type initiation system will be used.
- The detonation delay sequence shall be designed so as to ensure that firing of the holes is in the direction of free faces so as to minimise vibration effects.
- Appropriate blasting techniques shall be adopted such that the predicted peak particle velocity shall not exceed 8 mm/s.
- Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices

4.5 BIOLOGICAL ENVIRONMENT

There is a requirement to establish a stable ecosystem with both ecological and economic returns. Minimization of soil erosion and dust pollution enhances the beauty of the core and the buffer zone. To achieve this, it is planned to increase plantation activities. The basic objectives of plantations are as follows:-

- Improvement of Soil quality
- Quick vegetative cover to check soil erosion
- Improvement in mining site stability
- Conservation of biological diversity
- As dust receptor which likely to produce during mining.

4.5.2 Mitigation Measures

4.5.2.1. General Guidelines for Green Belt Development

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.

- Plants that grow fast will be preferred.
- Preference for high canopy covers plants with local varieties.
- Perennial and evergreen plants will be preferred.
- The development of the Green Belt is an important aspect for any plant because:
    - **a.** It improves the ambient air quality by controlling Suspended Particulate Matter (SPM) in the air.
    - **b.** It helps in noise abatement for the surrounding area.
    - **c.** It helps in the settlement of new birds and insects within itself.
    - **d.** It maintains the ecological balance.
    - **e.** It increases the aesthetic value of the site.

4.5.2.2. Species Recommendation for Plantation granted in the district.

Following points have been considered while recommending the species for plantation

- The natural growth of existing species and the survival rate of various species.
- Suitability of a particular plant species for a particular type of area.
- Creating biodiversity.
- Fast-growing, thick canopy copy, perennial, and evergreen large leaf area.
- Efficient in absorbing pollutants without major effects on natural growth.
- The following species may be considered primary for plantations best suited for the prevailing climate condition in the area.

Table No 4.1. List of plant species proposed for Greenbelt development

S. No	Name of the plant (Botanical)	Family Name	Common Name	Habit
1.	*Cassia roxburghii*	Fabaceae	Sengondrai	T
2.	*Syrygium cumini*	Myrtaceae	Naval	T
3.	*Morinda pubescens*	Rubiaceae	Nuna	T
4.	*Thespesia Populnea*	Malvaceae	Puvarasu	T
5.	*Borassus flabellifer*	Arecaceae	Panai	T
6.	*Saraca asoca*	Fabaceae	Asoca	T
7.	*Limonia acidissima*	Rutaceae	Odhiam	T
8.	*Lannea coromandelica*	Anacardiaceae	Vila maram	T
9.	*Pongamia pinnata*	Fabaceae	Pungam	T
10.	*Pterocarpus marsupium*	Fabaceae	Vengai	T

4.5.3. Anticipated Impact on Fauna

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

4.5.3.1. 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 for 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.

4.5.3.2. Mitigation Measures

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

4.5.4. Impact on Aquatic Biodiversity

Mining activities will not disturb the aquatic ecology as there is no effluent discharge proposed from the Rough stone & Gravel quarry. There is no natural perennial surface water body within the mine lease area, like wetlands, rivers streams, lakes, and farmer sites. There is no impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. Kindly refer the Chapter 3, clause No 3.6.3**.** Aquatic biodiversity is observed in the study area.

Table No. 4.3. Overall Ecological impact assessments of Poomalur Village, Rough stone & Gravel quarry, Palladam Taluk, Tiruppur District.

S.No	Attributes	Assessment
1.	Impact of mining activity on agricultural land nearby the proposed project site.	Agricultural land is located away from the proposed project site. There are no impacts on the agricultural land & Horticulture and livestock. Kindly refer to the conclusion.
2.	Impact on soil flora & vegetation around the project site.	'No '
3.	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.
4.	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.
5.	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/ coastline/estuary/sea	'No '
6.	The proposed project restricts access to waterholes for wildlife	'No '
7.	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.

8.	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.
9.	Risk of fall/slip or cause death to wild animals due to project activities.	'No'
10.	The project release effluents into a water body that also supplies water to a wildlife.	No water body near to core zone so the chances of water becoming polluted is low.
11.	Mining projects affect the forest-based livelihood/ any specific forest product on which local livelihood depended.	'No'
12.	The project likely to affect migration routes.	'No 'migration route observed during the monitoring period.
13.	The project is likely to affect the flora of an area, which have medicinal value	'No'
14.	Forestland is to be diverted, has carbon high sequestration.	'No 'There was no forest land diverted.
15.	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 4.12: RECOMMENDED SPECIES FOR GREENBELT DEVELOPMENT PLAN

SI.No	Name of the plant (Botanical)	Family Name	Common Name	Habit
1	*Azadirachta indica*	Meliaceae	Neem, Vembu	Tree
2	*Albiziafalcatoria*	Fabaceae	Tamarind, Puliyamaram	Tree
3	*Polyalthialongifolia*	Annonaceae	Kattumaram	Tree
4	*Borassus Flabellifer*	Arecaceae	Palmyra Palm	Tree

The 7.5m Safety distance along the boundary has been identified to be utilized for subsequent Afforestation. However, the afforestation should always be carried out in a systematic and scientific manner. Regional trees like Neem, Pongamia, Pinnata will be planted along the Lease boundary and avenue plantation will be carried out in the project site. The rate of survival expected to be 80% in this area. Greenbelt development Plan is given in

TABLE 4.13: GREENBELT DEVELOPMENT PLAN

Year	No. of tress proposed to be planted	Considering survival rate of 80% additionally 20% of plantation is proposed	Area to be covered in m^2	Name of the species
I	600	720	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development.	Neem, Pongamia Pinnata etc.,

4.6 SOCIO ECONOMIC

4.6.1 Anticipated Impact

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

4.6.2 Mitigation Measures

- Good maintenance practices will be adopted for all machinery and equipment, which will help to avert potential noise problems.
- Green belt will be developed in and around the project site as per Central Pollution Control Board (CPCB) guidelines.
- Air pollution control measure will be taken to minimize the environmental impact within the core zone.
- For the safety of workers, personal protective appliances like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear protecting devices will be provided as per mines act and rules.
- Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc.., from this project directly and indirectly.
- From above details, the quarry operations will have highly beneficial positive impact in the area

4.7 OCCUPATIONAL HEALTH AND SAFETY

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

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

4.7.1 Respiratory Hazards

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

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

4.7.2 Noise

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

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

4.7.3 Physical Hazards

The following measures are proposed for control of physical hazards

- Specific personnel training on work-site safety management will be taken up;
- Work site assessment will be done by rock scaling of each surface exposed to workers to prevent accidental rock falling and / or landslide, especially after blasting activities;
- Natural barriers, temporary railing, or specific danger signals will be provided along rock benches or other pit areas where work is performed at heights more than 2m from ground level;

- Maintenance of yards, roads and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be taken up

4.7.4 Occupational Health Survey

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

- General physical tests
- Audiometric tests
- Full chest, X-ray, Lung function tests, 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 42m bgl and the life of the mine is 10 years, 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 0.72.6Ha 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 discharge likely to cause adverse impacts is predicted in advance, appropriate mitigation measures like settling of suspended solids or passive treatment to improve water quality as well as quantity, etc., could be planned. Monitoring should demonstrate that there is no adverse effect of pollutant concentrations exceeding the statutory limits for the water, soil and air qualities in the area around the closed mine.

4.9.1.3 Biological Stability

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

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

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

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

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.0 INTRODUCTION

Consideration of alternatives to a project proposal is a requirement of EIA process. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives helps to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost-effective options.

5.1 FACTORS BEHIND THE SELECTION OF PROJECT SITE

The surrounding areas already undergone quarrying operation, there are 4-5 Crushers within the radius of 1km. Most of the quarries in the regions are Existing quarries. Hence this quarry will feed the rough stone material to the crushing units.

The Rough Stone and Gravel Quarry Project for excavation of Rough Stone, 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 drilling and blasting method will be used to extract Rough Stone in the area. All the applied mining lease areas have following advantages –

- As the mineral deposition is homogeneous and batholith formation, therefore opencast method of working is preferred over underground method
- The material will be loaded with the help of excavators into dumpers / trippers and transported to the needy customers.
- Blasting and availability of drills along with controlled blasting technology gives desired fragmentation so that the mineral is handled safely and used without secondary blasting.
- Semi-skilled labours fit for quarrying operations are easily available around the nearby villages.

5.4 ANALYSIS OF ALTERNATIVE TECHNOLOGY

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

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 in all the proposed quarries.

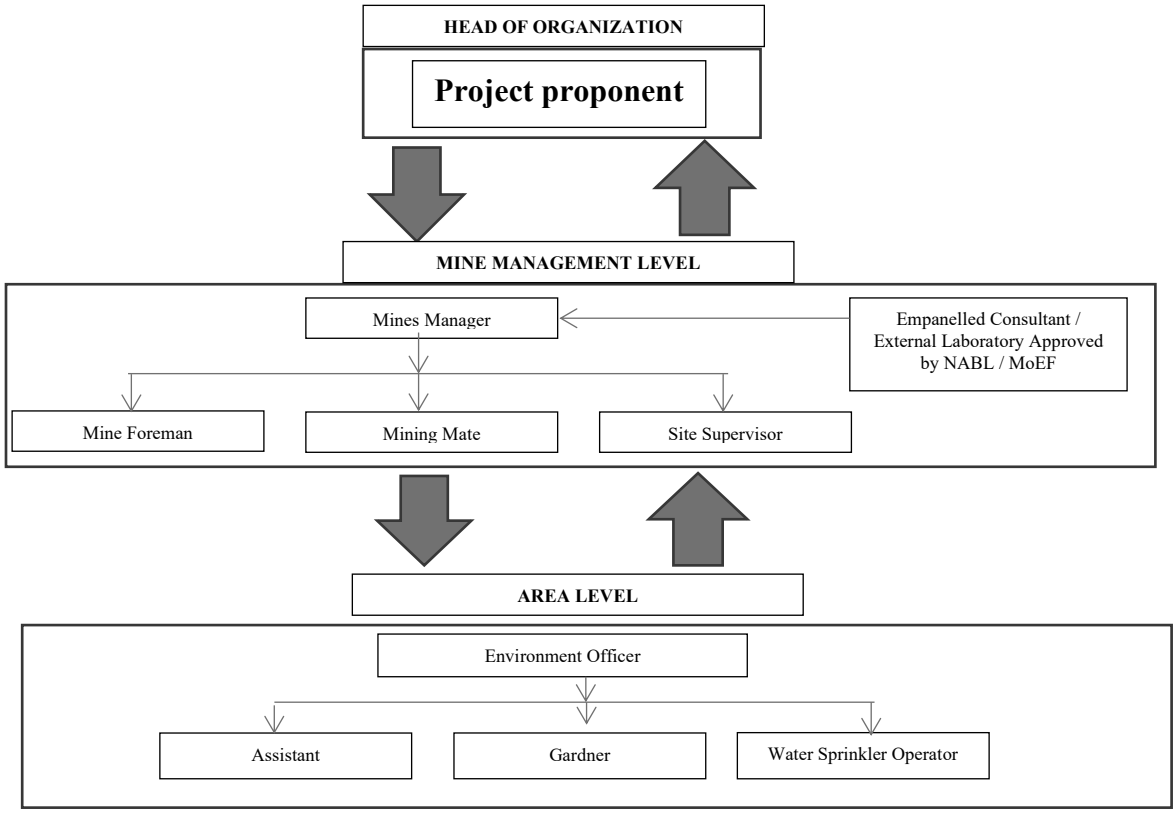
The responsibilities of this cell will be:

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

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

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

FIGURE 6.1: PROPOSED ENVIRONMENTAL MONITORING CELL



6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

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

TABLE 6.1 IMPLEMENTATION SCHEDULE

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

6.3 MONITORING SCHEDULE AND FREQUENCY

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 FOR P1

S.No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, $PM_{2.5}$, PM_{10}, SO_2 and NO_x.
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	–	During blasting Operation	Peak Particle Velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

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

6.4 BUDGETARY PROVISION FOR EMP

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

The proposed capital cost for Environmental Monitoring Programme is Rs 76,000/- and the recurring cost is Rs 3,80,000/- per annum for each Proposed Project.

TABLE 6.3 ENVIRONMENT MONITORING PROGRAM BUDGET

PROPOSAL – P1			
Sl.No.	**Parameter**	**Capital Cost**	**Recurring Cost per annum**
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		

3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**

Source: Approved Mining Plan

6.5 REPORTING SCHEDULES OF MONITORED DATA

The monitored data on air quality, water quality, noise levels and other environmental attributes will be periodically examined by the 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
- Post-COVID Health Management Plan

7.1. PUBLIC CONSULTATION

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

7.2 RISK ASSESSMENT

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

The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad for all proposed projects. Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening.

Factors of risks involved due to human induced activities in connection with these proposed mining & allied activities with detailed analysis of causes and control measures for the mine is given in below Table 7.1.

TABLE 7.1 RISK ASSESSMENT& CONTROL MEASURES

S. No	Risk factors	Causes of risk	Control measures
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations; Workers will be sent to the Training in the nearby Group Vocational Training Centre Entry of unauthorized persons will be prohibited; Fire-fighting and first-aid provisions in the mine office complex and mining area;

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

		While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	All vehicles should be fitted with reverse horn with one spotter at every tipping point Loading according to the vehicle capacity Periodical maintenance of vehicles as per operator manual
6	Natural calamities	Unexpected happenings	Escape Routes will be provided to prevent inundation of storm water Fire Extinguishers & Sand Buckets
7	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m height.

Source: Analysed and Proposed by FAE & EC

7.3 DISASTER MANAGEMENT PLAN

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

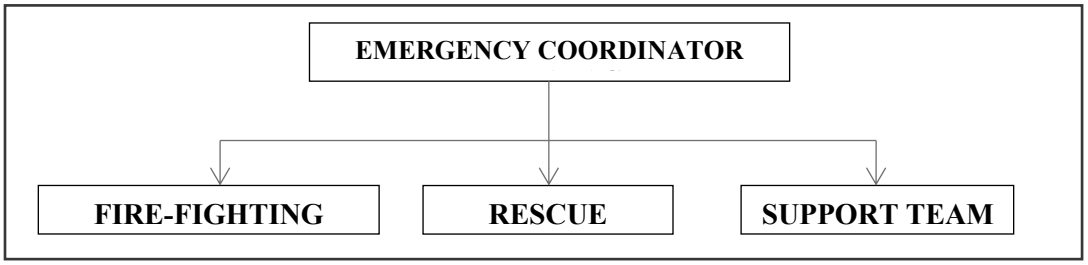
The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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

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

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

FIGURE 7.1: DISASTER MANAGEMENT TEAM LAYOUT



The emergency organization shall be headed by emergency coordinator who will be qualified competent mine manager. In his absence senior most people available at the mine shall be emergency coordinator till arrival of

mine manager. There would be three teams for taking care of emergency situations – Fire-Fighting Team, Rescue Team and Support Team. The proposed composition of the teams is given in Table 7.2.

TABLE 7.2: PROPOSED TEAMS TO DEAL WITH EMERGENCY SITUATION

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

Once the mine becomes operational, the above table along with names of personnel will be prepared and made easily available to workers. 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 QUARRY					
CODE	**Name of the Owner**	**Village**	**S.F. Nos**	**Extent in Ha**	**Status**
P1	**Thiru. P. Senniyappan**	Poomalur	302/1A, 303/2A1, 303/2A2B(Part) & 302/1B	1.19.5	**Lr No.SEIAA-TN/F.No.10177/SEAC/ToR-1528/2023 Dated:09.08.2023**
			TOTAL EXTENT	**1.19.5**	
EXISTING QUARRIES					
CODE	**Name of the Owner**	**Village**	**S.F. Nos**	**Extent in Ha**	**Status**
E-1	Thiru.K.V.Velusamy	Poomalur	303/1(P)	1.29.0	EC granted Lr.No.SEIAA-TN/F.No.7741/(a)/EC.No:5350/2022 dated :10.10.2022
E-2	Thiru.B.S. Mohanraj	Poomalur	304/2(P), 303/2A2A	1.74.5	EC granted Lr.No.SEIAA-TN/F.No.7737/(a)/EC.No:5067/2021dated :23.05.2022
E-3	Tmt.G.Vijayalakshmi	Poomalur	305/1 (P), 307/1 (P), 307/2 (P)	1.83.90	EC granted Lr.No.SEIAA-TN/F.No.7366 /EC.No:5169/2022 dated :26.07.2022
			TOTAL EXTENT	**4.87.4**	
ABANDONED / EXPIRED QUARRIES					
NIL					
			TOTAL CLUSTER EXTENT	**6.06.9Ha**	

- **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. P. Senniyappan Rough stone and Gravel quarry	
S.F. No.	302/1A, 303/2A1, 303/2A2B(Part) & 302/1B	
Extent	1.19.5 ha	
Village Taluk and District	Poomalur Village, Palladam Taluk, Tiruppur District.	
Land Type	Proponent own patta land	
Land Ownership	It is a Patta land, registered name of the applicant (Thiru.P.Senniyappan) Vide patta No 1084,652 & 3240	
Existing quarry operation	It is a fresh lease application but, the applied area has been considered quarrying operation earlier. The quarry lease was previously granted in favour of Thiru. P.Senniyappan (Same applicant), over an extent of 0.68.5 Hectares of Patta lands in S.F.Nos. 302/1A and 303/2A1 of Poomalur Village, Palladam Taluk, Tiruppur District vide District Collector's Proceedings Rc.No.440/Mines/2016, Dated: 28.03.2018 for the period of five years from 28.03.2018 to 27.03.2023 for quarrying of Rough Stone and Gravel. The applicant has obtained Environmental Clearance from the District Level Environment Impact Assessment Authority, Tamil Nadu vide letter No. DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018 (Refer Annexure No. VII). Now the applicant has applied a quarry lease on 23.07.2021 for the period of five years over an extent of 1.19.50 Ha.	
EC certificate	Letter No DEIAA – TPR / F.No. 601/2 (VIII) / 2017 dated: 08.03.2018	
Explosive certificate	S.S & CO EXPLOSIVES E/SC/TN22/648 (E88325)	
Toposheet No	58 - E/04	
Latitude between	**11°02'57.06"N to 11°03'00.21"N**	
Longitude between	**77°14'31.04"E to 77°14'36.63"E**	
Elevation of the area	382m AMSL	
Lease period	5 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	42m Bgl	
	Rough Stone in m^3	Gravel m^3
Geological Resources	2,48,656	6,032
Mineable Reserves	62,430	3,344
Year wise Production	62,430	3,344
Peak Production	13,900	3,344
Ultimate Pit Dimension	Pit I : 123m(L) x 78m(B) x 42m(D) Bgl	
Existing Pit Dimension	Pit I -105m (L) x 74m (W) x 28m(D) Bgl	
Water Level in the region	78-73 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives	
Topography	The lease applied area is a Plain terrain. The area has gentle sloping towards Northeastern side and altitude of the area is 382m (max) above from Mean Sea level. The area is covered by 2m thickness of Gravel, 3m thickness of weathered rock and followed by Massive Charnockite which is clearly inferred from the existing quarry pit.	
Machinery proposed	Jack Hammer	2 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 Nos
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	21 Nos	
Operational Cost	Rs. 26,70,000 /-	

EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs. 30,50,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Odai	250m- SW
	Canal	430m- NW
	Odai	800m- SW
Greenbelt Development Plan	Proposed to plant 600Nos 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	1.0 KLD	
Nearest Habitation	410m – North East	
Nearest Reserve Forest	Vayappadi R.F – 32.0km – NE Sathiyamangalam Tiger Reserve – 48.6km - NW	
Nearest Wild Life Sanctuary	Vellode birds sanctuary – 49.0km - NE	

Source: Approved Mining Plan

TABLE 7.6: SALIENT FEATURES OF PROPOSAL "E1"

Name of the Project	Thiru.K.V.Velusamy Rough stone and Gravel quarry	
EC granted	Lr.No.SEIAA-TN/F.No.7741/ (a)/EC.No:5350/2022 dated :10.10.2022	
TNPCB CTO copy	No F.0570TPS/RS/DEE/TNPCB/TPS/W/2017	
DFO Letter copy	No.7312/2022/F Dated 05.07.2022	
Explosive certificate	S.S & Co Explosives, Palladam. Lic no A/E/SC/TN/22/648(E88325)	
S.F. No.	303/1(P)	
Extent	1.29.0 ha	
Village Taluk and District	Poomalur Village, Palladam Taluk, Tiruppur District.	
Land Type	Proponent own patta land	
Land Ownership	It is a Patta land. Registered in the name of applicant (Thiru.K.V.Velusamy), vide Patta No.985.	
Existing quarry operation	It is a fresh lease application but, the applied area has been considered quarrying operation earlier. The quarry lease was previously granted in favour of Thiru. K.V. Velusamy, over an extent of 1.42.0 hectares of Patta land in S.F.No. 303/1 of Poomalur Village, Palladam Taluk, Tiruppur District vide Rc.No. 29/Mines/2013, dated: 03.09.2014 for the period of five years from 22.09.2014 to 21.09.2019 for quarrying Rough stone and Gravel. In this situation the lessee has once again applied a quarry lease on 07.02.2019 for the period of five years. The application was meritoriously processed by the District Collector, Tiruppur and recommended the quarry lease for over on extent of 1.29.0 Ha only in S.F.No. 303/1(Part) for the period of five years.	
Toposheet No	58 - E/04	
Latitude between	11°03'00.60"N to 11°03'03.13"N	
Longitude between	77°14'33.16"E to 77°14'38.58"E	
Elevation of the area	386m AMSL	
Lease period	5 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	42m [2m Gravel + 40m Rough stone] below ground level	
	Rough Stone in m^3	Gravel m^3
Geological Resources	3,09,333m^3	5,424m^3
Mineable Reserves	74,842m^3	2,928m^3
Year wise Production	74,842m^3	2,928m^3
Peak Production	15,500m^3	1342 m^3
Ultimate Pit Dimension	Pit I : 135m(L) x 60m(B) x 42m(D) below from the general ground level	

Existing Pit Dimension	Pit I -110m (L) x 57m (W) x 19m(D) Bgl	
Water Level in the region	62-58 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards Northeastern side. The altitude of the area is 386m (max) above Mean sea level. The area is covered by the Gravel formation which is about 2m thickness. Massive Charnockite is found after 2m (Gravel) which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	3Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	1Nos
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	17 Nos	
Project Cost	Rs.38,00,800/-	
EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs.41,80,800/-	
CER Cost	Rs. 5,00,000/-	
Greenbelt Development Plan	Proposed to plant 645Nos 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	3.1 KLD	
Nearest Habitation	Poomalur – 3.0km - N	

Source: Approved Mining Plan

TABLE 7.7: SALIENT FEATURES OF PROPOSAL "E2"

Name of the Project	Thiru.B.S. Mohanraj Rough stone and Gravel quarry
EC granted	Lr.No.SEIAA-TN/F.No.7737/ (a)/EC.No:5067/2021dated :23.05.2022
TNPCB CTO copy	No F.TPS0759/RS/DEE/TNPCB/TPS/W/2014 Dated 19.07.2014
DFO Letter copy	No.7312/2022/F Dated 05.07.2022
Explosive certificate	S.S & Co Explosives, Palladam. Lic no A/E/SC/TN/22/648(E88325)
S.F. No.	304/2(P), 303/2A2A
Extent	1.74.5 ha
Village Taluk and District	Poomalur Village, Palladam Taluk, Tiruppur District.
Land Type	Proponent own patta land
Land Ownership	It is a Patta land. Registered in the name of applicant (Thiru.K.V.Velusamy), vide Patta No.985.
Existing quarry operation	It is a fresh lease application but, the applied area has been considered quarrying operation earlier. The quarry lease was previously granted in favour of Thiru. P.S.Mohanraj, S/o. Shanmugam, over an extent of 1.74.5 hectares of Patta lands in S.F.No. 304/1(P) and 303/2A2A of Poomalur Village, Palladam Taluk, Tiruppur District vide Rc.No. 30/Mines/2013, dated: 03.09.2014 for the period of five years from 22.09.2014 to 21.09.2019 for quarrying of Rough stone and Gravel. Now the lessee has applied a quarry lease on 11.03.2019 for the period of five years in the same extent. The application was meritoriously processed by the District Collector, Tiruppur and recommended the quarry lease for the period of five years.
Toposheet No	58 - E/04

Latitude between	11°03'02.86"N to 11°03'06.22"N	
Longitude between	77°14'31.88"E to 77°14'38.66"E	
Elevation of the area	386m AMSL	
Lease period	5 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	42m [2m Gravel + 40m Rough stone] below ground level	
	Rough Stone in m^3	Gravel m^3
Geological Resources	4,12,325m^3	5,882m^3
Mineable Reserves	1,04,160m^3	3,360m^3
Year wise Production	1,04,160m^3	3,360m^3
Peak Production	28,730m^3	1,760 m^3
Ultimate Pit Dimension	Pit I : 134m(L) x 83m(B) x 42m(D) below from the general ground level	
Existing Pit Dimension	Pit I -110m (L) x 82m (W) x 22m(D) Bgl	
Water Level in the region	62-58 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards Northeastern side. The altitude of the area is 386m (max) above Mean sea level. The area is covered by the Gravel formation which is about 2m thickness. Massive Charnockite is found after 2m (Gravel) which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	3Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	1Nos
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	18Nos	
Project Cost	Rs. 46,44,100/-	
EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs. 50,24,100/-	
CER Cost	Rs. 5,00,000/-	
Greenbelt Development Plan	Proposed to plant 875Nos 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	3.89 KLD	
Nearest Habitation	Poomalur – 3.0km - N	

Source: Approved Mining Plan

TABLE 7.8: SALIENT FEATURES OF PROPOSAL "E3"

Name of the Project	Tmt.G.Vijayalakshmi Rough stone and Gravel quarry
EC granted	Lr.No.SEIAA-TN/F.No.7366 /EC.No:5169/2022 dated :26.07.2022
S.F. No.	305/1 (P), 307/1 (P), 307/2 (P)
Extent	1.83.90 ha
Village Taluk and District	Poomalur Village, Palladam Taluk, Tiruppur District.
Land Type	Proponent own patta land
Land Ownership	It is a Patta land, registered name of the Thiru.V.Gurusamy Vide patta No 698
Existing quarry operation	It is a fresh lease application. The area has been quarrying in earlier.
Toposheet No	58 - E/04

Latitude between	11° 03' 08.80"N to 11° 03' 11.72"N	
Longitude between	77° 14' 22.53"E to 77° 14' 31.50"E	
Elevation of the area	365m AMSL	
Lease period	5 Years	
Mining Plan period	5 years	
Proposed Depth of Mining	48m Bgl (3m gravel +45m Roughstone)	
	Rough Stone in m^3	Gravel m^3
Geological Resources	8,27,550	55,170
Mineable Reserves	96,655	-
Year wise Production	96,655	-
Peak Production	21,875	-
Ultimate Pit Dimension	Pit I : 256m(L) x 54m(B) x 48m(D) Bgl	
Existing Pit Dimension	Pit I -256m (L) x 54m (W) x 38m(D) Bgl	
Water Level in the region	55-50 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives	
Topography	The lease applied area is a Plain terrain. The area has gentle sloping towards North-eastern side and altitude of the area is 365m (max) above from Mean Sea level. The area is covered by 2m thickness of Gravel, 3m thickness of weathered rock and followed by Massive Charnockite which is found after 3m(Gravel) which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	1Nos
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	19 Nos	
Proejct Cost	Rs. 39,07,200 /-	
EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs. 42,87,200/-	
CER Cost	Rs. 5,00,000/-	
Greenbelt Development Plan	Proposed to plant 920Nos 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	2.01 KLD	
Nearest Habitation	Kidathurai 1.0Km – NW	

Source: Approved Mining Plan

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

Air Environment –

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

TABLE 7.11: CUMULATIVE PRODUCTION LOAD OF ROUGH STONE

Quarry	Production for five-year plan period	Per Year Production in m^3	Per Day Production in m^3	Number of Lorry Load Per Day
P1	62,430	12,486	42	7
Total	**62,430**	**12,486**	**42**	**7**
E1	74,842	14,968	50	8
E2	1,04,160	20,832	69	12
E3	96,655	19,331	64	11
Total	**2,75,657**	**55,131**	**183**	**31**
Grand Total	**3,38,087**	**67,617**	**225**	**38**

TABLE 7.12: CUMULATIVE PRODUCTION LOAD OF GRAVEL

Quarry	Production for five-year plan period	Per Year Production in m^3	Per Day Production in m^3	Number of Lorry Load Per Day
P1	3,344	3,344	11	2
Total	**3,344**	**3,344**	**11**	**2**
E1	2,928	976	3	1
E2	3,360	1,120	4	1
E3	-	-	-	-
Total	**6,288**	**2,096**	**7**	**2**
Grand Total	**9,632**	**5,440**	**18**	**4**

On a cumulative basis considering the proposed quarry, it can be seen that the overall production of Rough Stone is 42m^3 per day and overall production of Gravel is 11 m^3 per day with a capacity of 7rips of Rough Stone per day and 2Trips per day of Gravel from the cluster.

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

Based on the above production quantities the emissions due to various activities in all the 2 mines includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.18.

TABLE 7.14: EMISSION ESTIMATION FROM QUARRIES WITHIN 500 METER RADIUS

EMISSION ESTIMATION FOR QUARRY "P1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.057163476	g/s
	Blasting	Point Source	0.000147641	g/s
	Mineral Loading	Point Source	0.037230613	g/s
	Haul Road	Line Source	0.002484835	g/s/m
	Overall Mine	Area Source	0.041269987	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000173413	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000004876	g/s
EMISSION ESTIMATION FOR QUARRY "E1"				

Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.059062755	g/s
	Blasting	Point Source	0.000173853	g/s
	Mineral Loading	Point Source	0.037142895	g/s
	Haul Road	Line Source	0.002484773	g/s/m
	Overall Mine	Area Source	0.042552259	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000174728	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000005263	g/s
EMISSION ESTIMATION FOR QUARRY "E2"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.071074674	g/s
	Blasting	Point Source	0.000438721	g/s
	Mineral Loading	Point Source	0.039414147	g/s
	Haul Road	Line Source	0.002486891	g/s/m
	Overall Mine	Area Source	0.048421005	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000325703	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000012946	g/s
EMISSION ESTIMATION FOR QUARRY "E3"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.065493562	g/s
	Blasting	Point Source	0.000291479	g/s
	Mineral Loading	Point Source	0.038126873	g/s
	Haul Road	Line Source	0.002485554	g/s/m
	Overall Mine	Area Source	0.049197307	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000238434	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000009903	g/s

Source: Emission Calculation

TABLE 7.15: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM_{10} in µg/m^3	
Background	43.8
Incremental	10.88
Resultant	54.7
NAAQ Norms	**100 µg/m^3**
$PM_{2.5}$ in µg/m^3	
Background	18.0
Incremental	4.92
Resultant	23.0
NAAQ Norms	**60 µg/ m^3**
So2 in µg/m^3	
Background	6.0
Incremental	1.48
Resultant	7.4
NAAQ Norms	**80 µg/ m^3**
No2 in µg/m^3	
Background	19.9
Incremental	7.69

Resultant	27.6
NAAQ Norms	**80 µg/ m^3**

Noise Environment –

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

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

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

Where:

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

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

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

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

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

TABLE 7.16: PREDICTED NOISE INCREMENTAL VALUES FROM QUARRY

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	56.6	54.7	55.4	53.9	54.9	53.9	54.7
Incremental Value dB(A)	50.56	46.48	27.04	29.73	24.54	26.12	30.00
Total Predicted Noise level dB(A)	57.56	55.31	55.41	53.92	54.90	53.91	30.00

Source: Lab Monitoring Data

The incremental noise level is found within the range of 24.5 (Buffer zone) – 50.56 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).

Ground Vibrations

Ground vibrations due to mining activities in the all the 4 Mines within cluster are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc. However, the major source of ground vibration from the all the 4 mines is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements nearby the mining areas and may cause injury to persons or damage to the structures. Nearest Habitations from 4mines respectively are as in below Table 7.21.

TABLE 7.17: NEAREST HABITATION FROM EACH MINE

Location ID	Distance & Direction
Habitation Near P1	410-North East
Habitation Near E1	3km -North
Habitation Near E2	3km-North
Habitation Near E3	1km- North West

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

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

Where –
V = peak particle velocity (mm/s)
K = site and rock factor constant
Q = maximum instantaneous charge (kg)
B = constant related to the rock and site (usually 1.6)
R = distance from charge (m)

TABLE 7.18: GROUND VIBRATIONS AT 4MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	18	410-North East	0.333
E1	22	3km -North	0.016
E2	30	3km-North	0.021
E3	28	1km- North West	0.114

Source: Blasting Calculations

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

Socio Economic Environment –

The 4 mines shall contribute towards CER and the community shall develop.

TABLE 7.19: SOCIO ECONOMIC BENEFITS FROM 4 MINES

Location ID	Project Cost	CER
P1	Rs. 30,50,000/-	Rs.5,00,000
E1	Rs.41,80,800/-	Rs.5,00,000
E2	Rs. 50,24,100/-	Rs.5,00,000
E3	Rs.42,87,200/-	Rs.5,00,000
Total	**Rs. 1,65,42,100/-**	**Rs.20,00,000**

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

- Proposed Projects shall fund towards **CER – Rs 5,00,000/-**
- Existing Projects shall fund towards **CER- Rs.15,00,000/-**

TABLE 7.20: EMPLOYMENT BENEFITS FROM 4MINES

Description	Employment
P1	21

Total	**21**
E1	17
E2	18
E3	19
Total	**54**
Grand Total	**75**

A total of 21 people will get employment due to one proposed mines in cluster and 54 people are already employed at existing mines.

TABLE 7.21: GREENBELT DEVELOPMENT BENEFITS FROM 4 MINES

CODE	No of Trees proposed to be planted	Survival %	Area Covered Sq.m	Name of the Species
P1	600	80%	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development	Neem, Pinnata, Pongamia, Ashoka etc.,
Total	**600**			
E1	645			
E2	975			
E3	920			
Total	**2,540**			
G.Total	**3,140**			

Based on the Proposed Mining Plans it's anticipated that there shall growth of native species of Neem, Pinnata et., in the Cluster at a rate of 3,140 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 7.22: 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 Rough Stone and gravel at Poomalur Village aims to produce 62,430m^3 Rough Stone over a period of 5 Years and Gravel 3,344m^3 for period of One year. 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 21 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 Poomalur Village, Palladam Taluk, Tiruppur 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 Poomalur 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 Government School near the project site the details are given below:

TABLE 8.1 CER – ACTION PLAN

Activity	CER
• Renovation/ Construction of Existing Toilet • Providing Environmental Related books to the school Library • Carrying out plantation and maintenance in the school Ground • Any other requirements in consultation with the school Head master	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 - THIRU. P. SENNIYAPPAN

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. P. Senniyappan 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
Refueling to be undertaken in a safe location, away from vehicle movement pathways&100 m away of any watercourse Refueling activity to be under visual observation at all times. Drainage of refueling 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 upto a depth of 42 m BGL, the water table in the area is 78m – 73m 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, drilling and blasting and cutting activities. No mining activities are planned during night time.

TABLE 10.5.: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.7. GROUND VIBRATION AND FLY ROCK CONTROL

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

TABLE 10.6.: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK – P1

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 600nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7: PROPOSED GREENBELT ACTIVITIES

Year	No. of tress proposed to be planted	Considering survival rate of 80% additionally 20% of plantation is proposed	Area to be covered in m^2	Name of the species
I	600	720	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development.	Neem, Pongamia Pinnata 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 PLANTSAITON

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	1st Year	2nd Year	3rd Year	4th Year	5th 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

	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	11950	11950
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring	800000	50000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance - 3 Units	50000	5000
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governers @ Rs. 5000/- per Tipper/Dumper deployed - 2 Units	10000	500
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour	0	5000
	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Provision for 2 labours @ Rs.10,000/labour (Contractual) per Hectare	0	23900
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	20000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0

	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Competent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	162318
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff management	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	11950	5000
	2. Progressive Closure Activity Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	239000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 600Trees - (150 Inside Lease Area & 570 Outside Lease Area)	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @ 200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring)	30000	4500
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	171000	17100

	4. Implementation of Final Mine Closure Activity as per Approved Mining Plan on Last Year	Few activities already covered as progressive closure activities as greenbelt development, wire fencing, garland drain. *For Final Closure Activities 15% of the proposed closure cost will be spent during the final mine closure stage - Last Year	33300	0
	5. Contribution towards Green Fund. As per TNMMCR 1959, Rule 35 A	The Contribution towards Green Funds @ 10% of Seigniorage fee are indicated as part of EMP Budge and not necessarily implemented in the Project Site	368337	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000
	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) - 21Employees	84000	21000
	Health check up for workers will be provisioned	IME & PME Health check-up @ Rs. 1000/- per employee	0	21000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	2390
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	59750	10000

	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
CER	As per MoEF &CC OM 22-65/2017-IA.III Dated 25.02.2021	Detailed Description in following slides and Budget allocation is included as per MoeEF & CC OM	500000	0
TOTAL			**2127650**	**1251658**

*Marked cost is already discussed in the mining plan hence that is not included in the total Environmental Management plan cost Total Cost for the five years. The EMP has been prepared for the entire **lease period of 5 years** for the peak production capacity of **13,900m^3 of Rough stone**.

Year	Total Cost
1st	3379308
2nd	1314240.9
3rd	1379952.9
4th	1448950.6
5th	1554698.1
Total	**91 Lakhs**

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 Rough stone and Gravel quarry project located in S.F.No 302/1A, 303/2A1, 303/2A2B(Part) & 302/1B, Poomalur Village, Palladam Taluk, Tiruppur District belongs to Thiru. P. Senniyappan. the Project falls in the Cluster category consist of 1 Proposed, 3 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 Oct- Dec2023 for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suitable mitigation measures for likely adverse impacts due to the proposed project is suggested individually for the respective proposed project under Chapter 10.

The project proponent ensures to obtain necessary clearances and quarrying will be carried out as per rules and regulations. The Mining Activity will be carried out in a phased manner as per the approved mining plan after obtaining EC, CTO from TNPCB, execution of lease deed and obtaining DGMS Permission and working will be carried out under the supervision of Competent Persons employed. Overall, the EIA report has predicted that the project will comply with all environment standards and legislation after commencement of the project and operational stage mitigation measures are implemented.

Mining operations has positive impact on environment and socio economy such as landscape improvement, water as by-product, economy development and better public services, providing and supply of Rough Stone as per market demand. Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 21 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. P. Senniyappan Rough stone and Gravel quarry (Extent – 1.19.5ha).

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, Advaitha Ashram Road,
Alagapuram, Salem – 636 004
Tamil Nadu, India
Email:infogeoexploration@gmail.com
Web: www.gemssalem.com
Phone: 0427 2431989.

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

Sl.No.	Name of the expert	In house/ Empanelled	EIA Coordinator		FAE	
			Sector	Category	Sector	Category
1	**Dr. M. Ifthikhar Ahmed**	**In-house**	**1**	**A**	WP GEO SC	B A A
2	Dr. P. Thangaraju	In-house	-	-	HG GEO	A A
3	Mr. A. Jagannathan	In-house	-	-	AP NV SHW	B A B
4	Mr. N. Senthilkumar	Empanelled	38 28	B B	AQ WP RH	B B A
5	Mrs. Jisha parameswaran	In-house	-	-	SW	B
6	Mr. Govindasamy	In-house	-	-	WP	B
7	Mrs. K. Anitha	In-house	-	-	SE	A
8	Mrs. Amirtham	In-house	-	-	EB	B
9	Mr. Alagappa Moses	Empanelled	-	-	EB	A
10	Mr. A. Allimuthu	In-house	-	-	LU	B
11	Mr. S. Pavel	Empanelled	-	-	RH	B
12	Mr. J. R. Vikram Krishna	Empanelled	-	-	SHW RH	A A

Abbreviations

EC	EIA Coordinator	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. P. Senniyappan Rough stone and Gravel quarry over an Extent of 1.19.5ha in Poomalur Village, Palladam Taluk, Tiruppur 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: **January 2019 to till date**

EIA COORDINATORS IN THE ORGANIZATION

Sno	Name	Sector	Cate A/B	Signature
1	Dr. M. Ifthikhar Ahmed	1, 38	A	
2	Dr. P. Thangaraju	1	A	
3	Mr.Vikram Krishna JR	1	A	
4	Mr. S.Nagamani	1	B	
5	Mr.N.Senthilkumar	28,38 & 31	B	
6	Mr.Vikram Krishna JR	38	B	

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	
			Mr.P.Govindasamy	
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.	Dr. M. Ifthikhar Ahmed	

		▪ Preparation of mineral and geological maps. ▪ Geology and Geo morphological analysis/description and Stratigraphy/Lithology.	Dr. P. Thangaraju	
			Mr. S. Nagamani	
			Mr.V.Balasubramanian	
			Mr.A. Natarajan	
			Mr. M. Abdul Nissar	
			Mr.S. Umamaheswaran	
			Mr.M.Santhoshkumar	
5	SE	▪ Revision in secondary data as per Census of India, 2011. ▪ Impact Assessment & Preventive Management Plan ▪ Corporate Environment Responsibility.	Mrs. K. Anitha	
			Mrs.T.Sasikala	
			Mr.A.Allimuthu	
6	EB	▪ Collection of Baseline data of Flora and Fauna. ▪ Identification of species labelled as Rare, Endangered and threatened as per IUCN list. ▪ Impact of the project on flora and fauna. ▪ Suggesting species for greenbelt development.	Mr..D.Devanathan	
			Mr.P. Panneer Selvam	
			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	
			Mr.S. Umamaheswaran	
			Mr.P. Viwanathan	
			Mr.S.Ilavarasan	
9	NV	▪ Identify impacts due to noise and vibrations ▪ Suggesting appropriate mitigation measures for EMP.	Mr. A. Jagannathan	
10	AQ	▪ Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. ▪ Recommending mitigations measures for EMP	Mr. N. Senthilkumar	
11	SC	▪ Assessing the impact on soil environment and proposed mitigation measures for soil conservation	Dr. M. Ifthikhar Ahmed	
12	SHW	▪ Identify source of generation of non-hazardous solid waste and hazardous waste. ▪ Suggesting measures for minimization of generation of waste and how it can be reused or recycled.	Mr. A. Jagannathan	
			Mr. J. R. Vikram Krishna	

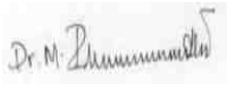
LIST OF TEAM MEMBERS AS FUNCTIONAL AREA EXPERT

Sl.No.	Name	Functional Area Proposed	FAE /Mentor	Involvement	Signature
1	Mrs.Nathiya T	EB	Mr. A.Alagappa Moses	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	
2	Mr. R. Sakthivel	LU	Mr.A. Allimuthu	▪ Site Visit with FAE ▪ Assisting FAE in preparation of land use maps ▪ identifying impacts Assisting FAE in preparation of land use maps	
3	Mr. M Abdul Niyaas.	GEO	Mr. S.Umamahesvaran	▪ Site Visit with FAE ▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	

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 Cluster EIA/EMP for Thiru. P. Senniyappan Rough stone and Gravel quarry over an Extent of 1.19.5ha in Poomalur Village, Palladam Taluk, Tiruppur District of Tamil Nadu. It is also certified that information furnished in the EIA study are true and correct to the best of our knowledge.

Signature& Date:



Name:	**Dr. M. Ifthikhar Ahmed**
Designation:	**Managing Partner**
Name of the EIA Consultant Organization:	**M/s. Geo Exploration and Mining Solutions**
NABET Certificate No & Issue Date:	**NABET/EIA/2225/RA 0276 Dated: 20-2-2023**
Validity:	**Valid till 06.08.2025**