

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

KODANGIPALAYAM ROUGH STONE AND GRAVEL CLUSTER QUARRIES

Cluster Extent: 15.02.89 Ha

(5 Proposed + 4 Existing Quarries)

P1	P2
Thiru.M.Devaraj S/o. Marappa Gounder, No.2/456, Amma Kadu, Kodangipalayam, Palladam Taluk, Tiruppur District Extent : 1.60.5 ha	Thiru.A.Duraisamy S/o. Arumugam, No.4/33, Karanampettai, Palladam Taluk, Tiruppur District Extent: 1.08.0 ha

PROJECT LOCATION	PROPOSED PRODUCTION
P1: S.F.No. 311/3 and 311/4B P2: S.F.No. 315/2B Kodangipalayam Village, Palladam Taluk, Tiruppur District.	Reserves: P1 137627 m ³ of Rough stone & 608 m ³ of Gravel Depth: 42m bgl Reserves: P2 90371 m ³ of Rough stone & 8754 m ³ of Gravel Depth: 22m bgl

ToR obtained vide

File No.11105 TOR Identification No.T024B0108TN5222655N Dated: 06.03.2025-P1

File No.11129 TOR Identification No. T024B0108TN5544123N Dated: 10.03.2025-P2

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

October to December 2024

April 2025

UNDERTAKING

I Thiru. M.Devaraj given undertaking that this EIA & EMP report prepared for our Rough stone and Gravel quarry situated in S.F.No. 311/3 and 311/4B over an extent of 1.60.50 Ha in Kodangipalayam Village, Palladam Taluk, Tiruppur District based on the ToR issued by the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu vide File No.11105 TOR Identification No. TO24B0108TN5222655N Dated:06.03.2025

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

Signature of the Project Proponent



M.Devaraj

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. 311/3 and 311/4B over an extent of 1.60.50 Ha in Kodangipalayam 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:

UNDERTAKING

I Thiru. A. Duraisamy given undertaking that this EIA & EMP report prepared for our Rough stone and Gravel quarry situated in S.F.No. 315/2B over an extent of 1.08.0 Ha in Kodangipalayam Village, Palladam Taluk, Tiruppur District based on the ToR issued by the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu vide File No.11129 TOR Identification No. TO24B0108TN5544123N Dated:10.03.2025

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

A handwritten signature in black ink, appearing to read 'A. Duraisamy', followed by a vertical line.

A. Duraisamy

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. 315/2B over an extent of 1.08.0 Ha in Kodangipalayam 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 representation of Proposed and Existing Quarries in the Cluster are given unique codes and identifies and studied in this EIA/ EMP Report.

PROPOSED QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
P1	Thiru.M.Devaraj	Kodangipal ayam	311/3 & 311/4B	1.60.5	Applied for quarry lease
P2	Thiru.A. Duraisamy	Kodangipal ayam	315/2B	1.08.0	Applied for quarry lease
P3	Thiru.R.Shanmugam	Kodangipal ayam	316/4	1.29.0	Applied for quarry lease
P4	Thiru.K.Selvakumar	Kodangipal ayam	311/2	1.16.5	Applied for quarry lease
P5	Thiru.K.Sivakumar	Kodangipal ayam	308/1B,38/2	1.69.0	Applied for quarry lease
TOTAL EXTENT				6.83.0 Ha	
EXISTING QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
E-1	Thiru.S.Velusamy	Kodangipal ayam	324/2A	1.62.0	08.03.2022 to 07.03.2027
E-2	Thiru.M.Ramasamy	Kodangipal ayam	314/1A(P),314/1B,324/2B & 324/2C	3.61.5	17.03.2022 to 16.03.2027
E-3	Thiru.P.Shanmugasundaram	Kodangipal ayam	315/A3B1,320/2B2	0.74.39	EC Granted
E-4	Thiru.S.Thangavel	Kodangipal ayam	315/2D	2.22.0	EC Granted
TOTAL EXTENT				8.19.89	
ABANDONED / EXPIRED QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
Ex-1	Thiru.M.Devaraj	Kodangipal ayam	312/3,313/1,313/2(P)	3.16.0	20.09.2018 to 19.09.2023
EX-2	Thiru.S.Rangasamy	Kodangipal ayam	315/2A1,315/2A3A	1.86.0	24.07.2014 to 27.08.2019
EX-3	Thiru.R.Shanmugam	Kodangipal ayam	312/4	0.94	
TOTAL EXTENT				5.96.0	
TOTAL CLUSTER EXTENT				15.02.89	

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

TERMS OF REFERENCE (ToR) COMPLIANCE

Thiru.M. Devaraj- P1

File No.11105 TOR Identification No. TO24B0108TN5222655N Dated:06.03.2025

SPECIFIC CONDITIONS		
1	The PP shall submit the revised Mining Plan along with the Environmental Impact Assessment report.	Noted & agreed. Revised Mining Plan will be submit along with final EIA report.
2	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of required statutory personnel, appropriate environmental management, system of maintaining the haul roads and village/panchayat roads, authorized blasting operation, Monitoring system of the environmental & other statutory compliances & its reporting status, etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: (i) Copy of the agreement forming CMC. (ii) The Organisation chart of the Committee with defining the role of the members (iii) The 'Standard Operating Procedures' (SoP) executing the planned activities.	Noted and agreed PP has agreed to establish a Cluster Management Committee. Copy of the agreement concerning CMC will be Submitted during the appraisal meeting.
3	The PP shall ensure the installation of CCTV at the proposed quarry site and ensure its inclusion during the EIA presentation.	Noted and agreed. PP agreed to install CCTV cameras at the quarry site Photographs will be submitted during the appraisal meeting.
2.SEAC STANDARD CONDITIONS		
1	In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone/benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.	It is an Existing quarry Existing Pit Depth – 24m bgl Existing Pit Dimension is given below, Pit – I: 70m (L) X 22m (W) X 2 BGL (D) Pit – II: 23m (L) X 85m (W) X 24 BGL (D)
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	Noted and agreed. Letter obtained from the VAO regarding surface features within 300m radius
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.	Noted and agreed The structure study has been carried out within the radius of 300m. There is no habitation within the radius of 300m from the project site the details of the structures is given in the EIA report, Chapter No.III

4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.	Noted and agreed. The hydro-geological assessment was carried out to assess the potential effects on the groundwater table. It is expected that there will be no major impacts on the water bodies in the vicinity of the project site. Further information is given in Chapter 3.
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Noted and agreed The Bio diversity study has been conducted by the Functional Area Expert approved by the NABET. The same has been detailed in the Chapter No. 3.
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	Request to consider the secondary source data detailing the nearest reserve forest from Tamil Nadu Geographical Information System (TNGIS). The Nearest Reserve Forest Bolampatti I Reserve Forest 30.0km- SW
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	Noted and agreed. It is an existing quarry. The slope stability report will be submitted together with the half-yearly compliance report once the depth reaches 30 meters.
8	However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level.	Noted and agreed. It is an existing quarry. The slope stability report will be submitted together with the half-yearly compliance report once the depth reaches 30 meters.
9	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.	Noted and agreed The Proponent given affidavit stating that the blasting operation will be carried 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 The details of design for carrying out controlled blasting operation involving line drilling and muffle blasting to minimize blast-induced ground vibrations and controlled fly rock travel beyond 30 m from the blast site is detailed in Chapter 4.
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences	Noted and agreed. The project proponent possesses no additional quarries except this proposal.
12	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,	Noted and agreed
13	What was the period of the operation and stoppage of the earlier mines with last work permit	Earlier mining operation carried out from 26.02.2011 to 25.02.2016

	issued by the AD/DD mines?	
14	Quantity of minerals mined out. · Highest production achieved in any one year · Detail of approved depth of mining. · Actual depth of the mining achieved earlier. · Name of the person already mined in that leases area. · If EC and CTO already obtained, the copy of the same shall be submitted. · Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	Existing depth – 24m bgl
15	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Noted and agreed The project site has been superimposed on the high resolution imagery. The Satellite imagery of the project site is enclosed in Chapter II Geomorphology map of the area is enclosed in Chapter II. Lithology and Geology Map of the area is enclosed in Chapter II.
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,	Noted and agreed The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project site.
17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 810 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.
18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	Noted and agreed Details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology justifications are provided in Chapter 2. The anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same are provided in Chapter 4.
19	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Noted and agreed The Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act, 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.
20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this	Noted and agreed The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3.

	regard may be provided.	
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study	Noted and agreed Baseline Data were collected for Post monsoon season October 2024 to Dec 2024. The Details of the Baseline Monitoring is given in the Chapter No. 3.
22	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	Noted and agreed Cumulative impact study has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No. 7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
24	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Noted and Agreed Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 3, Table No 3.3
25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	Not applicable.
26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
27	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
28	Impact on local transport infrastructure due to the Project should be indicated.	Noted and agreed Traffic density survey was carried out to analyze the impact of transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details have been provided in Chapter No. 2.
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	Noted and agreed

30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific	Noted & agreed. Mine closure plan is detailed in Chapter No. 4.
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible	Noted and agreed
32	The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the Appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 810 Nos of trees were planted as a part of greenbelt development program all along the periphery of the lease applied area and approach roads and village roads.
33	Taller/one-year-old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 810 Nos of trees were planted as a part of greenbelt development program all along the periphery of the lease applied area and approach roads and village roads.
34	A Disaster Management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period	Noted and agreed. Disaster management Plan is explicated in chapter 7.
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period	Noted and agreed. Risk Assessment and management Plan is explicated in chapter 7.
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Noted and agreed Occupational Health impacts of the project elaborately discussed in chapter 10.
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Noted and agreed No Public Health Implications anticipated due to this project. The anticipated impact and effective mitigation measures are discussed in the Chapter No. 4
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Noted and agreed Socio-economic studies were conducted within a 5-kilometer radius of the quarry site. Details of report given in Chapter 3.
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending against this project
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Noted and agreed. The details of the Project benefits are given in the Chapter No. 8.

41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	Noted and agreed.
42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	Noted and agreed The EMP has been prepared for the entire life of the mine i.e., up to the lease period.
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

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

		The Mining operation will be carried out to reduce the impact further to the level of negligence.
10	Impact on soil flora & vegetation around the project site.	The vegetation details have been provided in chapter III. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
11	Details of type of vegetation including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetation all along the boundary of the proposed mining area shall committed mentioned in EMP.	Noted and agreed There are no trees within the existing quarry site, and therefore, no proposal for tree felling or removal is anticipated during the quarrying operations.
12	The Environmental Impact Assessment should study the agro-biodiversity, agro-forestry, horticultural plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Noted and agreed The details of the soil analysis and the impacts are given in the Chapter No 3 & 4.
13	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted and agreed The Eco System of the area will be retained during the mining operation by the way of planting trees in the boundary barrier and un utilized areas. After completion of mining operation, the quarried-out pit will be facilitated to collect the rainwater to pit act as temporary reservoir
14	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock	Noted and agreed The project area is situated centre part of the quarry lands. The proposed Rough Stone quarrying operation will employ the wet drilling method, which is expected to have negligible impacts on nearby agricultural lands.
Forests		
15	The project proponent shall detailed study on impact of mining on Reserve forests and free ranging wildlife	Noted and agreed. There is no Reserve Forest within 1km radius from the project area. The mining operation will not cause any significant impact to the Reserve Forest and Wild life Sanctuaries
16	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	There is no forest/wildlife within 10km radius, chapter 3 details of Ecology and Biodiversity, and 4 endemic vulnerable and endangered indigenous flora and fauna.
17	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection	Details are discussed in the Chapter No.3
18	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
19	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period	There are 10 open wells and 7 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method
20	Erosion Control measures	Details discussed in the chapter No.4

21	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	Details in Chapter 3
22	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir	Food webs describe who eats whom in an ecological community. Made of interconnected food chains, food webs help us understand how changes to ecosystems — say, removing a top predator or adding nutrients — affect many different species, both directly and indirectly. Whereas in this proposed project is for quarrying of Rough Stone and Gravel and is on a hard batholith formation where no diversion of any water bodies is proposed of there is no intersection of ground water table anticipated.
23	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	Details are given in the Chapter No 4.
24	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	Details in Chapter 4 impact of bio diversity.
25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components	Details of impact on soil environment is detailed in Chapter No.4
26	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites	Bolampatti I R.F. 30.0km-SW There is, National Parks, Eco sensitive areas, Wild life sanctuaries within the radius of 10km. An ecological survey of the study area was conducted particularly with reference to the listing of species and assessment of the existing baseline ecological (terrestrial) condition in the study area. Ecological Environment is discussed under Chapter 3
27	The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment. b) Bio-geochemical processes and its foot prints including environmental stress. c) Sediment geochemistry in the surface streams.	There are 10 open wells and 7 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method
Energy		
28	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Noted and agreed. Control measures of Noise, Air Water, Dust discussed in chapter 4
Climate Change		
29	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities	Noted and agreed. Details discussed in chapter 4.
30	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features	Noted and agreed. Details are discussed in chapter 3.
31	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	A greenhouse gas (GHG) is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are carbon

		dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and ozone (O₃) Carbon dioxide (CO₂): Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials. Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Methane (CH₄): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, land use and by the decay of organic waste in municipal solid waste landfills. Nitrous oxide (N₂O): Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater
Mine Closure Plan		
32	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Progressive Mine closure plan has been prepared considering the entire lease period in the mining plan and the same has been approved.
EMP		
33	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs	Noted and agreed Detailed EMP discussed in chapter 10.
34	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	Noted and agreed. Detailed EMP discussed in chapter 10.
Risk Assessment		
35	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Noted and agreed. Risk Assessment and management Plan explicated in chapter 7.
Disaster Management Plan		
36	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Noted and agreed. Disaster management Plan details given in Chapter-7
Others		
37	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	Letter obtained from the VAO regarding surface features within 300m radius
38	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	Noted and agreed. It will be updated in final EIA/EMP report.
39	The project proponent shall study and furnish the possible pollution due to plastic and micro plastic on	Noted and agreed.

	the environment. The ecological risks and impacts of plastic & micro plastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported	Plastic waste management of the proposed project explicated in chapter 7.
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Standard Terms of Reference for (Mining of minerals)		
S.No	Terms of Reference	Reply
1.1	An EIA-EMP Report shall be prepared for peak capacity (.....MTPA) operation in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.	Peak Production – 29375m ³ Depth – 42m bgl Mine Lease area – 1.60.5 Ha
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modeling for.... MTPA of mineral production based on approved project/Mining Plan for.... MTPA. Baseline data collection can be for any season (three months) except monsoon.	Peak capacity of 29375m ³ operation to cover the impacts and environment management plan in chapter- IV and Chapter 10 covered in project specific activities. Baseline Data were collected for Post Monsoon Season Oct– Dec2024 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. III
1.3	Proper KML file with pin drop and coordinate of mine at 500-1000 m interval be provided.	Noted, Google earth image showing lease area with Coordinates of pillars in chapter-II.
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines, and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also.	Land use and land cover of the 10km Radius of study area is discussed in Chapter No. III. Geology map of the project area covering 10km radius Figure No. 2.8. page No.22 Geomorphology of the area is given in Chapter No 2 Figure No 2.9, page no.23 There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.	Land use and land cover of the study area is discussed in Chapter No. III with Physical features such as waterbodies, odai, canal etc.,
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.	DEM data using Drainage pattern around 10km radius showing streams and lakes etc., discussed in Chapter No. 3.

1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ riverlet system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need elaboration in form of length, quantity and quality of water to be diverted.	Drainage pattern around 10km radius showing streams and lakes etc., is discussed in Chapter No. 3.
1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.	Details in chapter-2 showing the land features. And also enclosed Approved 3 rd Scheme of mining plan in annexure.
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. 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.
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing through the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.	Impact Studies and Mitigation Measures of Water Environment including Surface Water and Ground Water are discussed in Chapter 4.
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channeling of the water courses, etc., approach roads, major haul roads, etc should be indicated.	Not Applicable. The details of waste dump management are given in the Chapter No. 4

1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights					Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.5.		
	Sno	ML. project Land use	Area under Surface Rights(ha)	Area Under Mining Rights(ha)	Area under Both (ha)	Description	Present area (Ha)	Area at the end of lease period (Ha)
						Area Under Quarry	1.23.0	1.24.43
						Site Services	0.01.0	0.01.00
	1	Agriculture Land				Roads	0.02.0	0.02.00
	2	Forest Land				Green Belt	Nil	0.21.00
	3	Grazing Land				Unutilized Area	0.34.5	0.12.07
	4	Settlements						
	5	Others (Specify)				Grand Total	1.60.5	1.60.5
	S.No	Details		Area (Ha)				
	1	Buildings						
	2	Infrastructure						
	3	Roads						
4	Others (Specify)							
	Total							
1.13	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate budgetary provision should be prepared and submitted with EIA-EMP Report; and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.					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.		
1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/ MoEF&CC certification of the respective laboratory and NABET accreditation of the consultant to be provided.					Baseline Data were collected for Post Monsoon Season Oct– Dec 2024 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.		

1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air) / downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.	Details in chapter-3 showing the various sampling stations As per CPCB guidelines.
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10km buffer zone i.e., dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison	Air Quality Modelling and wind rose pattern for prediction of incremental GLC's of pollutant was carried out using AERMOD view 13 Model. Details in Chapter No. 4.
1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.	Traffic density survey was carried out to analyses the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details in Chapter-II.
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need-based survey for CSR activities to be followed.	Detailed in chapter-3 socio-economic study with occupational status & economic status of the study area. The study should also include the status of infrastructural facilities and amenities present in the study area CSR are discussed under Chapter 8.
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.	Detailed Ecology and biodiversity study in chapter-3
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.	Detailed in chapter-4 population in the impact zone and measures for occupational health and safety and proposed occupational health in chapter-X
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted.	Noted and agreed

1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.	The ground water table is at 58-62m below ground level. In this project, ultimate depth is 42m Bgl It is inferred the quarrying activities in the Cumulative EIA project (Quarry) will not intersect the Ground water table.
1.23	Study on land subsidence including modeling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.	Detailed in Chapter-IV Anticipated and mitigation measures of in the study area.
1.24	Detailed water balance should be provided. The breakup of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.	Total Water Requirement: 1.5 KLD Discussed under Chapter 2, Table No 2.15, The required water will be met from rainwater accumulated in mine pit (when available) and from the approved water vendors.
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs	Methodology And Instrument Used for Air Quality Analysis in chapter-3 and Air Pollution control equipment (APCEs) in chapter-10 sub 10.2 Environmental policy.
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of mineral. The measures adopted to conserve energy or use of renewable sources shall be explored.	Details in Machinery and equipment details in Chapter-2 Table No 2.16
1.27	PP to evaluate the green house emission gases from the mine operation/ washery plant and corresponding carbon absorption plan.	Noted and agreed
1.28	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.	A Risk Assessment and Disaster Preparedness and management Plan Chapter- 7
1.29	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation, handling & storage/stockyard, etc, Impact of blasting, noise and vibrations should be provided.	Detailed in Machinery and technology used Chapter-3 Table 3.17 – Methodology and Instrument Used for Air Quality Analysis Detailed study in chapter-4 Impact of choice of mining method and impact on air quality and blasting and noise and vibrations.
1.30	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2. Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2.
1.31	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2

1.32	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.	Detailed in chapter-2 for mineral transportation route with approach roads etc., and impacting air quality detailed given chapter-4
1.33	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre- mining status should be provided. A Plan for the ecological restoration of the mined-out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.	Discussed under Chapter 2. Mine Closure Plan is a part of Approved Mining Plan enclosed as Annexure Volume – 1.
1.34	Adequate greenbelt nearby areas, mineral stock yard and transportation area of mineral shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route.	Greenbelt Development Plan is discussed under Chapter 4
1.35	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.	The total cost and the details are given in the Chapter No. 10
1.36	Details of R&R. Detailed project specific R&R Plan with data on the existing socio- economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc. and costs along with the schedule of the implementation of the R&R Plan should be given.	Not Applicable. There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
1.37	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.	CSR are discussed under Chapter 8. And specific budgetary provisions (capital and recurring) for specific activities over the life of the project in chapter-10
1.38	Corporate Environment Responsibility:	CER are discussed under Chapter 8.
1.39	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.	Detailed in chapter-10 The Environment Policy
1.40	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.	
1.41	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.	The Environment Monitoring Cell discussed under Chapter 6
1.42	d) To have proper checks and balances, the company should have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large.	The Environment Monitoring Cell discussed under Chapter 6
1.43	e) Environment Management Cell and its responsibilities to be clearly spell out in EIA/ EMP report	The Environment Monitoring Cell discussed under Chapter 6
1.44	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	The Environment Monitoring Cell discussed under Chapter 6
1.45	Status of any litigations/ court cases filed/pending on the project should be provided.	No litigation is pending in any court against this project

1.46	PP shall submit clarification from DFO that mine does not falls under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.	Nanjarayan Bird Sanctuary – 22.7km –NE It will Submit final EIA/EMP report
1.47	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable	Noted and agreed
1.48	Details on the Forest Clearance should be given as per the format given: Total Mine lease area (ha): Total Forest Land (Ha) : Date of FC : Extent of Forest Land : Balance area for which FC is yet to be obtained: Status of application for diversion of forest Land: If more than one provides details of each FC	Boluvampatti I R.F. 30.0km- SW Total Mine Lease area 1.60.5ha Details on the Forest Clearance will Submit final EIA/EMP report.
1.49	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report.	Noted and agreed.
1.50	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same. should be provided.	The outcome of public hearing will be updated in the final EIA/AMP report.
1.51	PP shall carry out survey through drone highlighting the ground reality for at least 10 minutes.	Noted and agreed
1.52	Detailed Chronology of the project starting from the first lease deed allotted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular form.	Noted and agreed.
1.53	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification)	Noted and agreed. As per detailed in front page of Draft EIA/EMP, NABET, NABL certification detailed given in the report.
1.54	The compliances of Tor must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapters section.	Noted and agreed. As per Tor compliance each chapter wise page and table, figure no given in the EIA/EMP report.

TERMS OF REFERENCE (ToR) COMPLIANCE

Thiru.A. Duraisamy- P2

File No.11129 TOR Identification No. TO24B0108TN5544123N Dated:10.03.2025

SPECIFIC CONDITIONS		
1	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of required statutory personnel, appropriate environmental management, system of maintaining the haul roads and village/panchayat roads, authorized blasting operation, Monitoring system of the environmental & other statutory compliances & its reporting status, etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: (i) Copy of the agreement forming CMC. (ii) The Organisation chart of the Committee with defining the role of the members (iii) The 'Standard Operating Procedures' (SoP) executing the planned activities.	Noted and agreed PP has agreed to establish a Cluster Management Committee. Copy of the agreement concerning CMC will be Submitted during the appraisal meeting.
2	The PP shall ensure the installation of CCTV at the proposed quarry site and ensure its inclusion during the EIA presentation.	Noted and agreed. PP agreed to install CCTV cameras at the quarry site Photographs will be submitted during the appraisal meeting.
2.SEAC STANDARD CONDITIONS		
1	In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone/benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.	It is an Existing Quarry Existing Depth – 7m bgl Existing pit dimensions -116m (L) X 34m (W) X 7 BGL (D)
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	Noted and agreed. Letter obtained from the VAO regarding surface features within 300m radius
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.	Noted and agreed The structure study has been carried out within the radius of 300m. There is no habitation within the radius of 300m from the project site the details of the structures is given in the EIA report, Chapter No.III
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying	Noted and agreed. The hydro-geological study was conducted to evaluate the possible impact on the ground water

	operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.	table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Noted and agreed The Bio diversity study has been conducted by the Functional Area Expert approved by the NABET. The same has been detailed in the Chapter No. 3.
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	Request to consider the secondary source data detailing the nearest reserve forest from Tamil Nadu Geographical Information System (TNGIS). The Nearest Reserve Forest Bolampatti I Reserve Forest 30.5km- SW
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	Noted and agreed. It is an existing quarry. PP agreed to conduct slope stability study and the report will submit along with HYCR systematically when the depth attains 30m
8	However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level.	Noted and agreed. It is an existing quarry. PP agreed to conduct slope stability study and the report will submit along with HYCR systematically when the depth attains 30m
9	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.	Noted and agreed The Proponent given affidavit stating that the blasting operation will be carried 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 The details of design for carrying out controlled blasting operation involving line drilling and muffle blasting to minimize blast-induced ground vibrations and controlled fly rock travel beyond 30 m from the blast site is detailed in Chapter 4.
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences	Noted and agreed. The project proponent possesses no additional quarries except this proposal.
12	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,	It is an existing quarry
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	It is an existing quarry
14	Quantity of minerals mined out. · Highest production achieved in any one year · Detail of approved depth of mining. · Actual depth of the mining achieved earlier.	It is an existing quarry

	· Name of the person already mined in that leases area. · If EC and CTO already obtained, the copy of the same shall be submitted. · Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	
15	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Noted and agreed The project site has been superimposed on the high resolution imagery. The Satellite imagery of the project site is enclosed in Chapter II Geomorphology map of the area is enclosed in Chapter II . Lithology and Geology Map of the area is enclosed in Chapter II.
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,	Noted and agreed The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project site.
17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 540 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.
18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	Noted and agreed Details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology justifications are provided in Chapter 2. The anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same are provided in Chapter 4.
19	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Noted and agreed The Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act, 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.
20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.	Noted and agreed The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3.
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil	Noted and agreed Baseline Data were collected for Post monsoon season October 2024 to Dec 2024.

	quality & flora/fauna including traffic/vehicular movement study	The Details of the Baseline Monitoring is given in the Chapter No. 3.
22	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	Noted and agreed Cumulative impact study has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No. 7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
24	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Noted and Agreed Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 3, Table No 3.3
25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	Not applicable.
26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
27	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Noted and agreed The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
28	Impact on local transport infrastructure due to the Project should be indicated.	Noted and agreed Traffic density survey was carried out to analyze the impact of transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details have been provided in Chapter No. 2.
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	Noted and agreed
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific	Noted & agreed. Mine closure plan is detailed in Chapter No. 4.

31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible	Noted and agreed
32	The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the Appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	Noted and agreed As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 540 Nos of trees were planted as a part of greenbelt development program all along the periphery of the lease applied area and approach roads and village roads.
33	Taller/one-year-old Saplings raised in appropriate size of bags, preferably ecofriendly bagsshould 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 As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 540 Nos of trees were planted as a part of greenbelt development program all along the periphery of the lease applied area and approach roads and village roads.
34	A Disaster Management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period	Disaster management Plan is detailed in Chapter- 7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period	A Risk Assessment and management Plan Chapter- 7
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Noted and agreed Occupational Health impacts are discussed in chapter- 10
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Noted and agreed No Public Health Implications anticipated due to this project. The anticipated impact and effective mitigation measures are discussed in the Chapter No. 4
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Noted and agreed Socio-economic studies carried out 5km within quarry site and it explicated in chapter 3.
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending against this project
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Noted and agreed. The details of the Project benefits are given in the Chapter No. 8.
41	If any quarrying operations were carried out in the proposed quarrying site for which now the	Noted and agreed

	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.	
42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	Noted and agreed The EMP has been prepared for the entire life of the mine i.e., upto the lease period.
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

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

		The Mining operation will be carried out to reduce the impact further to the level of negligence.
10	Impact on soil flora & vegetation around the project site.	The vegetation details have been provided in chapter III. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
11	Details of type of vegetation including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetation all along the boundary of the proposed mining area shall committed mentioned in EMP.	Noted and agreed There are no trees within the existing quarry site, and therefore, no proposal for tree felling or removal is anticipated during the quarrying operations.
12	The Environmental Impact Assessment should study the agro-biodiversity, agro-forestry, horticultural plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Noted and agreed The details of the soil analysis and the impacts are given in the Chapter No 3 & 4.
13	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted and agreed The Eco System of the area will be retained during the mining operation by the way of planting trees in the boundary barrier and un utilized areas. After completion of mining operation, the quarried-out pit will be facilitated to collect the rainwater to pit act as temporary reservoir
14	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock	Noted and agreed The project area is situated centre part of the quarry lands. The proposed Rough Stone quarrying operation will employ the wet drilling method, which is expected to have negligible impacts on nearby agricultural lands.
Forests		
15	The project proponent shall detailed study on impact of mining on Reserve forests and free ranging wildlife	Noted and agreed. There is no Reserve Forest within 1km radius from the project area. The mining operation will not cause any significant impact to the Reserve Forest and Wild life Sanctuaries
16	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	There is no forest/wildlife within 10km radius, chapter 3 details of Ecology and Biodiversity, and 4 endemic vulnerable and endangered indigenous flora and fauna.
17	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection	Details are discussed in the Chapter No.3
18	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
19	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect	There are 10 open wells and 7 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method

	groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period	
20	Erosion Control measures	Details discussed in the chapter No.4
21	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	Details in Chapter 3
22	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir	Food webs describe who eats whom in an ecological community. Made of interconnected food chains, food webs help us understand how changes to ecosystems — say, removing a top predator or adding nutrients — affect many different species, both directly and indirectly. Whereas in this proposed project is for quarrying of Rough Stone and Gravel and is on a hard batholith formation where no diversion of any water bodies is proposed of there is no intersection of ground water table anticipated.
23	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	Details are given in the Chapter No 4.
24	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	Details in Chapter 4 impact of bio diversity.
25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components	Details of impact on soil environment is detailed in Chapter No.4
26	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites	Bolampatti I R.F. 30.5-SW There is, National Parks, Eco sensitive areas, Wild life sanctuaries within the radius of 10km. An ecological survey of the study area was conducted particularly with reference to the listing of species and assessment of the existing baseline ecological (terrestrial) condition in the study area. Ecological Environment is discussed under Chapter 3
27	The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment. b) Bio-geochemical processes and its foot prints including environmental stress. c) Sediment geochemistry in the surface streams.	There are 10 open wells and 7 bore wells within the radius of 1km from the project area, Hydrogeological study has been conducted by the resistivity method
Energy		
28	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Detailed discussed in chapter 4
Climate Change		
29	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities	Noted and agreed. Details discussed in chapter 4.
30	The Environmental Impact Assessment should study impact on climate change, temperature	Detailed discussed in chapter 3.

	rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features	
31	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	A greenhouse gas (GHG) is a gas that absorbs and emits radiant energy within the thermal infrared range, causing the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and ozone (O₃) Carbon dioxide (CO₂): Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials. Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle. Methane (CH₄): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, land use and by the decay of organic waste in municipal solid waste landfills. Nitrous oxide (N₂O): Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater
Mine Closure Plan		
32	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Progressive Mine closure plan has been prepared considering the entire lease period in the mining plan and the same has been approved.
EMP		
33	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs	Detailed discussed in chapter 10.
34	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	Detailed discussed in chapter 10.
Risk Assessment		
35	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	A Risk Assessment and management Plan Chapter- 7
Disaster Management Plan		
36	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Disaster management Plan details in Chapter-7
Others		

37	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	Letter obtained from the VAO regarding surface features within 300m radius
38	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	The issues raised during public hearing is addressed in chapter No.7
39	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported	Plastic waste management in the project area detailed in Chapter No.7.

Standard Terms of Reference for (Mining of minerals)		
S.No	Terms of Reference	Reply
1.1	An EIA-EMP Report shall be prepared for peak capacity (.....MTPA) operation in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.	Peak Production – 18655m ³ Depth – 22m bgl Mine Lease area – 1.08.0 Ha
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modeling for.... MTPA of mineral production based on approved project/Mining Plan for.... MTPA. Baseline data collection can be for any season (three months) except monsoon.	Peak capacity of 18655m ³ operation to cover the impacts and environment management plan in chapter- IV and Chapter 10 covered in project specific activities. Baseline Data were collected for Post Monsoon Season Oct– Dec2024 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. III
1.3	Proper KML file with pin drop and coordinate of mine at 500-1000 m interval be provided.	Noted, Google earth image showing lease area with Coordinates of pillars in chapter-II.
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines, and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also.	Land use and land cover of the 10km Radius of study area is discussed in Chapter No. III. Geology map of the project area covering 10km radius Figure No. 2.8. page No.22 Geomorphology of the area is given in Chapter No 2 Figure No 2.9, page no.23 There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.

1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.	Land use and land cover of the study area is discussed in Chapter No. III with Physical features such as waterbodies, odai, canal etc.,
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.	DEM data using Drainage pattern around 10km radius showing streams and lakes etc., discussed in Chapter No. 3.
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ riverlet system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need elaboration in form of length, quantity and quality of water to be diverted.	Drainage pattern around 10km radius showing streams and lakes etc., is discussed in Chapter No. 3.
1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.	Details in chapter-2 showing the land features. And also enclosed Approved 3 rd Scheme of mining plan in annexure.
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. 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.
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing through the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.	Impact Studies and Mitigation Measures of Water Environment including Surface Water and Ground Water are discussed in Chapter 4.

1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channeling of the water courses, etc., approach roads, major haul roads, etc should be indicated.					Not Applicable. The details of waste dump management are given in the Chapter No. 4		
1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights					Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.5.		
						Description	Present area (Ha)	Area at the end of lease period (Ha)
	Sno	ML. project Land use	Area under Surface Rights(ha)	Area Under Mining Rights(ha)	Area under Both (ha)	Area Under Quarry	0.40.50	0.88.20
	1	Agriculture Land				Site Services	Nil	0.01.00
	2	Forest Land				Roads	0.01.00	0.01.00
	3	Grazing Land				Green Belt	Nil	0.14.28
	4	Settlements				Unutilized Area	0.66.50	0.04.52
	5	Others (Specify)				Grand Total	1.08.00	1.08.00
	S.No	Details		Area (Ha)				
	1	Buildings						
	2	Infrastructure						
	3	Roads						
	4	Others (Specify)						
		Total						
1.13	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate budgetary provision should be prepared and submitted with EIA-EMP Report; and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.					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.		

1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/ MoEF&CC certification of the respective laboratory and NABET accreditation of the consultant to be provided.	Baseline Data were collected for Post Monsoon Season Oct– Dec 2024 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.
1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air) / downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.	Details in chapter-3 showing the various sampling stations As per CPCB guidelines.
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10km buffer zone i.e., dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison	Air Quality Modelling and wind rose pattern for prediction of incremental GLC's of pollutant was carried out using AERMOD view 13 Model. Details in Chapter No. 4.
1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.	Traffic density survey was carried out to analyses the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details in Chapter-II.
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need-based survey for CSR activities to be followed.	Detailed in chapter-3 socio-economic study with occupational status & economic status of the study area. The study should also include the status of infrastructural facilities and amenities present in the study area CSR are discussed under Chapter 8.
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.	Detailed Ecology and biodiversity study in chapter-3
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.	Detailed in chapter-4 population in the impact zone and measures for occupational health and safety and proposed occupational health and safety discussed in chapter-X

1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted.	Noted and agreed
1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.	The ground water table is at 58-62m below ground level. In this project, ultimate depth is 22m Bgl It is inferred the quarrying activities in the Cumulative EIA project (Quarry) will not intersect the Ground water table.
1.23	Study on land subsidence including modeling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.	Detailed in Chapter-IV Anticipated and mitigation measures of in the study area.
1.24	Detailed water balance should be provided. The breakup of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.	Total Water Requirement: 2.0 KLD Discussed under Chapter 2, Table No 2.15, The required water will be met from rainwater accumulated in mine pit (when available) and from the approved water vendors.
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs	Methodology And Instrument Used for Air Quality Analysis in chapter-3 and Air Pollution control equipment (APCEs) in chapter-10 sub 10.2 Environmental policy.
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of mineral. The measures adopted to conserve energy or use of renewable sources shall be explored.	Details in Machinery and equipment details in Chapter-2 Table No 2.16
1.27	PP to evaluate the green house emission gases from the mine operation/ washery plant and corresponding carbon absorption plan.	Noted and agreed
1.28	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.	A Risk Assessment and Disaster Preparedness and management Plan Chapter- 7
1.29	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation, handling & storage/stockyard, etc, Impact of blasting, noise and vibrations should be provided.	Detailed in Machinery and technology used Chapter-3 Table 3.17 – Methodology and Instrument Used for Air Quality Analysis Detailed study in chapter-4 Impact of choice of mining method and impact on air quality and blasting and noise and vibrations.
1.30	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.	Traffic density survey was carried out to analyze the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2. Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2.

1.31	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2
1.32	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.	Detailed in chapter-2 for mineral transportation route with approach roads etc., and impacting air quality detailed given chapter-4
1.33	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre- mining status should be provided. A Plan for the ecological restoration of the mined-out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.	Discussed under Chapter 2. Mine Closure Plan is a part of Approved Mining Plan enclosed as Annexure Volume – 1.
1.34	Adequate greenbelt nearby areas, mineral stock yard and transportation area of mineral shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route.	Greenbelt Development Plan is discussed under Chapter 4
1.35	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.	The total cost and the details are given in the Chapter No. 10
1.36	Details of R&R. Detailed project specific R&R Plan with data on the existing socio- economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc. and costs along with the schedule of the implementation of the R&R Plan should be given.	Not Applicable. There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
1.37	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.	CSR are discussed under Chapter 8. And specific budgetary provisions (capital and recurring) for specific activities over the life of the project in chapter-10
1.38	Corporate Environment Responsibility:	CER are discussed under Chapter 8.
1.39	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.	Detailed in chapter-10 The Environment Policy
1.40	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.	
1.41	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.	The Environment Monitoring Cell discussed under Chapter 6
1.42	d) To have proper checks and balances, the company should have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large	The Environment Monitoring Cell discussed under Chapter 6
1.43	e) Environment Management Cell and its responsibilities to be clearly spell out in EIA/ EMP report	The Environment Monitoring Cell discussed under Chapter 6

1.44	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	The Environment Monitoring Cell discussed under Chapter 6
1.45	Status of any litigations/ court cases filed/pending on the project should be provided.	No litigation is pending in any court against this project
1.46	PP shall submit clarification from DFO that mine does not falls under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.	Nanjarayan Bird Sanctuary – 23.0km –NE It will Submit final EIA/EMP report
1.47	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable	Noted and agreed
1.48	Details on the Forest Clearance should be given as per the format given: Total Mine lease area (ha): Total Forest Land (Ha) : Date of FC : Extent of Forest Land : Balance area for which FC is yet to be obtained: Status of application for diversion of forest Land: If more than one provides details of each FC	Bolampatti I R.F. 30.5km- SW Total Mine Lease area 1.08.0ha Details on the Forest Clearance will Submit final EIA/EMP report.
1.49	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report.	Noted and agreed.
1.50	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same. should be provided.	The outcome of public hearing will be updated in the final EIA/AMP report.
1.51	PP shall carry out survey through drone highlighting the ground reality for at least 10 minutes.	Noted and agreed
1.52	Detailed Chronology of the project starting from the first lease deed allotted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular form.	It is a fresh lease.
1.53	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification)	Noted and agreed. As per detailed in front page of Draft EIA/EMP, NABET, NABL certification detailed given in the report.
1.54	The compliances of Tor must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapters section.	Noted and agreed. As per Tor compliance each chapter wise page and table, figure no given in the EIA/EMP report.

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	Not applicable. This is not a violation category project. This proposal falls under B1 Category

	EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	
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.	Noted & agreed.
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	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 whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The applied area was inspected by the officers of Department of Geology along with revenue officials and found that the land is fit for quarrying under the policy of State Government.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent has framed their Environmental Policy and the same is discussed in the Chapter No 10.1.
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90 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.	Noted & agreed. The study area considered for this study is 10 km radius and all data contained in the EIA report such as waste generation etc., is for the Life of the Mine / lease period.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and	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

	submitted. Impact, if any, of change of land use should be given.	
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	Not Applicable. There is no waste anticipated during this quarry operation. The entire quarried out rough stone will be transported to the needy customers. No Dumps is proposed outside the lease area.
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Not Applicable. There is no Forest Land involved in the proposed project area. The proposed project area is a Patta land. Approved Mining Plan is enclosed as Annexure Volume 1.
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No Reserve Forest within the Study Area.
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 KM of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	Not Applicable. There are no National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3. There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
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	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range'.

	furnished to the effect that the proposed mining activities could be considered.	
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable. The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Not Applicable. There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for Post Monsoon Season (Oct to Dec 2024) 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.	Total Water Requirement for this project is given in the chapter No 2, Table No 2.13.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water for dust suppression, greenbelt development and domestic use will be obtained from accumulated rainwater/seepage water in mine pits. Drinking water will be sourced from the approved water vendors, No 2, Table No 2.13.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	The rain water collected in the pits after spell of rain will be used for greenbelt development and dust suppression.

27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Quality discussed in Chapter No. 4.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The ground water table is at 58-62m below ground level. The ultimate depth of this projects is P1 Pit – I: 70m (L) X 22m (W) X 7 BGL (D) Pit – II: 123m (L) X 89m (W) X 42 BGL (D) P2 Pit I-254m (L) X 35m (W) X 22 BGL (D) 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.	Details in Chapter 3 Water Environment
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	Progressive greenbelt development plan has been prepared and discussed along with Recommended Species details are given in the Chapter 4, Table No.4.9
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2.
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2. .
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Discussed in chapter No 2.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Details in Chapter 10.
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Details in Chapter 10.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Details in Chapter 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.	Environment Management Plan Chapter 10.
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	The outcome of public hearing will be updated in the final EIA/AMP report
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	No litigation is pending in any court against this project.
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.	The proposed capital cost for Environmental Monitoring Programme is Rs 3,80,000/- and the recurring cost is Rs 76,000/- per annum for each project. Details in Chapter 6 .
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.	Details in Chapter 10.
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, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) Dated: 4th August, 2009 are followed.
H	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF & CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	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	Not applicable.

	Regional Office of Ministry of Environment, Forest and Climate Change, as may be 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.

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1.INTRODUCTION

1.0 PREAMBLE

Environmental Impact Assessment (EIA) is the management tool to ensure 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.

Rough Stone is the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of the proposed Kodangipalayam Rough Stone Quarries, five proposed Quarries and four existing quarries with total extent of Cluster of 15.02.89 ha at Kodangipalayam Village, Palladam Taluk, Tiruppur District and Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

This EIA Report is prepared in compliance with ToR obtained for the below proposals in Table 1.1 and the Baseline Monitoring study has been carried out during the period of Oct – Dec 2024

TABLE 1.1: ToR OBTAINED PROJECTS

Code.	Proponent Name	Extent (Ha)	Terms of Reference (ToR)
P1	Thiru.M.Devaraj	1.60.5	File No.11105. TOR Identification No. TO24B0108TN5222655N Dated:06.03.2025
P2	Thiru.A.Duraisamy	1.08.0	File No.11129. TOR Identification No. TO24B0108TN5544123N Dated:10.03.2025

Source: ToR Letter's of the respective project proponents

1.1 PURPOSE OF THE REPORT

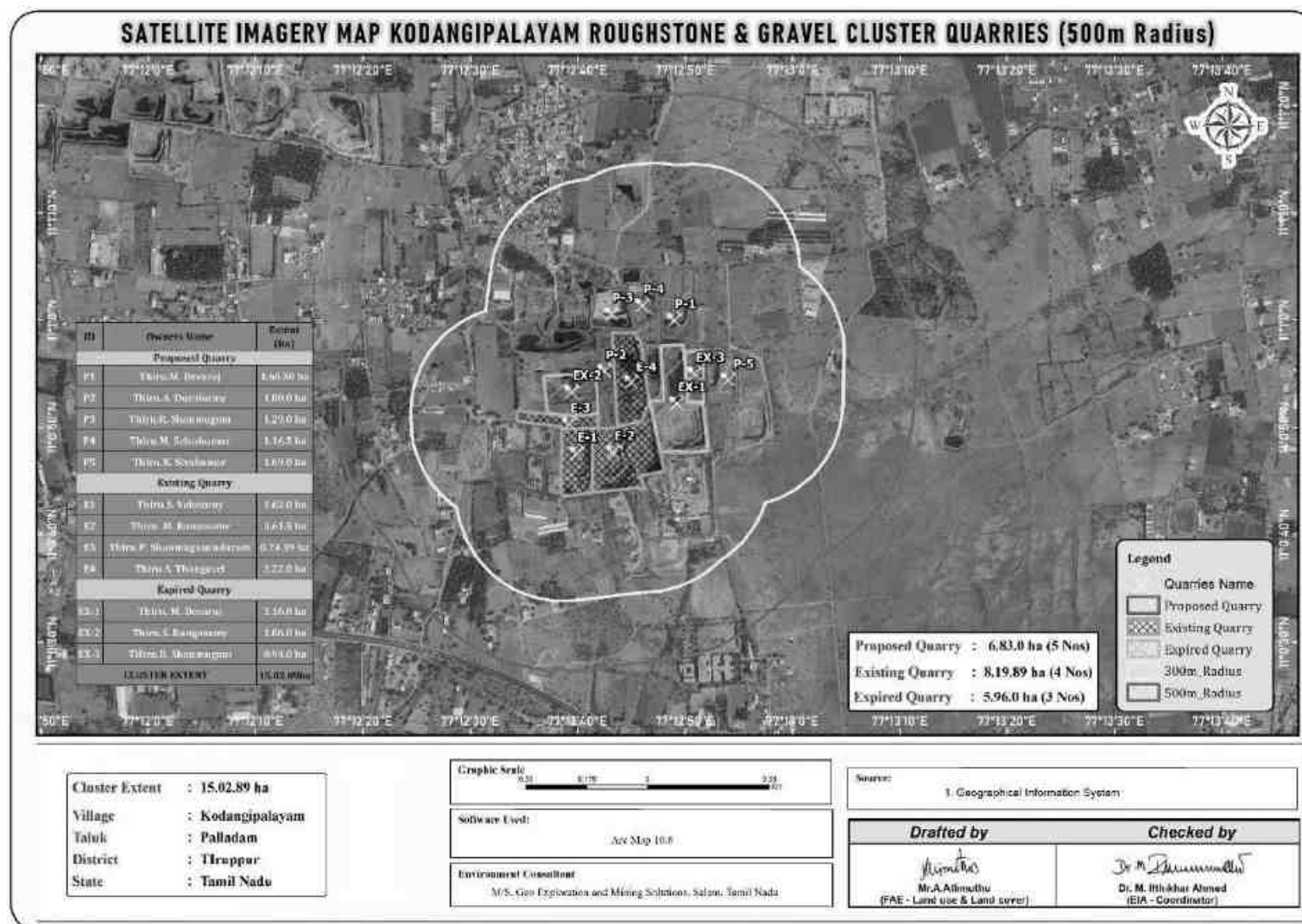
The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 1889 of 20th April 2022, Mining Projects are classified under two categories i.e. A (> 250 Ha) and B ($\leq$ 250 Ha),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

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

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

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

FIGURE 1.1 SATELLITE IMAGERY CLUSTER QUARRIES



1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 Identification of Project Proponent

TABLE 1.1: DETAILS OF PROJECT PROPONENT

	P1	P2
Name of the Project Proponent	Thiru.M.Devaraj	Thiru.A.Duraisamy
Address	S/o. Marappa Gounder, No.2/456, Amma Kadu, Kodangipalayam, Palladam Taluk, Tiruppur District	S/o. Arumugam, No.4/33, Karanampettai, Palladam Taluk, Tiruppur District
Mobile	+91 98422 67507	+91 98422 39591
Email	thambiblumetals3535@gamil.com	duraipalaniappa@gmail.com
Status	Individual	Individual

1.2.2 Identification of Project

TABLE 1.2: SALIENT FEATURES OF THE PROPOSED PROJECT- P1

Name of the Project	Thiru. M.Devaraj Rough stone and Gravel quarry				
S.F. No.	311/3 & 311/4B				
Extent	1.60.5 ha				
Village Taluk and District	Kodangipalayam Village, Palladam Taluk, Tiruppur District.				
Land Type	Proponent own patta land				
Land Ownership	It is a Patta lands. Registered in the name of the applicant (Thiru.M.Devaraj), vide Patta Nos. 2009 and 1989				
Previous lease details	It is a fresh application. But the applied area has been considered quarrying operation earlier				
	S.No	Name of Lessee	District collector's Proceeding Number and date	Extent and S.F.Nos	Lease Period
	1	Thiru.K.R.Rathinasamy	Rc.No.1556/2005/MM2 Dated: 16.08.2005	1.60.5ha and 311/3&311/4B	14.09.2005 to 13.09.2010
	2	Thiru.K.R.Rathinasamy	Rc.No.655/Mines/2010 Dated: 26.02.2011	1.60.5Ha and 311/3&311/4B	26.02.2011 to 25.02.2016
Toposheet No	58 - E/04				
Latitude between	11° 00' 57.66"N to 11° 01' 04.72"N				
Longitude between	77° 12' 47.33"E to 77° 12' 50.78"E				
Elevation of the area	410m(Max) 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	454744		2672		
Mineable Reserves	137627		608		
Year wise Production	137627		608		
Peak Production	29375		608		

Ultimate Pit Dimension	Pit I- 70m(L) x 22m(W) x 7m(D) Bgl Pit II- 123m(L) x 89m(W) x 42m(D) Bgl	
Water Level in the region	58-62m bgl	
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives	
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards Northwestern side. The altitude of the area is 410m (max) above Mean Sea level. The area is covered by gravel having an average thickness of 2m and followed by Massive Charnockite Which is clearly inferred from the adjacent existing quarry pit	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 Nos
	Excavator with Bucket and Rock Breaker	1 No
	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	22 Nos	
Project Cost	Rs.1,86,91,000/-	
EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs. 1,90,71,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Odai	520m SW
	Odai	530m West
	Kuttai	720m NE
	Odai	2km NE
	Samalapuram Lake	6.0km NW
	Noyyal River	6.5km NW
Greenbelt Development Plan	Proposed to plant 810 Nos of trees considering 500 Nos of trees/ Ha criteria The plantation will be developed around the project site and nearby village roads	
Proposed Water Requirement	1.5 KLD	
Nearest Habitation	390m – North West	
Nearest Reserve Forest	Boluvampatti R.F I – 30.0 km – South West	
Nearest Wild Life Sanctuary	Nanjarayan bird Sanctuary – 22.7km – NE Sathiyamangalam Tiger Reserve- 50.8km NW	

Source: Approved Mining & Land Documents.

TABLE 1.2: SALIENT FEATURES OF THE PROPOSED PROJECT- P2

Name of the Project	Thiru.A.Duraisamy Rough stone and Gravel quarry				
S.F. No.	315/2B				
Extent	1.08.0 ha				
Village Taluk and District	Kodangipalayam Village, Palladam Taluk, Tiruppur District.				
Land Type	Proponent own patta land				
Land Ownership	It is a Patta lands. Jointly registered in the name of the applicant Thiru.A.Duraisamy and Thiru.A.Thangavel, vide Patta Nos. 1447				
Previous lease details	It is a fresh application. But the applied area has been considered quarrying operation earlier				
	S.No	Name of Lessee	District collector's Proceeding Number and date	Extent and S.F.Nos	Lease Period

	1	Thiru.A.Duraisamy	Rc.No.2335/2005/X1 Dated: 30.11.2005	1.08.0ha and 315/2B	30.11.2005 to 29.11.2010
Toposheet No	58 - E/04				
Latitude between	11° 00' 49.97"N to 11° 00' 58.85"N				
Longitude between	77° 12' 41.74"E to 77° 12' 43.50"E				
Elevation of the area	408m(Max) AMSL				
Lease period	5 Years				
Mining Plan period	5 years				
Proposed Depth of Mining	22m Bgl				
	Rough Stone in m ³		Gravel m ³		
Geological Resources	200648		13648		
Mineable Reserves	90371		8754		
Year wise Production	90371		8754		
Peak Production	18655		3392		
Ultimate Pit Dimension	254m(L) x 35m(W) x 22m(D) Bgl				
Water Level in the region	58-62 m bgl				
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives				
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards North-Western side. The altitude of the area is 408m (max) above Mean Sea level. The area is covered by gravel having an average thickness of 2m and followed by Massive Charnockite Which is clearly inferred from the adjacent existing quarry pit				
Machinery proposed	Jack Hammer		3 Nos		
	Compressor		1 Nos		
	Excavator with Bucket and Rock Breaker		1 No		
	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	20 Nos				
Project Cost	Rs.1,10,10,000/-				
EMP Cost	Rs. 3,80,000/-				
Total Project cost	Rs. 1,16,18,000/-				
CER Cost	Rs. 5,00,000/-				
Nearby Water Bodies	Odai		240m SW		
	Odai		350m West		
	Kuttai		980m NE		
	Odai		2.2km NE		
	Samalapuram Lake		6.2km NW		
	Noyyal River		7.0km NW		
Greenbelt Development Plan	Proposed to plant 540Nos 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	310m – North West				
Nearest Reserve Forest	Boluvampatti R.F I – 30.5 km – South West				
Nearest Wild Life Sanctuary	Nanjarayan bird Sanctuary – 23km – NE Sathiyamangalam Tiger Reserve- 51km NW				

Source: Approved Mining & Land Documents.

1.3 BRIEF DESCRIPTION OF THE PROJECT

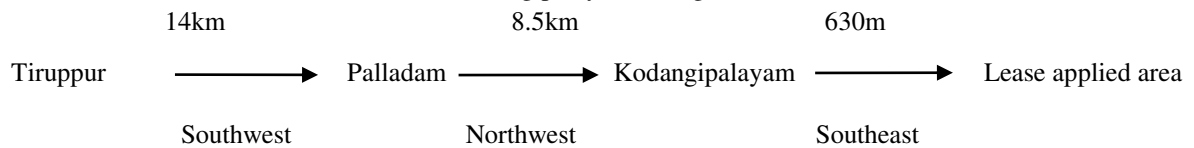
1.3.1 Nature and Size of the Project

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.

1.3.2 Location of the Project

P1

- The project site is located in Kodangipalayam Village, Palladam Taluk, Tiruppur District.
- The lease applied area is located about 17.5 km Southwest side of Tiruppur, 8km Northwest side of Palladam town and 630m Northwestern side of Kodangipalayam Village.



P2

- The project site is located in Kodangipalayam Village, Palladam Taluk, Tiruppur District.
- The lease applied area is located about 17.5 km Southwest side of Tiruppur, 8 km Northwest side of Palladam town and 500m Northwestern side of Kodangipalayam Village.

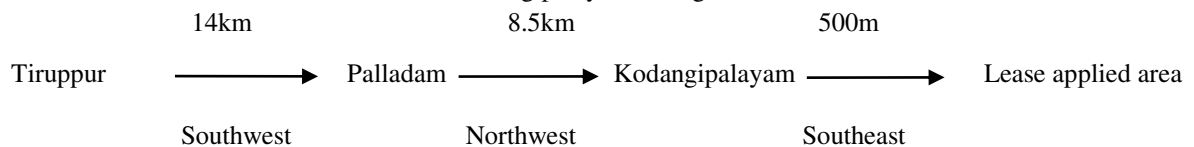
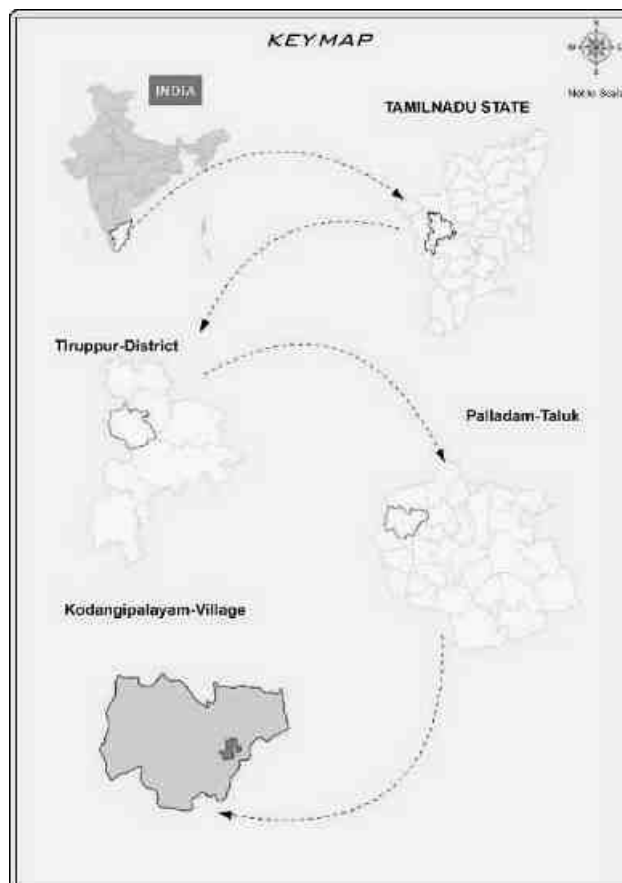


FIGURE 1.2 LOCATION MAP OF THE PROJECT SITE

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

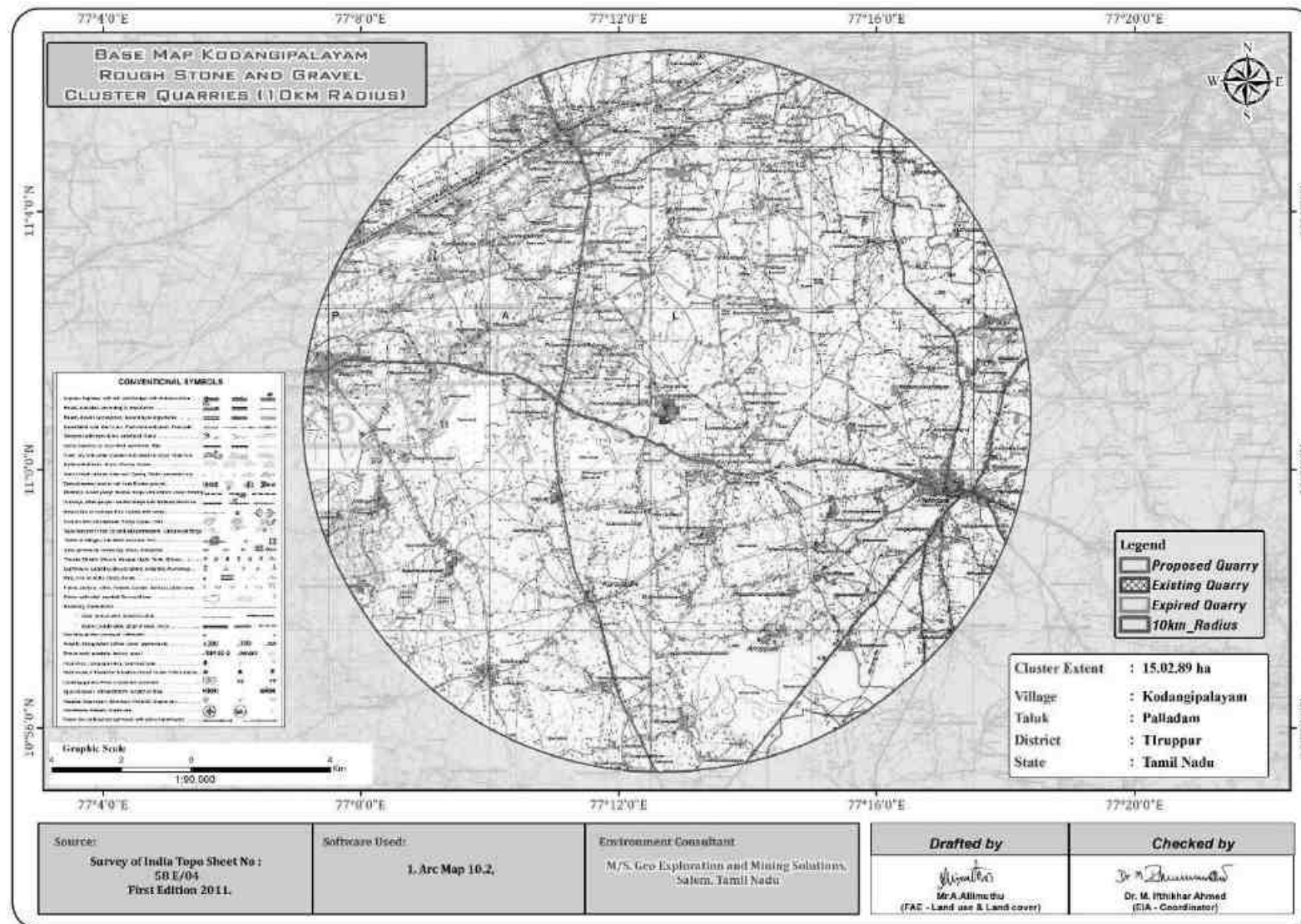
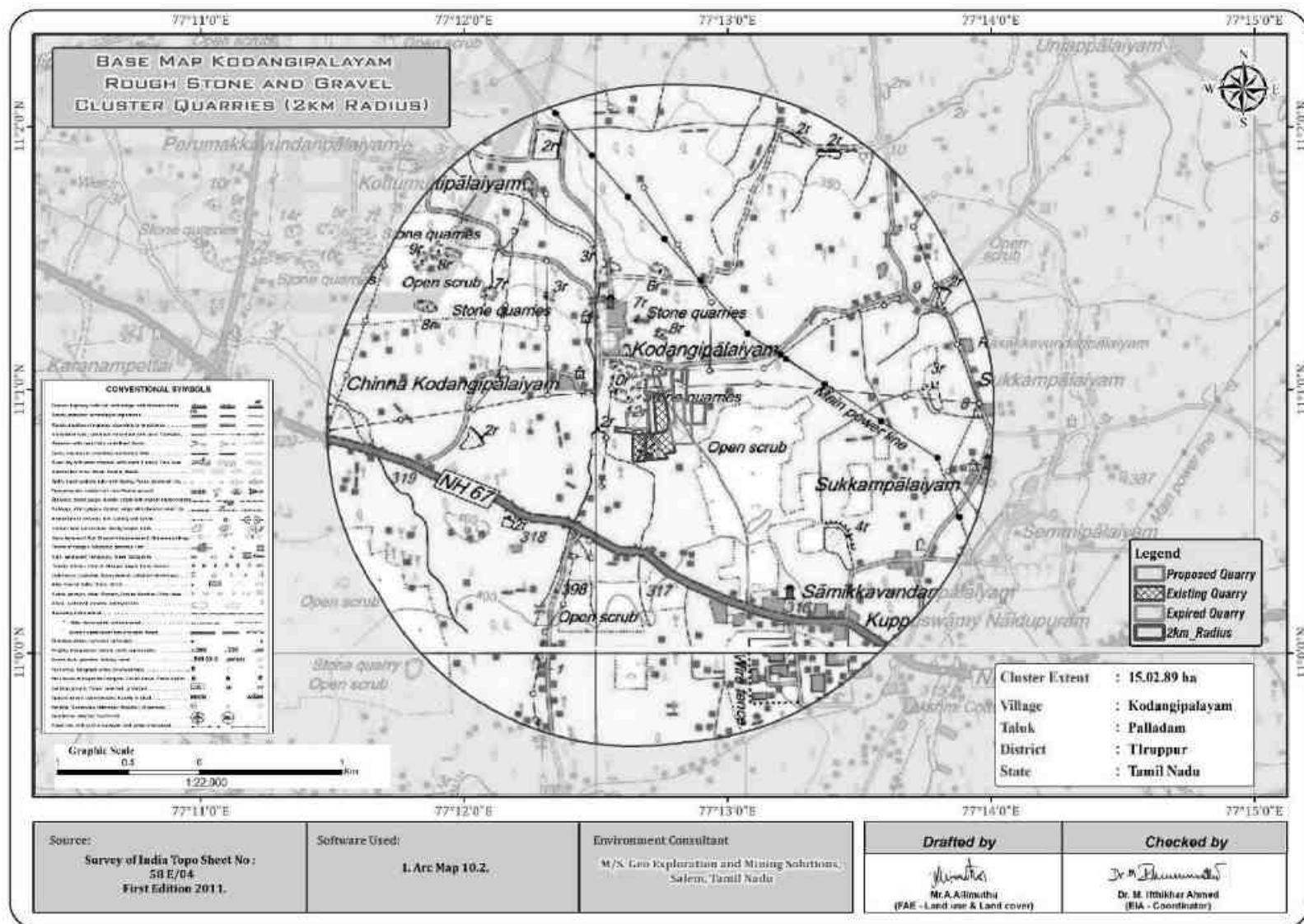
FIGURE 1.3: TOPOSHEET MAP OF THE STUDY AREA 10 KM RADIUS

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



1.4 ENVIRONMENTAL CLEARANCE

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

- Screening,
- Scoping
- Public consultation &
- Appraisal

SCREENING: -P1

- Proponent applied for Rough stone and Gravel quarry lease on 04.05.2022
- Precise area communication letter was issued by the Assistant Director vide Rc.No.410/Mines/2022, Dated: 10.01.2024.
- The Mining plan has been prepared by the Qualified person and got approval vide Letter Rc.No. 410/Mines/2022 Dated: 12.06.2024.
- The proposed project falls under “B1” Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/488076/2024 dated 16.07.2024

SCOPING: -P1

- The proposal was placed in 492nd SEAC meeting held on 29.08.2024 and the committee recommended for issue of ToR.
- The proposal was considered in 753rd Authority meeting held on 10.09.2024 & 11.09.2024
- The proposal was placed in 533rd SEAC meeting held on 14.02.2025 and the committee recommended for issue of ToR.
- The proposal was considered in 799th Authority meeting held on 03.03.2025 & 04.03.2025, issued ToR vide **File No.11105. TOR Identification No TO24B0108TN5222655N, dated: 06.03.2025**

SCREENING: -P2

- Proponent applied for Rough stone and Gravel quarry lease on 04.05.2022
- Precise area communication letter was issued by the Assistant Director vide Rc.No.411/Mines/2022, Dated: 12.01.2024
- The Mining plan has been prepared by the Qualified person and got approval vide Letter Rc.No. 411/Mines/2022 Dated: 18.06.2024
- The proposed project falls under “B1” Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/488203/2024 dated 16.07.2024

SCOPING: P2

- The proposal was placed in 492nd SEAC meeting held on 29.08.2024 and the committee recommended for issue of ToR.

- The proposal was considered in 753rd Authority meeting held on 10.09.2024 & 11.09.2024
- The proposal was placed in 533rd SEAC meeting held on 14.02.2025 and the committee recommended for issue of ToR.
- The proposal was considered in 799th Authority meeting held on 03.03.2025 & 04.03.2025, issued ToR vide **File No.11129. TOR Identification No TO24B0108TN5544123N, dated: 10.03.2025**

PUBLIC CONSULTATION

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

APPRAISAL –

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

1.5 TERMS OF REFERENCE (ToR)

The ToR was issued by the SEIAA vide

- **File No.11105. TOR Identification No TO24B0108TN5222655N, dated: 06.03.2025. – P1**
- **File No.11129. TOR Identification No TO24B0108TN5544123N, dated: 10.03.2025. –P2**

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

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 (Oct to Dec 2024) 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.
- Environment Protection Act, 1986
- Water (Prevention & Control) Act, 1974
- Air (Prevention & Control) Act, 1981
- ToR vide **File No.11105. TOR Identification No TO24B0108TN5222655N, dated: 06.03.2025. – P1**
- ToR vide **File No.11129. TOR Identification No TO24B0108TN5544123N, dated: 10.03.2025. –P2**

2. PROJECT DESCRIPTION

2.0 GENERAL

The Proposed Rough Stone Quarry require Environmental Clearance. There are 5 proposed and 4 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 15.02.89 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.

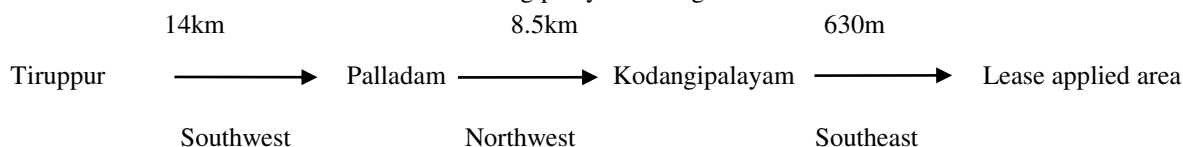
2.1 DESCRIPTION OF THE PROJECT

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

P1

- The project site is located in Kodangipalayam Village, Palladam Taluk, Tiruppur District.
- The lease applied area is located about 17.5 km Southwest side of Tiruppur, 8km Northwest side of Palladam town and 630m Northwestern side of Kodangipalayam Village.



P2

- The project site is located in Kodangipalayam Village, Palladam Taluk, Tiruppur District.
- The lease applied area is located about 17.5 km Southwest side of Tiruppur, 8 km Northwest side of Palladam town and 500m Northwestern side of Kodangipalayam Village.

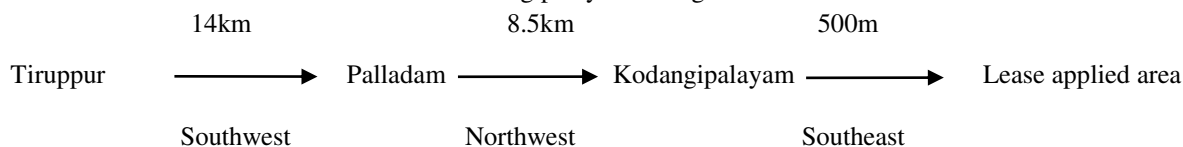


TABLE 2.1: SITE CONNECTIVITY

Nearest Roadway	NH (81) - Coimbatore – Trichy – 1.0 km – South West SH (165) - Kamaikenpalayam – Annur Road- 3.1km –West
Nearest Village	Kodangipalayam - 330m-W
Nearest Town	Palladam – 8.0 km-SE

Nearest Railway Station	Somanur – 8.2 km – North West
Nearest Airport	Coimbatore– 19.0 km –West
Seaport	Kochi– 156.0 km – South West

Source: Survey of India Toposheet

TABLE 2.2: CO-ORDINATES – PROJECT BOUNDARY-P1

Corner Nos.	Latitude	Longitude
1	11° 00' 57.66"N	77° 12' 47.58"E
2	11° 01' 01.37"N	77° 12' 47.55"E
3	11° 01' 01.43"N	77° 12' 47.33"E
4	11° 01' 04.61"N	77° 12' 47.40"E
5	11° 01' 04.62"N	77° 12' 47.54"E
6	11° 01' 02.31"N	77° 12' 47.41"E
7	11° 01' 01.92"N	77° 12' 49.59"E
8	11° 01' 04.69"N	77° 12' 49.72"E
9	11° 01' 04.72"N	77° 12' 50.78"E
10	11° 00' 57.76"N	77° 12' 50.57"E
Datum: UTM-WGS84, Zone 43 North		

Source: Approved Mining Plan

TABLE 2.2: CO-ORDINATES – PROJECT BOUNDARY-P2

Corner Nos.	Latitude	Longitude
1	11° 00' 58.83"N	77° 12' 43.05"E
2	11° 00' 50.08"N	77° 12' 43.50"E
3	11° 00' 50.02"N	77° 12' 43.19"E
4	11° 00' 49.97"N	77° 12' 42.16"E
5	11° 00' 58.85"N	77° 12' 41.74"E
Datum: UTM-WGS84, Zone 43 North		

Source: Approved Mining Plan

FIGURE 2.1: TOPOGRAPHICAL VIEW OF PROJECT AREA –P1



FIGURE 2.1: TOPOGRAPHICAL VIEW OF PROJECT AREA-P2



FIGURE 2.2 PHOTOS OF GREEN BELT & FENCING-P1

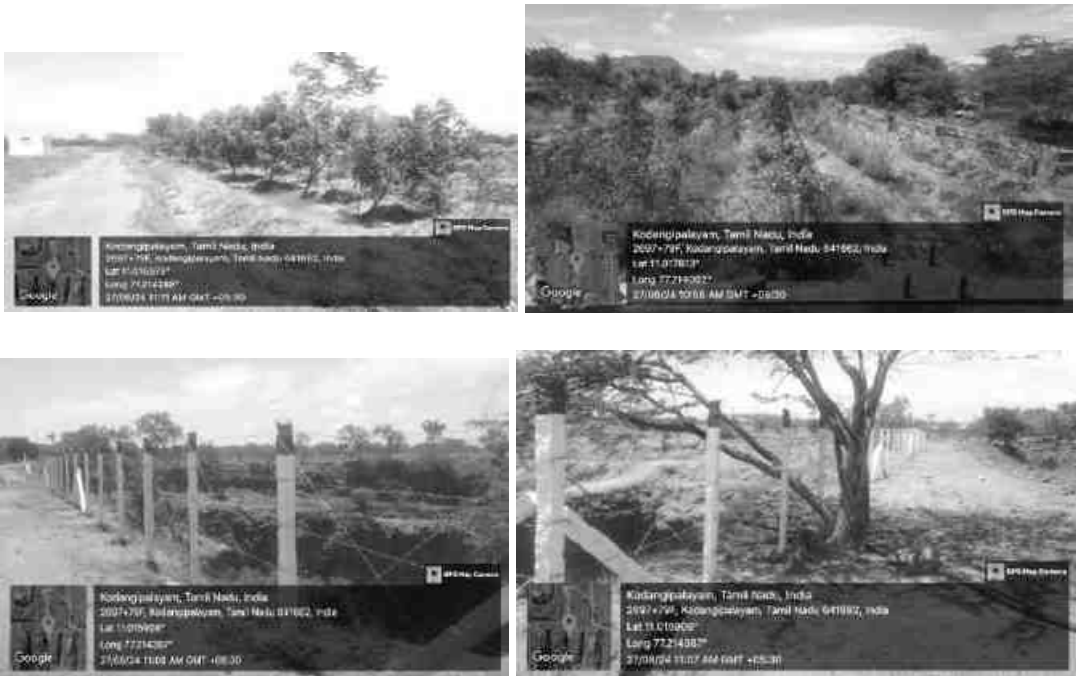


FIGURE 2.2 PHOTOS OF GREEN BELT & FENCING-P2





FIGURE 2.2: GOOGLE IMAGE OF THE PROJECT AREA –P1

Source: Google Earth Imagery

FIGURE 2.2: GOOGLE IMAGE OF THE PROJECT AREA –P2

Source: Google Earth Imagery

FIGURE 2.3: QUARRY LEASE PLAN / SURFACE PLAN- P1

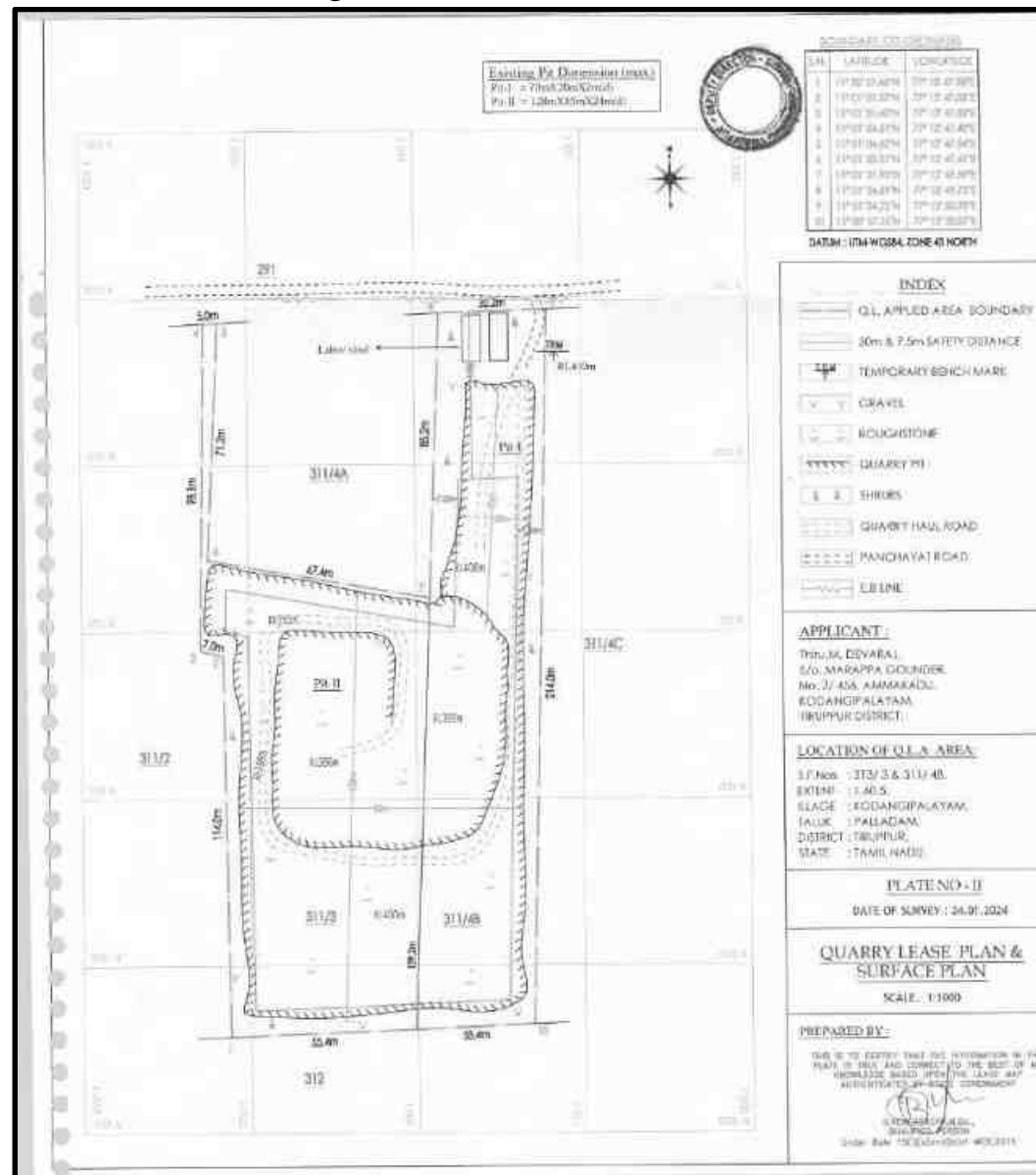


FIGURE 2.3: QUARRY LEASE PLAN / SURFACE PLAN- P2

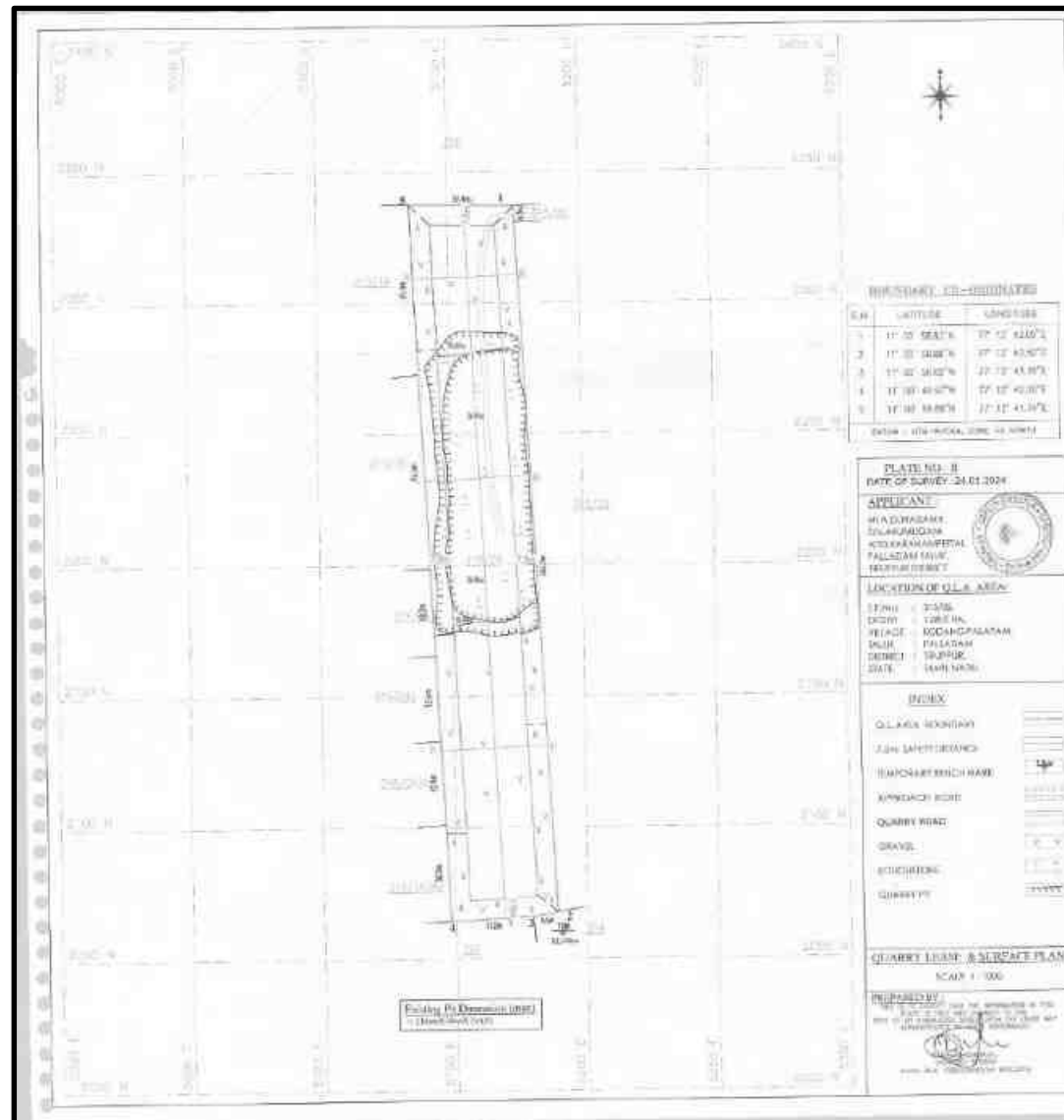


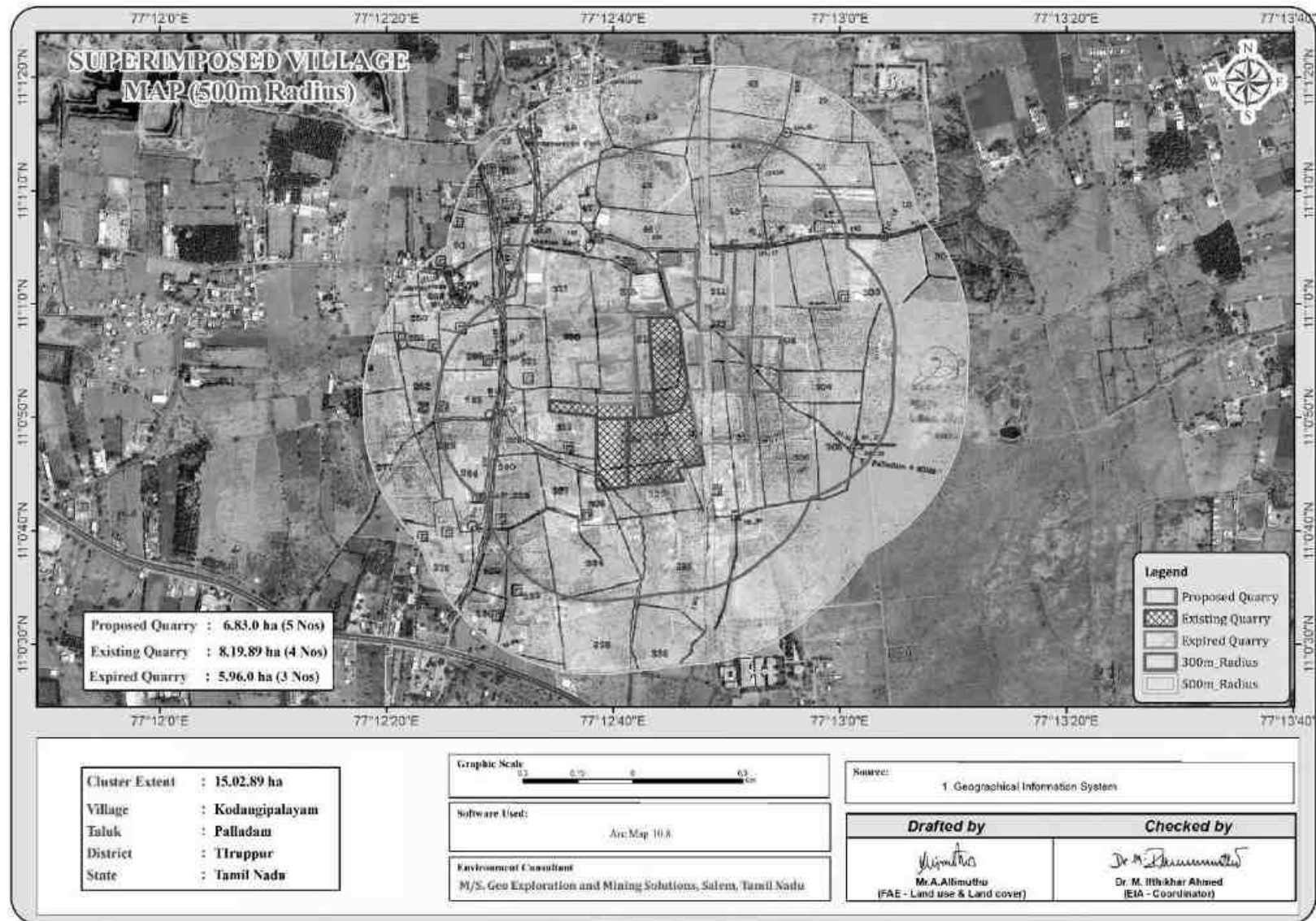
FIGURE 2.4: VILLAGE MAP SUPERIMPOSED ON GOOGLE EARTH IMAGE

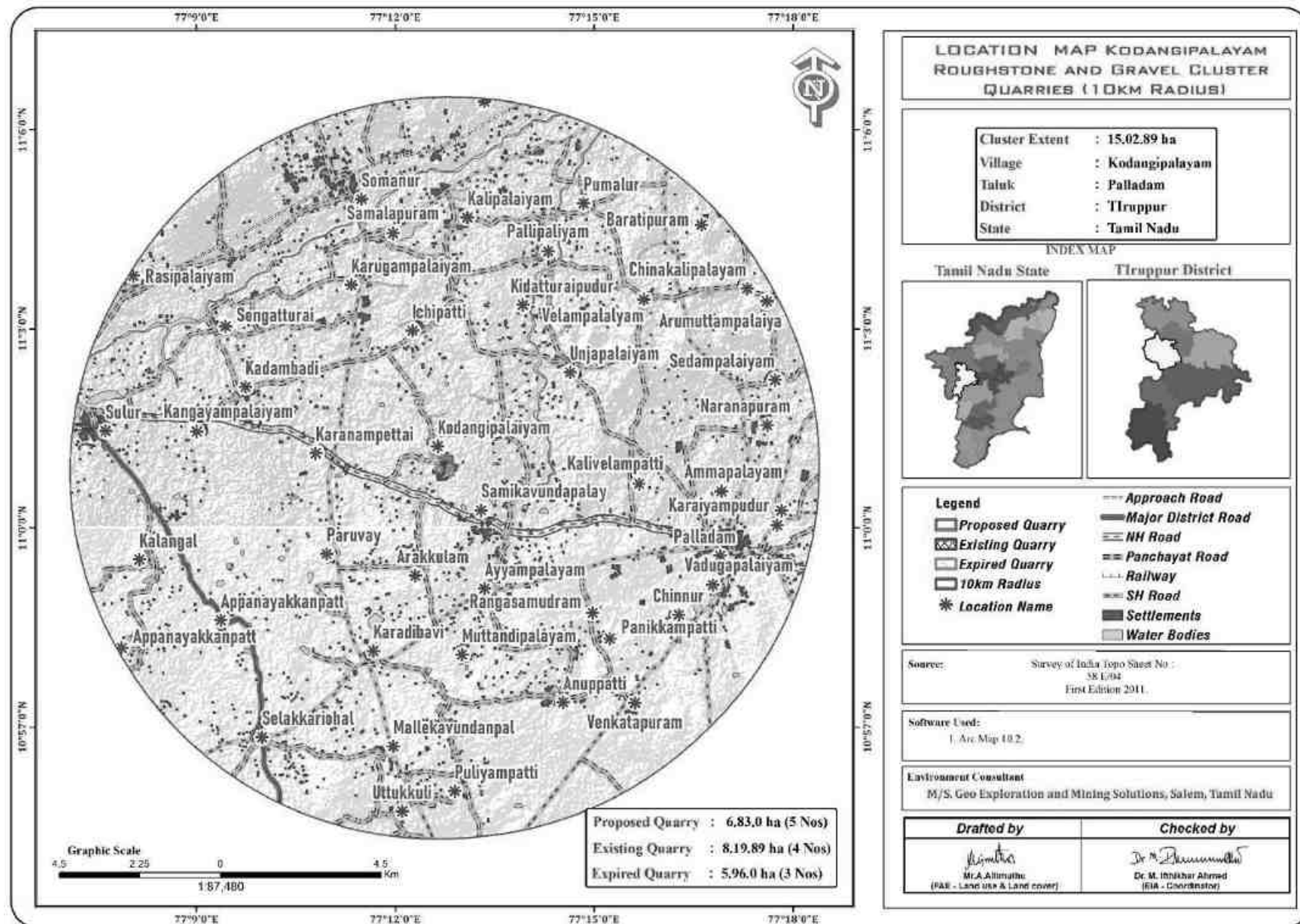
FIGURE 2.5: IMAGE SHOWING SURFACE FEATURES AROUND 10 KM RADIUS

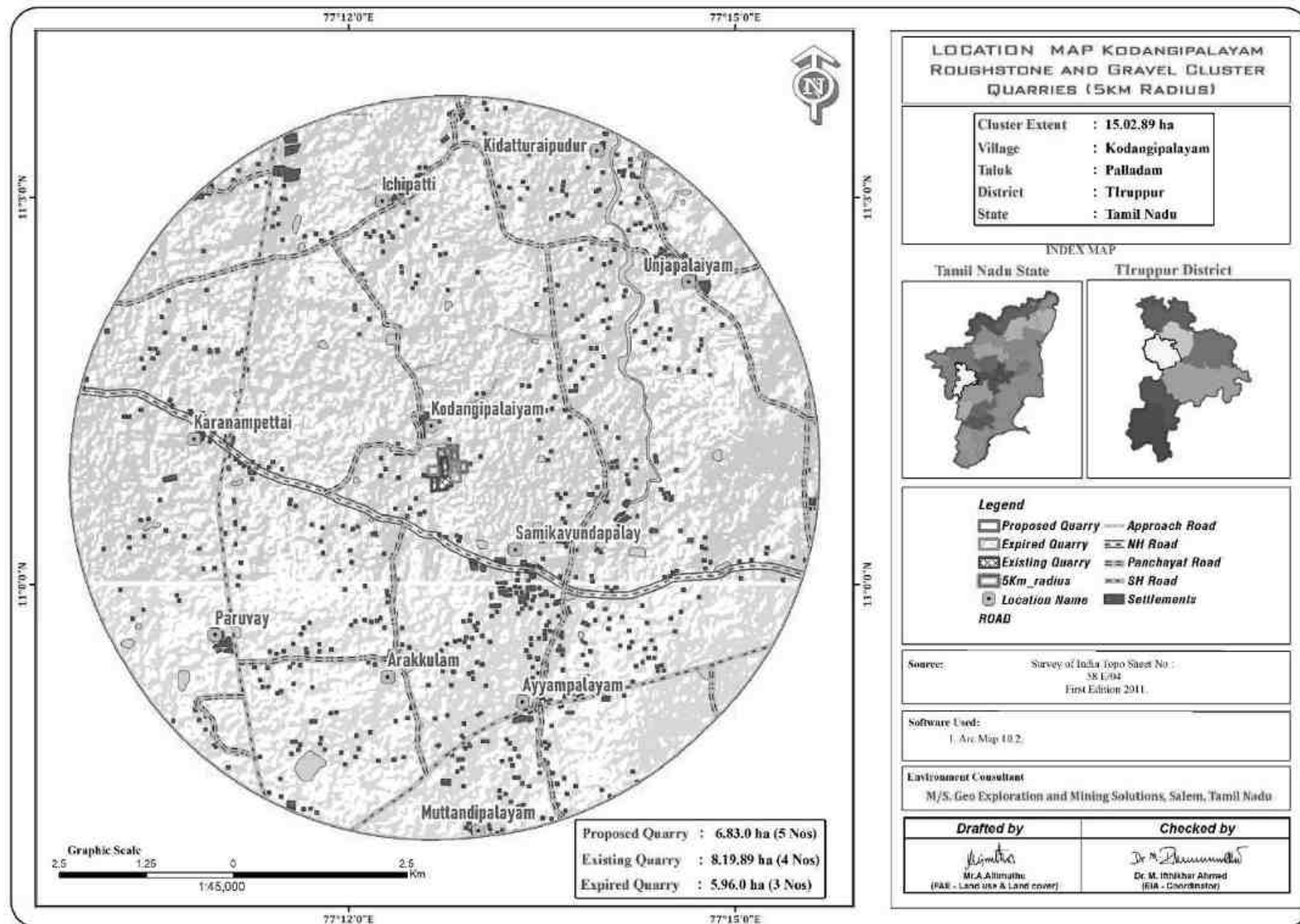
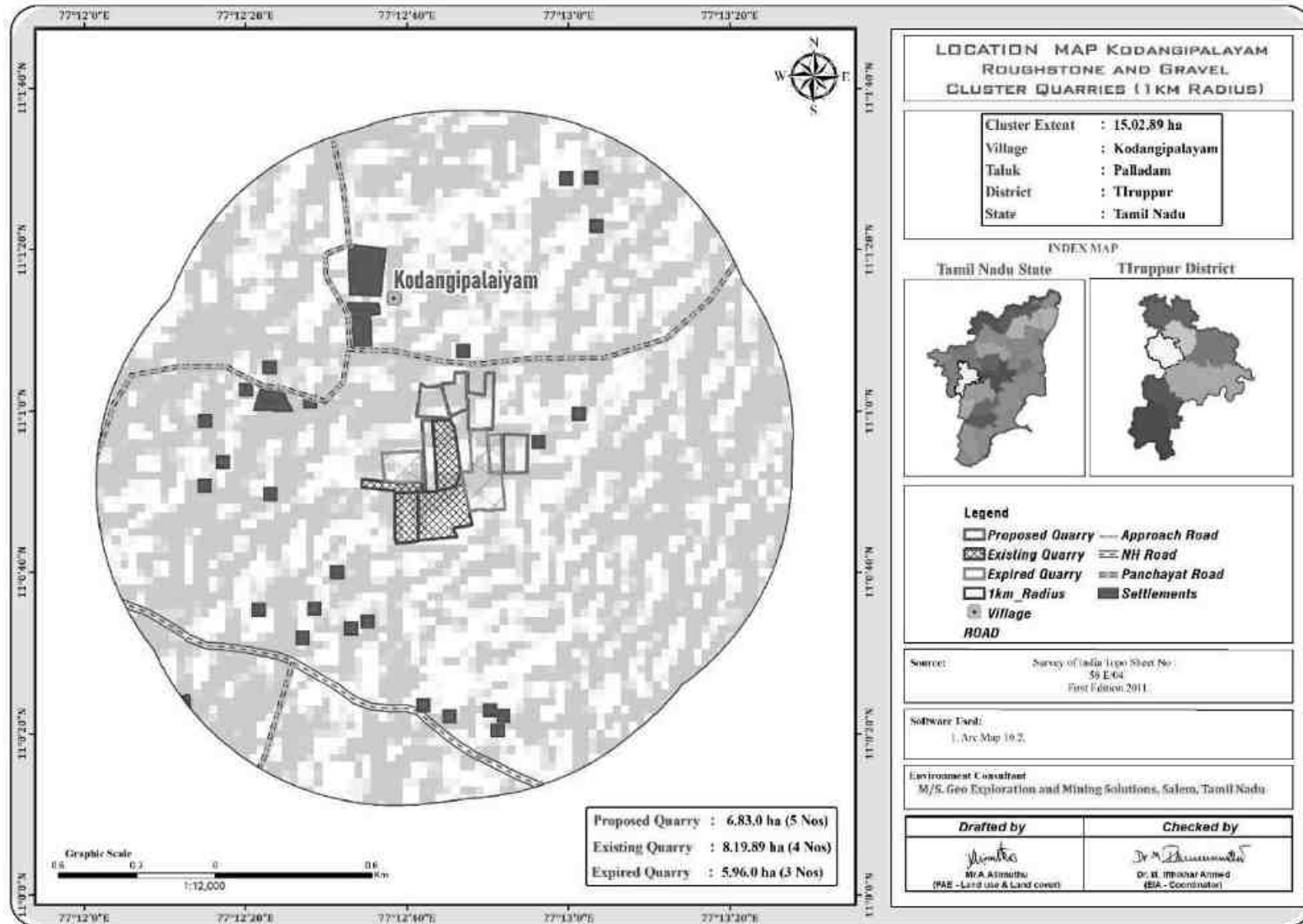
FIGURE 2.6: IMAGE SHOWING SURFACE FEATURES AROUND 5 KM RADIUS

FIGURE 2.6A: 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- P1

Description	Present area (Ha)	Area at the end of the lease period (Ha)
Area Under Quarrying	1.23.0	1.24.43
Infrastructure	0.01.0	0.01.00
Roads	0.02.0	0.02.00
Green Belt	Nil	0.21.00
Unutilized Area	0.34.5	0.12.07
Grand Total	1.60.5	1.60.5

Source: Approved Mining Plan

TABLE 2.3: LAND USE PATTERN- P2

Description	Present area (Ha)	Area at the end of the lease period (Ha)
Area Under Quarrying	0.40.50	0.88.20
Infrastructure	Nil	0.01.00
Roads	0.01.0	0.01.00
Green Belt	Nil	0.14.28
Unutilized Area	0.66.50	0.04.52
Grand Total	1.08.00	1.08.00

Source: Approved Mining Plan

2.2.2 Size or Magnitude of Operation**TABLE 2.4: RESOURCES AND RESERVES FOR FIVE YEARS –P1**

PARTICULARS	DETAILS	
	Rough Stone in m ³	Gravel in m ³ (3 years)
Geological Resources	454744	2672
Mineable Reserves	137627	608
Production for five-year plan period	137627	608
Peak Production	29375	608
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	92	2
No of Lorry loads (12m ³ per load)	8	1
Total Depth of Mining	42m below ground level	

Source: Approved mining plan.

TABLE 2.4: RESOURCES AND RESERVES FOR FIVE YEARS –P2

PARTICULARS	DETAILS	
	Rough Stone in m ³	Gravel in m ³ (3 years)
Geological Resources	200648	13648
Mineable Reserves	90371	8754
Production for five-year plan period	90371	8754
Peak Production	18655	3392
Mining Plan Period / Lease Applied Period	5 Years	
Number of Working Days	300 Days	
Production per day	60	10
No of Lorry loads (12m ³ per load)	5	1
Total Depth of Mining	22m 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 Nepheline. 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 Avinashi. 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 408-410m (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 SE60°.

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 250m³ /day and in bore well between 260 and 430 m³ /day. The weathered thickness varies from 2.5 m to 42m in general there are 3 to 5 fracture zones within 100 m and 1 to 4 fracture zones between 100 and 200 m.

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

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

Aquifer Systems:

Occurrence and storage of groundwater depend upon three factors viz., Geology, Topography and rainfall in the form of precipitation. Apart from Geology, wide variation in topographic profile and intensity of rainfall constitutes the prime factors of groundwater recharge. Aquifers are part of the more complex hydro geological system and the behaviour of the entire system cannot be interpreted easily. In hard rock terrain the occurrence of Ground Water is limited to top weathered, fissured and fractured zone which extends to maximum 30 m on an average it is about 10-15 m in 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 37m and the average thickness of the aquifer is approximately 12m. These formations are porous and permeable which have good water bearing zones.

Tertiary Cuddalore sandstone

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

Cretaceous Formations

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

Hard Rock Formations

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

Granitic Gneiss

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

Charnockite

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

Aquifer Parameters

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

TABLE 2.5: RANGE OF AQUIFER PARAMETERS

Name	Sp. Capacity (lpm/d)	Specific Yield (%)	T (m ² /d)	K (m/day)	Yield of wells (lps)
Alluvium	2.08	7.2	98	19.7	2.5

Tertiary	78-173	1.4-3.5	46-134	16-33	2-3.3
Cretaceous	33-782	0.3-2.56	33-782	10-66	1.1-3.5
Crystalline	27-224	0.8-2.5	16-60	5-20	1-2

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

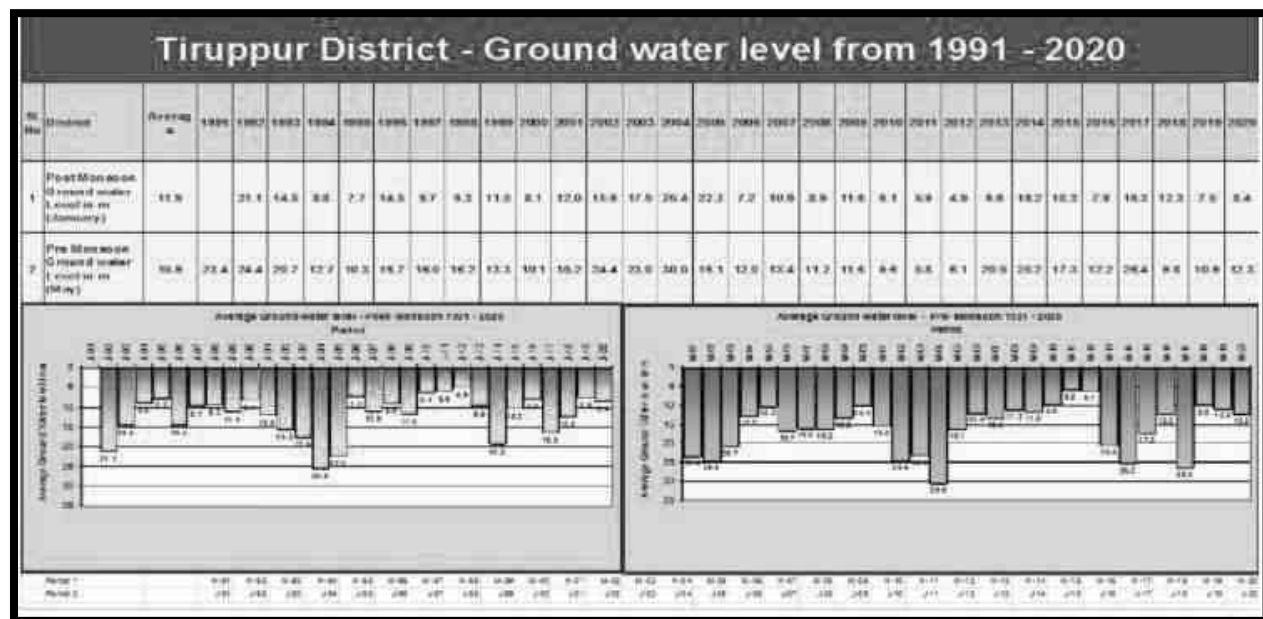


TABLE 2.6: GROUND WATER LEVEL VARIATIONS OF TIRUPPUR DISTRICT

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>

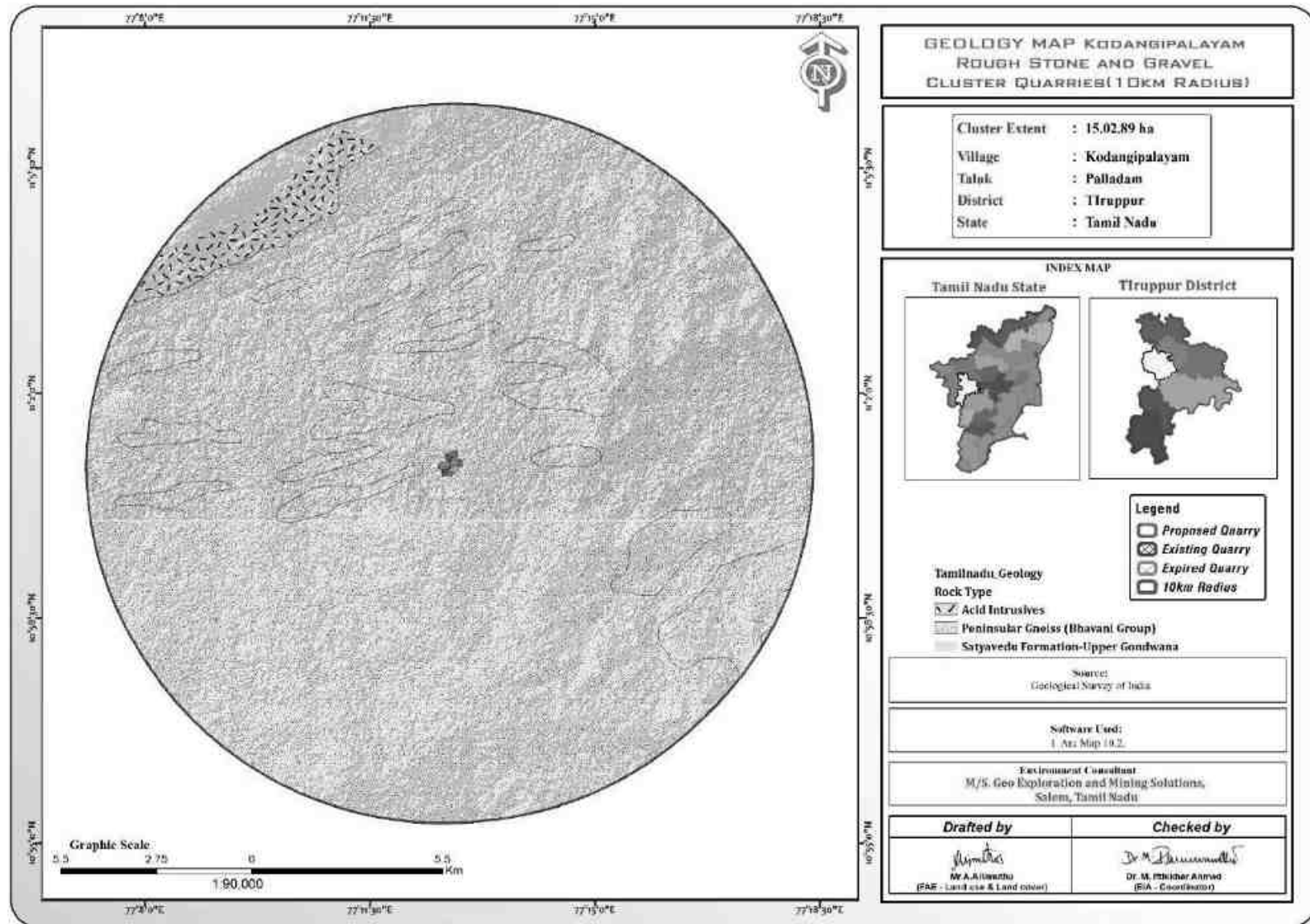
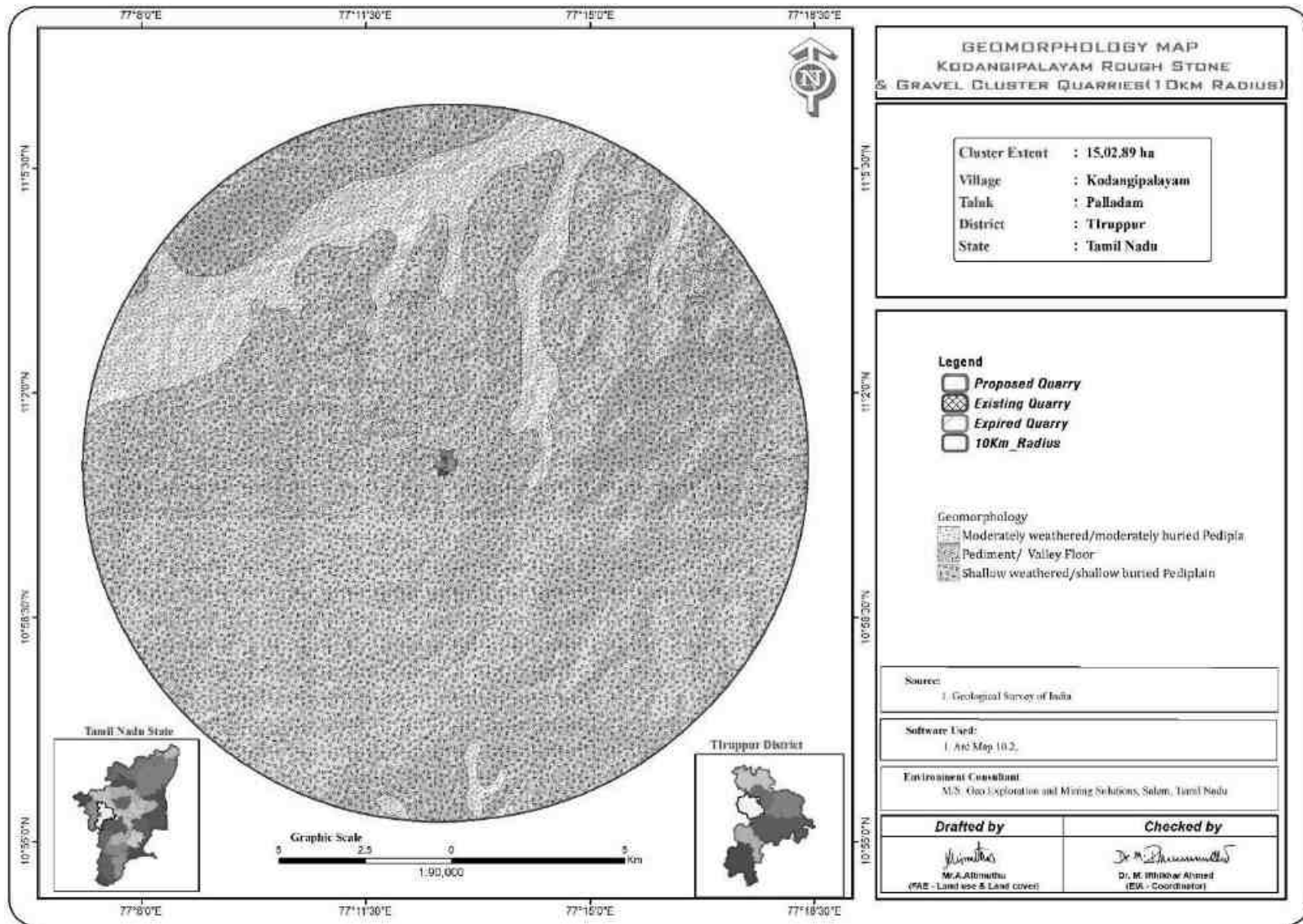
FIGURE 2.8: REGIONAL GEOLOGY MAP

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 2.7: RESOURCES AND RESERVES- P1

Description	Rough Stone in m ³	Gravel in m ³ (3 years)
Geological Resource in m ³	454744	2672
Mineable Resource in m ³	137627	608
Year wise production for five-year plan period	137627	608
Peak Production	29375	608

Source: Approved Mining Plan

TABLE 2.7: RESOURCES AND RESERVES- P2

Description	Rough Stone in m ³	Gravel in m ³ (3 years)
Geological Resource in m ³	200648	13648
Mineable Resource in m ³	90371	8754
Year wise production for five-year plan period	90371	8754
Peak Production	18655	3392

Source: Approved Mining Plan

TABLE 2.8: YEAR-WISE PRODUCTION PLAN-P1

Year	Rough Stone in m ³	Gravel in m ³
I	29375	-
II	27182	608
III	27875	-
IV	27905	-
V	25290	-
Total	137627	608

Source: Approved Mining Plan

TABLE 2.8: YEAR-WISE PRODUCTION PLAN-P2

Year	Rough Stone in m³	Gravel in m³
I	18521	2418
II	16674	2944
III	18136	3392
IV	18655	-
V	18385	-
Total	90371	8754

Source: Approved Mining Plan

Disposal of Waste

The overburden in the form of gravel totals approximately 9362 m³ up to a depth of 2m. The quarry gravel will be placed right away onto tippers and used to fill and level low-lying regions.

QUARRY PLAN

SECTION ALONG X-Y

SECTION ALONG A-B

SECTION ALONG XI-YI

SECTION ALONG C-D

SECTION ALONG E-F

INDEX

NO.	DESCRIPTION	SYMBOL
1.	Q.L. APPLIED AREA, BOUNDARY	---
2.	Q.L. & 7.5m SAFETY DISTANCE	---
3.	TEMPORARY BENCH MARK	BM
4.	GRAVEL	---
5.	ROUGHSTONE	---
6.	GUNNY PIT	---
7.	STONE & CR	---
8.	SAFETY	---
9.	QUARRY HOLE ROAD	---
10.	PANCHAYAT ROAD	---
11.	C.S. (CR)	---
12.	D.O.E. (DRAFT OF ESTIMATION)	---

APPLICANT:
 SHRI M. DEVARAJ
 370, MARAPPA GOUNDER,
 NO. 22, 45A, ANNAMALAI,
 KODANGALPATTAM,
 TRIPPLUR DISTRICT

LOCATION OF Q.L. AREA:
 T.P. NO. : 31/2 & 31/1 48
 HEIGHT : 11.40 S
 PLACE : KODANGALPATTAM,
 TALUK : PALLADAM,
 DISTRICT : TRIPPLUR
 STATE : TAMIL NADU

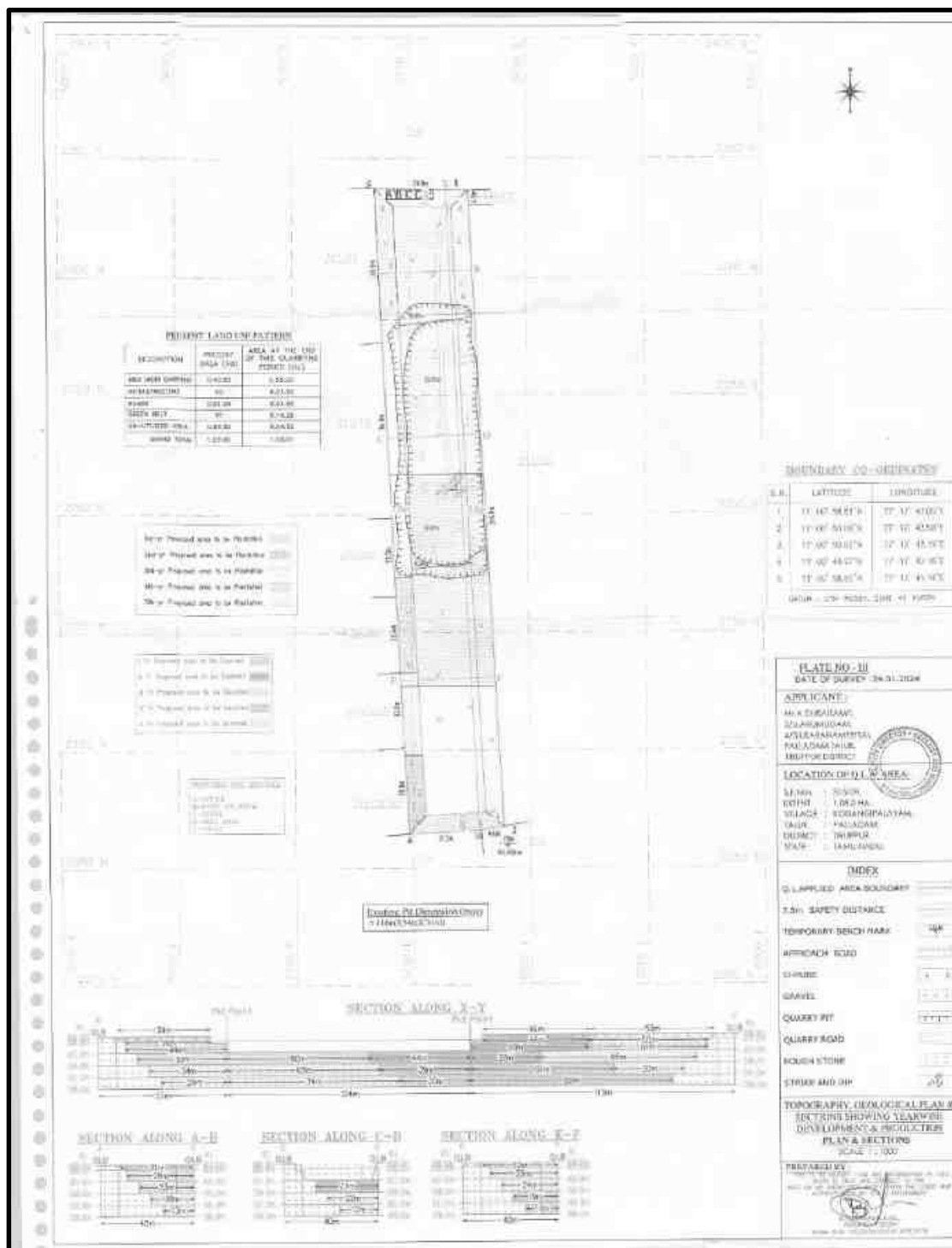
PLATE NO. - II
 DATE OF SURVEY : 24.01.2024

**TOPOGRAPHY, GEOLOGICAL PLAN,
 YEARWISE DEVELOPMENT &
 PRODUCTION PLAN & SECTION**

SCALE : 1:1000

PREPARED BY:
 [Signature]

**FIGURE 2.10: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENT
PRODUCTION PLAN AND SECTIONS-P1**



Conceptual Mining Plan/ Final Mine Closure Plan

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

TABLE 2.9: ULTIMATE PIT DIMENSION- P1

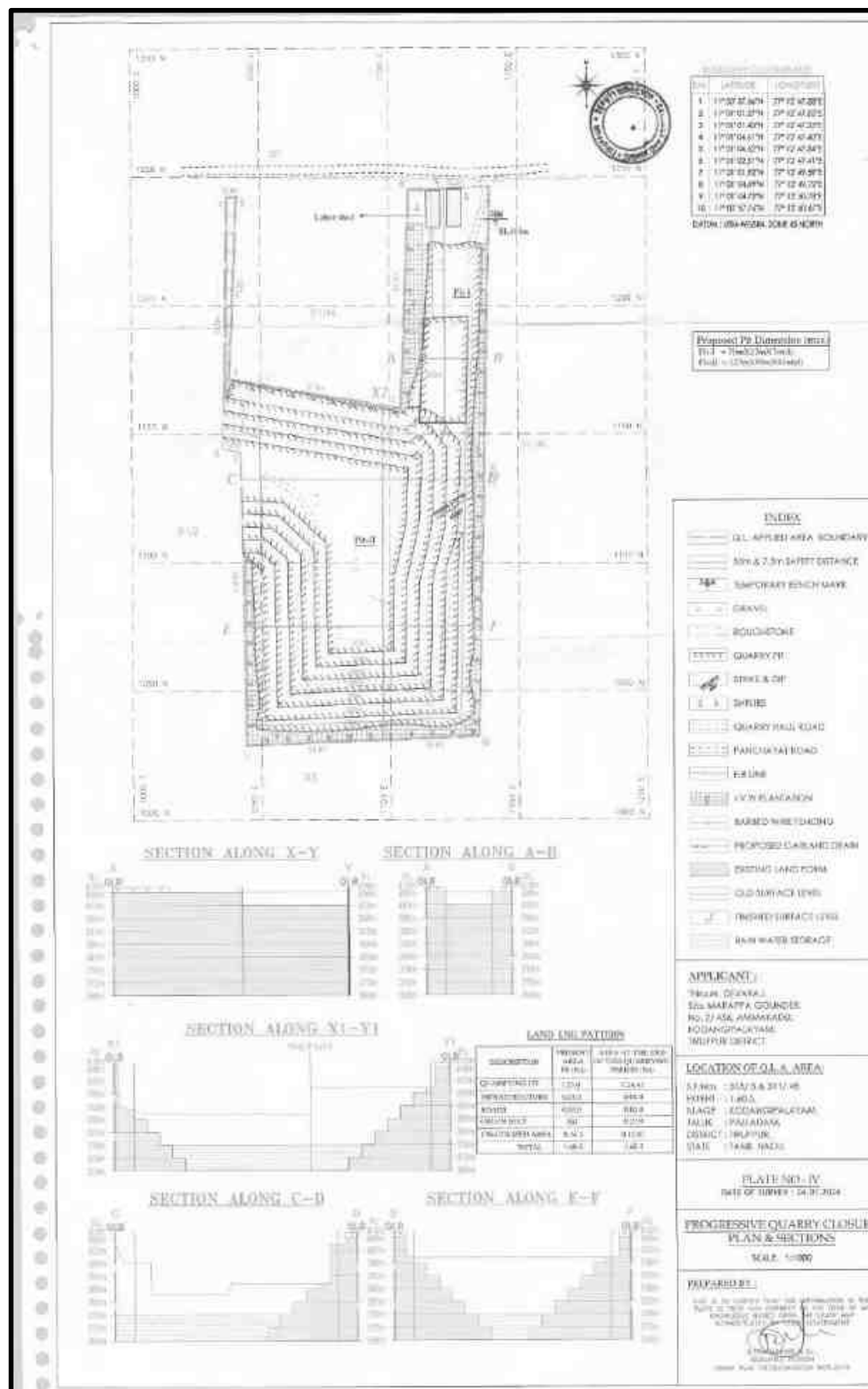
Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	70	22	7m bgl
II	123	89	42m bgl

Source: Approved Mining Plan

TABLE 2.9: ULTIMATE PIT DIMENSION- P2

Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	254	35	22m bgl

Source: Approved Mining Plan

FIGURE 2.11: CLOSURE PLAN AND SECTIONS – P1

Source: Approved Mining Plan

BOUNDARY CO-ORDINATES

S.N.	LATITUDE	LONGITUDE
1	11° 09' 58.82"N	77° 12' 43.80"E
2	11° 09' 58.82"N	77° 12' 43.80"E
3	11° 09' 58.82"N	77° 12' 43.80"E
4	11° 09' 58.82"N	77° 12' 43.80"E
5	11° 09' 58.82"N	77° 12' 43.80"E

SATM - 075-000000, 2000, 42, 00000

PLATE NO - IV
DATE OF SURVEY 18/01/2024

APPLICANT
MCA, DURGAMU, 70, ARUNACHAL, KODAKKALAI, PALLADAM TALUK, TRIPUNDRU DISTRICT

LOCATION OF Q.L.A. AREA
2 FMS 31500, 01/11/11, 100000, VILLAGE KODAKKALAI, TALUK PALLADAM, DISTRICT TRIPUNDRU, STATE TAMIL NADU.

INDEX

Q. L. AREA	AREA BOUNDARY	---
7.5m SAFETY DISTANCE	---	---
TEMPORARY BENCH MARK	---	---
APPROACH ROAD	---	---
SHRUBS	---	---
GRAVEL	---	---
QUARRY PIT	---	---
QUARRY ROAD	---	---
STRIKE AND DIP	---	---
FENCING	---	---
TREES	---	---
EXISTING LANDFORM	---	---
OLD SURFACE LEVEL	---	---
FINISHED SURFACE LEVEL	---	---
PROPOSED GARLAND DRAIN	---	---

SECTION ALONG X-Y

SECTION ALONG A-B

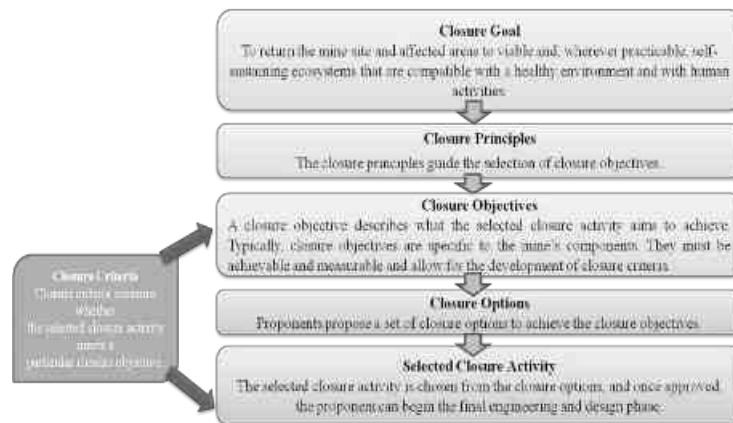
SECTION ALONG C-D

SECTION ALONG E-F

34

- 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°.

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

P1

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	–	1.6 m
Charge per hole	–	0.50 – 0.75kg
Powder factor	–	6.0 tonnes/kg
Diameter of hole	–	32 mm
Peak production Capacity	=	98m ³ of Rough stone per day
Spacing X Burden X Depth	=	1.2m X 1.0m X 1.6m = 1.92m ³
	=	1.92m ³ X 2.6 (Bulk Density) = 4.9Ts per hole

hence for the peak production per day of 98m³ (4.9Ts) = 52 Nos of holes to be drilled per day

Explosives per hole = ½ kg hence 25 kg of Explosives will be utilized maximum considering the peak production

P2

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	–	1.6 m
Charge per hole	–	0.50 – 0.75kg
Powder factor	–	6.0 tonnes/kg

Diameter of hole	–	32 mm
Peak production Capacity	=	62m ³ of Rough stone per day
Spacing X Burden X Depth	=	1.2m X 1.0m X 1.6m = 1.92m ³
	=	1.92m ³ X 2.6 (Bulk Density) = 4.9Ts per hole

hence for the peak production per day of 62m³ (4.9Ts) = 33 Nos of holes to be drilled per day

Explosives per hole = ½ kg hence 20 kg of Explosives will be utilized maximum considering the peak production

Type of Explosives to be used –

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

Storage of Explosives –

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

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

2.5.2 Extent of Mechanization

TABLE 2.10 PROPOSED MACHINERY DEPLOYMENT-P1

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

Source: Approved Mining Plan

TABLE 2.10 PROPOSED MACHINERY DEPLOYMENT-P2

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	3	1.2m to 2.0m	Compressed air
2	Compressor	1	400psi	Diesel Drive
3	Excavator with Bucket and Rock Breaker	1	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. Kodangipalayam Panchayat Road
2. State Highway_Tiruppur to Somandur -SH Road

Traffic density measurement was made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., Heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station during each shift- one person on either direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken.

TABLE.2.11: TRAFFIC SURVEY LOCATIONS

Station Code	Road Name	Distance and Direction	Type of Road
TS-1	Kodangipalayam Panchayat Road	780m_NW	Village Road
TS-2	Tiruppur-Somandur SH Road	6.0km NE	State Highway Road

Source: On-site monitoring by GEMS FAE & TM

TABLE 2.12: EXISTING TRAFFIC VOLUME

Station code	HMOV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	60	180	90	90	130	60	330
TS2	240	720	110	110	240	120	950

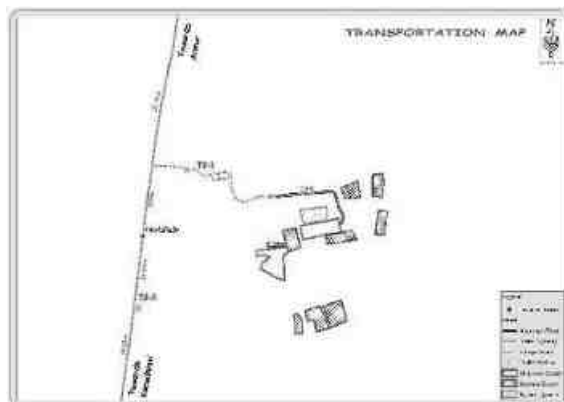
Source: On-site monitoring by GEMS FAE & TM

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

TABLE 2.13: ROUGH STONE & GRAVEL HOURLY TRANSPORTATION REQUIREMENT

Transportation of Rough Stone & Gravel per day		
Capacity of trucks	No. of Trips per day	Volume in PCU
20 tonnes	17	51

FIGURE.2.12: MINERAL TRANSPORTATION ROUTE MAP



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

TABLE 2.14: SUMMARY OF TRAFFIC VOLUME

Route	Existing Traffic volume in PCU	Incremental traffic due to the project	Total traffic volume	Hourly Capacity in PCU as per IRC – 1960 guidelines
Panchayat Road	330	51	381	1200
State Highway Annur to Pollachi Road	990	51	1001	1500

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

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

2.6.4 Mineral Beneficiation and Processing

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

2.7 PROJECT REQUIREMENT

2.7.1 Water Source & Requirement

Detail of water requirements in KLD as given below:

TABLE 2.15: WATER REQUIREMENT FOR THE PROJECT- P1

Purpose	Quantity	Source
Dust Suppression	0.7KLD	From the existing pit or from the water vendors
Green Belt	0.5KLD	From the existing pit or from the water vendors
Sanitation & Drinking	0.3KLD	From the existing pit or from the water vendors.
Total	1.5 KLD	

Source: Prefeasibility report

TABLE 2.15: WATER REQUIREMENT FOR THE PROJECT- P2

Purpose	Quantity	Source
Dust Suppression	0.7KLD	From the existing pit or from the water vendors
Green Belt	1.0KLD	From the existing pit or from the water vendors
Sanitation & Drinking	0.3KLD	From the existing pit or from the water vendors.
Total	2.0 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- P1

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 = 98m^3

Peak production of Gravel = 2m^3

Type of machinery	Working hours	Average Diesel consumption/ Hour	Quantity of Diesel in Ltrs
Working hours of Excavator (Aprx)	$98\text{m}^3/20\text{m}^3=4.9\text{hrs}$ (Rough stone)	18 Ltrs	
	$2\text{m}^3/60\text{m}^3 = 0.03\text{Hrs}$	18 Ltrs	1
Compressor	Working hours per day 2Hrs	8 Ltrs	16
Tippers, Motor pumps to drain water	Occasionally		20
Total Diesel Consumption			125

The Maximum diesel consumption is around 125Ltrs per day considering the peak production.

Fuel Requirement- P2

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 = 60m^3

Peak production of Gravel = 10m^3

Type of machinery	Working hours	Average Diesel consumption/ Hour	Quantity of Diesel in Ltrs
Working hours of Excavator (Aprx)	$60\text{m}^3/20\text{m}^3=3\text{hrs}$ (Rough stone)	18 Ltrs	54
	$10\text{m}^3/60\text{m}^3 = 0.16\text{Hrs}$	18 Ltrs	3
Compressor	Working hours per day 2Hrs	8 Ltrs	16
Tippers, Motor pumps to drain water	Occasionally		20
Total Diesel Consumption			93

The Maximum diesel consumption is around 93Ltrs 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 given below,

Total Project Cost	
P1	Rs.1,90,71,000/-
P2	Rs.1,13,90,000/-

2.8 EMPLOYMENT REQUIREMENT:

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

TABLE 2.16: PROPOSED MANPOWER DEPLOYMENT- P1

Designation	No of persons
Geologist	1
Mines Foreman	1
Mate/Blaster	1
Jack hammer operator	8
Excavator Operator	1
Water Sprinkler Driver	1
Tipper Driver	2
Labour & Helper	2
Cleaner & Co-operator	4
Security	1
Total	22

Source: Approved Mining Plan

TABLE 2.16: PROPOSED MANPOWER DEPLOYMENT- P2

Designation	No of persons
Geologist	1
Mines Foreman	1
Mate/Blaster	1
Jack hammer operator	6
Excavator Operator	1
Tipper Driver	2
Water Sprinkler Driver	1
Labour & Helper	2
Cleaner & Co-operator	4
Security	1
Total	20

Source: Approved Mining Plan

2.9 PROJECT IMPLEMENTATION SCHEDULE

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

TABLE 2.17: EXPECTED TIME SCHEDULE

Sl.No.	Particulars	Time Schedule (In Month)					Remarks if any
		1 st	2 nd	3 rd	4 th	5 th	
1	Environmental Clearance						
2	Consent to Operate						
3	Execution of Lease deed						
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 to Dec 2024 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 season **Post monsoon** i.e., Oct 2024 to Dec 2024.

Study Methodology

- The project area was surveyed in detail with the help of Total Station Survey instruments and pillars were marked. The boundary coordinates were superimposed on the satellite imagery to understand the relief of the area, besides Land use pattern of the area was studied through the Bhuvan (ISRO)
- Soil samples were collected and analysed for relevant physio-chemical characteristics in order to assess the impact due to mining activities and to recommend saplings for Greenbelt development.
- Ground water samples were collected from the existing bore wells, Surface water was collected from water bodies in the buffer zone and analysed as per CPCB Guidelines.
- An onsite meteorological station was setup in cluster area, to collect data about wind speed, wind direction, temperature, relative humidity, rainfall and general weather conditions were recorded throughout the study period.
- Air quality Data were collected by installation of Respiratory Dust Samplers (RDS) for Fugitive dust, PM₁₀ and SO₂, NO_x with gaseous attachments & Fine Dust Samplers (FDS) for PM_{2.5} and other parameters as per NAAQ norms and analysed for primary air pollutants to work out the existing status of air quality.
- The Noise level measurements were also made at various locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.
- Baseline biological studies were carried out to assess the ecology of the study area to study the existing flora and fauna pattern of the area.

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

TABLE 3.1: MONITORING ATTRIBUTES AND FREQUENCY OF MONITORING

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land-use Land cover	Land-use Pattern within 10 km radius of the study area	Data from census handbook 2011 and from the satellite imagery	Study Area	Satellite Imagery Primary Survey
*Soil	Physio-Chemical Characteristics	Once during the study period	6 (2 core & 4 buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	6 (2 surface water & 4 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Auto matic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
*Ambient Air Quality	PM10 PM2.5 SO2 NOX Fugitive Dust	24 hourlies twice a week (Oct to Dec 2024)	7 (2 core & 5 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	7 (2 core & 5 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio–Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

Source: On-site monitoring/sampling by Global Lab and Consultancy Services

* 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

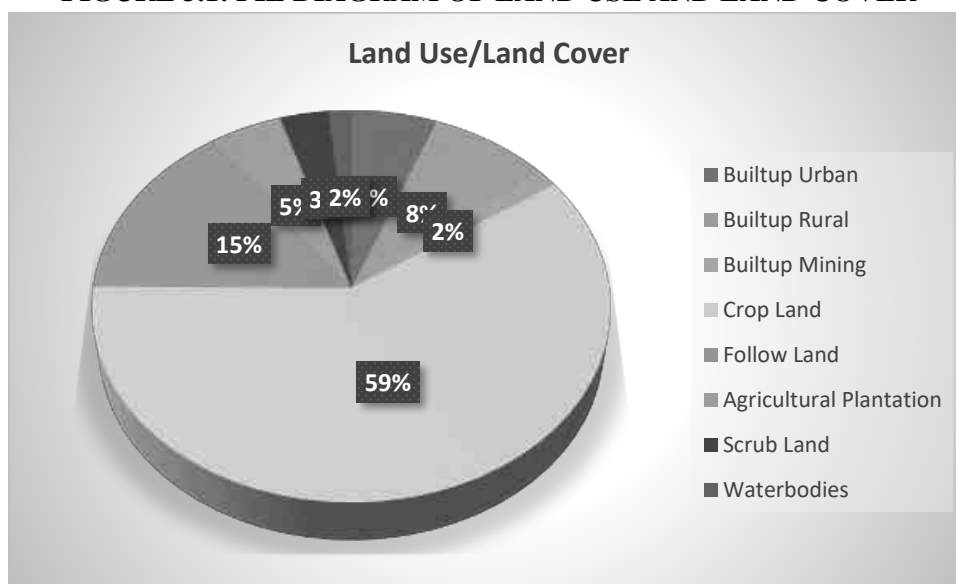
A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through 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	1955.05	5.84
2	Builtup Rural	2702.57	8.08
3	Builtup Mining	549.28	1.64
AGRICULTURAL LAND			
4	Agricultural Land	1619.42	4.84
5	Crop Land	19921.02	59.55
6	Fallow Land	5076.08	15.17
BARREN/WASTE LANDS			
7	Scrub Land	1092.56	3.27
WETLANDS/ WATER BODIES			
8	Waterbodies	537.81	1.61
TOTAL		33453.80	100

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) 79.56 % followed by Built-up Lands – 13.92 %, Scrub land – 3.27%, and Water bodies 1.61%.

The total mining area within the study area is 549.28 ha i.e., 1.64%. The cluster area of 15.02.89ha contributes about 2.73% of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.1.2 Topography

The lease applied area exhibits plain topography. The area has gentle sloping towards Northwestern side. The altitude of the area is 408-410m (max) above Mean Sea level. The area is covered by 2m thickness of Gravel formation and followed by Massive Charnockite which is clearly inferred from the adjacent existing quarry pits.

3.1.3 Drainage Pattern of the Area

The drainage pattern of the area is dendritic – sub dendritic. Drainage pattern is the pattern formed by the streams, rivers, and lakes in a particular drainage basin. They are governed by the topography of the land, whether a particular region is dominated by hard or soft rocks, and the gradient of the land. There are no streams, canals or water bodies crossing within the project area.

3.1.4 Seismic Sensitivity

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

3.1.5 Environmental Features in the Study Area

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

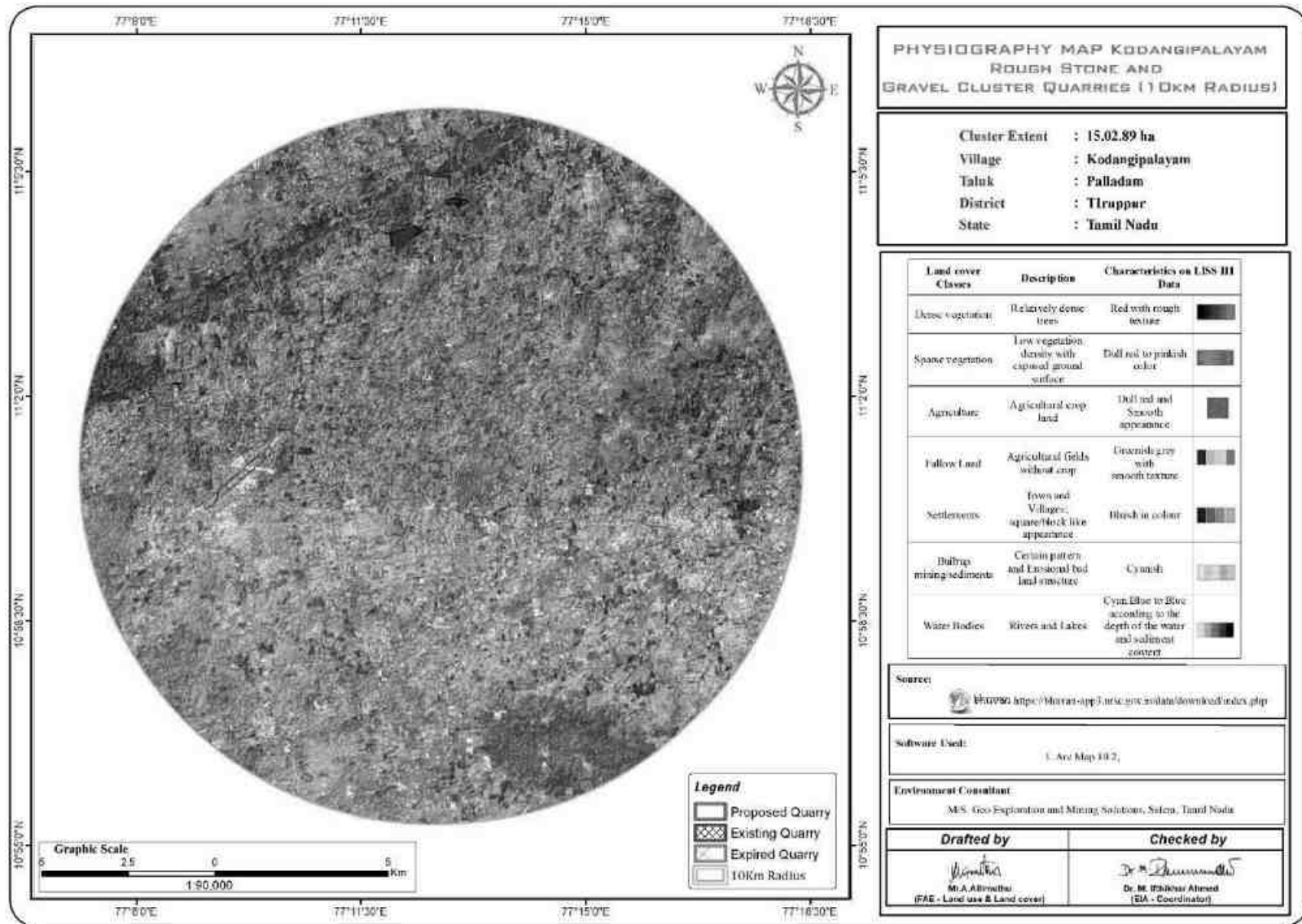
FIGURE 3.2: PHYSIOGRAPHIC MAP 10KM RADIUS

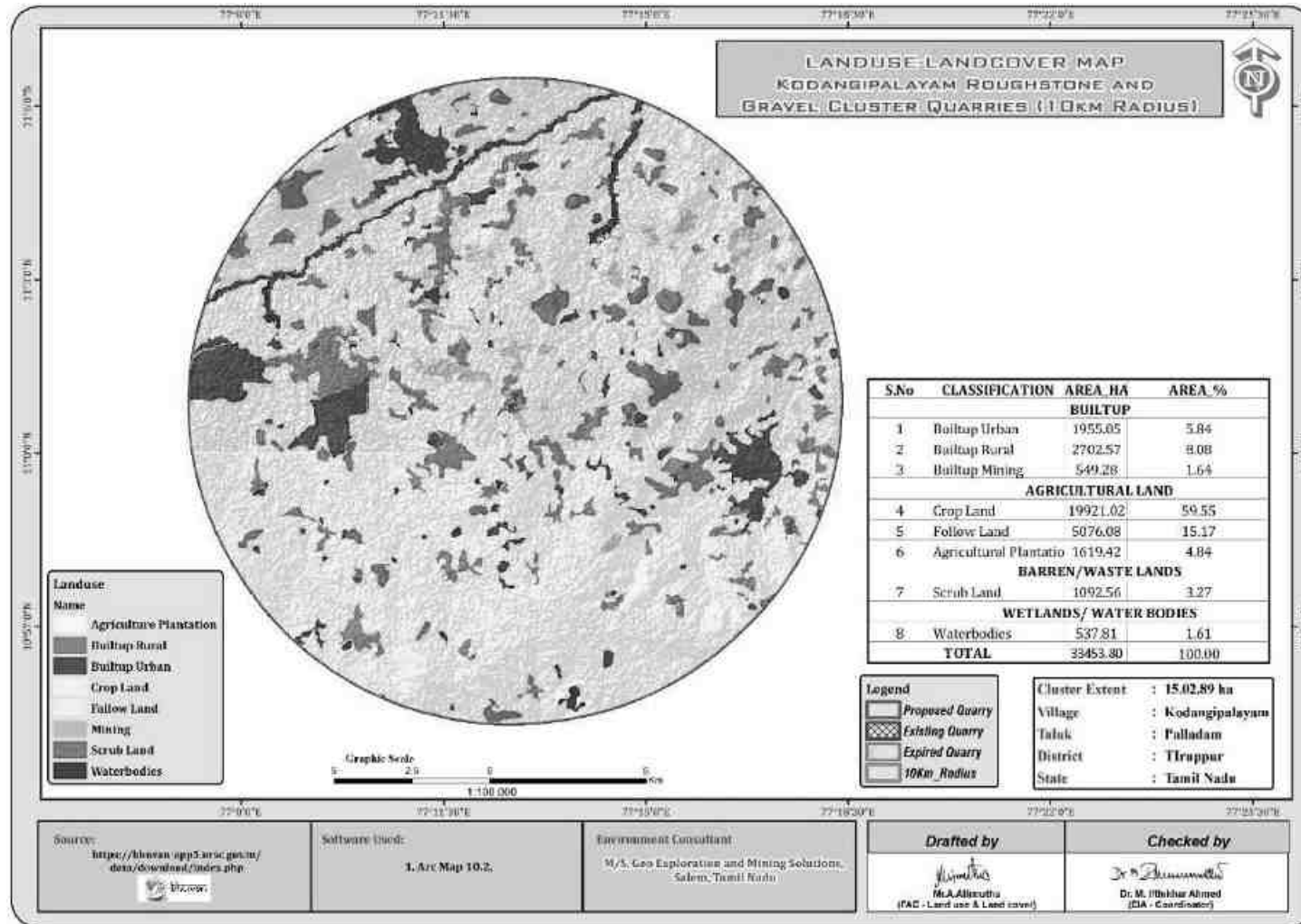
FIGURE 3.3: LAND USE LAND COVER MAP 10KM RADIUS

TABLE 3.3: DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE CLUSTER

Sl.No	Sensitive Ecological Features	Name	Arial Distance in km from Cluster
1	National Park / Wild life Sanctuaries	Nanjarayan Bird Sanctuary	23.0km- NE
2	Reserve Forest	Bolampatti R.F	30.5km- South West
3	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	Sathiyamangalam Tiger Reserve	51.0km - NW
4	Critically Polluted Areas	Coimbatore - SIDCO Industrial Estate	Around 26.4 km- South West
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 SITES

Sl.No	NAME	DISTANCE & DIRECTION
P1		
1	Odai	520m SW
2	Odai	530m West
3	Kuttai	720m NE
4	Odai	2km NE
5	Samalapuram Lake	6.0km NW
6	Noyyal River	6.5km NW
P2		
1	Odai	240m SW
2	Odai	350m West
3	Kuttai	980m NE
4	Odai	2.2km NE
5	Samalapuram Lake	6.2km NW
6	Noyyal River	7.0km NW

Source: Village Cadastral Map and Field Survey

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

3.1.6 Soil Environment

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

The objective of the soil sampling is -

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

TABLE 3.5: SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Core Zone	Project Area	11° 0'54.71"N 77°12'57.00"E
2	S-2	Core Zone	Project Area	11° 0'50.37"N 77°12'42.66"E
3	S-3	Kodangipalayam	450m NW	11° 1'9.54"N 77°12'32.87"E
4	S-4	Samigoundanpalayam	2Km South East	11° 0'29.90"N 77°13'51.16"E
5	S-5	Paruvai	3.8Km South West	10°59'51.73"N 77°10'53.18"E
6	S-6	Kadampadi	5.5Km North West	11° 2'25.69"N 77°14'40.28"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services

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

FIGURE 3.4: PHOTOGRAPHS OF SOIL SAMPLING COLLECTIONS

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.

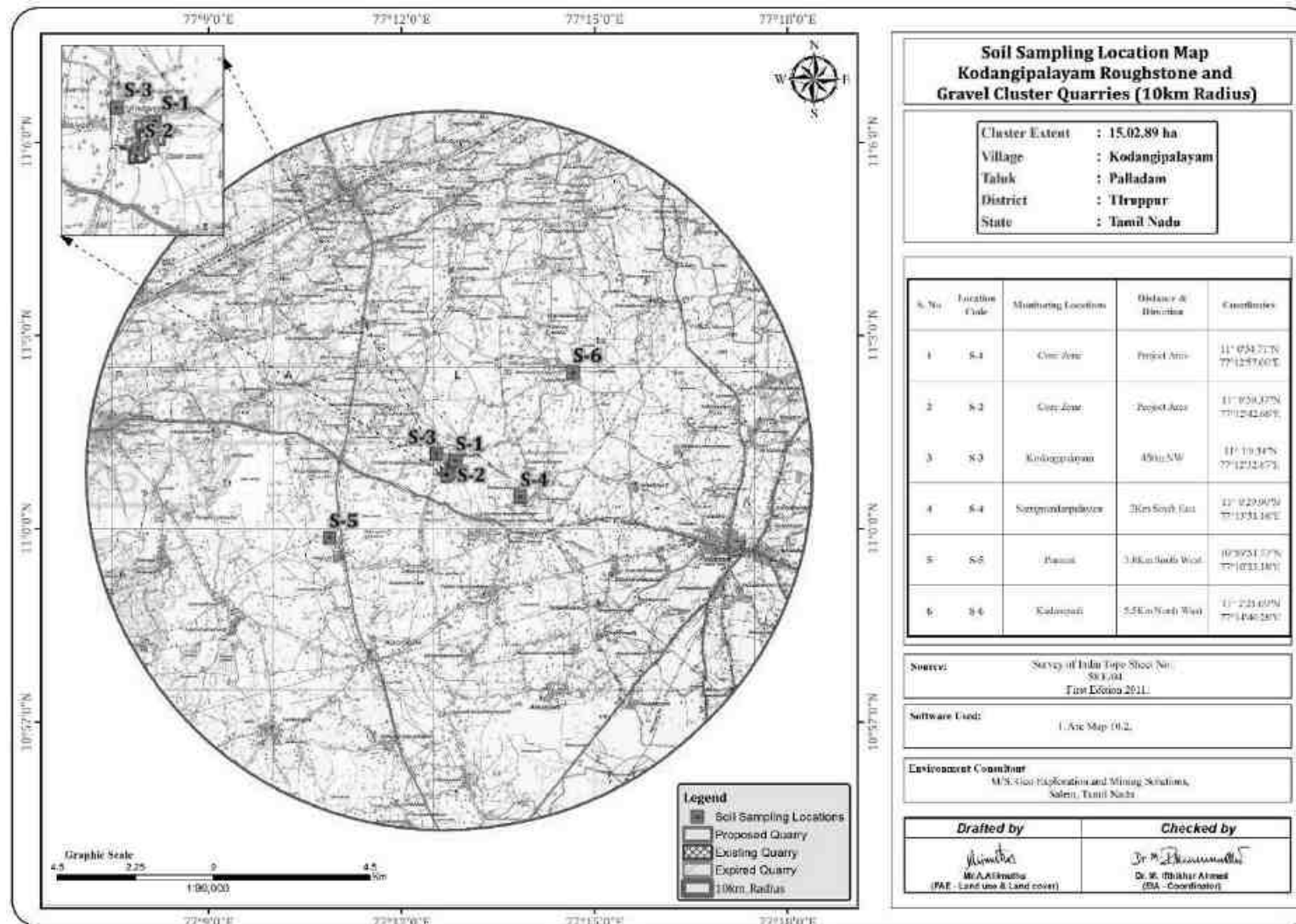
FIGURE 3.5: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS

FIGURE 3.6: SOIL MAP

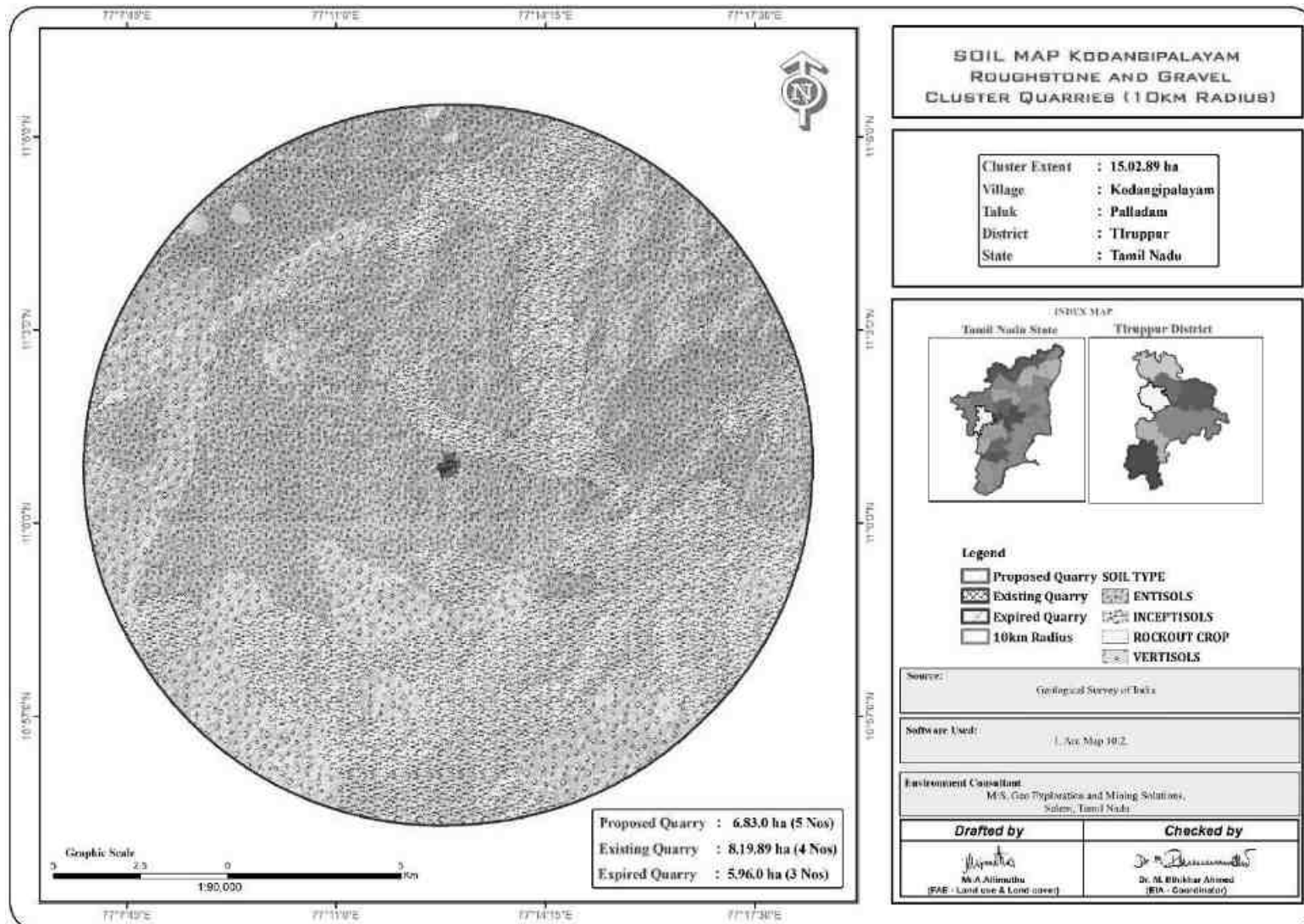


TABLE 3.7: SOIL QUALITY OF THE STUDY AREA

Sl. No	TEST PARAMETERS	TEST METHOD	UNIT	S-1 Project Area	S-2 Project Area	S-3 Kodangipalaya m	S-4 Samyground anpalayam	S-5 Paruvai	S-6 Kadampadi
1	Available Nitrogen as N	GLCS/SOP/S/029 ;Issue no:02: 2024	kg/ha	514	276	464	526.8	364	401
2	Available Phosphorous(as P)	GLCS/SOP/S/005 ; Issue no:02: 2024	mg/kg	8.3	6.6	7.1	3.0	4.1	6.0
3	Boron	USEPA-6010D:2014	mg/kg	BDL (DL:0.5)	53	33.5	BDL (DL:0.5)	BDL (DL:0.5)	6.75
4	Bulk Density	GLCS/SOP/S/017; Issue no:02: 2024	g/cc	1.13	1.15	1.16	1.15	1.12	1.12
5	Cadmium	USEPA-6010 D-2014	mg/kg	13	5	10.8	9.0	3.75	3.75
6	Cation Exchange Capacity	GLCS/SOP/S/024; Issue no:02: 2024	meq/100g	41.2	37.4	47.4	38.4	36.4	42.8
7	Chlorides (as Cl-) in saturation extract	GLCS/SOP/S/004; Issue no:02: 2024	meq/l	3.2	5.7	5.8	4.9	3.4	6.4
8	Chromium	USEPA-6010D-2014	mg/kg	12.8	25.8	10.0	8.0	19.75	15.25
9	Copper	USEPA-6010D :2014	mg/kg	7.5	14	4.0	5.5	16.5	8.0
10	Exchangeable Calcium (as Ca)	GLCS/SOP/S/020; Issue no:02: 2024	meq/100g	2.1	1.8	1.5	2.8	2.9	1.4
11	Exchangeable Magnesium (as Mg)	GLCS/SOP/S/021; Issue no:02: 2024	meq/100g	1.7	1.8	1.1	0.7	1.2	1.3
12	Iron	USEPA-6010 D-2014	mg/kg	36.8	38.5	42	24.3	36.5	33.25
13	Lead	USEPA-6010D-2014	mg/kg	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)	BDL (DL:0.5)	4.25	BDL (DL:0.5)
14	Manganese	USEPA-6010 D-2014	mg/kg	12	9.5	18	12	22.0	5.25
15	Organic Carbon	GLCS/SOP/S/003; Issue no: 02: 2024	%	0.54	0.89	0.8	0.6	0.67	0.87
16	Organic Matter	GLCS/SOP/S/003; Issue no:02: 2024	%	0.93	1.5	1.38	1.03	1.16	1.5
17	pH Value	IS 2720 (Part 26): 1987(Reaffirmed 2021)	-	7.81	8.04	8.12	7.48	7.72	7.98
18	Soluble Potassium (as K) in saturation extract	GLCS/SOP/S/006; Issue no:02 : 2024	mg/100g	1.28	0.76	1.3	0.6	1.3	0.8
19	Specific Electrical Conductivity	IS 14767: 2000(Reaffirmed 2021)	µS/cm	560	436	448	398	405	424
20	Sulphate (as SO4)	GLCS/SOP/S/009; Issue no:02: 2024	mg/100g	3.8	4.5	3.5	4.0	2.7	4.4

21	Texture : Clay	GLCS/SOP/S/015 ;Issue no:02: 2024	%	24.25	26.24	21.25	27.5	26.25	24.0
22	Texture : Sand	GLCS/SOP/S/015; Issue no:02: 2024	%	35.78	36.75	35	37.5	31.25	36.6
23	Texture : Silt	GLCS/SOP/S/015 ; Issue no:02: 2024	%	39.98	37	43.75	35.0	42.50	39.4
24	Water Holding Capacity	GLCS/SOP/S/016; Issue no:02: 2024	%	62	56	72	58.0	48	68
25	Zinc	USEPA-6010D-2014	mg/kg	16	5.8	4.8	7.8	8.5	BDL (DL:0.5)

Source: Sampling Results by Global Lab and Consultancy Services

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 (21.25 % to 27.5%) to Sandy Loam Soil and Bulk Density of Soils in the study area varied between 1.12 to 1.16 g/cc. The Water Holding Capacity is found to be medium i.e., ranging from 48 – 72 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 7.48 to 8.12
- The available Nitrogen content range between 276 to 526.8mg/kg
- The available Phosphorus content range between 3.0 to 8.3mg/kg
- The available Potassium range between 0.6 to 1.3 mg/100g

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 Lake	6km North West	11° 4'22.20"N 77°12'12.62"E
2	SW-2	Noyyal River	7.2km NW	11° 3'57.16"N 77°10'4.33"E
GROUND WATER				
3	WW-1	Near Project Area	400m East	11° 0'56.02"N 77°13'3.92"E
4	WW-2	Kadampadi	5.5Km North West	11° 2'26.37"N 77°14'21.69"E
5	BW-1	Near Project Area	350m West	11° 0'51.56"N 77°12'30.55"E
6	BW-2	Paruvai	3.8Km South West	10°59'38.49"N 77°10'55.41"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services

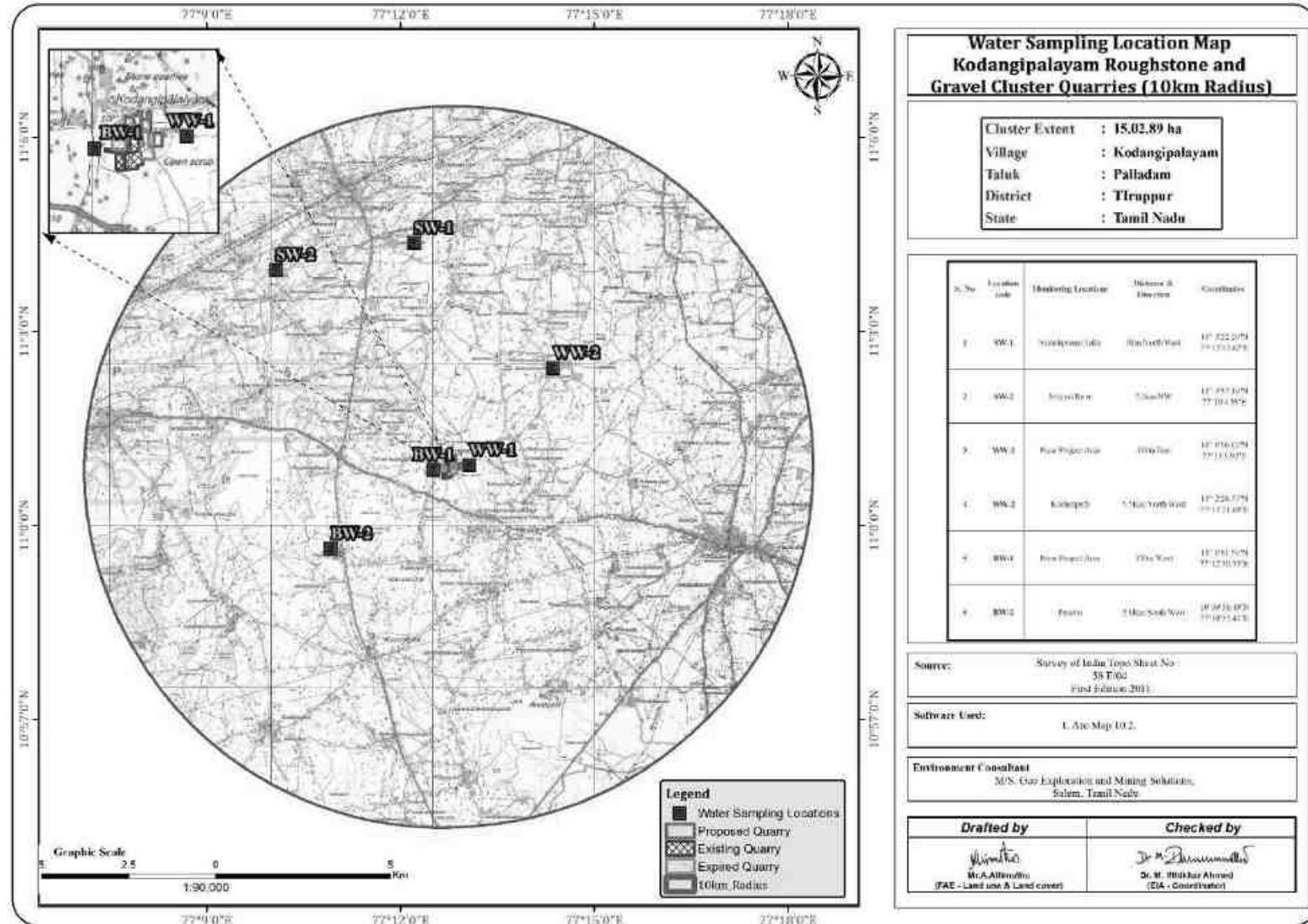
FIGURE 3.7: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS

TABLE 3.9: GROUND WATER SAMPLING RESULTS

S.No	Parameters	Units	WW-1	WW-2	BW-1	BW-2	Acceptable limit	Permissible limit
1	Aluminium	mg /l	0.024	0.14	BDL (DL:0.01)	0.03	0.03	0.2
2	Ammoniacal Nitrogen as NH ₃ -N	mg /l	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)	0.5	No Relaxation
3	Arsenic as As	mg /l	BDL (DL:0.002)	BDL (DL:0.002)	BDL (DL:0.002)	BDL (DL:0.002)	0.01	0.05
4	Barium as Ba	mg /l	BDL (DL:0.01)	0.046	0.142	BDL (DL:0.01)	0.7	No Relaxation
5	Boron as B	mg /l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	0.5	1.0
6	Cadmium as Cd	mg /l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	0.003	No Relaxation
7	Calcium as Ca	mg /l	124	100	72	88	75	200
8	Chloride as Cl ⁻	mg/l	320	150	190	225	250	1000
9	Chromium as Cr	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	0.05	No Relaxation
10	Color	CU	<1	<1	<1	<1	5	15
11	Copper as Cu	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	0.05	1.5
12	Cyanide as CN	mg/l	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)	BDL (DL:0.02)	0.05	No Relaxation
13	Electrical Conductivity (EC)	µS/cm	1625	1282	962	1246	2000	2000
14	Fluoride as F ⁻	mg/l	0.4	0.34	0.42	0.47	1.0	1.5
15	Free Residual Chlorine as Cl ₂	mg/l	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)	0.2	1
16	Iron as Fe	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	0.18	0.2	0.3	No Relaxation
17	Lead as Pb	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	BDL (DL:0.01)	0.01	No Relaxation
18	Magnesium as Mg	mg/l	63	58	44	49	30	100
19	Manganese as Mn	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	0.1	0.3
20	Mercury as Hg	mg/l	BDL (DL:0.002)	BDL (DL:0.002)	BDL (DL:0.002)	BDL (DL:0.002)	0.001	No Relaxation
21	Molybdenum as Mo	mg/l	0.025	0.025	0.026	0.026	0.07	No Relaxation
22	Nitrate as NO ₃	mg/l	BDL (DL:2.0)	BDL (DL:2.0)	BDL (DL:2.0)	BDL (DL:2.0)	45	No Relaxation
23	Odor	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
24	pH	-	7.28	7.39	7.54	7.63	6.5-8.5	No Relaxation
25	Phenols	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	0.001	0.002
26	Selenium as Se	mg/l	BDL (DL:0.005)	BDL (DL:0.005)	BDL (DL:0.005)	BDL (DL:0.005)	0.01	No Relaxation
27	Sulphate as SO ₄	mg/l	59	75	59	77	200	400
28	Sulphide as S (Iodometric Method)	mg/l	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)	BDL (DL:1.0)	0.05	No Relaxation

29	Total Alkalinity as CaCO ₃	mg/l	430	450	260	370	200	600
30	Total Dissolved Solids (TDS)	mg/l	1056	833	625	810	500	2000
31	Total Hardness as CaCO ₃	mg/l	570	490	360	420	200	600
32	Total Suspended Solids (TSS)	mg/l	BDL (DL:2.0)	BDL (DL:2.0)	BDL (DL:2.0)	BDL (DL:2.0)	500	2000
33	Turbidity	NTU	<1	<1	<1	<1	1	5
34	Zinc as Zn	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	0.018	0.013	5	15
35	Escherichia coli	MPN/100ml	Absent	Absent	Absent	Absent	Shall not be detectable in any 100 ml	-
36	Total Coliforms		Absent	Present	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

S.No	Parameters	Units	SW-1 Samalapuram Lake	SW-2 Noyyal River	Acceptable limit	Permissible limit
1	Aluminium	mg /l	BDL (DL:0.01)	0.069	0.03	0.2
2	Ammoniacal Nitrogen as NH ₃ -N	mg /l	BDL (DL:1.0)	BDL (DL:1.0)	0.5	No Relaxation
3	Arsenic as As	mg /l	BDL (DL:0.002)	BDL (DL:0.002)	0.01	0.05
4	Barium as Ba	mg /l	0.2	0.114	0.7	No Relaxation
5	Biochemical Oxygen Demand (BOD) at 27°C for 3 Days	mg /l	3.0	9.0	30	30
6	Boron as B	mg /l	BDL (DL:0.1)	BDL (DL:0.1)	0.5	1.0
7	Cadmium as Cd	mg /l	BDL (DL:0.01)	BDL (DL:0.01)	0.003	No Relaxation
8	Calcium as Ca	mg /l	60	92	75	200
9	Chemical Oxygen Demand (COD)	mg /l	BDL (DL:10.0)	30	250	250
10	Chloride as Cl ⁻	mg/l	220	260	250	1000
11	Chromium as Cr	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	0.05	No Relaxation
12	Color	CU	<1	5	5	15
13	Copper as Cu	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	0.05	1.5
14	Cyanide as CN	mg/l	BDL (DL:0.02)	BDL (DL:0.02)	0.05	No Relaxation
15	Dissolved Oxygen (DO)	mg/l	5.6	5.1	4-6	4-6
16	Electrical Conductivity (EC)	µS/cm	1372	1363	2000	2000
17	Fluoride as F ⁻	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	1.0	1.5
18	Free Residual Chlorine as Cl ₂	mg/l	BDL (DL:1.0)	BDL (DL:1.0)	0.2	1
19	Iron as Fe	mg/l	0.65	0.37	0.3	No Relaxation
20	Lead as Pb	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	0.01	No Relaxation
21	Magnesium as Mg	mg/l	58	56	30	100
22	Manganese as Mn	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	0.1	0.3
23	Mercury as Hg	mg/l	BDL (DL:0.002)	BDL (DL:0.002)	0.001	No Relaxation
24	Molybdenum as Mo	mg/l	0.027	0.026	0.07	No Relaxation
25	Nitrate as NO ₃	mg/l	BDL (DL:2.0)	BDL (DL:2.0)	45	No Relaxation
26	Odor	-	Agreeable	Agreeable	Agreeable	Agreeable

27	pH	-	7.68	7.92	6.5-8.5	No Relaxation
28	Phenols	mg/l	BDL (DL:0.1)	BDL (DL:0.1)	0.001	0.002
29	Selenium as Se	mg/l	BDL (DL:0.005)	BDL (DL:0.005)	0.01	No Relaxation
30	Sulphate as SO ₄	mg/l	281	93.0	200	400
31	Sulphide as S (Iodometric Method)	mg/l	BDL (DL:1.0)	BDL (DL:1.0)	0.05	No Relaxation
32	Total Alkalinity as CaCO ₃	mg/l	270	380	200	600
33	Total Dissolved Solids (TDS)	mg/l	892	886	500	2000
34	Total Hardness as CaCO ₃	mg/l	390	460	200	600
35	Total Suspended Solids (TSS)	mg/l	12	32	500	2000
36	Turbidity	NTU	4	10	1	5
37	Zinc as Zn	mg/l	0.028	0.011	5	15
38	Escherichia coli	MPN/100ml	Absent	Absent	Shall not be detectable in any 100 ml	-
39	Total Coliforms		Absent	Absent		-

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 7.68 to 7.92 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 625 to 1056 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride content is 220–260 mg/l. Nitrates varied from BDL (DL:2.0), while sulphates varied from 93-281 mg/l

Ground Water

The pH of the water samples collected ranged from 7.28 to 7.63 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 625-1056 mg/l in all samples. Total hardness varied between 360-570mg/l for all samples.

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

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by hard rock formation fissured and fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-ATS Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth between 58-62m. The maximum depth proposed out of proposed projects is 42m 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 10 open well and 7 borewells.

The average water level in the open well is varies from = 10.41m to 11.81m bgl

The water level in the bore well is varies from = 62.84to 64.04m 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 58m 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-24	Nov-24	Dec-24
1	OW-1	77° 13' 03.7900" E	11° 00' 55.9400" N	10.2	11	11.6
2	OW-2	77° 12' 38.0900" E	11° 01' 07.6400" N	9.9	10.7	11.3
3	OW-3	77° 13' 01.2300" E	11° 01' 26.8100" N	10.3	11.1	11.7
4	OW-4	77° 12' 34.6707" E	11° 01' 36.3276" N	9.1	9.9	10.5
5	OW-5	77° 13' 26.8615" E	11° 00' 57.4709" N	10.7	11.5	12.1
6	OW-6	77° 12' 53.5800" E	11° 00' 21.7200" N	10.4	11.2	11.8
7	OW-7	77° 12' 40.5700" E	11° 00' 21.2600" N	10.9	11.7	12.3
8	OW-8	77° 12' 28.8500" E	11° 00' 52.4500" N	10.5	11.3	11.9
9	OW-9	77° 12' 33.4200" E	11° 00' 33.1500" N	10.7	11.5	12.1
10	OW-10	77° 12' 05.8114" E	11° 01' 09.6093" N	11.4	12.2	12.8

Source: Onsite monitoring data

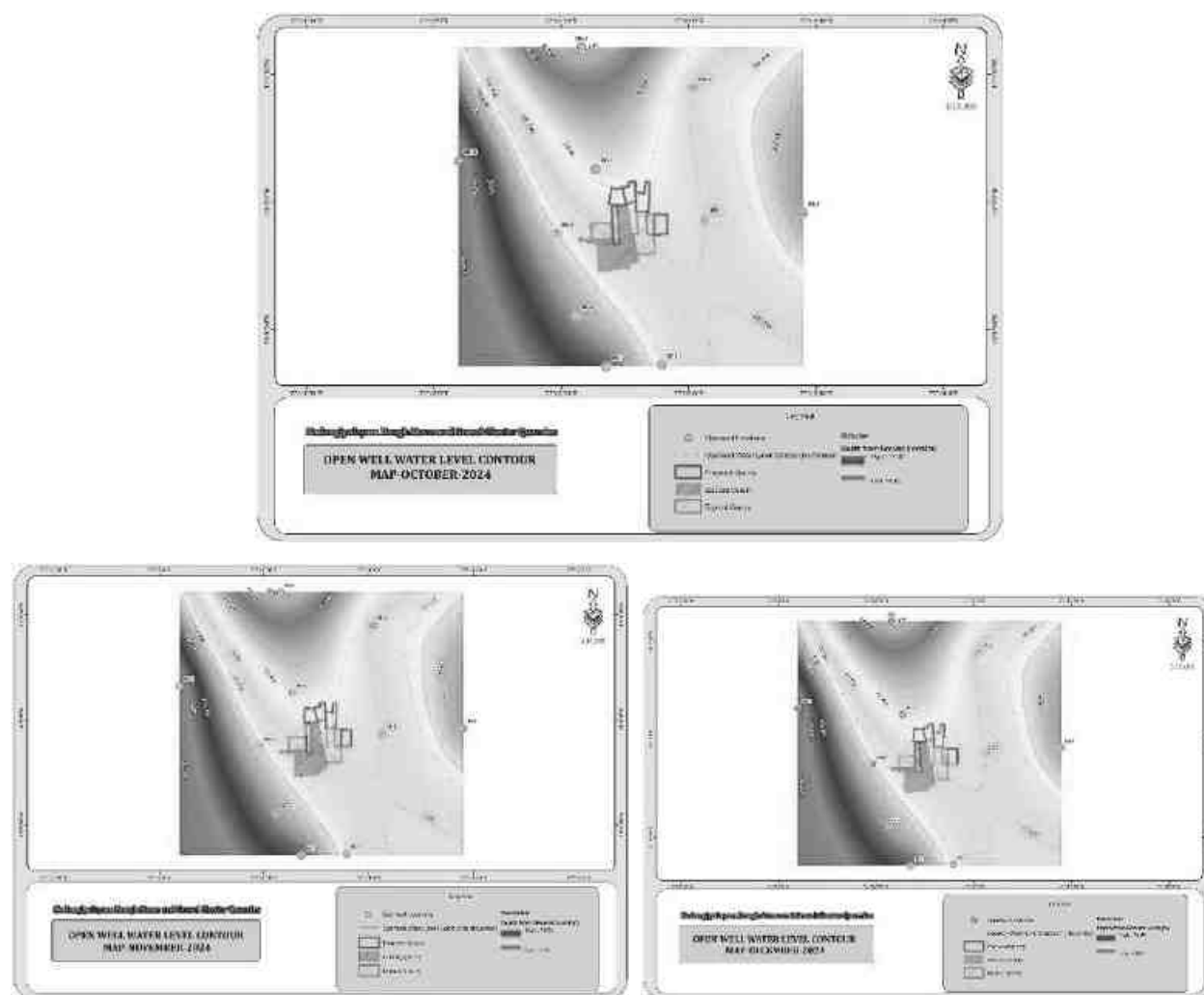
FIGURE 3.8: OPEN WELL CONTOUR MAP (Oct to Dec 2024)

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

S.NO	LABEL	LONGITUDE	LATITUDE	Oct-24	Nov-24	Dec-24
1	BW1	77° 12' 30.5730" E	11° 00' 51.6346" N	62.9	63.7	64.1
2	BW2	77° 12' 27.1400" E	11° 01' 18.5300" N	62.7	63.5	63.9
3	BW3	77° 12' 51.6237" E	11° 00' 22.7866" N	62.3	63.1	63.5
4	BW4	77° 13' 32.5245" E	11° 00' 49.6958" N	63.4	64.2	64.6
5	BW5	77° 12' 07.9100" E	11° 01' 02.3000" N	63	63.8	64.2
6	BW6	77° 13' 12.2700" E	11° 01' 13.7300" N	62.6	63.4	63.8
7	BW7	77° 12' 48.6903" E	11° 01' 37.6918" N	63	63.8	64.2

Source: Onsite monitoring data

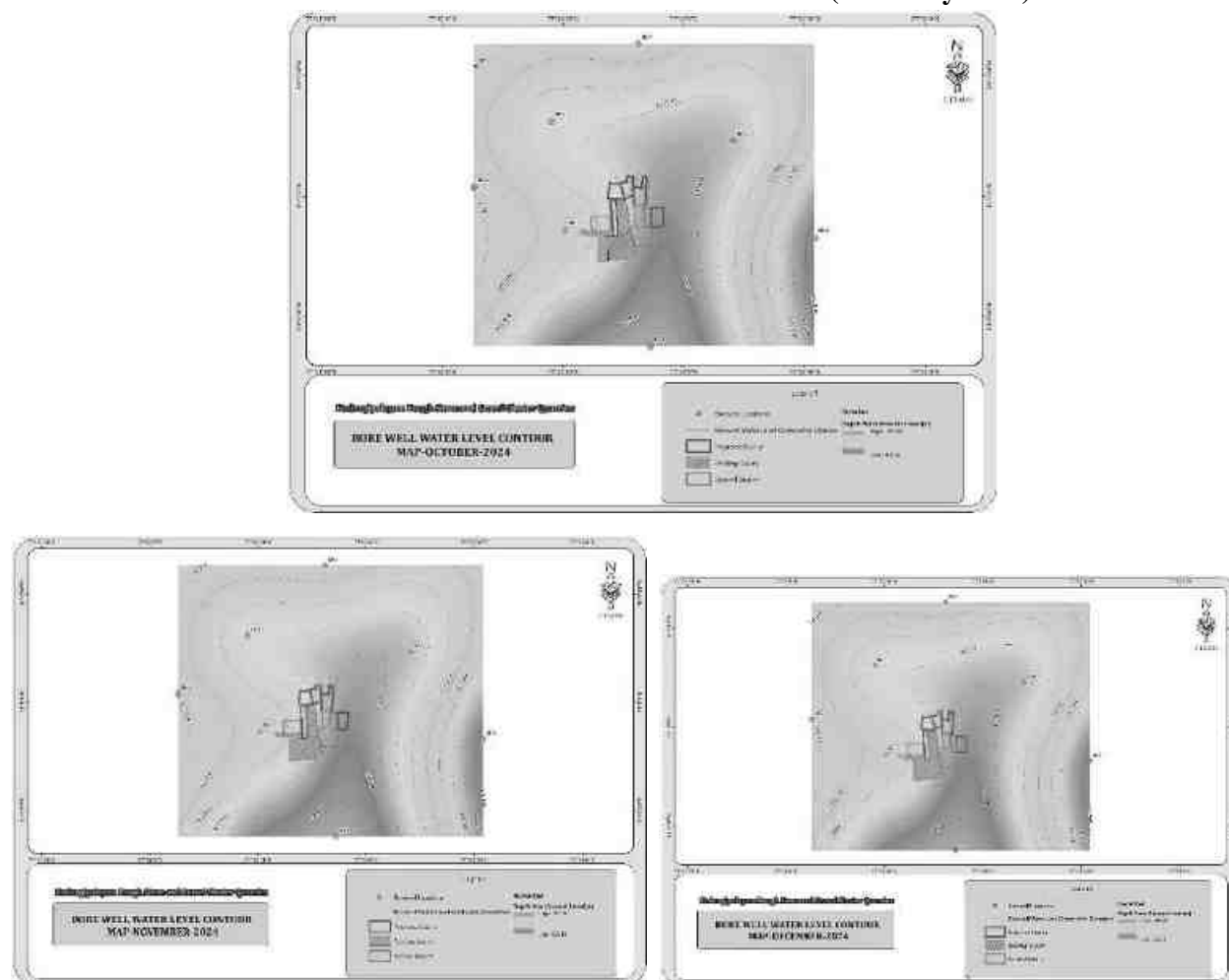
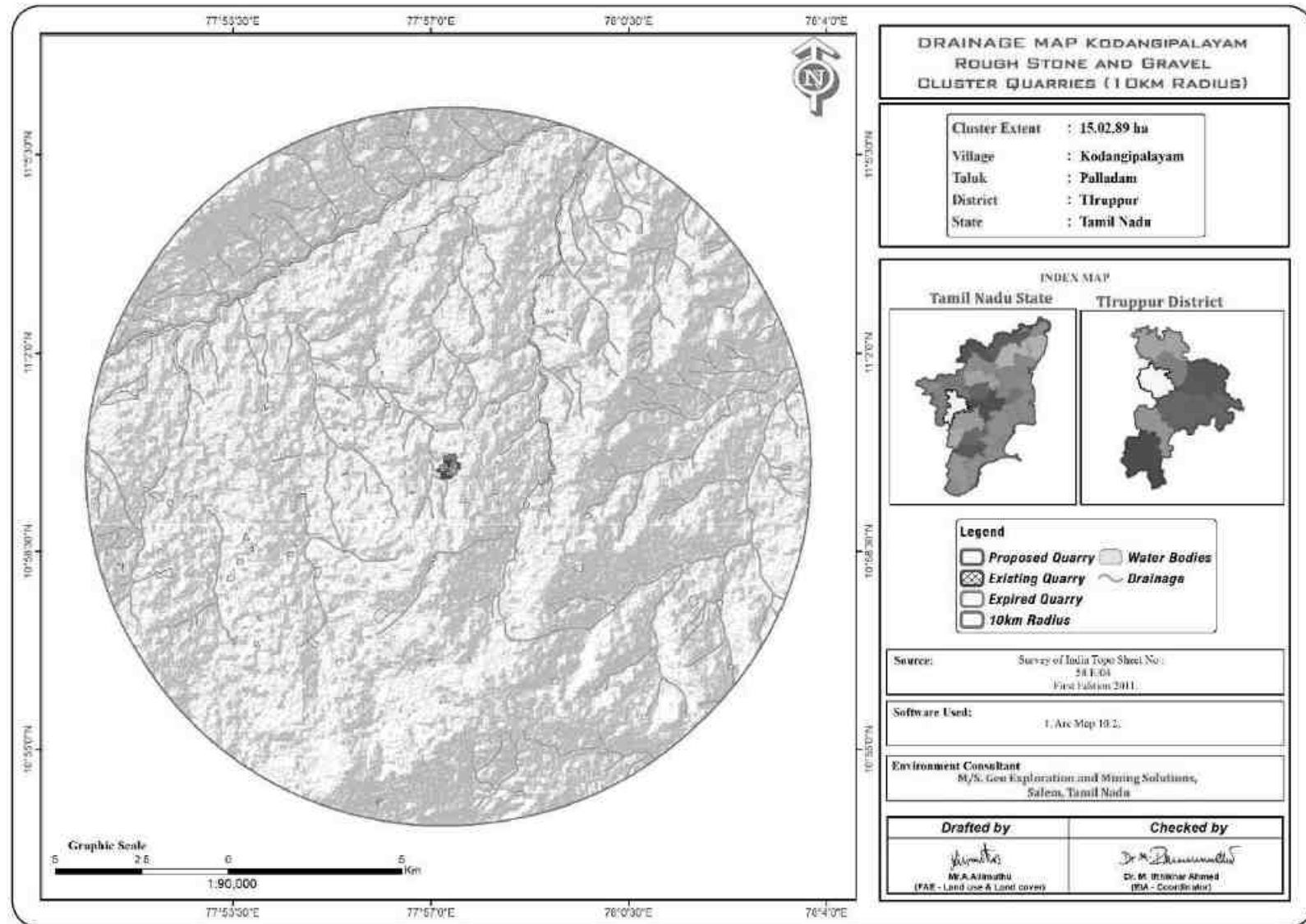
FIGURE 3.9: BOREWELL CONTOUR MAP (Oct- May 2024)

FIGURE 3.10: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE

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

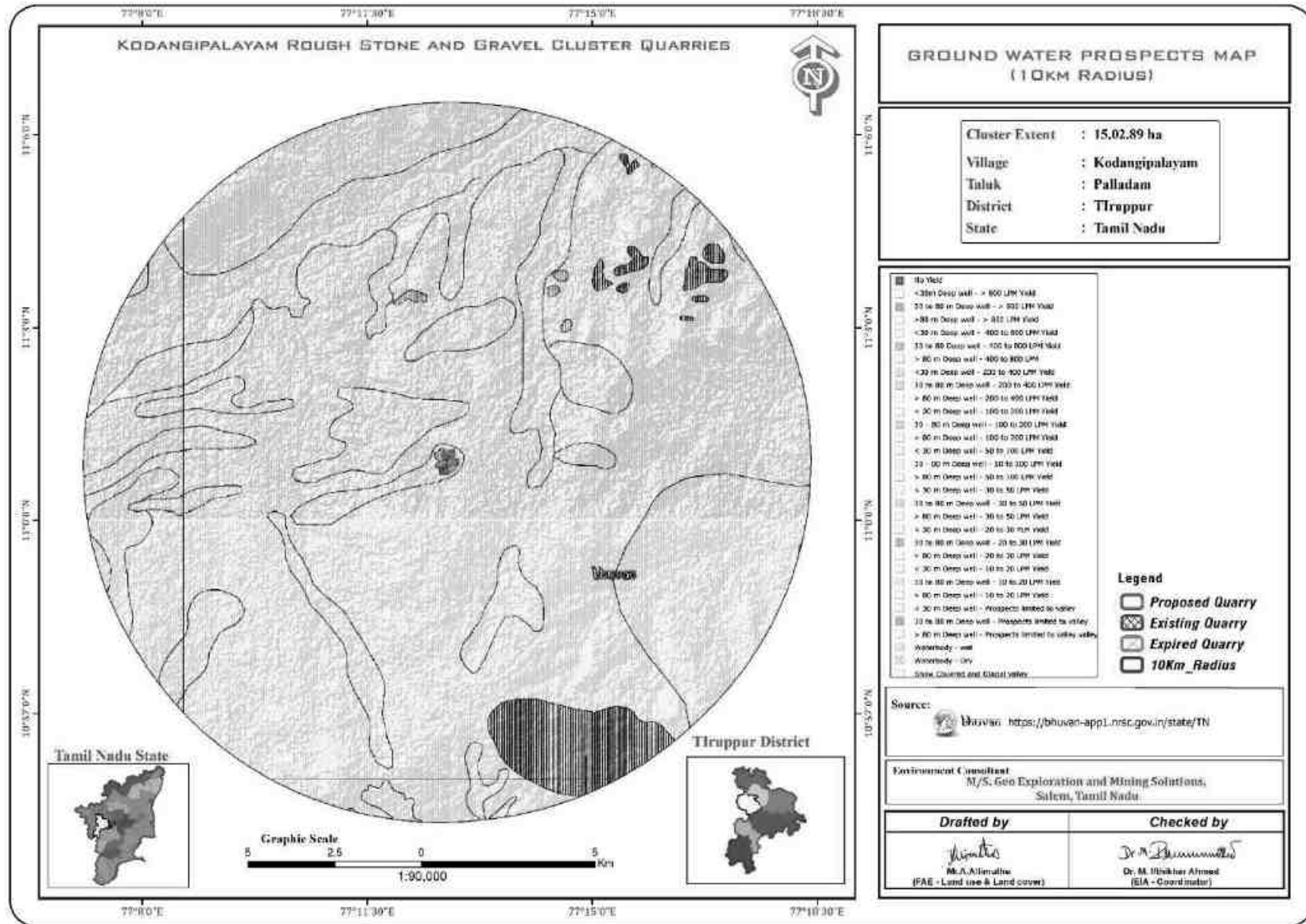
FIGURE 3.11: GROUND WATER PROSPECT MAP

FIGURE 3.12: PHOTOGRAPHS OF WATER SAMPLING COLLECTION

Geophysical Resistivity Survey

3.2.5.1 Methodology and Data Acquisition

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

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

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

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

ΔV = potential difference between receiving electrodes

G = Geometric Factor.

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

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

ρ_r = Resistivity of Rocks

ρ_w = Resistivity of water in pores of rock

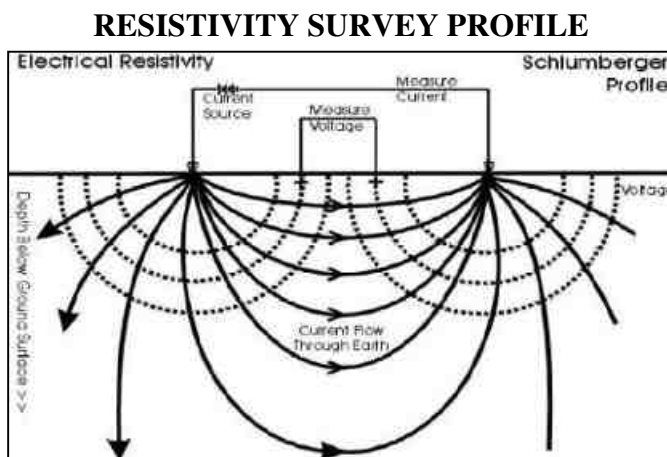
F = Formation Factor

$\emptyset$ = Fractional pore volume

A = Constants with values ranging from 0.5 to 2.5

3.2.5.2 Survey Layout

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



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

3.2.5.3 Data Presentation

It was inferred that the low resistance encountered at the depth between 58-62m. The maximum depth proposed out of proposed projects 45m BGL. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area.

3.2.5.4 Geophysical Data Interpretation

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

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

3.3 AIR ENVIRONMENT

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

The baseline studies on air environment include identification of specific air pollution parameters and their existing levels in ambient air. The ambient air quality with respect to the study zone of 10 km radius around the cluster forms the baseline information. The prime objective of the baseline air quality study was to establish the existing ambient air quality of the study area. These will also be useful for assessing the conformity to standards of the ambient air quality during the operation of proposed projects in cluster.

3.3.1 Meteorology & Climate

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

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

Climate

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

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

Rainfall

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

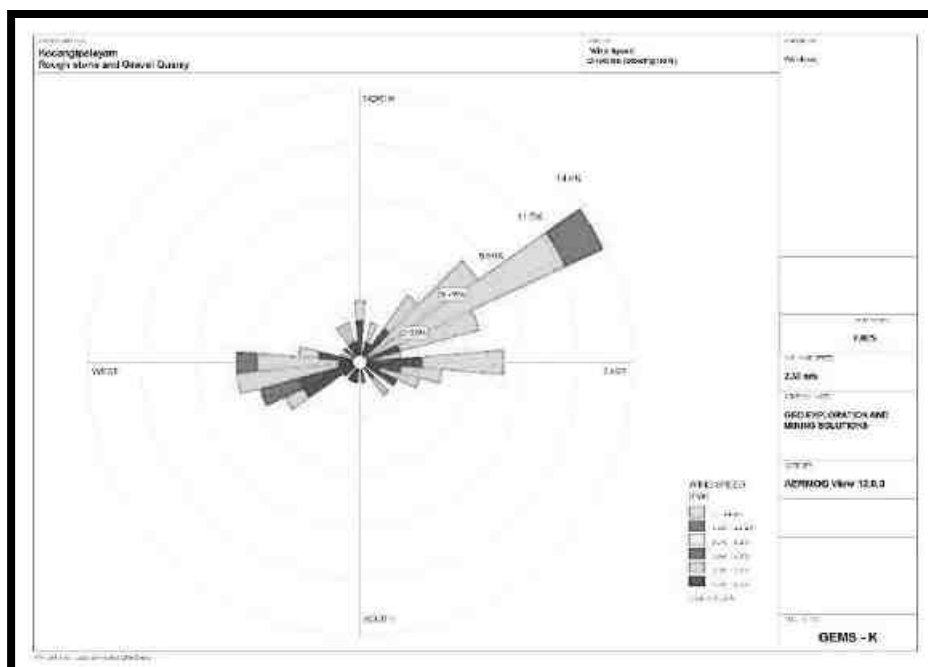
S.No	Parameters		Oct-2024	Nov-2024	Dec-2024
1	Temperature ($^{\circ}\text{C}$)	Max	28.91	25.88	25.95
		Min	23.85	23.27	21.94
		Avg	26.38	24.57	23.94
2	Relative Humidity (%)	Avg	78.54	82.81	85.56
3	Wind Speed (m/s)	Max	4.8	3.47	4.7
		Min	0.9	1.32	0.79
		Avg	2.85	2.39	2.74
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		WSW,W	ENE,E	NE,E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services

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-South-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 ENE, NE, WSW, W, 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 23.94 to 26.38 °C
5. Relative humidity ranging from 78.54- 85.56%
6. The monitoring was carried out continuously for three months. (Oct to Dec 2024)

3.3.2 Methodology and Objective

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

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

3.3.3 Sampling and Analytical Techniques

TABLE 3.15: METHODOLOGY AND INSTRUMENT USED FOR AAQ ANALYSIS

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

Source: Sampling Methodology followed by Global Lab and Consultancy Services & CPCB Notification

TABLE 3.16: NATIONAL AMBIENT AIR QUALITY STANDARDS

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

4	Particulate matter (size less than 2.5 μm PM _{2.5} ($\mu\text{g}/\text{m}^3$))	Annual Avg. 24 hours	40.0 60.0	40.0 60.0
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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 to Dec 2024. The baseline data of ambient air has been generated for PM₁₀, PM_{2.5}, Sulphur Dioxide (SO₂) & Nitrogen Dioxide (NO₂) Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications.

The equipment was placed preferably at a height of at least $3 \pm 0.5\text{m}$ 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° 1'2.12"N 77°12'50.52"E
2	AAQ-2	Core Zone	Project Area	11° 0'50.26"N 77°12'42.70"E
3	AAQ-3	Kodangipalayam	400m NW	11° 1'7.96"N 77°12'32.94"E
4	AAQ-4	Samigoundanpalayam	2Km South East	11° 0'21.43"N 77°13'44.21"E
5	AAQ-5	Paruvai	3.8Km South West	10°59'45.47"N 77°10'55.20"E
6	AAQ-6	Naduvelpalayam	3.8Km North East	11° 2'23.44"N 77°14'29.42"E
7	AAQ-7	Kadampadi	5.5Km North West	11°2'0.49"N 77° 9'52.81"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services

FIGURE 3.14: PHOTOGRAPHS OF AMBIENT AIR QUALITY MONITORING



FIGURE 3.15: AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

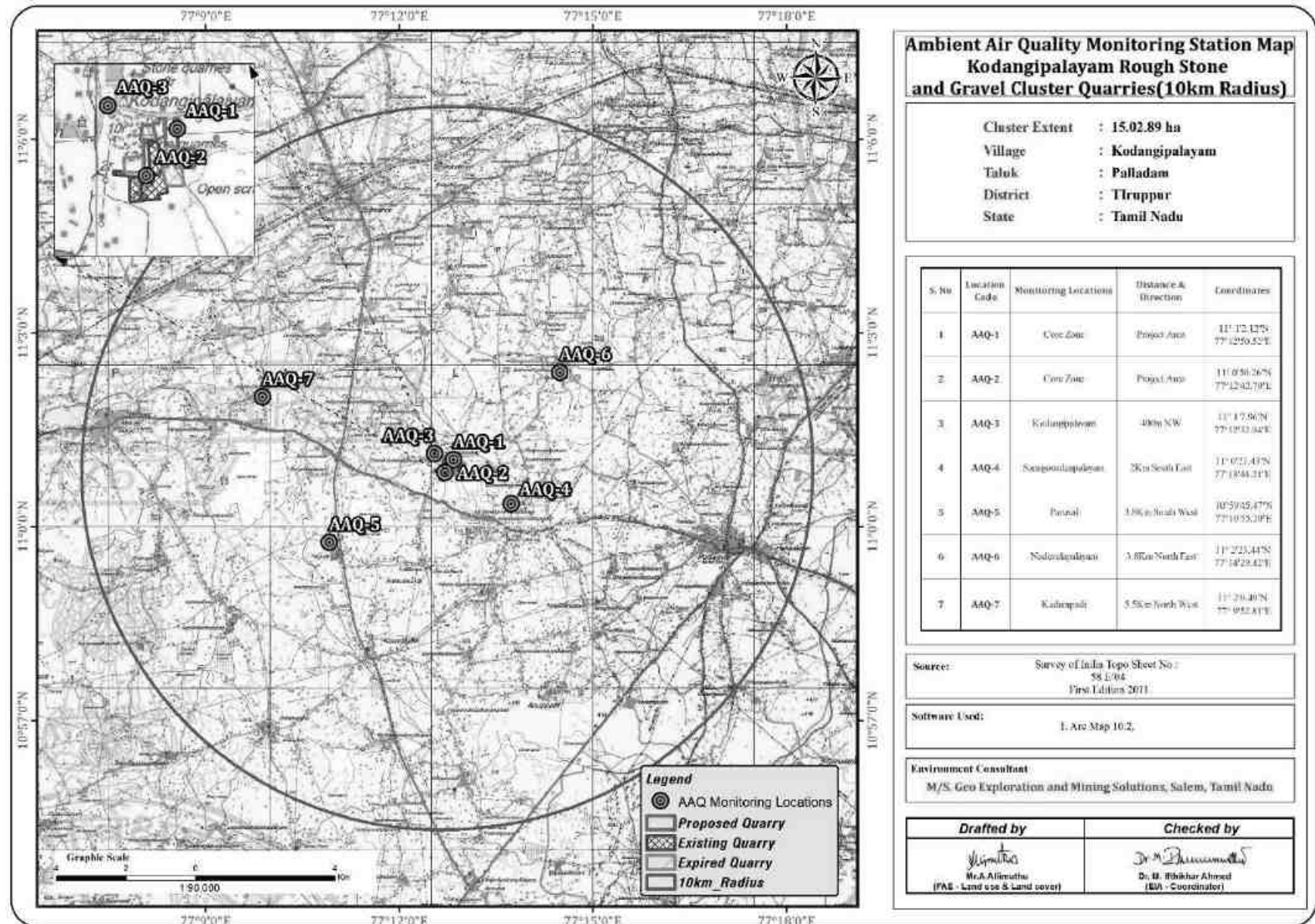


TABLE 3.25: SUMMARY OF AAQ 1 to AAQ 7

PM₁₀	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	41.5	42.5	44.7	45.0	46.0	45.9	45.6
Minimum	40.4	40.2	41.0	42.3	43.1	42.5	43.4
Maximum	42.4	43.2	47.4	47.0	48.6	48.3	48.4
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PM_{2.5}	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	20.4	21.3	23.5	24.5	25.2	25.4	24.6
Minimum	18.7	19.5	20.0	20.4	23.3	21.6	20.8
Maximum	22.0	22.9	25.8	26.6	27.4	27.8	27.9
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0
SO₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	4.7	4.6	4.8	5.0	4.9	5.0	4.7
Minimum	4.1	4.1	4.2	4.1	4.1	4.1	4.2
Maximum	5.8	5.6	5.8	6.2	6.1	6.3	5.5
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0
NO₂	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	20.3	19.8	20.5	20.6	19.9	19.9	20.6
Minimum	16.5	16.7	18.8	18.2	16.1	17.2	18.2
Maximum	26.0	23.8	24.2	27.0	26.6	22.1	23.5
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0

TABLE 3.26: ABSTRACT OF AMBIENT AIR QUALITY DATA

1	Parameter	PM ₁₀	PM _{2.5}	SO ₂	NO ₂
2	No. of Observations	260	260	260	260
3	10 th Percentile Value	41.6	20.4	4.2	18.4
4	20 th Percentile Value	43.1	22.2	4.4	18.8
5	30 th Percentile Value	44.1	23.3	4.5	19.3
6	40 th Percentile Value	44.7	23.7	4.6	19.6
7	50 th Percentile Value	45.1	24.1	4.8	20.0
8	60 th Percentile Value	45.5	24.5	4.9	20.5
9	70 th Percentile Value	45.9	25.4	5.0	20.7
10	80 th Percentile Value	46.4	25.8	5.1	21.5
11	90 th Percentile Value	47.4	26.6	5.4	22.0
12	95 th Percentile Value	47.9	27.0	5.7	23.5
13	98 th Percentile Value	48.4	27.7	6.2	26.5
14	Arithmetic Mean	45.5	24.6	5.0	21.0
15	Geometric Mean	45.4	24.5	4.9	20.9
16	Standard Deviation	2.1	2.2	0.6	2.4
17	Minimum	41.6	20.4	4.2	18.4
18	Maximum	48.4	27.7	6.2	26.5
19	NAAQ Norms*	100.0	60.0	80.0	80.0
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

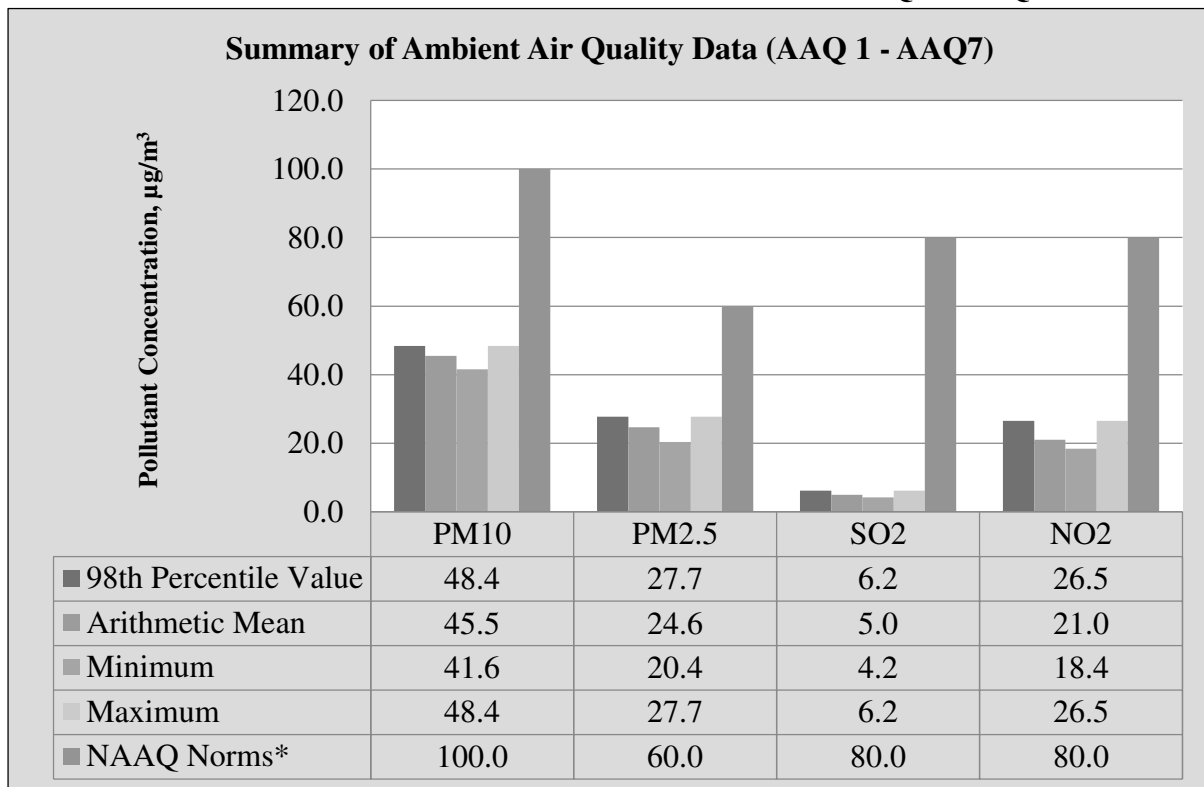
FIGURE 3.16: BAR DIAGRAM OF SUMMARY OF AAQ 1 – AAQ7

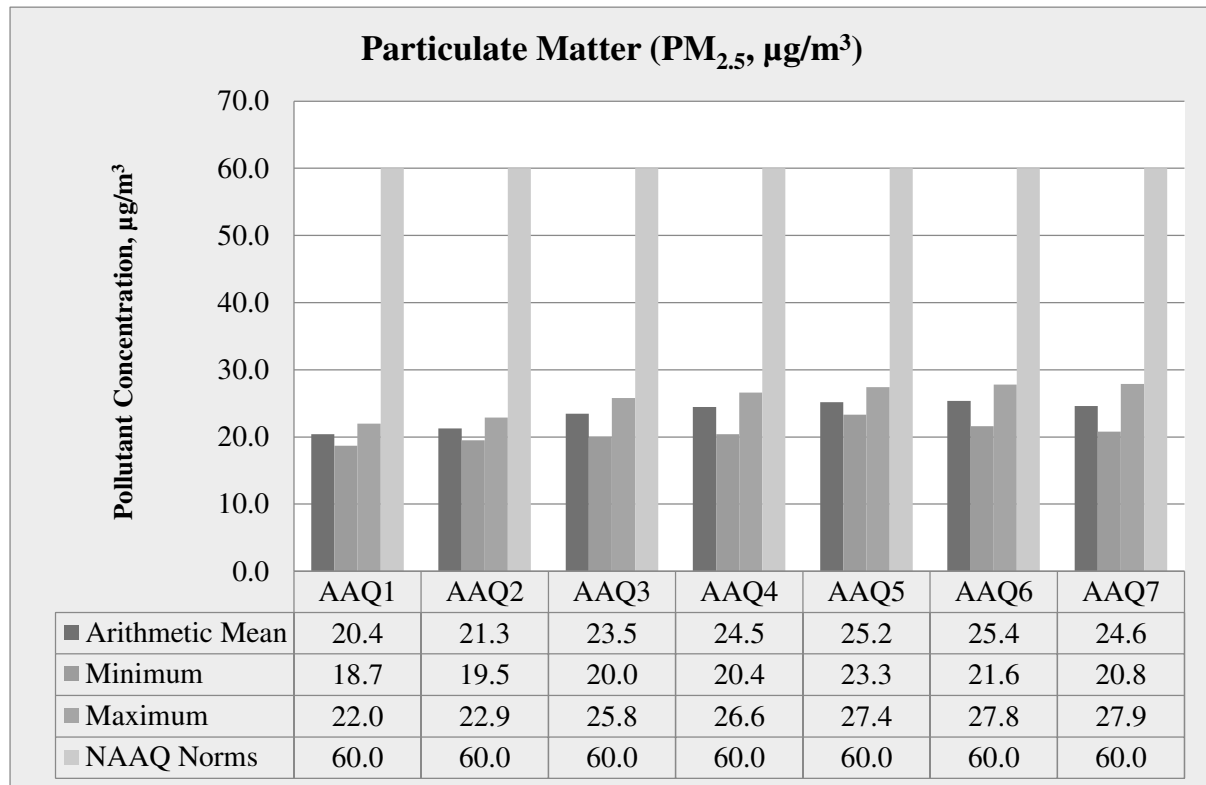
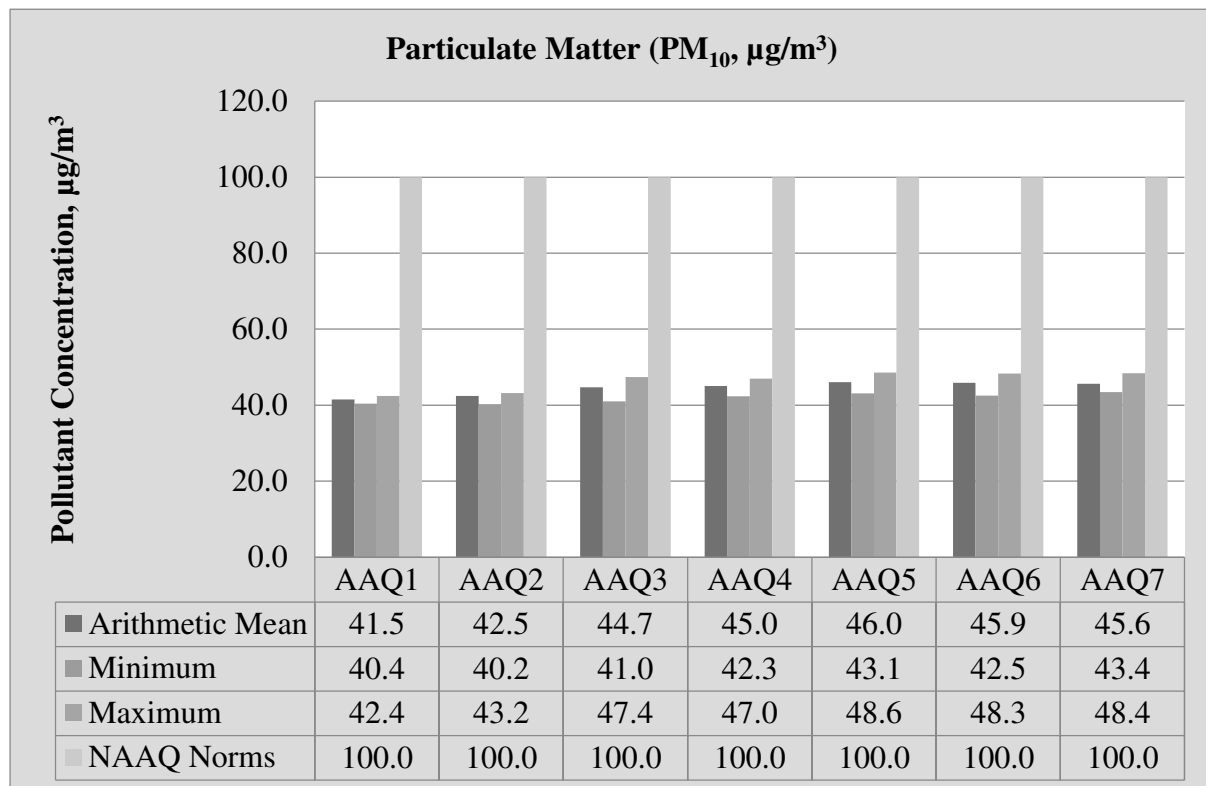
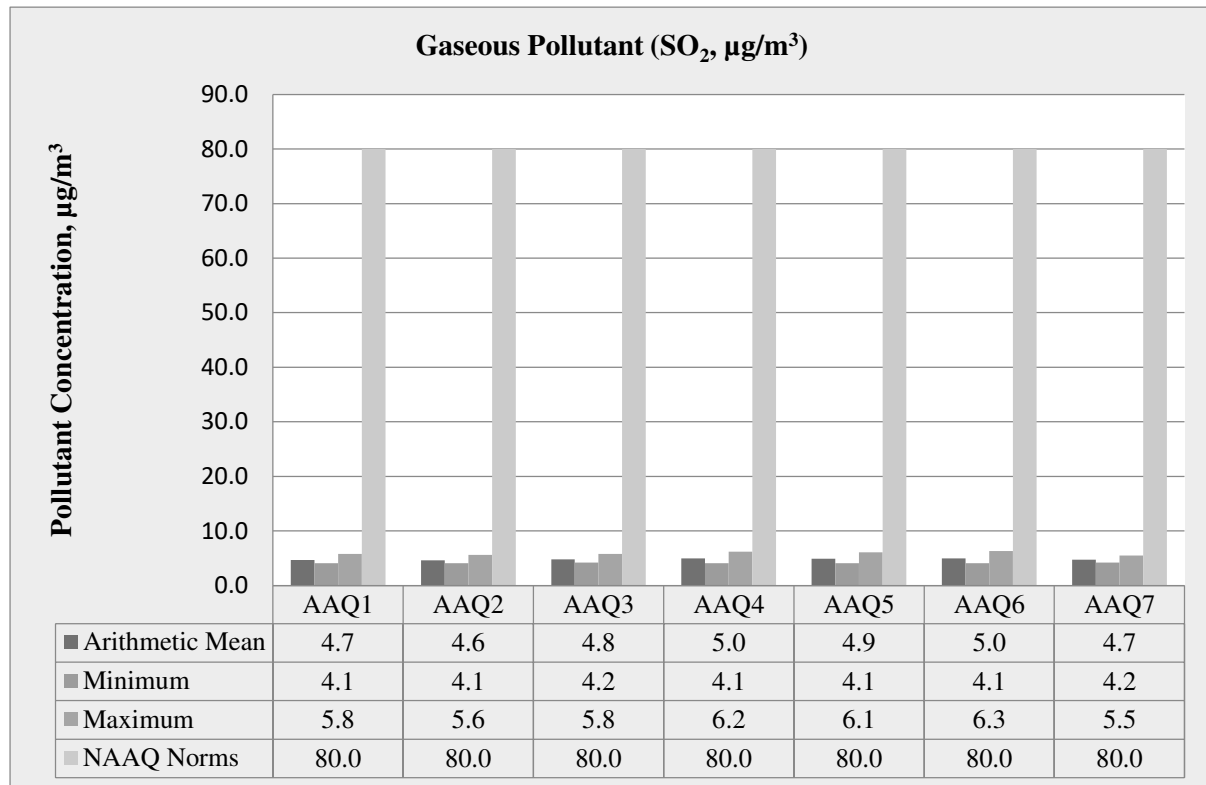
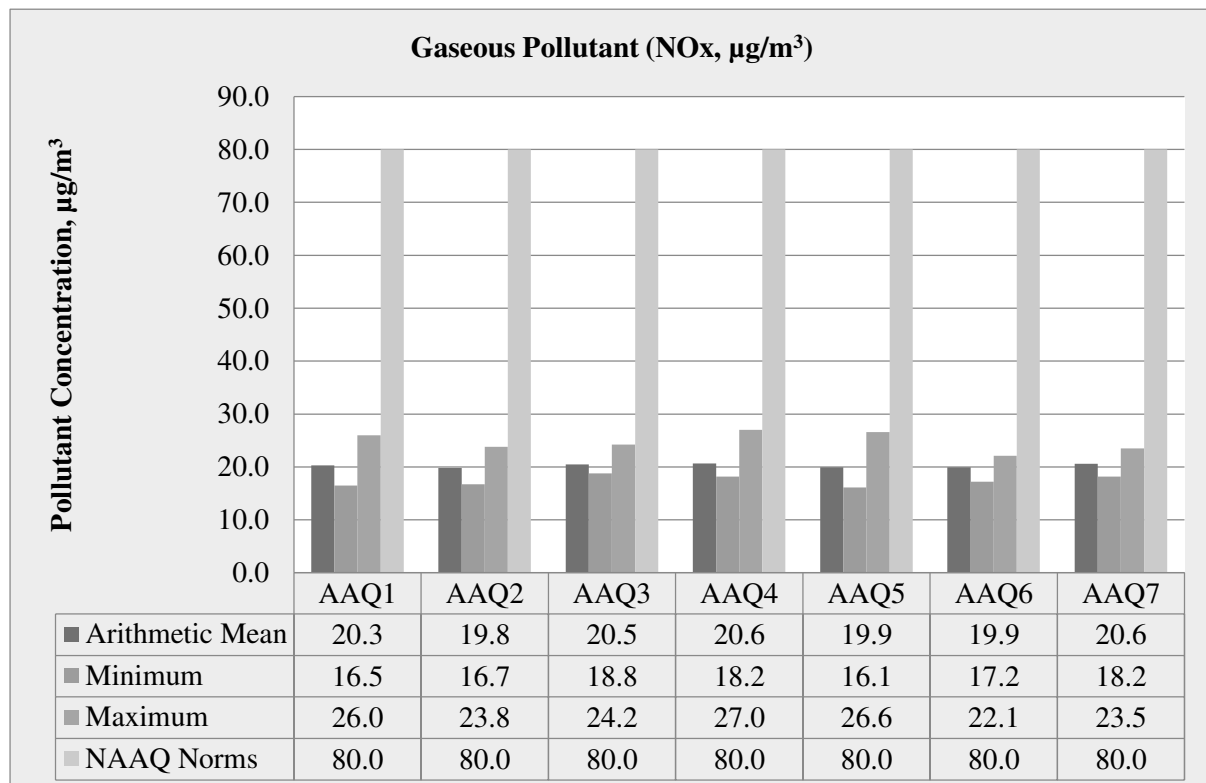
FIGURE 3.17: BAR DIAGRAM OF PARTICULATE MATTER PM_{2.5}**FIGURE 3.18: BAR DIAGRAM OF PARTICULATE MATTER PM₁₀**

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

3.3.6 Interpretations & Conclusion

As per monitoring data, PM₁₀ ranges from 41.5 µg/m³ to 46.0 µg/m³, PM_{2.5} data ranges from 20.4 µg/m³ to 25.4 µg/m³, SO₂ ranges from 4.6µg/m³ to 5.0µg/m³ and NO₂ data ranges from 19.8 µg/m³ to 20.6

$\mu\text{g}/\text{m}^3$. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

3.4 NOISE ENVIRONMENT

The vehicular movement on road and mining activities is the major sources of noise in study area, the environmental assessment of noise from the mining activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses. The main objective of noise monitoring in the study area is to establish the baseline noise level and assess the impact of the total noise expected to be generated during the project operations around the project site.

3.4.1 Identification of Sampling Locations

In order to assess the ambient noise levels within the study area, noise monitoring was carried out at Seven (7) locations. The noise level measurement was carried out at each ambient air quality station. The main aim of the noise level monitoring is

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

The noise level monitoring locations were carried out by covering commercial, residential, rural areas within the radius of 10km. A noise monitoring methodology was chosen such that it best suited the purpose and objectives of the study.

TABLE 3.27: DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Core Zone	Project Area	11° 0'58.32"N 77°12'50.37"E
2	N2	Core Zone	Project Area	11° 0'52.37"N 77°12'43.35"E
3	N3	Kodangipalayam	400m NW	11° 0'52.37"N 77°12'43.31"E
4	N4	Samigoundanpalayam	2Km South East	11° 0'21.44"N 77°13'44.28"E
5	N5	Paruvai	3.8Km South West	10°59'45.41"N 77°10'55.46"E
6	N6	Kadampadi	5.5Km North West	11°2'0.39"N 77° 9'52.84"E
7	N7	Naduvelapalayam	3.8Km North East	11° 2'30.68"N 77°14'26.56"E

Source: On-site monitoring/sampling by Global Lab and Consultancy Services

FIGURE 3.21: PHOTOGRAPHS OF AMBIENT NOISE MONITORING

3.4.2 Method of Monitoring

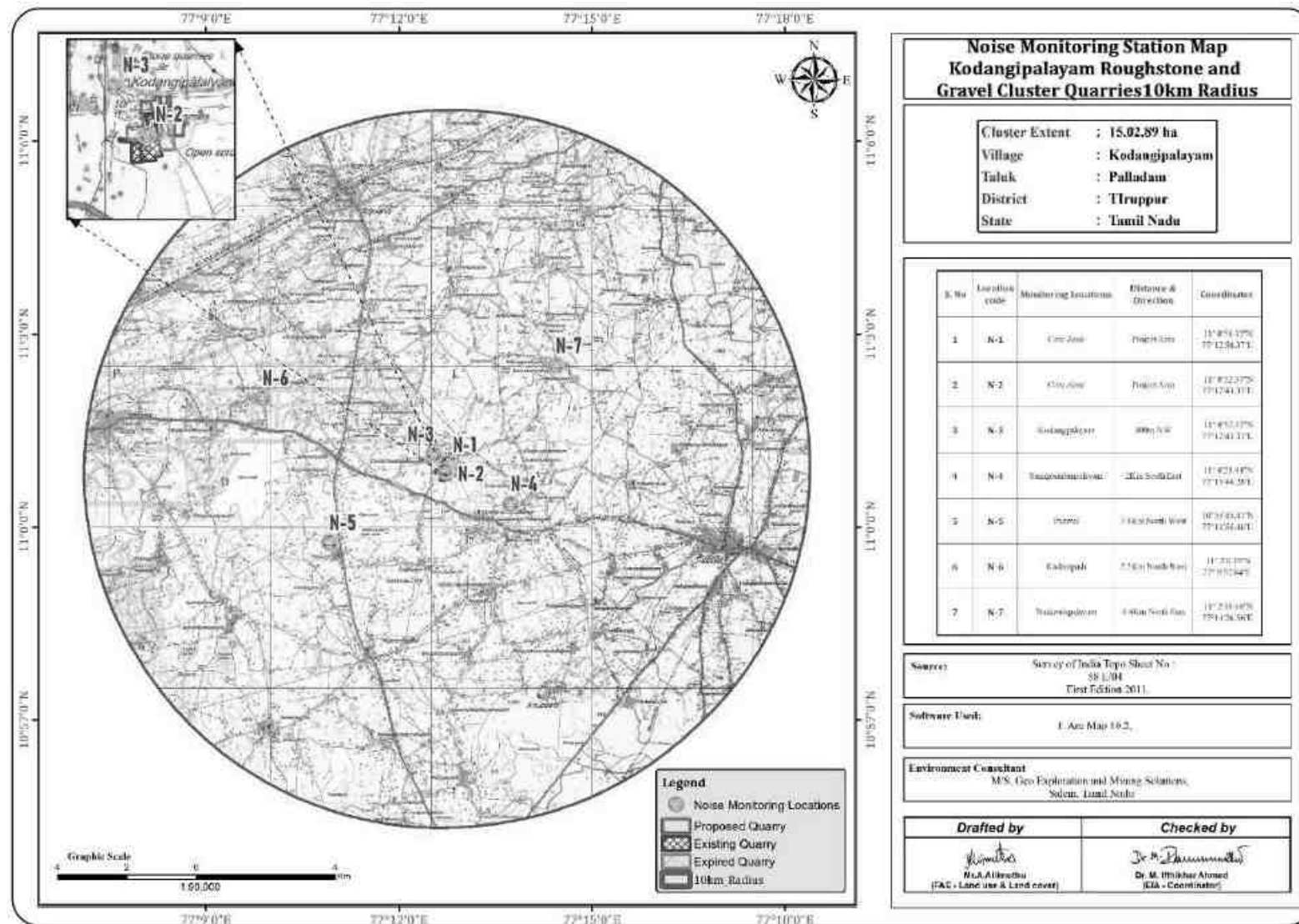
Digital Sound Level Meter was used for the study. All reading was taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring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

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

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

T = Time interval of observation

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

FIGURE 3.22: NOISE MONITORING STATIONS AROUND 10 KM RADIUS

3.4.3 Analysis of Ambient Noise Level in the Study Area

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

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

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

TABLE 3.28: AMBIENT NOISE QUALITY RESULT

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Core Zone	47.0	36.5	Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)
2	Core Zone	45.0	34.9	
3	Kodangipalayam	50.1	39.4	
4	Samigoundanpalayam	48.5	38.6	
5	Paruvai	50.9	35.3	Residential Day Time- 55 dB (A) Night Time- 45 dB (A)
6	Kadampadi	49.7	37.8	
7	Naduvelapalayam	51.2	37.1	

Source: On-site monitoring/sampling by Global Lab and Consultancy Services

FIGURE 3.23: DAY TIME NOISE LEVELS IN CORE AND BUFFER ZONE

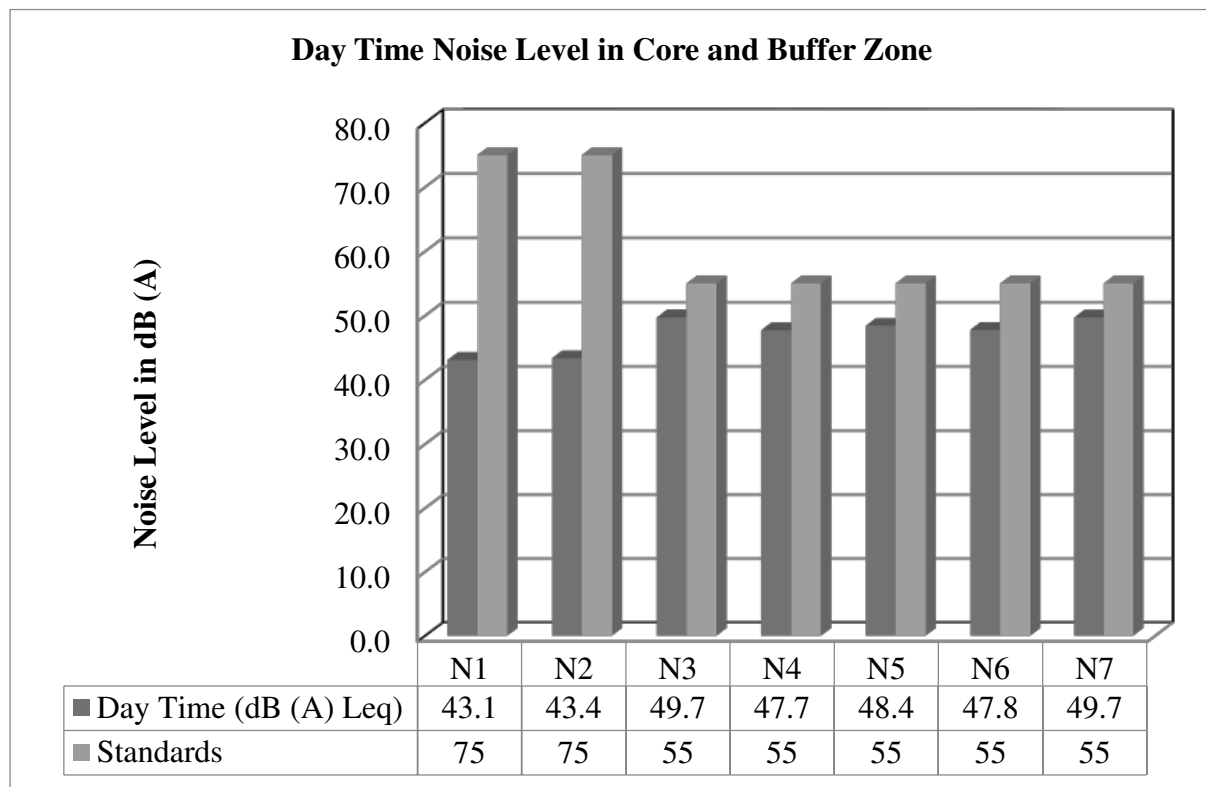
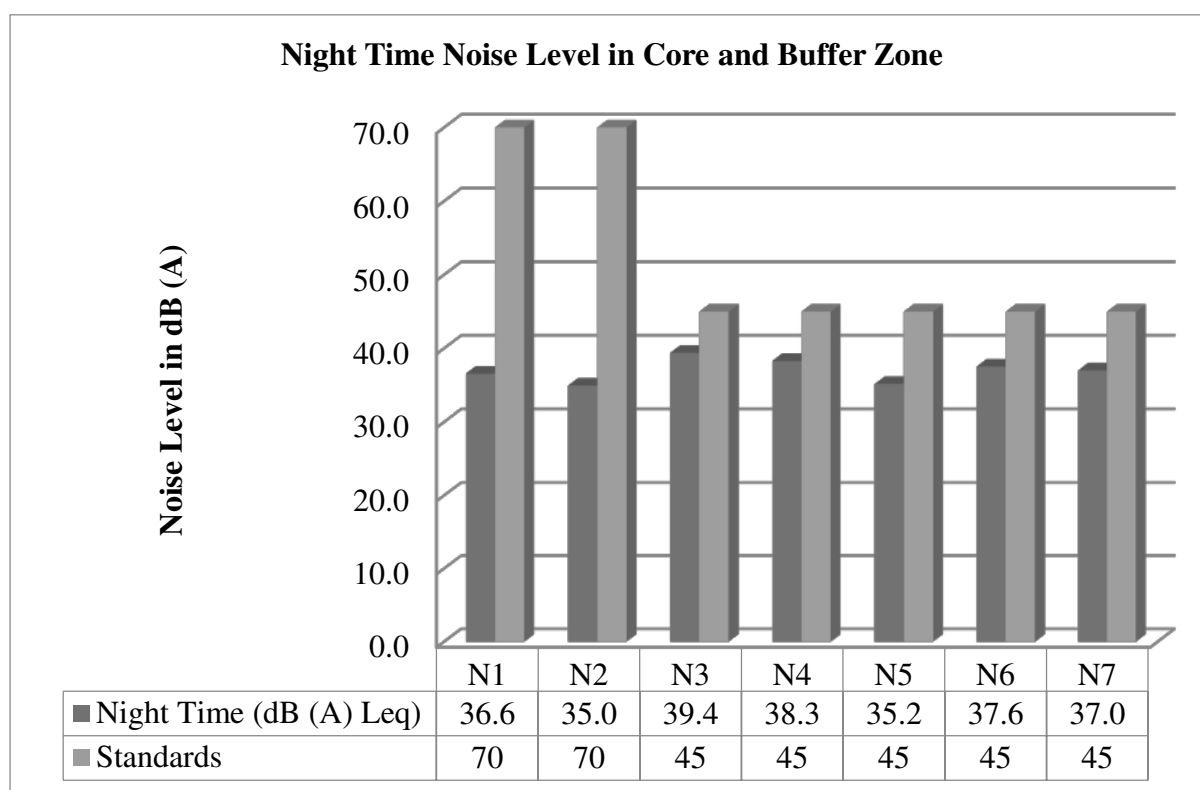


FIGURE 3.24: NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE

3.4.4 Interpretation & Conclusion:

Ambient noise levels were measured at 7 (Seven) locations around the proposed project area. Noise levels recorded in core zone during day time were from 43.1 –43.4 dB (A) Leq and during night time were from 35.0 – 36.6 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 47.7 to 49.7dB (A) Leq and during night time were from 35.2 to 39.4 dB (A) Leq. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.5 BIOLOGICAL ENVIRONMENT

Biological Environment

3.5.1. Study area Ecology

Biodiversity, or biological diversity, refers to the variety of life forms on Earth, encompassing all species of plants, animals, fungi, and microorganisms, as well as the ecosystems they create. This diversity can be broadly measured by the number of species in a given area. Biodiversity is crucial for maintaining ecosystem resilience, as each species plays a vital role in essential functions such as pollination, nutrient cycling, and climate regulation. Moreover, biodiversity is crucial to human well-being, providing resources like food, medicine, and clean water. Unfortunately, human activities-including deforestation, pollution, climate change, and mining threatening biodiversity at an alarming rate, leading to habitat destruction and biodiversity loss. The preservation of biodiversity is therefore critical for sustaining natural systems and ensuring the health and stability of our planet for future generations.

Rough stone open-cast mining involves extensive land use, removing vegetation, topsoil, and large portions of the earth's surface to extract stones, leading directly to habitat loss. Many species are forced to relocate or remove if they cannot adapt to the changes. Furthermore, open-cast mining exacerbates soil erosion, disrupts water flow, and releases dusts pollutants, all of which harm the surrounding land and water systems, making it increasingly stress on native flora and fauna. Additionally, mining often fragments habitats, creating isolated populations of species that struggle to reproduce and thrive.

Baseline studies are critical before granting environmental clearance for mining projects, as they provide a comprehensive understanding of the existing environmental, ecological, and social conditions of a given area. These studies assess biodiversity, air and water quality, soil composition, and the presence of sensitive habitats or endangered species. By collecting this baseline data, we can accurately predict the potential environmental impacts of mining and develop strategies to minimize and mitigate the negative impact. Furthermore, baseline studies serve as a benchmark to monitor changes over time, ensuring accountability and adherence to environmental regulations. In the context of mining, it is essential to protect and conserve rare, endangered, endemic, or threatened (REET) species of flora and fauna in both the core and buffer zones to ensure the conservation these species.

3.5.2. Project Description

The Kodangipalayam Cluster quarries is involved in the undertaking of establishment, construction, development, and closure of opencast mines. She, through the exploration phase, identified the proposed project site as the one that has a great potential of producing an economically viable quantity of rough stone and gravel. The proposed quarry project is located in Kodangipalayam Village, Palladam Taluk, Tiruppur District, Tamil Nadu. The area lies between latitudes from 11°00'57.66" N to 11°01'04.72" N and longitudes from 77°12'47.33"E to 77°12'50.78" E. The altitude of the area is 410m above Mean Sea level.

3.5.3. Study Area

The study area, in and around the core and buffer zones, is a plain, open land, with less vegetation, agricultural land and farms. The core zone of Ha Rough Stone and Gravel Quarry located at Kodangipalayam Village, Palladam Taluk, Tiruppur District. The core mining site is located plain topography. The images of the study area are shown in Figure 2. Buffer zone is covered by mainly rainfed agriculture land as well as irrigated agriculture farms with diverse crops.

3.5.4. Scope of the Assessment

This rapid biodiversity assessment for the Rough Stone and Gravel Quarry involves a comprehensive baseline survey of the existing flora, fauna, and other ecological features, including rare, endemic, or threatened species within the project site and surrounding areas. The assessment employs rapid visual surveys, quadrat sampling, and targeted sampling of key habitats. Additionally, secondary data is collected from existing literature, reports, online biodiversity databases, and expert discussions. The study estimates population sizes and distributions of key species, particularly those with conservation status (e.g., endangered species), and evaluates population trends if historical data is available. It also identifies breeding sites, migration routes, and nesting areas critical to species' life cycle processes. The study predicts the potential direct and indirect impacts of mining on biodiversity, including habitat loss, pollution, noise, dust, and soil degradation, and recommends measures to

minimize, mitigate, and, where possible, restore or offset biodiversity loss. This detailed biodiversity report has been prepared on behalf of the stakeholders involved in the Rough Stone and Gravel Quarry and is submitted to the Tamil Nadu State Environment Impact Assessment Authority (TN-SEIAA) for review and approval.

3.5.5. Objectives of Biodiversity Study

- To conduct field surveys in the proposed rough stone and gravel quarry area to document qualitative and quantitative analysis of flora and fauna in core mining and buffer zones.
- To identify and list out the flora and fauna, and check the existence of species categorized under IUCN Red List and Wildlife Protection Act Schedules.
- To calculating the species diversity and evenness index for biodiversity (flora) in core and buffer zones of the proposed quarry site.
- To identify the impacts of mining activities on local ecosystems, including agricultural lands, and evaluate how these changes may affect biodiversity.
- To recommend biodiversity conservation and management plans for the proposed mining site.

3.5.5.1. Field survey

Field survey study was conducted twice in the month Dec 2024 to survey the existing flora and fauna in the core area (actual mining place) (Cluster Extent.15.02.89 hectares) as well as the buffer area (1000-meter radius from the core zone). The study was conducted by a team consisting of experts in Biodiversity assessment, NABET certified Functional Area Expert (FAE) in Ecology and Biodiversity, and local residents for guidance. The study team visited the mining site twice to collect the field data on floral and faunal species in the study areas.

3.5.6. Methodology

3.5.6.1. Primary data collection

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 parts of plants. 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 the Wildlife schedule category was ascertained as per the IUCN-Red Data Book and Indian wildlife (Protection) Act, 1972.

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

Direct observations and bird calls were used for bird documentation. Same transects were used for counting butterflies. Opportunistic observations were made for Amphibians, reptiles and ordinales. 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).

Known species of flora and fauna were recorded and identified in the field. Doubtful plant specimens were photographed and collected and further identified in the lab using appropriate guides, literature, online resources.

Quadrat method was used to estimate the floral count in core and buffer zones within 1000-meter periphery from the core area. Sampling locations were selected with reference to topography, land use, vegetation pattern, etc. In this study, quadrats of 10 m × 10 m were laid down to assess trees, and sub quadrats of 5 m × 5 m were laid down for shrubs, 1 m x 1 m were laid done for herbs (Figure 3 and 4). Field observation data were recorded in filed note book/data sheets. Photographs and videos were taken for ecological components, flora and available fauna species.

3.5.6.2. Secondary data

The secondary baseline data such as the morphological features, flowering and fruiting phenology, habitat and distribution of flora and fauna have been collected from various data sources:

1. Forest working plan.
2. Schedule I to V: Indian Wildlife (Protection) Act, 1972
3. Vivek Menon, Indian Mammals: A Field Guide. Hachette Book publishing India Pvt.Ltd., India.
4. Daniel J.C. The Book of Indian Reptiles and Amphibians, Bombay Natural History Society., India.
5. Ali, S and Ripley. Handbook of the Birds of India and Pakistan together with those of Nepal, Sikkim and Bhutan, Oxford University Press, Bombay.
6. ENVIS Centre on Wildlife and Protected Area.
7. Birds Life Data Zone
8. Ebird.org
9. Global Biodiversity Information Facility
10. http://tnenvis.nic.in/Content/1_2878.aspx
11. Endemic Birds in Tirupur, tirupur Ornithological

3.5.6.3. Data compilation and analysis

Based on the collected data, analysis was done for species identification, habit distribution pattern analysis, and phytosociological relationship, and ecological index and identify the REET categories. Endemic species were analysed using distribution in the regional and local floras and online databases. Rare or Endangered or Endemic or Threatened species were analysed based on the IUCN Red List database and threatened plants of BSI (India database of Botanical Survey of India)

<https://bsi.gov.in/uploads/documents/research-program/Threatened-plants-of%20India.pdf>

<https://www.iucnredlist.org/>

3.5.7. Phytosociological Studies

Phytosociological studies are the scientific investigations that focus on understanding the structure, composition, and distribution of plant communities within a specific area. These studies examine how different plant species interact with each other and their environment, and how these interactions contribute to the overall ecological balance. Phytosociology involves categorizing plant communities based on factors like species

diversity, abundance, and the physical environment, such as soil, moisture, and light availability. Sample plots were selected in such a way to get maximum representation of different types of vegetation and plots were laid out in different part of the study area. Analysis of the vegetation will help in determining the relative importance of each species in the study area and to reveal if species is threatened. Phytosociological parameters, such as *Density*, *Frequency*, *Abundance* and *Importance Value Index* of individual species were determined in randomly placed quadrat of different sizes in the study area, as shown the formula below.

$$\begin{aligned} \text{Density} &= \frac{\text{Total No. of individuals of species}}{\text{Total No. of Quadrats used in sampling}} \\ \text{Frequency (\%)} &= \frac{\text{Total No. of Quadrats in which species occur}}{\text{Total No. of Quadrats studied}} \times 100 \\ \text{Abundance} &= \frac{\text{Total No. of individuals of species}}{\text{No. of Quadrats in which they occur}} \\ \text{Relative Density} &= \frac{\text{Total No. of individuals of species}}{\text{Sum of all individuals of all species}} \\ \text{Relative Frequency} &= \frac{\text{Total No. of Quadrats in which species occur}}{\text{Total No. of Quadrats occupied by all species}} \times 100 \end{aligned}$$

3.5.7.1. Shannon – Wiener Index, Evenness and Richness

Biodiversity index is a quantitative measure that reflects how many different types of species, there are in a dataset, and simultaneously considers how evenly the basic entities (such as individuals) are distributed among those types of species. The value of biodiversity index increases both when the number of types increases and when evenness increases. For a given number of type of species, the value of a biodiversity index is maximized when all type of species is equally abundant. The corresponding formulas are given below.

$$\text{Shannon-Wien Index} \quad H = -\sum [(p_i) * \ln(p_i)]$$

Where p_i : Proportion of total sample represented by species
 i : number of individuals of species i / total number samples

$$\text{Evenness} \quad H/H_{\max}$$

Where $H_{\max} = \ln(s)$ = maximum diversity possible; S = No. of species

$$\text{Species Richness by Margalef} \quad RI = S - 1 / \ln N$$

Where S = Total Number of species in the community

N = Total Number of individuals of all species in the community

3.5.7.2. Data compilation:

Based on the collected data, exclusive checklists were prepared for both endemic and REET plants of Tamil Nadu.

3.6. Floral Diversity Analysis

3.6.1. Floral Diversity in core zone

Identification of plant species for the natural flora and cultivated crops was conducted through field surveys and onsite observations. The plant species identification was done based on the reference materials and also by examining the plant morphological and reproductive characteristics of the plants i.e. flowers, fruits and seeds. Unidentified and double samples were photographed and minimally collected for further investigation in the laboratory. Land use pattern in relation to agriculture crop varieties were identified through physical verification of agriculture field.

A total number of 121 species were recorded from the study area. of the 121 species, 22 different species were observed in the core site. These floral species include 34% (6) herbs and grasses, 2% (2) shrubs (shrubs, under shrubs and climbing shrubs) 23% (5) Climbers & liana 11% (3) Trees 29% (5), (Fig No 3.34). The observed

floral species are most commonly distributed plants and most of the herbs are annual plants herbs. Herbs are dominant in the core site (Table No.3.55). The members of Poaceae are abundant in number followed by Fabaceae, Malvaceae, Asteraceae (Table No.3.55).

Table No: 3.28. Occurrence of different floral habits in core and buffer zones of the study area.

Habit	Core Zone	Buffer Zone
Herbs	6	33
Grasses	2	2
Undershrubs	1	9
Shrubs	3	11
Climbing shrub	1	3
Climbers	2	9
Liana	1	3
Trees	5	29
Total	22	99

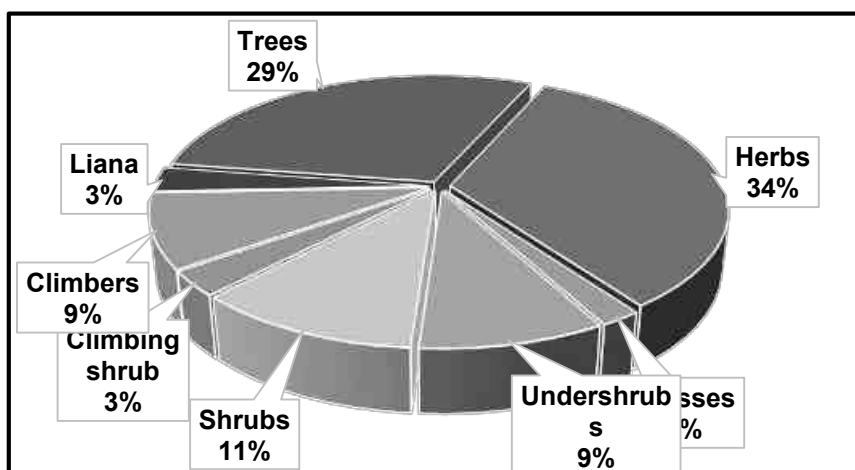


Fig No: 3.28. Habit analyses of the species recorded from core zone of the study area.



a. *Azadirachta indica*



b. *Prosopis juliflora*

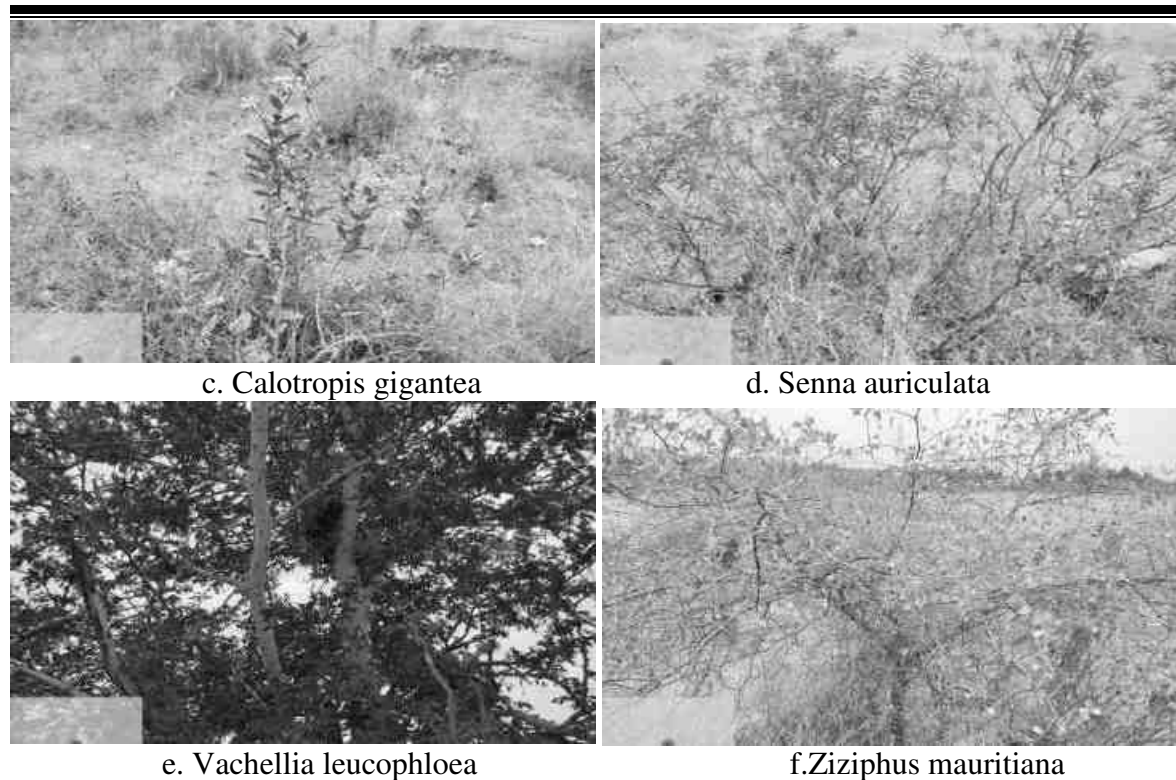


Fig No: 3.29. Flora species observation in the Buffer zone area

3.6.2. Tree survey around 300m radius

The trees surveys were conducted around 300m radius from the proposed project site cluster are of Kodangipalayam village. This is the standard scientific method followed by various workers in respect of phytosociological studies (Cottom and Curtis 1956; Ralhan et al. 1982; Saxena and Sing 1982; Nayak et al. 2000; Lu et al. 2004; Nautiyal 2008). While sampling, circumference at breast Height (CBH) of tree species was measured at 1.36m from ground level, along with the name of the species, phenology (flowering, fruiting, and flushes), and uses. After surveying areas, a detailed trees inventory has been compiled. A list of all plants from the study area was prepared and their habitats were recorded. The species of trees were documented during this base line survey. The dominant plant species growing in this area were *Cocos nucifera* *Prosopis juliflora*, etc. Please refer the Table No.3.54.

Table No: 3.29. Tree survey around 300m radius from the proposed project site (Primary data)

S. No	English Name	Vernacular Name	Scientific Name	No of trees
Trees				
1.	Acacia Nilotica	Karuvelammaram	<i>Vachellianilotica</i>	4
2.	Mesquite	Mullumaram	<i>Prosopis juliflora</i>	10
3.	Neem	Vembu	<i>Azadirachta indica</i>	60
4.	Madras Thorn	Kodukapuli	<i>Pithecellobium dulce</i>	10
5.	White Bark Acacia	Vela maram	<i>Vachellia leucophloea</i>	10
6.	Mango	Manga	<i>Mangifera indica</i>	3
7.	Coconut	Thennai maram	<i>Cocos nucifera</i>	138

(Sources: Species observation in the field study)

3.7. Floral Diversity in buffer zone

The buffer zone area (observed within 1000 meter) encompassed different land use patterns. The survey in the buffer zone reveals that a total of 99 plant species were recorded from both natural and agricultural habitats. Of the recorded species, 92 species are wild and 7 are cultivated or planted species in agricultural land. The vegetation habit type analysis of buffer zone indicates that the flora composed of 34% herbs, 23% shrubs, 12% climbers and 29% trees species (Fig No.3.36 and Table.3.56). These 99 species belong to the 43 families. The occurrence of maximum number of species are from family Fabaceae (11), followed by Lamiaceae (6), Mimosaceae (6), Apocynaceae. Other family have less than 5 species. The details of scientific name, common name, vernacular name and habit type and status of IUCN category are given in Table No.3.56. Diversity of floral families and number of species recorded from each family are given in Table No.3.55 and Fig No.3.37.

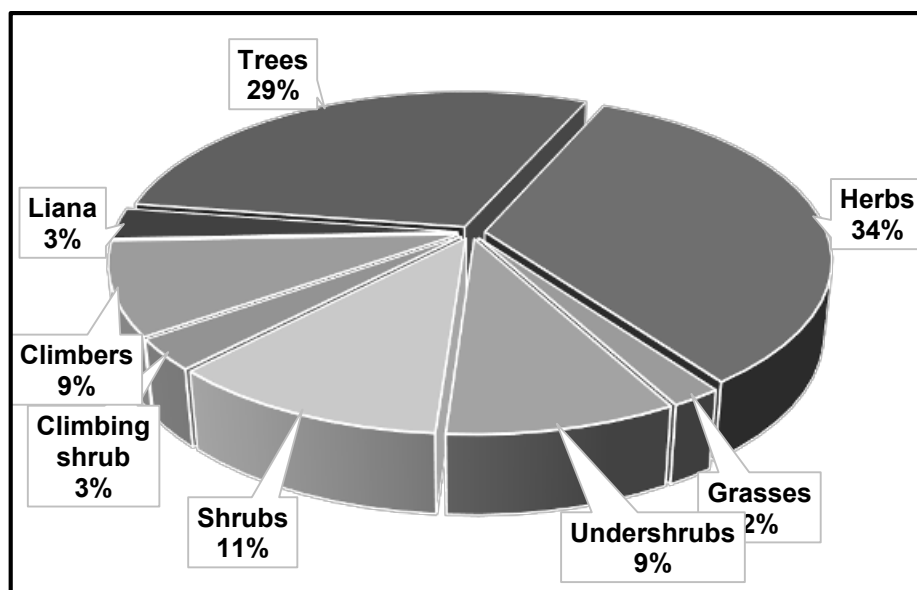


Fig No: 3.30. Habit analyses of the species recorded from buffer zone of the study area.

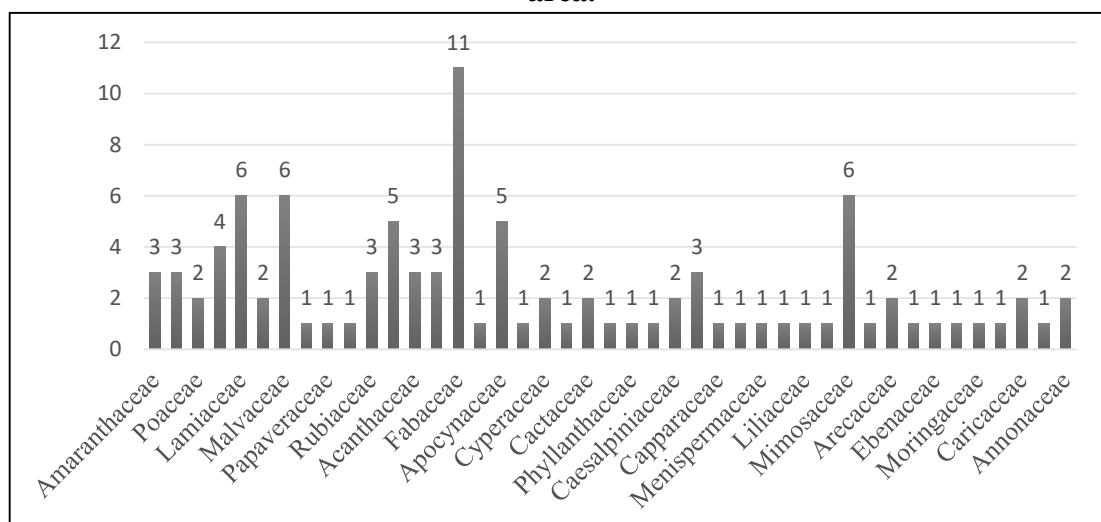


Fig No: 3.37. Family wise occurrence of flora in buffer zone.

Table No: 3.30. Diversity of plant families and number of species recorded in the study area

S.No.	Family Name	Number of Species Recorded	S.No.	Family Name	Number of Species Recorded
1	Amaranthaceae	3	26	Rhamnaceae	3
2	Asteraceae	3	27	Capparaceae	1
3	Poaceae	2	28	Sapindaceae	1
4	Euphorbiaceae	4	29	Menispermaceae	1
5	Lamiaceae	6	30	Cucurbitaceae	1
6	Cleomaceae	2	31	Liliaceae	1
7	Malvaceae	6	32	Simaroubaceae	1
8	Nyctaginaceae	1	33	Mimosaceae	6
9	Papaveraceae	1	34	Meliaceae	1
10	Plantaginaceae	1	35	Arecaceae	2
11	Rubiaceae	3	36	Burseraceae	1
12	Convolvulaceae	5	37	Ebenaceae	1
13	Acanthaceae	3	38	Moraceae	1
14	Solanaceae	3	39	Moringaceae	1
15	Fabaceae	11	40	Myrtaceae	1
16	Molluginaceae	1	41	Caricaceae	2
17	Apocynaceae	5	42	Verbenaceae	1
18	Pedaliaceae	1	43	Annonaceae	2
19	Cyperaceae	2			
20	Zygophyllaceae	1			
21	Cactaceae	2			
22	Vitaceae	1			
23	Phyllanthaceae	1			
24	Lythraceae	1			
25	Caesalpiniaceae	2			

a. *Abutilon indicum*b. *Jatropha curcas*c. *Azadirachta indica*d. *Ricinus communis*

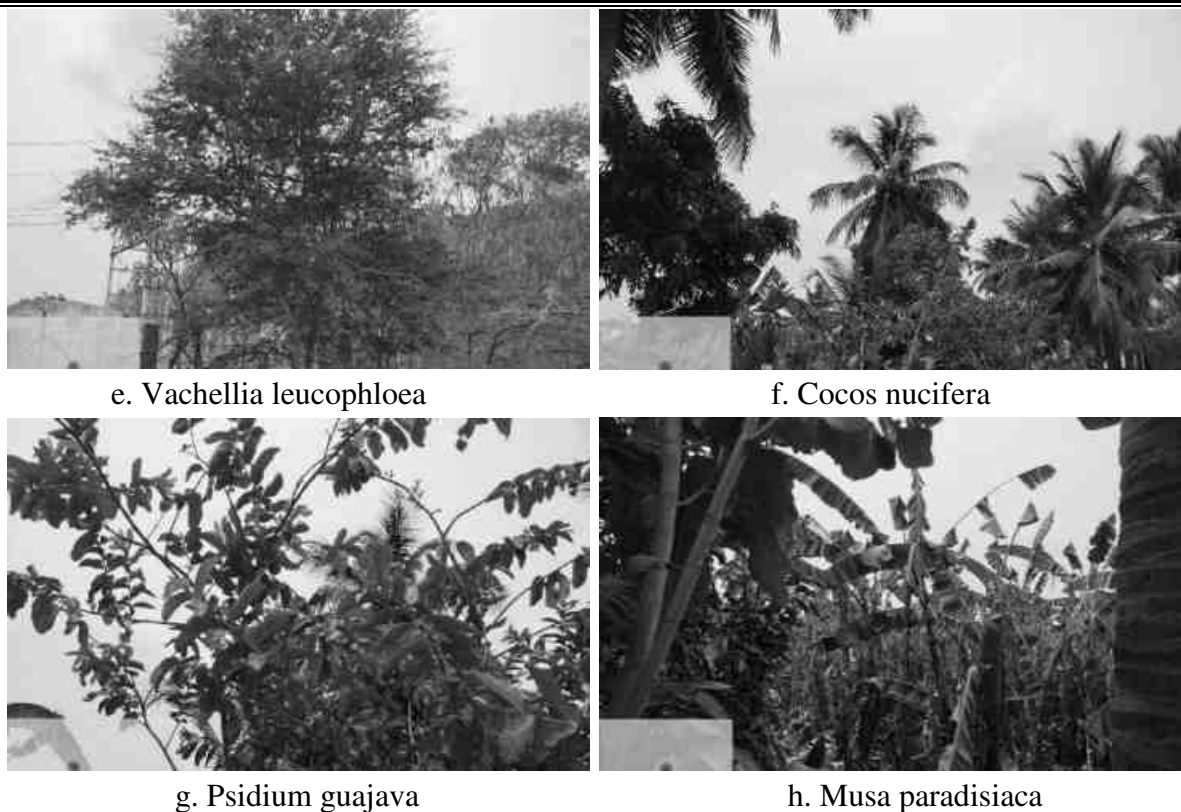


Fig No: 3.31. Flora species observation in the Buffer zone area

3.8. 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. There is no invasive species present in the study area.

Table No: 3.31. Flora recorded from the study area (Core and Buffer zones) of the proposed rough stone and gravel quarry.**Herbs and Grasses**

S.No	Scientific Name	Family	English Name	Vernacular Name	Recorded Zone	IUCN Status
1.	<i>Achyranthes aspera</i>	Amaranthaceae.	Prickly chaff flower	Nayuruv	C+B	Not Evaluated
2.	<i>Tridax procumbens</i>	Asteraceae	Tridax daisy	Veetukaayapoondur	C+B	Not Evaluated
3.	<i>Cynodondactylon</i>	Poaceae	Indian doab	Arugampul	C+B	Not Evaluated
4.	<i>Acalypha indica</i>	Euphorbiaceae	Copperleaf	Kuppaimeni	B	Not Evaluated
5.	<i>Anisomelesmalabarica</i>	Lamiaceae	Indian Catmint Plant	Pei viratti	B	Not Evaluated
6.	<i>Celome viscosa</i>	Cleomaceae	Cleome viscosa	Nai kadugu	C+B	Not Evaluated
7.	<i>Sida acuta</i>	Malvaceae	Common Wireweed	Arivalmanaipoondur	B	Not Evaluated
8.	<i>Boerhaaviadiiffusa</i>	Nyctaginaceae	Punarnava	Mukkirattai	B	Not Evaluated
9.	<i>Argemone mexicana</i>	Papaveraceae	Mexican prickly poppy	Kudiyotti	B	Least Concern
10.	<i>Leucas aspera</i>	Lamiaceae	Common leucas	Thumbai	C+B	Not Evaluated
11.	<i>Scoparia dulcis</i>	Plantaginaceae	Licorice weed	Kallurukki	B	Not Evaluated
12.	<i>Oldenlandiaumbellata</i>	Rubiaceae	Chay root	Chaaya ver	B	Least Concern
13.	<i>Evolvulusalsinoides</i>	Convolvulaceae	Slender dwarf morning-glory	Vittunu-k-kiranti	B	Not Evaluated
14.	<i>Hygrophila auriculata</i>	Acanthaceae	Marsh barbel	Neermulli	B	Not Evaluated
15.	<i>Solanum surattense</i>	Solanaceae	Yellow-fruit nightshade	Kandakathirika	B	Not Evaluated
16.	<i>Mimosa pudica</i>	Fabaceae	Shameplant	Thottachenunki	B	Not Evaluated
17.	<i>Justicia procumbens</i>	Acanthaceae	Water willow	Kotakacalai	B	Not Evaluated
18.	<i>Mollugocerviana</i>	Molluginaceae	Threadstem carpetweed	Parppatakam	B	Not Evaluated
19.	<i>Euphorbia hirta</i>	Euphorbiaceae	Asthma-plant	Ammanpacharisi	C+B	Not Evaluated
20.	<i>Hyptissuaveolens</i>	Lamiaceae	Pignut	Nattapoochedi	B	Not Evaluated
21.	<i>Ocimumtenuiflorum</i>	Lamiaceae	Holy basil	Thulasi	B	Not Evaluated
22.	<i>Catharanthus roseus</i>	Apocynaceae	Madagascar Periwinkle	Nithykalyani	B	Least Concern
23.	<i>Cleome viscosa</i>	Cleomaceae	Asian spiderflower	Naaikaduku	B	Not Evaluated
24.	<i>Digeria muricata</i>	Amaranthaceae	Digeria muricata	Thoiyakeerai	B	Not Evaluated
25.	<i>Parthenium hysterophorus</i>	Asteraceae	Carrot grass	Parttiniyam	B	Not Evaluated
26.	<i>Sesamum alatum</i>	Pedaliaceae	Wing-Seed Sesame		B	Not Evaluated
27.	<i>Sorghum vulgaris</i>	Poaceae	Sorghum bicolor	Cholam	B	Not Evaluated

28.	<i>Cyperus articulatus</i>	Cyperaceae	Jointed flatsedge	Korai kizhangu	C+B	Least Concern
29.	<i>Cyperus rotundus</i>	Cyperaceae	Nut grass	Korai kizhangu	B	Least Concern
30.	<i>Tephrosia pumila</i>	Fabaceae	Indigo Sauvage	Kolinchi	B	Least Concern
31.	<i>Tephrosia purpurea</i>	Fabaceae	Wild indigo	Kolinchi	B	Not Evaluated
32.	<i>Tephrosia villosa</i>	Fabaceae	Shaggy wild Indigo	Punaikkaivetlai	B	Not Evaluated
33.	<i>Tribulus terrestris</i>	Zygophyllaceae	Puncture Vine	Nerunji	C+B	Least Concern
34.	<i>Tridax procumbens</i>	Asteraceae	Mexican daisy	Kenathuppoondu	B	Not Evaluated
35.	<i>Vigna radiata</i>	Fabaceae	Green Gram	Pachai-payaru	B	Not Evaluated

Shrubs, Undershrubs, and Climbing shrubs

S.No.	Scientific name	Family Name	Common Name	Local name	Recorded Zone	IUCN Status
36.	<i>Abrus precatorius</i>	Fabaceae	Black-Eyed Susan	Kundumani	B	Not Evaluated
37.	<i>Abutilon indicum</i>	Malvaceae	Indian Mallow	Thuthi	C+B	Not Evaluated
38.	<i>Barleria prionitis</i>	Acanthaceae	porcupine flower	Sulli poo	B	Not Evaluated
39.	<i>Calotropis gigantea</i>	Apocynaceae	Giant Milk-Weed	Erukku	C+B	Not Evaluated
40.	<i>Canthium coromandelicum</i>	Rubiaceae	Coromandel Canthium	Mullukkarai	B	Not Evaluated
41.	<i>Cereus pterogonus</i>	Cactaceae		Sippaai kathaalai	B	Not Evaluated
42.	<i>Cissus quadrangularis</i>	Vitaceae	Adament creeper	Pirandai	C+B	Not Evaluated
43.	<i>Datura innoxia</i>	Solanaceae	Pricklyburr	Oomathai	B	Not Evaluated
44.	<i>Euphorbia tricalli</i>	Euphorbiaceae		Kodi kalli	B	Least Concern
45.	<i>Flueggea leucopyrus</i>	Phyllanthaceae	Spinous Fluggea	Vellaipula	B	Least Concern
46.	<i>Jatropha gossypifolia</i>	Euphorbiaceae	Cotton leaf	Aatalai	B	Least Concern
47.	<i>Lawsonia inermis</i>	Lythraceae	Henna	Maruthani	B	Least Concern
48.	<i>Ocimum sanctum</i>	Lamiaceae	Holy Basil	Nallathulasi	C+B	Not Evaluated
49.	<i>Opuntia dillenii</i>	Cactaceae	Prickly Pear	Sappathikalli	C+B	Not Evaluated
50.	<i>Parthenium hysterophorus</i>	Asteraceae	Congress Weed	Vishachedi	B	Not Evaluated
51.	<i>Pavonia zeylanica</i>	Malvaceae	Ceylon Swamp Mallow	Mammatti	B	Not Evaluated
52.	<i>Pupalia lappacea</i>	Amaranthaceae	Sweethearts	Adai-otti	B	Least Concern
53.	<i>Ricinus communis</i>	Euphorbiaceae	Castor Plant	Aamanakku	B	Not Evaluated
54.	<i>Senna auriculata</i>	Caesalpiniaceae	Eared Senna	Aavarai	B	Not Evaluated
55.	<i>Sida acuta</i>	Malvaceae	Horn bean leaved sida	Ariva-mooku keerai	B	Not Evaluated

56.	<i>Sida cordifolia</i>	Malvaceae	Country Mallow	Nilatutti	B	Not Evaluated
57.	<i>Waltheria indica</i>	Malvaceae	Boater Bush	Sengalipundu	B	Least Concern
58.	<i>Ziziphus oenoplia</i>	Rhamnaceae	Jackal Jujube	Chooraimullu	B	Not Evaluated
Climbers. Liana						
59.	<i>Canavalia ensiformis</i>	Fabaceae	Sword Bean	Kattuthammatti	B	Not Evaluated
60.	<i>Capparis zeylanica</i>	Capparaceae		Suduthorat	B	Not Evaluated
61.	<i>Cardiospermum halicacabum</i>	Sapindaceae	Balloon vine	Modakkathan	B	Least Concern
62.	<i>Cissampelos pareira</i>	Menispermaceae	Velvet Leaf Pareira	Appatta	B	Not Evaluated
63.	<i>Coccinia grandis</i>	Cucurbitaceae	Ivy Gourd	Kovai	C+B	Not Evaluated
64.	<i>Cuscuta reflexa</i>	Convolvulaceae		Thuthuma Kothan	B	Least Concern
65.	<i>Gloriosa superba</i>	Liliaceae	Glorious lily	Kanvalikodi	B	Least Concern
66.	<i>Ipomoea pes-tigridis</i>	Convolvulaceae	Tiger's foot creeper	Punaikkirai	B	Not Evaluated
67.	<i>Ipomoea staphylina</i>	Convolvulaceae	Pretty Morning Glory	Oonankodi	B	Not Evaluated
68.	<i>Merrimeia tridentata</i>	Convolvulaceae	Arrow-leaf Morning Glory	Mutiyar-kuntal	C+B	Not Evaluated
69.	<i>Pergularia daemia</i>	Apocynaceae	Trellis Vine	Veli Paruthi	B	Least Concern
70.	<i>Rhynchosia minima</i>	Fabaceae	Jumby-bean	Kaliyanthuvarai	B	Least Concern

Trees						
71.	<i>Ailanthus excels</i>	<i>Simaroubaceae</i>	Indian Tree of Heaven	Perumaram	B	<u>Data Deficient</u>
72.	<i>Pithecellobium dulce</i>	Fabaceae	Madras Thorn	Kodukapuli	B	Least Concern
73.	<i>Albizia amara</i>	Mimosaceae	Oil cake tree	Usilai	B	Least Concern
74.	<i>Albizia lebbeck</i>	Mimosaceae	Siris Tree	Vagai	B	Least Concern
75.	<i>Azadirachta indica</i>	Meliaceae	Neem Tree	Veppa maram	C+B	Least Concern
76.	<i>Borassus flabellifer</i>	Arecaceae	Palmyra Palm	Panai maram	B	Least Concern
77.	<i>Cocos nucifera</i>	Arecaceae	Coconut Palm	Thennai	B	Not Evaluated
78.	<i>Commiphora berryi</i>	Burseraceae	Indian Balm of Gilead	Mul-kiluvai	B	Least Concern
79.	<i>Diospyros cordifolia</i>	Ebenaceae	Mountain Persimmon	Vakkanai maram	B	Not Evaluated
80.	<i>Ficus benghalensis</i>	Moraceae	Banyan	Alamaram	B	Least Concern
81.	<i>Euphorbia antiquorum</i>	Euphorbiaceae	Triangular spurge	Sadhurakalli	B	Least Concern
82.	<i>Morinda tinctoria</i>	Rubiaceae	Indian mulberry	Nuna	B	Not Evaluated

83.	<i>Moringa oleifera</i>	Moringaceae	Drumstick Tree	Murungai	B	Least Concern
84.	<i>Prosopis juliflora</i>	Mimosaceae	Mesquite	Semai parambai	B	Not Evaluated
85.	<i>Syzygium cumini</i>	Myrtaceae	Indian Blackberry	Naval	B	Least Concern
86.	<i>Albizia amara</i>	Fabaceae	Bitter Albizia	Arappu	C+B	Not Evaluated
87.	<i>Tamarindus indica</i>	Caesalpiniaceae	Tamarind Tree	Puliyamaram	B	Not Evaluated
88.	<i>Vachellia leucophloea</i>	Fabaceae	White Bark Acacia	Vela maram	C+B	Not Evaluated
89.	<i>Ziziphus mauritiana</i>	Rhamnaceae	Indian jujube	Elanthaimaram	B	Not Evaluated
90.	<i>Carica papaya</i>	Caricaceae	Papaya	Pappali maram	B	Not Evaluated
91.	<i>Tectona grandis</i>	Verbenaceae	Teak wood tree	Thaekku	B	Not Evaluated
92.	<i>Annona reticulata</i>	Annonaceae	Custard apple	Seethapazham	B	Not Evaluated
93.	<i>Terminalia catappa</i>	Combretaceae	Indian almond	Padam maram	B	Not Evaluated
94.	<i>Thespesia populnea</i>	Malvaceae	Portia Tree	Puvarasu	B	Not Evaluated
95.	<i>Vachellia leucophloea</i>	Mimosaceae	White Babool	Velvelam	B	Least Concern
96.	<i>Vachellia nilotica</i>	Mimosaceae	Gum Arabic Tree	Karuvelam	B	Least Concern
97.	<i>Wrightia tinctoria</i>	Apocynaceae	Milky Way Tree	Vetpalai	B	Least Concern
98.	<i>Ziziphus mauritiana</i>	Rhamnaceae	Indian jujube	Ilanthai	C+B	Least Concern
99.	<i>Prosopis juliflora</i>	Fabaceae	Mesquite	Mullu maram	C+B	Not Evaluated
C – Core zone; B Buffer zone C+B species occur in both zones						
LC- Least Concern - [Species categorized as Least Concern (LC) is a taxon when it has been evaluated against the Red List criteria and does not qualify for Endangered Near Threatened.].						
DD – Data Deficient [Species categorized as DD is a taxon when there is no inadequate information to make a direct, indirect assessment of its risk of extinction based on its distribution and/or population status].						

3.9. IUCN Red List species recorded in the in the core to buffer zone area.

Based on the IUCN Red List global assessment (Version 3.1), out of 99 species, 31 species belong to 20 families come under IUCN category. Of the 31 species, the Least Concern taxon include 12 trees, 4 climbers, and 3 shrubs. A maximum of 11 LC species belongs to the family Leguminosae (Fabaceae, Caesalpiniaceae, and Mimosaceae) followed by Apocynaceae, Euphorbiaceae and Malvaceae. Thorough analysis floral species indicates that there are no threatened (Vulnerable, Endangered & Critically Endangered) species recorded from the project area (both core and buffer zones). A list of the IUCN Red List analysed plant species recorded in the core and buffer zone of the proposed project site is Tabulated in Table No 3.57.

<https://www.iucnredlist.org/>

<https://bsi.gov.in/uploads/documents/research-program/Threatened-plants-of%20India.pdf>

Table No:3.32. List of IUCN categorized Plant Species

Scientific name	Family Name	Common Name	Local name	IUCN
<i>Ailanthus excelsa</i>	Simaroubaceae	Indian Tree of Heaven	Perumaram	DD
<i>Albizia amara</i>	Mimosaceae	Oil cake tree	Usilai	LC
<i>Albizia lebbeck</i>	Mimosaceae	Siris Tree	Vagai	LC
<i>Alternanthera sessilis</i>	Amaranthaceae	Joy Weed	Ponnaankannikeerai	LC
<i>Azadirachta indica</i>	Meliaceae	Neem Tree	Veppa maram	LC
<i>Borassus flabellifer</i>	Arecaceae	Palmyra Palm	Panai maram	LC
<i>Cardiospermum halicacabum</i>	Sapindaceae	Balloon vine	Modakkathan	LC
<i>Celosia argentea</i>	Amaranthaceae	Quail grass	Pannaikkerai	LC
<i>Commiphora berryi</i>	Burseraceae	Indian Balm of Gilead	Mul-kiluvai	LC
<i>Cuscuta reflexa</i>	Convolvulaceae		Thuthuma Kothan	LC
<i>Cyperus articulatus</i>	Cyperaceae	Jointed flatsedge	Korai kizhangu	LC
<i>Cyperus rotundus</i>	Cyperaceae	Nut grass	Korai kizhangu	LC
<i>Euphorbia antiquorum</i>	Euphorbiaceae	Triangular spurge	Sadhurakalli	LC
<i>Euphorbia heterophylla</i>	Euphorbiaceae	Green Poinsettia	Palperukki	LC
<i>Euphorbia tricalli</i>	Euphorbiaceae		Kodi kalli	LC
<i>Flueggea leucopyrus</i>	Phyllanthaceae	Spinous Fluggea	Vellaipula	LC
<i>Gloriosa superba</i>	Liliaceae	Glorious lily	Kanvalikodi	LC
<i>Jatropha gossypifolia</i>	Euphorbiaceae	Cotton leaf	Aatalai	LC
<i>Lawsonia inermis</i>	Lythraceae	Henna	Maruthani	LC
<i>Moringa oleifera</i>	Moringaceae	Drumstick Tree	Murungai	LC
<i>Pergularia daemia</i>	Apocynaceae	Trellis Vine	Veli Paruthi	LC
<i>Pupalia lappacea</i>	Amaranthaceae	Sweethearts	Adai-otti	LC
<i>Rhynchosia minima</i>	Fabaceae	Jumby-bean	Kaliyanthuvarai	LC
<i>Syzygium cumini</i>	Myrtaceae	Indian Blackberry	Naval	LC
<i>Tephrosia pumila</i>	Fabaceae	Indigo Sauvage	Kolinchi	LC
<i>Tribulus terrestris</i>	Zygophyllaceae	Puncture Vine	Nerunji	LC
<i>Vachellia leucophloea</i>	Mimosaceae	White Babool	Velvelam	LC
<i>Vachellia nilotica</i>	Mimosaceae	Gum Arabic Tree	Karuvelam	LC
<i>Waltheria indica</i>	Malvaceae	Boater Bush	Sengalipundu	LC
<i>Wrightia tinctoria</i>	Apocynaceae	Milky Way Tree	Vetpalai	LC
<i>Ziziphus mauritiana</i>	Rhamnaceae	Indian jujube	Ilanthai	LC

3.10. Phytosociological analysis of floral community

For quantitative phytosociological analysis of floral community of the study area, 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 of trees, shrubs, and herbs, respectively. Phyto-sociological parameters, such as Density, Frequency, and Abundance individual species of wild Trees were determined in randomly placed quadrat of different sizes in the study area, as shown in Table No.3.58. Species Diversity index such as Shannon-Wiener Index, Evenness and Richness were calculated for 29 trees. The results of above phyto-sociological parameters are given in Table No.3.58 and Fig No.3.39. The Shannon-Weiner Index (H) value 3.27 indicates that the trees are rich in diversity in the study area.

Table No: 3.33. Species diversity index

Scientific Name	Total No Counts	Quadrats with species	Total Quadrats	Density	Frequency	Abundance	Total No All Species	Total No of Quadrts with all species	Relative Density (RD)	Relative Frequency (RF)	Pi	lnPi	Pi x lnPi
<i>Ailanthus excels</i>	6	3	10	0.6	30	2.0	143	64	4.2	4.7	0.04	-3.17	-0.13
<i>Pithecellobium dulce</i>	6	2	10	0.6	20	3.0	143	64	4.2	3.1	0.04	-3.17	-0.13
<i>Albizia amara</i>	2	2	10	0.2	20	1.0	143	64	1.4	3.1	0.01	-4.27	-0.06
<i>Albizia lebbbeck</i>	8	3	10	0.8	30	2.7	143	64	5.6	4.7	0.06	-2.88	-0.16
<i>Azadirachta indica</i>	10	5	10	1.0	50	2.0	143	64	7.0	7.8	0.07	-2.66	-0.19
<i>Borassus flabellifer</i>	6	3	10	0.6	30	2.0	143	64	4.2	4.7	0.04	-3.17	-0.13
<i>Cocos nucifera</i>	5	2	10	0.5	20	2.5	143	64	3.5	3.1	0.03	-3.35	-0.12
<i>Commiphora berryi</i>	4	2	10	0.4	20	2.0	143	64	2.8	3.1	0.03	-3.58	-0.10
<i>Diospyros cordifolia</i>	2	1	10	0.2	10	2.0	143	64	1.4	1.6	0.01	-4.27	-0.06
<i>Ficus benghalensis</i>	5	1	10	0.5	10	5.0	143	64	3.5	1.6	0.03	-3.35	-0.12
<i>Euphorbia antiquorum</i>	2	2	10	0.2	20	1.0	143	64	1.4	3.1	0.01	-4.27	-0.06
<i>Morinda tinctoria</i>	4	2	10	0.4	20	2.0	143	64	2.8	3.1	0.03	-3.58	-0.10
<i>Moringa oleifera</i>	3	2	10	0.3	20	1.5	143	64	2.1	3.1	0.02	-3.86	-0.08
<i>Prosopis juliflora</i>	4	2	10	0.4	20	2.0	143	64	2.8	3.1	0.03	-3.58	-0.10
<i>Syzygium cumini</i>	5	2	10	0.5	20	2.5	143	64	3.5	3.1	0.03	-3.35	-0.12
<i>Albizia amara</i>	6	3	10	0.6	30	2.0	143	64	4.2	4.7	0.04	-3.17	-0.13
<i>Tamarindus indica</i>	3	1	10	0.3	10	3.0	143	64	2.1	1.6	0.02	-3.86	-0.08
<i>Vachellia leucophloea</i>	10	5	10	1.0	50	2.0	143	64	7.0	7.8	0.07	-2.66	-0.19
<i>Ziziphus mauritiana</i>	5	3	10	0.5	30	1.7	143	64	3.5	4.7	0.03	-3.35	-0.12
<i>Carica papaya</i>	3	1	10	0.3	10	3.0	143	64	2.1	1.6	0.02	-3.86	-0.08
<i>Tectona grandis</i>	4	1	10	0.4	10	4.0	143	64	2.8	1.6	0.03	-3.58	-0.10
<i>Annona reticulata</i>	3	1	10	0.3	10	3.0	143	64	2.1	1.6	0.02	-3.86	-0.08
<i>Terminalia catappa</i>	3	1	10	0.3	10	3.0	143	64	2.1	1.6	0.02	-3.86	-0.08
<i>Thespesia populnea</i>	4	1	10	0.4	10	4.0	143	64	2.8	1.6	0.03	-3.58	-0.10
<i>Vachellia leucophloea</i>	3	1	10	0.3	10	3.0	143	64	2.1	1.6	0.02	-3.86	-0.08
<i>Vachellia nilotica</i>	10	4	10	1.0	40	2.5	143	64	7.0	6.3	0.07	-2.66	-0.19
<i>Wrightia tinctoria</i>	5	2	10	0.5	20	2.5	143	64	3.5	3.1	0.03	-3.35	-0.12
<i>Ziziphus mauritiana</i>	8	3	10	0.8	30	2.7	143	64	5.6	4.7	0.06	-2.88	-0.16
<i>Prosopis juliflora</i>	4	3	10	0.4	30	1.3	143	64	2.8	4.7	0.03	-3.58	-0.10
	143	64											3.27

Table No: 3.34. Species Richness Index

Details	H	H max	Evenness	Species Richness
Trees	3.27	3.37	0.97	5.64

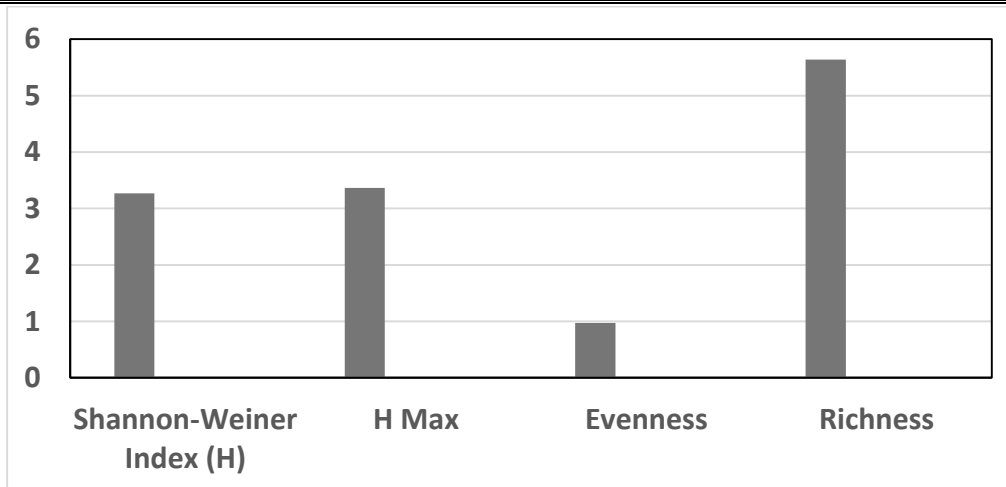


Fig No: 3.32. Species richness and evenness index.

3.10.1. Forest details

There are no biosphere reserves, wildlife sanctuaries, National parks, important bird areas (IBAs), RAMSAR Wetland sites, or faunal migration routes within and nearby the study area. The study area, encompassing the quarry lease area and a 1 km buffer zone, is not considered ecologically sensitive. Furthermore, there are no reserve forests within the buffer zone. Information regarding reserve forests was obtained from the Protected Area Gazette Notification Database (Tamil Nadu).

[https://wiienvs.nic.in/Database/Tamil Nadu_7838.aspx](https://wiienvs.nic.in/Database/Tamil%20Nadu_7838.aspx)

[https://wiienvs.nic.in/Database/ramsar wetland sites_8224.aspx](https://wiienvs.nic.in/Database/ramsar%20wetland%20sites_8224.aspx)

<https://dfe.gov.in/uploads/documents/ramsar-sites-pub.pdf>

3.10.2. Agriculture & Horticulture flora in the study area

Agriculture is the most predominant sector of the District economy, as 30 percent of the population is engaged in Agriculture and allied activities for their livelihood. Inattentive agriculture activities were observed in the buffer area and the region beyond the buffer area in rainfed and irrigated land. Twenty-four 24 different crop species were recorded in the sounding areas as given below (Table No.3.60).

Table No: 3.35. Agricultural activities and flora recorded from the study area

Scientific Name	Common Name	Vernacular Name
<i>Cocos nucifera</i>	Coconut Palm	Thennai
<i>Moringa oleifera</i>	Drumstick Tree	Murungai
<i>Musa paradisiaca</i>	Banana	Vazhai
<i>Ricinus communis</i>	Castor Plant	Aamanakku
<i>Sorghum vulgaris</i>	Sorghum bicolor	Cholam
<i>Vigna radiata</i>	Green Gram	Pachai payiru

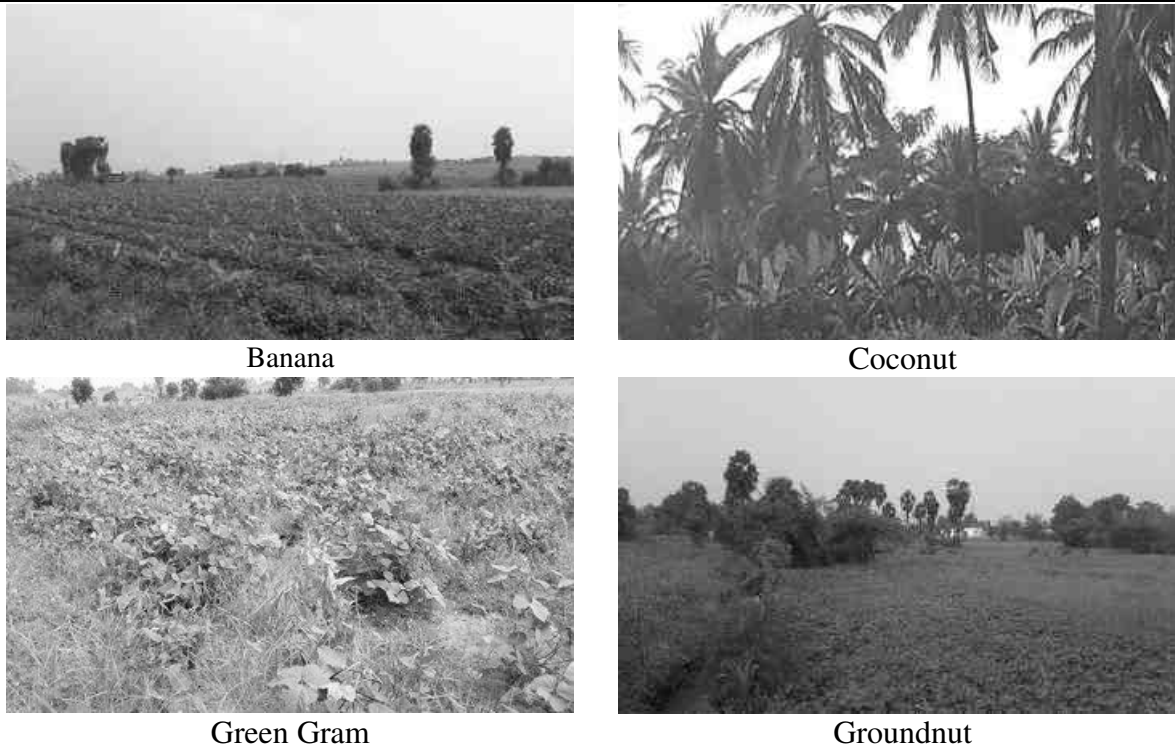


Fig No: 3.33. Agriculture activity observed in buffer zone area.

3.11. Fauna diversity

The baseline information of the proposed project site helps predict potential impacts on wildlife and habitats in the region. Field faunal survey was conducted to gather the existing mammals, birds, reptiles, amphibians, and butterflies in core and buffer zones of the proposed project. The methodologies used included random walks, opportunistic observations (for birds and insects), visual encounter surveys (for reptiles), and tracking signs (for mammals). Additionally, during the field survey, information was collected from local residents, using images and videos as tools to know the occurrence of faunal species in the study area. Our study team engaged in discussions and consultations with locals from nearby villages, as well as with herders and farmers to get more details. To identify and analyze the data, thoroughly searched and referred the secondary literature on flora, fauna, protected areas, natural habitats, and wildlife species. Species identification was conducted and online databases. Finally, cross checked the list of identified fauna with the IUCN Red List database to determine the presence of any REET species in the study area.

3.11.1. Fauna Composition in the Core Zone and Buffer zone

The faunal species observed in the study area are given below. A total of 53 species were recorded in both the core and buffer zones of the study area. The core zone exhibited fewer species, with only a limited number of insects, mammals and reptiles, while the buffer zone showed greater species diversity. Among the 53 species recorded, the distribution pattern was as follows: 34% birds, 26% insects, 17% reptiles, and 23% mammals (Fig No.3.41). All these species were cross-checked against the IUCN Red List Database version 3.1 to identify any threatened species. Data analysis revealed that 23 species belong to IUCN categorized list as Least Concern, while 11 species were not listed. The analysis indicates that there are no REET species in the core and buffer zones of the proposed colour rough stone and gravel quarry.

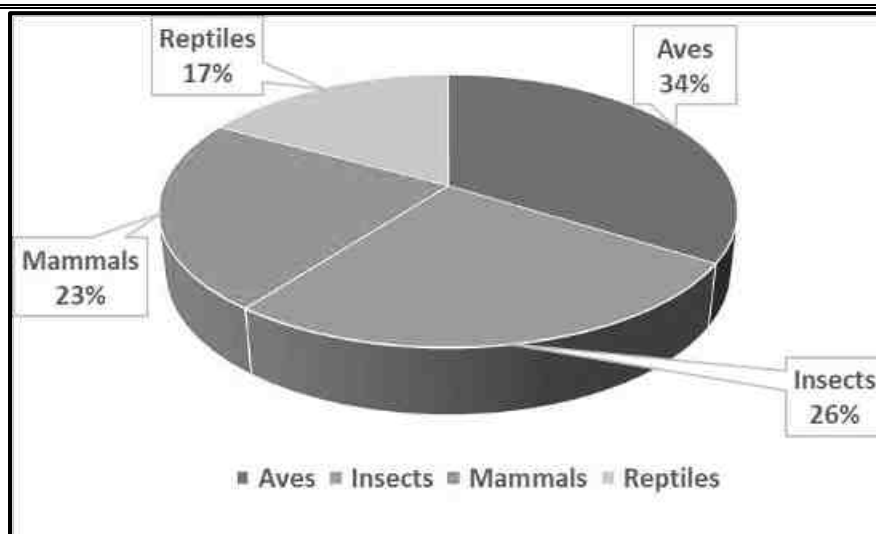


Figure No: 3.34. Occurrence of fauna in core and buffer zone

3.11.2. Mammals

The list of mammals observed including domesticated animals observed in the study areas are listed, a total 12 species were identified. Mammals traced from the site are common. There was no threatened species identified (Table No.3.61).

Table No: 3.36. diversity of mammal's species observed in the study area.

Common Name	Scientific Name	Family	IUCN Status
Indian Palm Squirrel	<i>Funambulus palmarum</i>	Sciuridae	LC
Indian mole rat	<i>Bandicota bengalensis</i>	Muridae	LC
Greater bandicoot rat	<i>Bandicota indica</i>	Muridae	LC
Cow	<i>Bos taurus</i>	Bovidae	NL
Goat	<i>Capra hircus</i>	Bovidae	NL
Sheep	<i>Ovis aries</i>	Bovidae	NL
Dog	<i>Canis lupus familiaris</i>	Canidae	NL
Cat	<i>Felis catus</i>	Felidae	NL
Indian hare	<i>Lepus nigricollis</i>	Leporidae	LC
Indian Field Mouse	<i>Mus booduga</i>	Muridae	LC
House mouse	<i>Mus musculus</i>	Muridae	LC
Domestic Water buffalo	<i>Bubalus bubalis</i>	Bovidae	NL

3.11.3. Aves

A total of 18 species of birds were identified by direct observations and voice-calls from the field. Also the expert opinion was sought to list the number of birds probably occurred in the area using the photographic field guide. There was no threatened species identified from the proposed site as per the IUCN status (Table No.3.61)

Table No: 3.37. Diversity of aves species observed in the study area.

Common Name	Scientific Name	Family	IUCN Status
Indian myna	<i>Acridotheres tristis</i>	Sturnidae	LC
Rose-ringed Parakeet	<i>Alexandrinus krameri</i>	Psittaculidae	LC
Oriental Darter	<i>Anhinga melanogaster</i>	Anhingidae	LC

Eastern Cattle-Egret	<i>Ardea coromanda</i>	Ardeidae	NE
Purple Sunbird	<i>Cinnyris asiaticus</i>	Nectariniidae	LC
Rock Pigeon	<i>Columba livia</i>	Columbidae	LC
Indian robin	<i>Copsychus fulicatus</i>	Muscicapidae	LC
Indian Roller	<i>Coracias benghalensis</i>	Coraciidae	LC
Large-billed crow	<i>Corvus macrorhynchos</i>	Corvidae	LC
House Crow	<i>Corvus splendens</i>	Corvidae	LC
Lesser Whistling-Duck	<i>Dendrocygna javanica</i>	Anatidae	LC
Black Drongo	<i>Dicrurus macrocercus</i>	Dicruridae	LC
Asian koel	<i>Eudynamys scolopaceus</i>	Cuculidae	LC
Purple-rumped Sunbird	<i>Leptocoma zeylonica</i>	Nectariniidae	LC
Scaly-breasted Munia	<i>Lonchura punctulata</i>	Estrildidae	LC
Black Kite	<i>Milvus migrans</i>	Accipitridae	LC
White browed Wagtail	<i>Motacilla maderaspatensis</i>	Motacillidae	LC
House Sparrow	<i>Passer domesticus</i>	Passeridae	LC

3.11.4. Insects

Among invertebrate, Butterflies were the most dominant category identified from the field. A total of 14 species were identified from the field and one species is in the least concerned category (Table No.3.63).

Table No: 3.38. Diversity of insects' species observed in the study area.

Common Name	Scientific Name	Family	IUCN Status
Tawny coster	<i>Acraea terpsicore</i>	Nymphalidae	NL
Yellow crazy ant	<i>Anoplolepis gracilipes</i>	Formicidae	NL
Red dwarf honey bee	<i>Apis florea</i>	Apidae	NL
Indian black ant	<i>Camponotus compressus</i>	Formicidae	NL
Lemon emigrant	<i>Catopsilia pomona</i>	Pieridae	NL
Mottled emigrant	<i>Catopsilia pyranthe</i>	Pieridae	NL
Oriental latrine fly	<i>Chrysomya megacephala</i>	Calliphoridae	NL
Cotton tipworm moth	<i>Crociosema plebejana</i>	Tortricidae	NL
Plain Tiger butterfly	<i>Danaus chrysippus</i>	Nymphalidae	LC
Potter wasps	<i>Delta esuriens</i>	Vespidae	NL
Blue-eyed ensign wasp	<i>Evania appendigaster</i>	Evaniidae	NL
Chocolate pansy	<i>Junonia iphita</i>	Nymphalidae	NL
Lemon pansy	<i>Junonia lemonias</i>	Nymphalidae	NL
Termite	<i>Odontotermes assmuthi</i>	Termitidae	NL

3.11.5. Reptiles

There were 9 different reptile species were spotted in the study area. All the species are least concern category.

Table No: 3.39. Diversity of reptile's species observed in the study area.

Common Name	Scientific Name	Family	IUCN Status
Oriental garden lizard	<i>Calotes versicolor</i>	Agamidae	LC
Indian chameleon	<i>Chamaeleo zeylanicus</i>	Chamaeleonidae	LC

House lizards	<i>Hemidactylus flaviviridis</i>	Gekkonidae	LC
White-spotted supple skink	<i>Lygosoma albopunctata</i>	Scincidae	LC
Common skink	<i>Mabuya carinatus</i>	Scincidae	LC
Streaked kukri snake	<i>Oligodon taeniolatus</i>	Colubridae	LC
Snake eyed lizard	<i>Ophisops leschenaultii</i>	Lacertidae	LC
South Indian rock agama	<i>Psammophilus dorsalis</i>	Agamidae	LC
Green keelback	<i>Rhabdophis plumbicolor</i>	Colubridae	LC

3.12. 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.

3.13. Summary

The biodiversity assessment of the proposed project site has identified no ecologically sensitive areas within and nearby the core or buffer zone that are home to IUCN-listed endangered species. Additionally, the site is not located on a migratory route for any fauna. While the operation of the stone and gravel quarry generate rock dust, which could affect the local ecosystem. Implementation of a green belt composed of triple layer of native tree species to be established to mitigate the impact on surrounding flora and fauna. Key recommendations from the assessment include: The adoption of green mining strategies to minimize environmental impact, Development of a green belt with native trees to reduce dust movement from mining activities and increase the biodiversity.

References

Some of the online databases referred for species identification and verification of threatened species category.

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 6. <https://typeset.io/pdf/survey-of-wetlands-in-and-around-tiruppur-district-tamil-244pav3mvl.pdf>
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 11. Ali, S and Ripley, S.D. 1969. Handbook of the Birds of India and Pakistan together with those of Nepal, Sikkim, Bhutan and Ceylon, 3. Stone Curlews to Owls. Oxford University Press, Bombay, 327pp.
- Bird Life International 2012. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.

3.6 SOCIO ECONOMIC ENVIRONMENT

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

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

3.6.1 Objectives of the Study

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

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

3.6.2 Scope of Work

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

3.6.3 District Profile

Tiruppur or Tirupur is a city in the Indian state of Tamil Nadu. Tiruppur is the administrative headquarters of Tiruppur district and the eighth largest city as well as urban agglomeration in Tamil Nadu. Located on the banks of Noyyal River, it has been ruled at different times, by the Early Pandyas, Medieval Cholas, Later Cholas, Mysore Kingdom and the British. It is about 450 kilometres (280 mi) southwest of the state capital Chennai about 50 kilometres (31 mi) east of Coimbatore 50 kilometres (31 mi) south of Erode and 50 kilometres (31 mi) north of Dharapuram.

Tiruppur is administered by municipal corporation which was established in 2008 and the total area of the corporation is 159.6 km² divided into 60 wards. The total population of the city as per the 2011 census is 877,778. Tiruppur is a part of the Tiruppur constituency that elects its member of parliament.

Tiruppur is a major textile and knit wear hub contributing to 90% of total cotton knit wear exports from India. The textile industry provides employment to over six lakh people and contributed to exports worth ₹200 billion (US\$2.8 billion) in 2014–15.

3.6.4 Study area:

KODANGIPALAYAM VILLAGE

Kodangipalayam is a village located in Palladam Taluk of Tiruppur district in Tamil Nadu. Around 606 families reside in Kodangipalayam village. Kodangipalayam village is administered by Sarpanch (Head of village) who is elected every five years.

As per the Census India 2011, Kodangipalayam village has population of 2018 of which 1006 are males and 1012 are females. The population of children between ages 0-6 is 176 which is 8.72% of total population.

The sex-ratio of Kodangipalayam village is around 1006 compared to 996 which is average of Tamil Nadu state. The literacy rate of Kodangipalayam village is 66.2% out of which 75.55% males are literate and 56.92% females are literate. There are 17.54% Scheduled Caste (SC) and 0 Scheduled Tribe (ST) of total population in Kodangipalayam village.

TABLE 3.40: KODANGIPALAYAM VILLAGE POPULATION FACTS

Number of Households	606
Population	2018
Male Population	1006 (49.85%)
Female Population	1012 (50.15%)
Children Population	176
Sex-ratio	1006
Literacy	66.2%
Male Literacy	75.55%
Female Literacy	56.92%
Scheduled Tribes (ST) %	0
Scheduled Caste (SC) %	17.54%

Source: <https://www.censusindia2011.com/tamil-nadu/tiruppur/palladam/kodangipalayam-population.html>

Gram Panchayat name of the Kodangipalayam village is Kodangipalayam. CD Block name is Palladam and Teshil/Taluk or sub-district is Palladam. Data Reference year is 2009 of Census 2011. Sub District HQ Name is PALLADAM and Sub District HQ Distance is 11 Km from the village. District Head Quarter name is TIRUPPUR and its distance from the village is 25KM. Nearest Town of the Kodangipalayam village is SULUR and nearest town distance is 7 km. Pincode of Kodangipalayam village is 641662. As per census 2011 village code of village Kodangipalayam is 644815.

TABLE 3.41: DEMOGRAPHICS POPULATION OF VILLAGE KODANGIPALAYAM

Total Population	Male Population	Female Population
6987	3494	3493

Source: <https://etrace.in/census/village/kodangipalayam-palladam-district-tiruppur-tamil-nadu-644815>

Sex Ratio of Kodangipalayam Village -Census 2011

As per the Census Data 2011 there are 1000 Females per 1000 males out of 6987 total population of village. There are 1016 girls per 1000 boys under 6 years of age in the village.

Literacy of Kodangipalayam Village

Out of total population total 4614 people in Kodangipalayam Village are literate, among them 2568 are male and 2046 are female in the village. Total literacy rate of Kodangipalayam is 74.22%, for male literacy is 82.52% and for female literacy rate is 65.89%.

Worker's profile of Kodangipalayam Village

Total working population of Kodangipalayam is 3595 which are either main or marginal workers. Total workers in the village are 3595 out of which 2322 are male and 1273 are female. Total main workers are 3146 out of which female main workers are 2109 and male main workers are 1037. Total marginal workers of village are 449.

TABLE 3.42: KODANGIPALAYAM VILLAGE CENSUS 2011 DATA

Description	Census 2011 Data
Village Name	Kodangipalayam
Teshil Name	Palladam
District Name	Tiruppur
State Name	Tamil Nadu
Total Population	6987
Total Area	1767 (Hectares)
Total No of House Holds	1961
Total Male Population	3494
Total Female Population	3493
0-6 Age group Total Population	770
0-6 Age group Male Population	382
0-6 Age group Female Population	388
Total Person Literates	4614
Total Male Literates	2568
Total Female Literates	2046
Total Person Illiterates	2373
Total Male Illiterates	926
Total Female Illiterates	1447
Scheduled Cast Persons	1207
Scheduled Cast Males	595
Scheduled Cast Females	612
Scheduled Tribe Persons	0
Scheduled Tribe Males	0
Scheduled Tribe Females	0

Source: <https://etrace.in/census/village/kodangipalayam-palladam-district-tiruppur-tamil-nadu-644815>

TABLE 3.43: KODANGIPALAYAM WORKING POPULATION ---CENSUS 2011

	Total	Male	Female
Total Workers	3595	2322	1273
Main Workers	3146	2109	1037
Main Workers Cultivators	354	222	132
Agriculture Labourer	463	202	261
Household Industries	217	141	76
Other Workers	2112	1544	568
Marginal Workers	449	213	236
Non Working Persons	3392	1172	2220

Source: <https://etrace.in/census/village/kodangipalayam-palladam-district-tiruppur-tamil-nadu-644815>

TABLE 3.44: POPULATION DATA OF STUDY AREA

Sl.No.	Village Name	No of House Holds	Total Population	Male	Female	Total Literate Population	Male Literate	Female Literate	Total Illiterate Population	Male Illiterate	Female Illiterate
1	Anuppatti	606	2018	1006	1012	1336	760	576	682	246	436
2	Appanaickenpatti	1121	3992	1998	1994	2665	1413	1252	1327	585	742
3	Arasur	38	123	61	62	88	50	38	35	11	24
4	Ichipatti	2754	9527	4892	4635	6315	3577	2738	3212	1315	1897
5	Iduvai (CT)	2183	8006	3984	4022	5212	2837	2375	2794	1147	1647
6	Kadampadi	2370	8147	4131	4016	5913	3184	2729	2234	947	1287
7	Kalangal	1639	5590	2853	2737	3889	2158	1731	1701	695	1006
8	Kangayampalayam	2247	8251	4394	3857	6485	3643	2842	1766	751	1015
9	Kaniyur (CT)	3444	12011	6028	5983	8648	4728	3920	3363	1300	2063
10	Karadibavi	1040	3647	1809	1838	2479	1327	1152	1168	482	686
11	Kasba Ayyampalayam	1024	3430	1728	1702	2451	1358	1093	979	370	609
12	Kodangipalayam	1961	6987	3494	3493	4614	2568	2046	2373	926	1447
13	Madappur	1609	5496	2770	2726	3440	1955	1485	2056	815	1241
14	Mallegoundenpalayam	421	1448	755	693	940	549	391	508	206	302
15	Naranapuram	3862	14018	7047	6971	10117	5456	4661	3901	1591	2310
16	Neelambur (CT)	2471	8382	4109	4273	5875	3155	2720	2507	954	1553
17	Palladam	12276	43246	22243	21003	31448	17253	14195	11798	4990	6808
18	Panickampatti	1196	3982	1968	2014	2576	1410	1166	1406	558	848
19	Paruvai	1098	3778	1909	1869	2682	1470	1212	1096	439	657
20	Poomalur	2209	7605	3829	3776	4602	2614	1988	3003	1215	1788
21	Puliampatti	604	2041	1000	1041	1529	821	708	512	179	333
22	Rasipalayam	1364	4407	2208	2199	3164	1757	1407	1243	451	792
23	Sellakkarichal	1863	6209	3109	3100	4368	2447	1921	1841	662	1179
24	Semmandampalayam	1718	5970	2954	3016	4114	2195	1919	1856	759	1097
25	Semmipalayam (CT)	2380	8429	4285	4144	6413	3467	2946	2016	818	1198
26	Sukkampalayam	1247	4420	2238	2182	2947	1665	1282	1473	573	900
27	Sulur	18822	65216	32914	32302	47830	25992	21838	17386	6922	10464
28	Vadugapalayam	1569	5595	2733	2862	3912	2077	1835	1683	656	1027
29	Velampalayam	1206	3943	1941	2002	2634	1470	1164	1309	471	838

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

TABLE 3.45: WORKERS PROFILE OF STUDY AREA

Sl.No.	Village Name	Total Workers Population	Male Workers	Female Workers	Total Main Workers	Main Workers Male	Main Workers Female	Main Cultivation Workers	Main Agriculture Workers	Main Other Workers	Non-Worker Population
1	Anuppatti	889	634	255	882	631	251	67	188	620	1129
2	Appanaickenpatti	2199	1285	914	2006	1197	809	115	430	1416	1793
3	Arasur	87	43	44	87	43	44	72	13	2	36
4	Ichipatti	4980	3290	1690	4825	3225	1600	223	484	3536	4547
5	Iduvai (CT)	3868	2558	1310	3593	2430	1163	151	305	2986	4138
6	Kadampadi	3832	2536	1296	3397	2320	1077	273	369	2579	4315
7	Kalangal	3112	1893	1219	2784	1806	978	243	639	1863	2478
8	Kangayampalayam	3493	2748	745	2753	2337	416	112	46	2513	4758
9	Kaniyur (CT)	5650	3814	1836	5268	3649	1619	121	137	4819	6361
10	Karadibavi	1842	1153	689	1678	1055	623	143	524	982	1805
11	Kasba Ayyampalayam	1692	1110	582	1372	916	456	251	290	798	1738
12	Kodangipalayam	3595	2322	1273	3146	2109	1037	354	463	2112	3392
13	Madappur	2699	1780	919	2533	1700	833	386	837	1280	2797
14	Mallegoundenpalayam	832	532	300	793	524	269	173	261	348	616
15	Naranapuram	6577	4500	2077	6251	4363	1888	177	401	5496	7441
16	Neelambur (CT)	3926	2673	1253	3718	2599	1119	65	131	3450	4456
17	Palladam	21309	14544	6765	19945	13838	6107	528	1414	17686	21937
18	Panickkampatti	2015	1290	725	1925	1260	665	189	376	1345	1967
19	Paruvai	1889	1249	640	1778	1233	545	312	378	900	1889
20	Poomalur	3960	2612	1348	3563	2446	1117	310	461	2597	3645
21	Puliampatti	1141	716	425	1093	697	396	332	431	246	900
22	Rasipalayam	2016	1404	612	1735	1288	447	126	121	1424	2391
23	Sellakkarichal	3200	2034	1166	2662	1768	894	403	1024	1097	3009
24	Semmandampalayam	2833	1861	972	2684	1793	891	382	459	1760	3137
25	Semmipalayam (CT)	4231	2687	1544	4053	2596	1457	105	271	3612	4198
26	Sukkampalayam	2760	1560	1200	2290	1356	934	404	242	1490	1660
27	Sulur	30906	21090	9816	27871	19643	8228	719	991	25575	34310
28	Vadugapalayam	2883	1794	1089	2806	1751	1055	175	504	2090	2712
29	Velampalayam	2315	1329	986	2260	1302	958	546	971	651	1628

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

TABLE 3.46: COMMUNICATION & TRANSPORT FACILITIES IN THE STUDY AREA

Sl	Village Name	PO	SPO	PTO	T	PCO	MP	IC / CSC	PCF	BS	PBS	RS	NH	SH	MDR	BTR	GR	NWR	FP
1	Anuppatti	2	1	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
2	Appanaickenpatti	2	1	2	1	2	1	2	2	1	1	2	2	1	1	1	1	2	1
3	Arasur	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
4	Ichipatti	2	1	2	1	2	1	2	2	1	1	2	2	1	1	1	1	2	1
5	Kadampadi	2	1	2	1	1	1	2	1	1	1	2	1	2	1	1	1	2	1
6	Kalangal	2	1	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
7	Kangayampalayam	1	2	1	1	1	1	1	1	1	1	2	1	2	1	1	1	2	1
8	Karadibavi	1	2	1	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
9	Kasba Ayyampalayam	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1	2	2	1
10	Kodangipalayam	2	1	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
11	Madappur	2	1	2	1	1	1	2	1	1	1	2	1	1	1	1	1	2	1
12	Mallegoundenpalayam	2	2	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
13	Naranapuram	2	1	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1
14	Panickampatti	2	1	2	1	1	1	2	2	1	1	2	2	2	2	1	1	2	1
15	Paruvai	2	1	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1
16	Poomalur	2	1	2	1	1	1	2	2	1	2	2	2	2	1	1	1	2	1
17	Puliampatti	2	1	2	1	2	1	2	2	1	2	2	2	2	1	1	1	2	1
18	Rasipalayam	2	1	2	1	2	1	2	2	1	1	2	2	2	2	1	1	2	1
19	Sellakkarichal	2	1	2	1	1	1	2	2	1	1	2	1	2	1	1	1	2	1
20	Semmandampalayam	2	1	2	1	1	1	1	2	1	1	2	2	1	1	1	1	2	1
21	Sukkampalayam	2	1	2	1	1	1	2	2	1	2	2	1	1	1	1	1	2	1
22	Vadugapalayam	2	1	2	1	1	1	2	2	1	1	2	1	1	1	1	1	2	1
23	velampalayam	2	1	2	1	1	1	2	2	1	1	2	2	2	1	1	1	2	1

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

TABLE 3.47: WATER & DRAINAGE FACILITIES IN THE STUDY AREA

Sl	Village Name	TP	CW	UCW	HP	TW/BH	S	R/C	T/P/L	CD	OD	CT
1	Anuppatti	1	1	1	2	1	2	2	2	1	1	2
2	Appanaickenpatti	1	1	1	1	1	2	2	2	1	1	2
3	Arasur	2	2	1	2	1	2	2	2	2	1	2
4	Ichipatti	1	1	1	2	1	1	2	2	1	1	2
5	Kadampadi	1	2	1	2	2	2	2	2	1	1	2
6	Kalangal	1	1	1	1	1	2	1	2	1	1	2
7	Kangayampalayam	1	1	1	1	1	1	2	1	1	1	2
8	Karadibavi	1	1	1	1	1	2	2	2	1	1	1
9	Kasba Ayyampalayam	1	1	1	2	1	1	2	2	1	1	2
10	Kodangipalayam	1	1	1	1	1	2	2	2	1	1	2
11	Madappur	1	1	1	1	1	2	2	2	1	1	2
12	Mallegoundenpalayam	1	1	1	2	1	2	2	2	1	1	2
13	Naranapuram	1	1	1	1	1	2	2	2	1	1	1
14	Panickampatti	1	1	1	2	1	2	2	2	1	1	2
15	Paruvai	1	1	1	2	1	1	2	2	1	1	2
16	Poomalur	1	1	1	2	1	2	1	2	1	1	2
17	Puliampatti	1	1	1	2	1	2	2	2	1	1	2
18	Rasipalayam	1	2	2	1	2	2	2	2	1	1	2
19	Sellakkarichal	1	1	1	1	1	1	2	2	1	1	2
20	Semmandampalayam	1	1	1	2	1	1	2	2	1	1	2
21	Sukkampalayam	1	1	1	1	1	2	2	2	1	1	2
22	Vadugapalayam	1	1	1	2	1	1	2	2	1	1	2
23	velampalayam	1	1	1	2	1	2	1	2	1	1	2

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

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

TABLE 3.48: OTHER FACILITIES IN THE STUDY AREA

Sl	Village Name	ATM	CB	COB	ACS	SHG	PDS	RM	AMS	NC	NC-AC	CC	SF	PL	NPS	APS	BDRO	PS
1	Anuppatti	2	2	1	2	1	1	2	2	1	1	2	1	1	1	1	1	1
2	Appanaickenpatti	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
3	Arasur	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
4	Ichipatti	2	2	1	1	1	1	2	2	1	1	2	2	1	1	1	1	1
5	Kadampadi	2	2	2	2	1	1	2	2	1	1	2	2	2	1	1	1	1
6	Kalangal	2	2	2	1	1	1	2	2	1	1	1	1	2	1	1	1	1
7	Kangayampalayam	1	2	1	2	1	1	2	1	1	1	2	2	2	1	1	1	1
8	Karadibavi	2	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1
9	Kasba Ayyampalayam	2	2	1	2	1	1	2	2	1	1	1	1	1	1	1	1	1
10	Kodangipalayam	2	2	1	2	1	1	2	2	1	1	1	1	2	1	1	1	1
11	Madappur	2	2	1	1	1	1	2	2	1	1	1	1	2	1	1	1	1
12	Mallegoundenpalayam	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
13	Naranapuram	2	2	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1
14	Panickampatti	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1
15	Paruvai	2	2	1	1	1	1	2	2	1	1	2	1	1	1	1	1	1
16	Poomalur	2	2	1	2	1	1	2	2	1	1	1	1	1	1	1	1	1
17	Puliampatti	2	2	2	1	1	1	2	2	1	1	2	1	1	1	1	1	1
18	Rasipalayam	2	1	1	1	1	1	2	2	1	1	2	2	1	1	1	1	1
19	Sellakkarichal	2	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1
20	Semmandampalayam	2	2	1	2	1	1	2	2	1	1	1	2	1	1	1	1	1
21	Sukkampalayam	2	2	2	2	1	1	2	2	1	1	2	2	2	1	1	1	1
22	Vadugapalayam	2	2	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1
23	velampalayam	2	2	2	2	1	1	2	2	1	1	2	1	1	1	1	1	1

Abbreviations: ATM - Automatic Teller Machine; PDS - Public Distribution System (Shop); CB - Commerical Bank; RM - Regular Market; COB - Co-operative Bank; AMS - Agricultural Market Society; ACS - Agricultural Credit Societies; NC - Nutritional Centres; SHG - Self Help Group; NC-AC - Nutritional Centres - Anganwadi Centre; DBRO - Birth & Death Registration Office; PS - Power Supply

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

TABLE 3.49: EDUCATIONAL FACILITIES IN THE STUDY AREA

Sl	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	Anuppatti	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
2	Appanaickenpatti	1	2	1	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	Arasur	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	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
5	Kadampadi	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
6	Kalangal	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	Kangayampalayam	1	2	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
8	Karadibavi	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
9	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
10	Kodangipalayam	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
11	Madappur	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	Mallegoundenpalayam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
13	Naranapuram	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
14	Panickampatti	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
15	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
16	Poomalur	1	2	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
17	Puliampatti	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
18	Rasipalayam	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
19	Sellakkarichal	1	2	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
20	Semmandampalayam	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
21	Sukkampalayam	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
22	Vadugapalayam	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
23	velampalayam	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

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

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

TABLE 3.50: MEDICAL FACILITIES IN THE STUDY AREA

Sl. No.	Village Name	CHC	PHC	PHSC	MCW	TBC	HA	HAM	D	VH	MHC	FWC	NGM-I/O
1	Anuppatti	0	0	0	0	0	0	0	0	0	0	0	b
2	Appanaickenpatti	0	0	1	0	0	0	0	0	0	0	0	b
3	Arasur	0	0	0	0	0	0	0	0	0	0	0	a
4	Ichipatti	0	0	1	1	0	0	0	0	1	0	0	b
5	Kadampadi	0	0	1	0	0	0	0	0	1	0	0	b
6	Kalangal	0	0	1	0	0	0	0	0	0	0	0	c
7	Kangayampalayam	0	0	1	0	0	0	0	0	0	0	0	c
8	Karadibavi	0	0	1	1	0	0	0	0	1	0	0	b
9	Kasba Ayyampalayam	0	0	1	0	0	0	0	0	0	0	0	a
10	Kodangipalayam	0	0	1	0	0	0	0	0	0	0	0	b
11	Madappur	0	0	2	0	0	0	0	0	2	0	0	b
12	Mallegoundenpalayam	0	0	0	0	0	0	0	0	0	0	0	b
13	Naranapuram	0	2	7	2	2	0	0	2	0	0	2	
14	Panickkampatti	0	0	1	0	0	0	0	0	0	0	0	b
15	Paruvai	0	0	1	0	0	0	0	0	0	0	0	b
16	Poomalur	0	1	1	1	1	0	0	1	0	0	1	
17	Puliampatti	0	0	1	0	0	0	0	0	0	0	0	b
18	Rasipalayam	0	1	1	1	1	0	0	1	0	0	1	
19	Sellakkarichal	0	0	1	0	0	0	0	0	3	0	0	b
20	Semmandampalayam	0	0	1	0	0	0	0	0	0	0	0	a
21	Sukkampalayam	0	0	1	0	0	0	0	0	0	0	0	a
22	Vadugapalayam	0	0	1	0	0	0	0	0	0	0	0	b
23	Velampalayam	0	0	1	0	0	0	0	0	1	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 – Tamil Nadu Census of India – 2011

3.6.6 Recommendation and Suggestion

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

3.6.7 Summary & Conclusion

The socio-economic study of surveyed villages gives a clear picture of its population, average household size, literacy rate and sex ratio etc. It is also found that a part of population is suffering from lack of permanent job to run their day-to-day life. Their expectation is to earn some income for their sustainability on a long-term basis.

The proposed project will aim to provide preferential employment to the local people there by improving the employment opportunity in the area and in turn the social standards will improve.

3.7 Structure Studies upto 300m Radius for P1

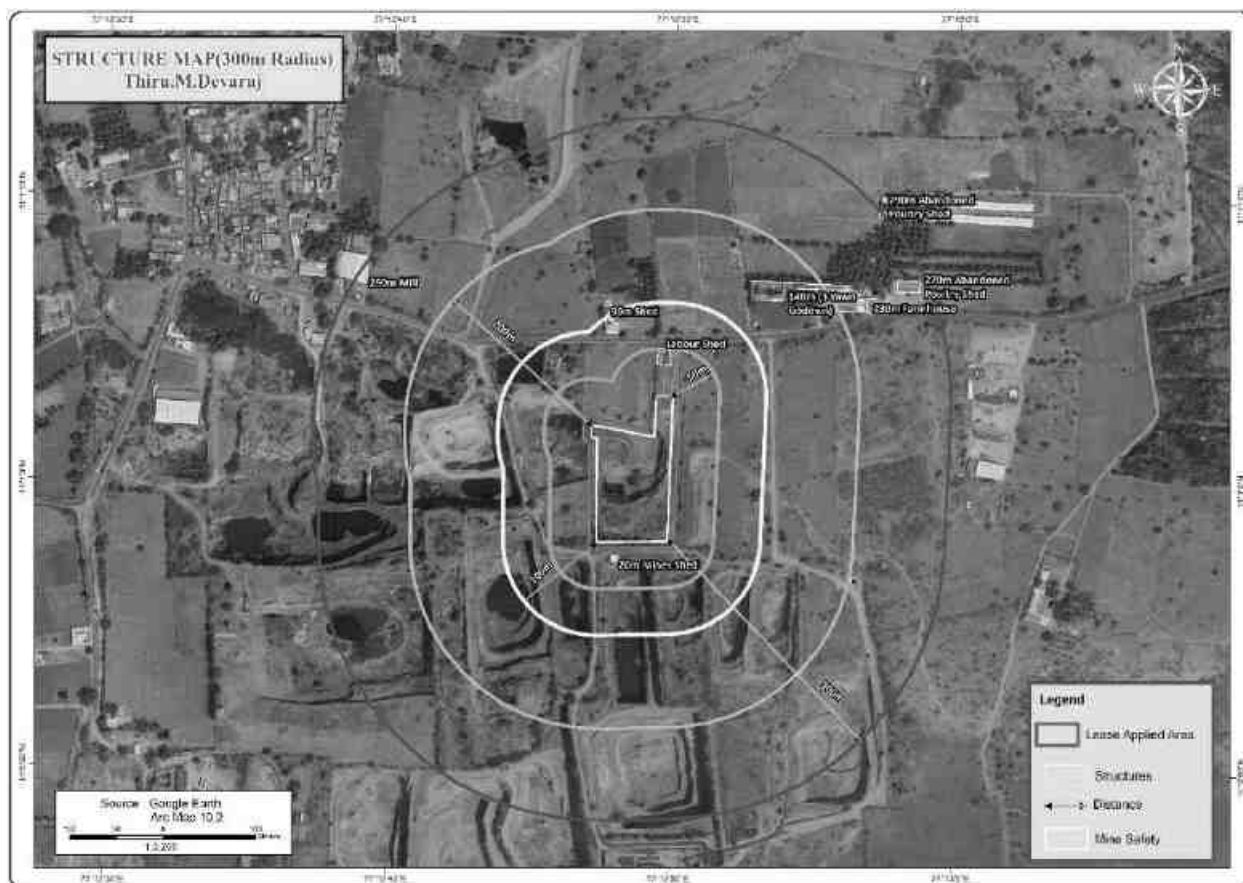


Fig.3.35 Structure map around 300m Radius

Table No 3.51 Structures details in the study area around 300m Radius

Enumeration of Structures from 0 - 300m Radius						
Structure Numbers	Distance & Direction from the project site	Structure Details and Usage Purpose	Type of Structure Structures (Kutch/ Brick/ Cement/ RCC/ Framed Structures)	No.of Occupants	Structure belongs to owner (Yes/No)	Remarks
1	Inside the lease area	Labour Shed	Sheet & Brick Structure	-	Yes	Now not in use Will be used after commencing the mining operation
2	20m - S	Mines Shed	Sheet Structure	-	Yes	Now not in use since the lease got expired
3	90m - N	Shed	Concrete Structure	2 Nos	No	Car Carriage Shed
(3- Nos) -6	140m - NE	Yarn Godown	Tiled & Brick Structure	8 Nos	No	To store Yarn
7	230m - NE	Farmhouse	Concrete Structure	3 Nos	No	To store agricultural materials
8	270m - NE	Abandoned Poultry Shed	Sheet Structure	-	No	Not in use
9	290 - NW	Mill	Sheet Structure	5 Nos	No	Produce yarn for textile
10	290m - NE	Abandoned Poultry Shed	Sheet Structure	3 Nos	No	Not in use

3.7.1 Structure Studies upto 300m Radius for P2

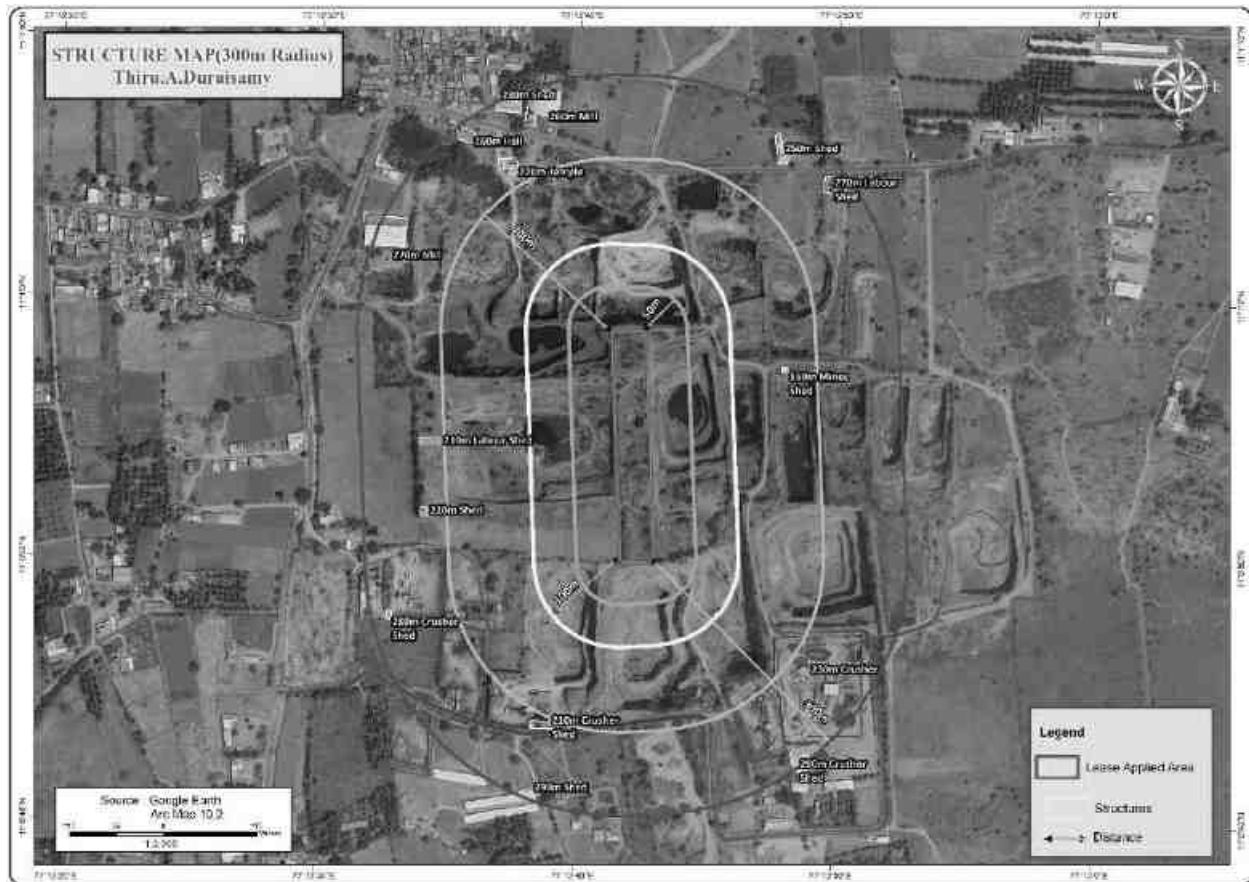


Fig.3.36 Structure map around 300m Radius

Table No 3.52 Structures details in the study area around 300m Radius

Enumeration of Structures from 0 - 300m Radius						
Structure Numbers	Distance & Direction from the project site	Structure Details and Usage Purpose	Type of Structure Structures (Kutch/ Brick/ Cement/ RCC/ Framed Structures)	No.of Occupants	Structure belongs to owner (Yes/No)	Remarks
1	160m - East	Mines Shed	Sheet Structure	-	No	Now not in use belongs to expired quarry
2	210m - West	Labour Shed	Sheet & Brick Structure	3 Nos	No	Labour used as a rest shelter
3	210m - SW	Crusher Shed	Sheet Structure	2 Nos	No	Used to store Crusher equipment and materials
4	220m - West	Shed	Sheet Structure	-	No	Storage Purpose – No stay
5	220m – NW	Temple	Brick Structure	2 Nos	No	Used to worship
6	230m - SE	Crusher	Framed Structure	4 Nos	No	Production M sand & P Sand
7	250m – NE	Farmhouse	Concrete Structure	2 Nos	No	To store agricultural materials
8	260m - NW	Mill	Sheet Structure	5 Nos	No	Producing yarn for the textiles
9	260m - NW	Hall	Brick Structure	-	No	Used to worship
10	270m - NW	Mill	Sheet Structure	2 Nos	No	Producing yarn for the textiles
11	270m - NE	Labour Shed	Sheet & Brick Structure	3 Nos	No	Labour used as a rest shelter
12	280m - NW	Shed	Sheet Structure	4 Nos	No	Storage Purpose –No stay
13	280m - SW	Crusher Shed	Sheet Structure	2 Nos	No	Used to store Crusher equipment and materials
14	290m - SE	Crusher Shed	Sheet Structure	3 Nos	No	Used to store Crusher equipment and materials
15	290m - SW	Shed	Sheet & Brick Structure	5 Nos	No	Storage Purpose –No stay

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

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

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

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

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

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

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

4.1 LAND ENVIRONMENT:

4.1.2 Anticipated Impact

- 1.24.43 Ha of the land will be under mining since the Permanent or temporary change on land use and land cover will occur
- About 1350 Nos of trees will be planted in the lease area and approach road will retain the ecosystem
- 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 0.88.20 Ha of the land will be converted into temporary reservoir which will full fill the water scarcity in the drought season and the nearby agriculture land will have benefitted by the supply of water
- About 1350 Nos of trees will be planted in the lease area and approach road will retain the ecosystem
- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development in the production
- Construction of garland drains all around the quarry pits and construction of silt trap at strategic location in lower elevations to prevent erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area.
- Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt.
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- Fencing will be constructed before starting the mining operation and it will be maintained in the conceptual stage Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.1.3 Soil Environment

4.1.4 Impact on Soil Environment

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

4.1.5 Mitigation Measures

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

4.1.6 Waste Dump Management

There is no waste anticipated in this 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
- 2.4 KLD water will be utilized for the quarrying operation

TABLE 4.1: WATER REQUIREMENTS P1-P2

PROPOSAL – P1		
*Purpose	Quantity	Source
Domestic & Drinking purpose	0.3KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Dust Suppression	0.7KLD	From Existing bore wells from nearby area
Green Belt	1.0KLD	From Existing bore wells from nearby area
Total	1.5 KLD	
PROPOSAL – P2		
*Purpose	Quantity	Source
Domestic & Drinking purpose	0.3KLD	From Existing, bore wells and drinking water will be sourced from Approved Water vendors.
Dust Suppression	0.7KLD	From Existing bore wells from nearby area
Green Belt	1.0KLD	From Existing bore wells from nearby area
Total	2.0 KLD	

4.2.2 Common Mitigation Measures

- Water for the quarrying operation such as sprinkling on haul roads, Greenbelt development will be sourced from the lower part of the mine pit which is specifically allotted to collect the rain water.
- Garland drain, settling tank will be constructed along the proposed mining lease area. The Garland drain will be connected to settling tank and sediments will be trapped in the settling traps and only clear water will be discharged out to the natural drainage
- Rainwater will be collected in sump in the mining pits and will be allowed to store and pumped out to surface settling tank of 15 m x 10m x 3m to remove suspended solids if any. This collected water will be judiciously used for dust suppression and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judiciously utilize the rainwater as part of rainwater harvesting system.
- Periodic (every 6 months once) analysis of quarry pit water and ground water quality in nearby villages.
- Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits.
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes.
- De-silting will be carried out before and immediately after the monsoon season.

4.3 AIR ENVIRONMENT

4.3.1. Anticipated Impact

- During mining, at various stages activities such as excavation, 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 PM₁₀ & PM_{2.5} and emissions of Sulphur dioxide (SO₂) & Oxides of Nitrogen (NO_x) due to excavation/loading equipment and vehicles plying on haul roads are the cause of air pollution in the project area.

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

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

AERMOD Software.

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

4.3.2.1 Emission Estimation

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

The general equation for emissions estimation is:

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

Where:

E = emissions;

A = activity rate;

EF = emission factor, and

ER =overall emission reduction efficiency, %

The proposed mining activity includes various activities like ground preparation, excavation, handling and transport of 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 10km around the source to assess the impact at each receptor separately at the various locations and maximum incremental GLC value at the project site. Maximum impact of PM₁₀ was observed close to the source due to low to moderate wind speeds. Incremental value of PM₁₀ was superimposed on the base line data monitored at the proposed site to predict total GLC of PM₁₀ due to combined impacts

TABLE 4.2: ESTIMATED EMISSION RATE FOR P1 & P2

EMISSION ESTIMATION FOR QUARRY “P1”- Thiru.M.Devaraj				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.071549656	g/s
	Blasting	Point Source	0.000453578	g/s
	Mineral Loading	Point Source	0.039348112	g/s
	Haul Road	Line Source	0.002486812	g/s/m
	Overall Mine	Area Source	0.046820058	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000320061	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000011798	g/s
EMISSION ESTIMATION FOR QUARRY “P2”- Thiru. A. Duraisamy				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.062438544	g/s
	Blasting	Point Source	0.000229551	g/s
	Mineral Loading	Point Source	0.038156746	g/s
	Haul Road	Line Source	0.002485581	g/s/m
	Overall Mine	Area Source	0.039750493	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000220886	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000005681	g/s

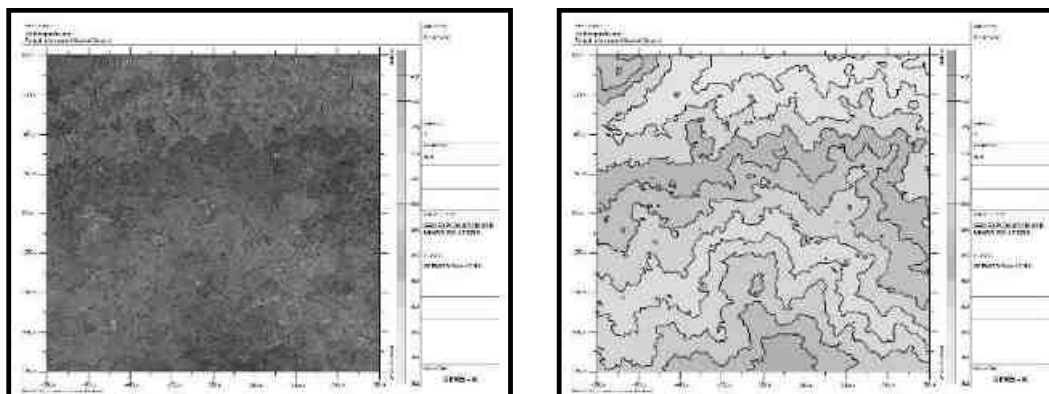
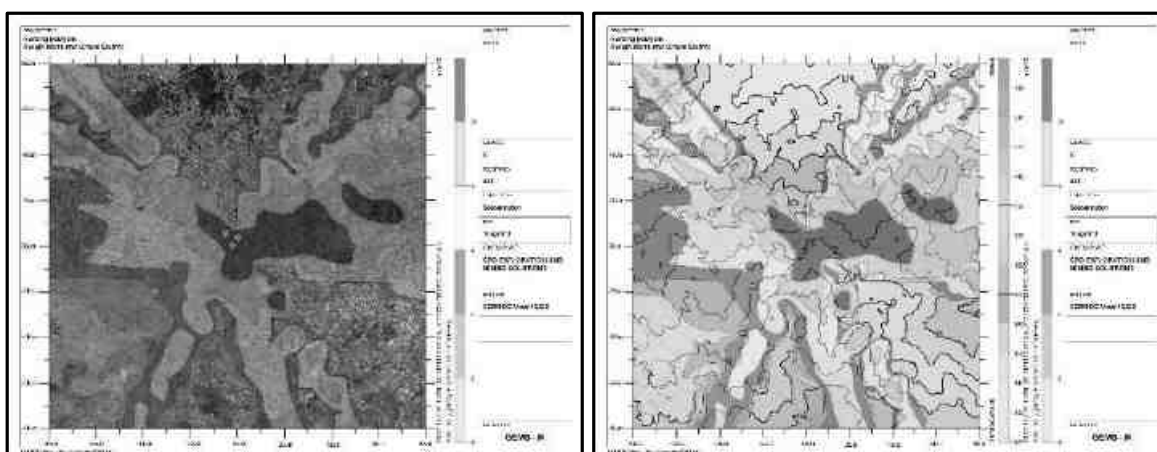
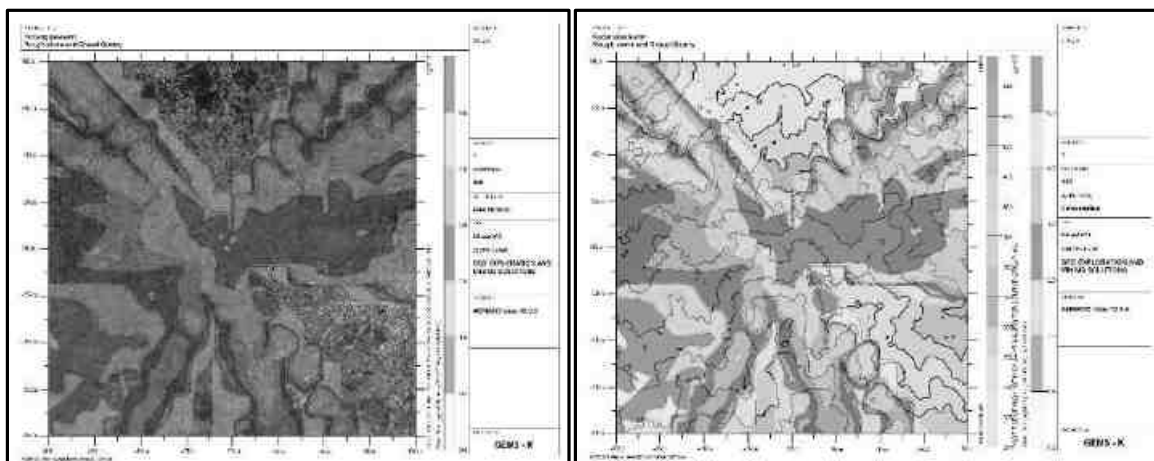
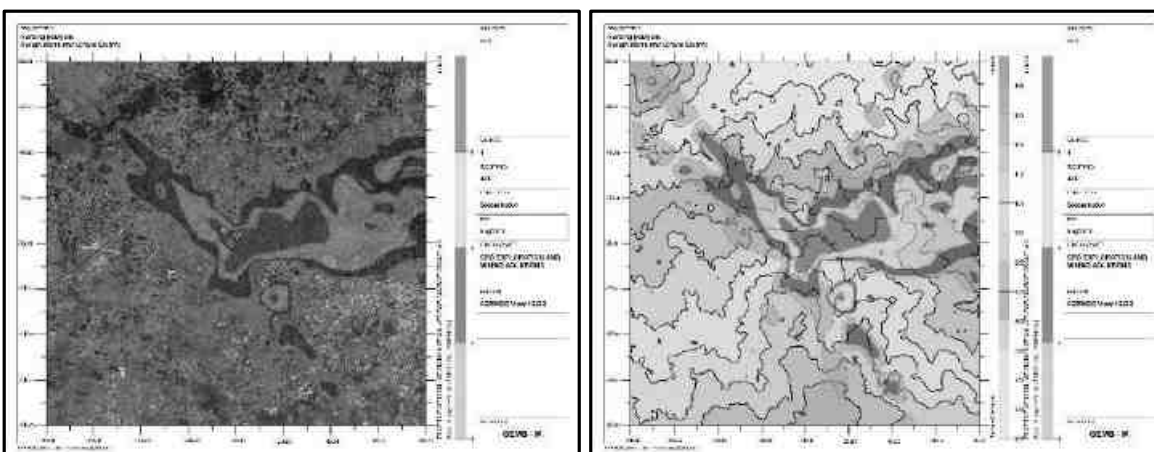
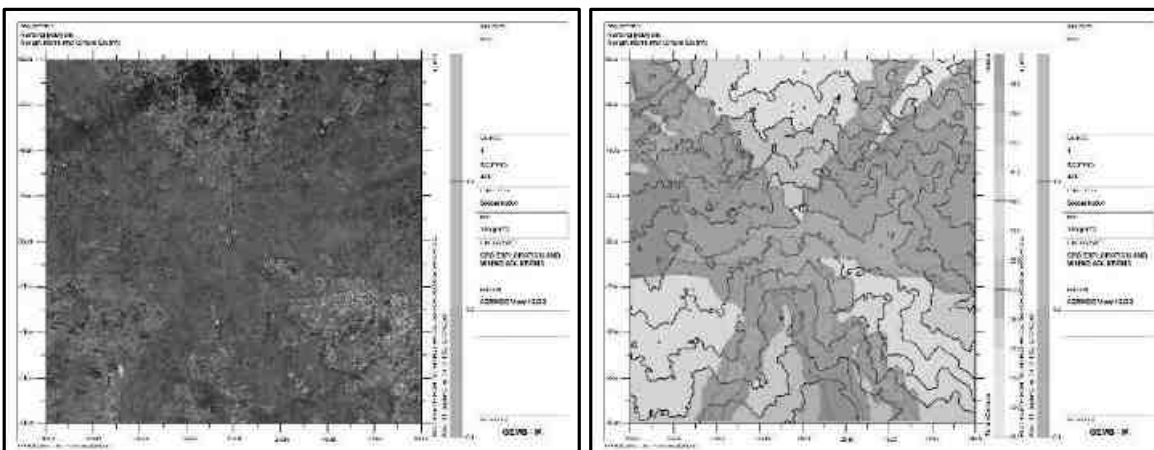
FIGURE 4.1: AERMOD TERRAIN MAP**FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM₁₀**

FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF PM₂₅**FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF NO_x****FIGURE 4.5: PREDICTED INCREMENTAL CONCENTRATION OF SO₂**

4.3.2.1 Model Results

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

TABLE 4.2: INCREMENTAL & RESULTANT GLC OF PM₁₀

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM ₁₀ (µg/m ³)	Incremental value of PM ₁₀ due to mining (µg/m ³)	Total PM ₁₀ (µg/m ³)
AAQ1	11° 1'2.12"N 77°12'50.52"E	36	43	41.5	12.91	54.41
AAQ2	11° 0'50.26"N 77°12'42.70"E	-203	-331	42.5	12.19	54.69
AAQ3	11° 1'7.96"N 77°12'32.94"E	-497	220	44.7	12.53	57.23
AAQ4	11° 0'21.43"N 77°13'44.21"E	1656	-1219	45.0	0	45.00
AAQ5	10°59'45.47"N 77°10'55.20"E	-3489	-2332	46.0	4.66	50.66
AAQ6	11° 2'23.44"N 77°14'29.42"E	3063	2554	45.9	10.00	55.9
AAQ7	11° 2'0.49"N 77° 9'52.81"E	-5395	1845	45.6	7.45	53.05

TABLE 4.3: INCREMENTAL & RESULTANT GLC OF PM_{2.5}

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM _{2.5} (µg/m ³)	Incremental value of PM _{2.5} due to mining (µg/m ³)	Total PM _{2.5} (µg/m ³)
AAQ1	11° 1'2.12"N 77°12'50.52"E	36	43	20.4	5.84	26.24
AAQ2	11° 0'50.26"N 77°12'42.70"E	-203	-331	21.3	5.20	26.5
AAQ3	11° 1'7.96"N 77°12'32.94"E	-497	220	23.5	5.49	28.99
AAQ4	11° 0'21.43"N 77°13'44.21"E	1656	-1219	24.5	0.18	24.68
AAQ5	10°59'45.47"N 77°10'55.20"E	-3489	-2332	25.2	2.34	27.54
AAQ6	11° 2'23.44"N 77°14'29.42"E	3063	2554	25.4	4.70	30.1
AAQ7	11° 2'0.49"N 77° 9'52.81"E	-5395	1845	24.6	3.29	27.89

TABLE 4.4: INCREMENTAL & RESULTANT GLC OF SO₂

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline SO ₂ (µg/m ³)	Incremental value due to mining (µg/m ³)	Total SO ₂ (µg/m ³)
AAQ1	11° 1'2.12"N 77°12'50.52"E	36	43	4.7	1.45	6.15
AAQ2	11° 0'50.26"N 77°12'42.70"E	-203	-331	4.6	1.17	5.77
AAQ3	11° 1'7.96"N 77°12'32.94"E	-497	220	4.8	1.33	6.13
AAQ4	11° 0'21.43"N 77°13'44.21"E	1656	-1219	5.0	0	5.00
AAQ5	10°59'45.47"N 77°10'55.20"E	-3489	-2332	4.9	0.20	5.1
AAQ6	11° 2'23.44"N 77°14'29.42"E	3063	2554	5.0	1.00	6.00
AAQ7	11° 2'0.49"N 77° 9'52.81"E	-5395	1845	4.7	0.68	5.38

TABLE 4.5: INCREMENTAL & RESULTANT GLC OF NO_x

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline NO _x (µg/m ³)	Incremental value due to mining (µg/m ³)	Total NO _x (µg/m ³)
AAQ1	11° 1'2.12"N 77°12'50.52"E	36	43	20.3	6.73	27.03
AAQ2	11° 0'50.26"N 77°12'42.70"E	-203	-331	19.8	5.80	25.6
AAQ3	11° 1'7.96"N 77°12'32.94"E	-497	220	20.5	6.42	26.92
AAQ4	11° 0'21.43"N 77°13'44.21"E	1656	-1219	20.6	0	20.6
AAQ5	10°59'45.47"N 77°10'55.20"E	-3489	-2332	19.9	0	19.9
AAQ6	11° 2'23.44"N 77°14'29.42"E	3063	2554	19.9	3.00	22.9
AAQ7	11° 2'0.49"N 77° 9'52.81"E	-5395	1845	20.6	0	20.6

From the resultant of cumulative concentration i.e., Background + Incremental Concentration of pollutant in all the receptor locations without effective mitigation measures are still within the prescribed NAAQ limits of 100, 80 & 80 µg/m³ for PM₁₀, SO₂ & NO_x respectively. By adopting suitable mitigation measures, the pollutant levels in the atmosphere can be further being controlled.

4.3.4. Common Mitigation Measures for Respective Individual Proposed Projects

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

Advantages of Wet Drilling: -

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

Blasting –

- Establish time of blasting to suit the local conditions and water sprinkling on blasting face
- Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas
- Controlled blasting includes Adoption of suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone and restricting blasting to a particular time of the day i.e. at the time lunch hours, controlled charge per hole as well as charge per round of hole
- Before loading of material water will be sprayed on blasted material
- Dust mask will be provided to the workers and their use will be strictly monitored

Haul Road & Transportation –

- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with tarpaulin
- The speed of tippers plying on the haul road will be limited below 20 km/hr to avoid generation of dust.
- Water sprinkling on haul roads & loading points will be carried out twice a day
- Main source of gaseous pollution will be from vehicle used for transportation of mineral; therefore, weekly maintenance of machines improves combustion process & makes reduction in the pollution.
- The un-metalled haul roads will be compacted weekly before being put into use.

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

Green Belt –

- 1600Nos 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.

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

Where:

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

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

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

4.4.1 Anticipated Impact

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

- Source data
- Receptor data
- Attenuation factor

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

TABLE 4.6: 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 noise prediction modelling.

TABLE 4.7: PREDICTED NOISE INCREMENTAL VALUES

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

The incremental noise level is found within the range of 54.5dB (A) in Core Zone and 46.2 – 53.1 dB (A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A) the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations are within permissible limits of Industrial area (core zone) & Residential area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.).

4.4.2 Mitigation Measures

The following noise mitigation measures are proposed for control of Noise

- 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 through training and awareness.

- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects

4.4.3 Ground Vibrations

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

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

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

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

Where –

V = peak particle velocity (mm/s)

K = site and rock factor constant

Q = maximum instantaneous charge (kg)

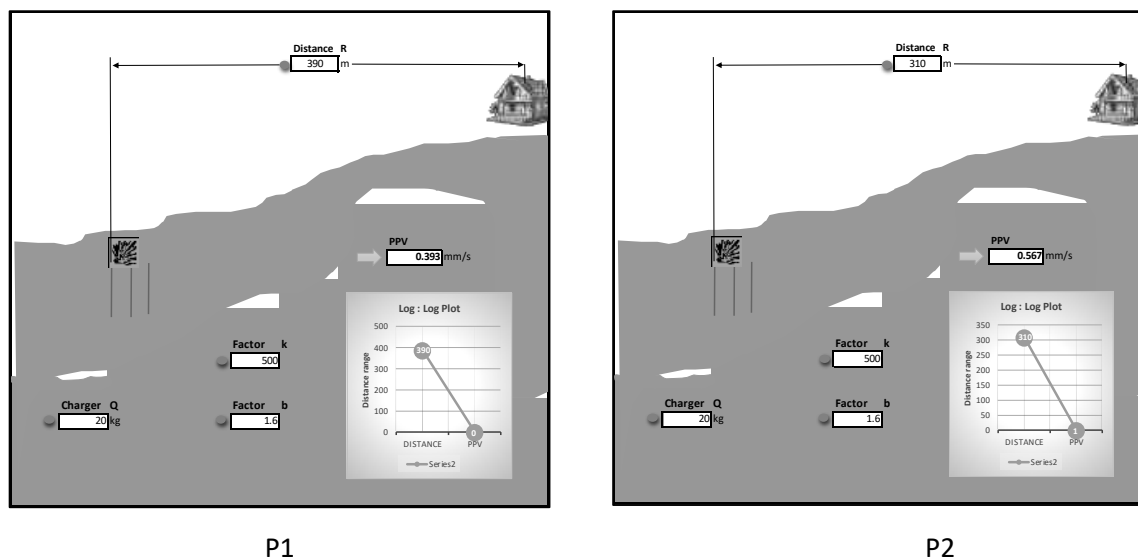
B = constant related to the rock and site (usually 1.6)

R = distance from charge (m)

TABLE 4.8: PREDICTED PPV VALUES DUE TO BLASTING

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	20	390-NW	0.393
P2	20	310 - NW	0.567

FIGURE 4.6: GROUND VIBRATION PREDICTION FOR P1 & P2



From the above graph, the charge per blast of 20 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 project proponent ensures that the charge per blast shall be less than 2 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 IMPACT ON THE BIOLOGICAL ENVIRONMENT

4.5.1. Anticipated Impact on agricultural land associated with flora

1. Mostly dust emission from nearby crusher unit and during operation and minerals are transported in approach roads.
2. Dust deposition on leaf observed on nearby lease boundary local plant species which may result in decline the rate of photosynthesis and retards the plant growth.

4.5.2. Mitigation Measures

4.5.2.1. General Guidelines for Green Belt Development

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

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

4.5.3.2. Proposed Green Belt

Extensive green belt development will be started during the construction phase, which will continue till the operation of the plant. About 1350 trees will be planted per hectare all around the plant, approach roads, and township premises. Locally available types of trees that are resistant to pollutants will be planted. In addition to the above, all open spaces available within the premises will be developed as nurseries, parks, gardens, and other forms of greenery. 5 m wide greenbelt will be developed along the plant premises, as per land available.

4.5.3.3. Development of Green Belt

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

4.5.3.4. Selection of Plant Species for Green Belt Development

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

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

Table No 4.9. List of plant species proposed for Greenbelt development

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

(*Source: Term of Reference-ToR)

Table No 4.10. Species suitable for abatement of noise and dust pollution

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

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

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

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

4.5.4. Anticipated Impact on Fauna

- Noise generation due to vehicle may affect avifauna.
- The lease area is not inhabited by any wild life, as there is no forest cover, hence there will not be any effect on migration or extinction of wildlife.

- There is no National Park, Biosphere Reserve, Wildlife corridors, and Tiger/Elephant Reserve found within 10 km radius of the project site.

4.5.4.1. Measures for protection and conservation of wildlife species

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

4.5.3. Impact on Aquatic Biodiversity

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

Table No. 4.11. Overall Ecological impact assessments of Kodangipalayam Village, Rough stone Quarry, Palladam Taluk, Tiruppur District and Tamil Nadu.

S.No	Attributes	Assessment
	Activities of the project affect the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in the mining lease site. The fauna sighted mostly migrated from the buffer area.
2	Located near an area populated by rare or endangered species	No Endangered, Critically Endangered, or vulnerable species were sighted in the core mining lease area.
3	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/ coastline/estuary/sea	Nil
4	The proposed project restricts access to waterholes for wildlife	'No '
5	Proposed mining project impact surface water quality that also provides water to wildlife	'No 'scheduled or threatened wildlife animals are sighted regularly core in the core area.
6	Proposed mining project increase siltation that would affect nearby biodiversity areas.	Surface runoff management such as drains is constructed properly so there will be no siltation effect in the nearby mining area.
7	Risk of fall/slip or cause death to wild animals due to project activities.	'No'

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

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

TABLE 4.12: RECOMMENDED SPECIES FOR GREENBELT DEVELOPMENT PLAN

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

The 7.5m Safety distance along the boundary has been identified to be utilized for subsequent Afforestation. However, the afforestation should always be carried out in a systematic and scientific manner. Regional trees like 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

PROPOSAL – P1			
No. of trees proposed to be planted	Survial %	Area to be covered	Name of the species
810	80	Near 7.5m safety distance, panchayat road and village road	Neem, Panai , Vilvam, Ashokha etc.
PROPOSAL – P2			
No. of trees proposed to be planted	Survial %	Area to be covered sq.m	Name of the species
540	80%	Near 7.5m safety distance, panchayat road and village road	Neem, Panai , Vilvam, Ashokha etc.

4.6 SOCIO ECONOMIC

4.6.1 Construction Phase

Anticipated Impacts:

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

4.6.2 Mitigation measures:

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

4.6.3 Operation Phase:

Anticipated Impacts:

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

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

Mitigation Measures:

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

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

4.6.4 Impact Evaluation:

Table 4.14 Impact Evaluation

Impact Evaluation Element	Impact on socio economics due to the Proposed project Kodangipalayam Rough Stone and Gravel quarries, Cluster Extent.15.02.89 Ha, Kodangipalayam Village, Palladam Taluk, Tiruppur District.			
Potential Effect/ Concern	Proposed project will provide direct & indirect employment opportunities to the local residents, which will help to increase their earning and better living standard as well as further up-liftment of socio-economic status of the area.			
Characteristics of Impacts				
Nature	Positive		Negative	Netural
	✓			
Type	Direct	Indirect	Cumulative	
Extent	Project area	Local	Zonal	Regional
	✓			
Duration	Short time		Long term	
			✓	
Intensity	Low		Medium	High
			✓	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				✓
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major

			✓	
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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 45m bgl and the life of the mine is 5years, after completion of mining operation the following action will be taken in the project site as a part of Mine closure plan

- The total Mined out land would be around 2.70.0Ha 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.

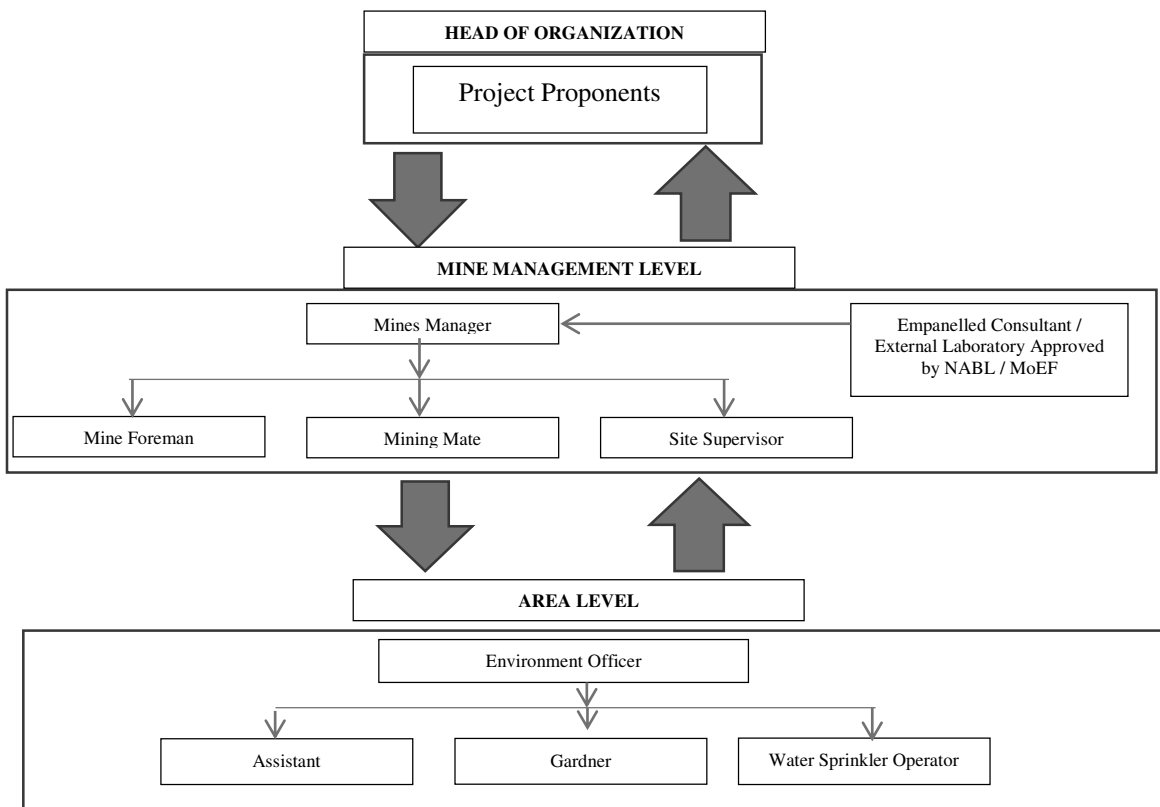
An Environment monitoring cell (EMC) will be constituted to monitor the implementation of EMP and other environmental protection measures in all the proposed quarries.

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 – P1& P2

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&P2

S.No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, PM _{2.5} , PM ₁₀ , SO ₂ and NO _x .
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 Locations (1 SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	L eq, L max, L min, L eq Day & L eq Night
6	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/- for five years each Proposed Project.

TABLE 6.3 ENVIRONMENT MONITORING PROGRAM BUDGET – P1 & P2

Sl.No.	Parameter	Capital Cost	Recurring Cost per annum
1	Air Quality	Rs. 76,000/-	Rs. 3,80,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		

5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		Rs 76,000/-	Rs 3,80,000/-

Source: Approved Mining Plan

6.5 REPORTING SCHEDULES OF MONITORED DATA

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

Periodical reports to be submitted to: -

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

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

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

7. ADDITIONAL STUDIES

7.0 GENERAL

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

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

7.1. PUBLIC CONSULTATION

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

7.2 RISK ASSESSMENT

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

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

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

TABLE 7.1 RISK ASSESSMENT& CONTROL MEASURES

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

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

7	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m height.
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Source: Analysed and Proposed by FAE & EC

7.3 DISASTER MANAGEMENT PLAN

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

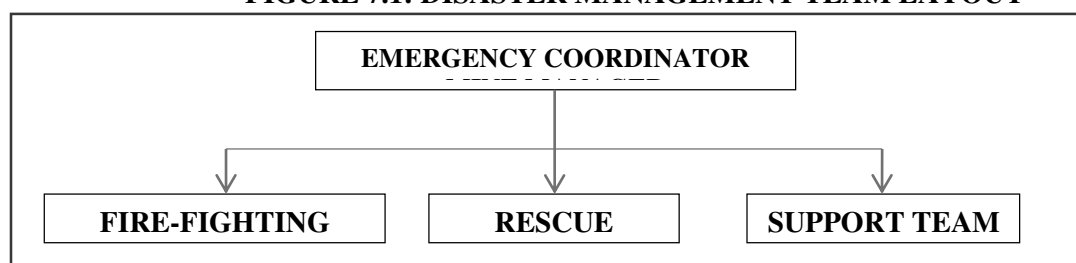
The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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

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

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

FIGURE 7.1: DISASTER MANAGEMENT TEAM LAYOUT



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

TABLE 7.2: PROPOSED TEAMS TO DEAL WITH EMERGENCY SITUATION

DESIGNATION	QUALIFICATION
FIRE-FIGHTING TEAM	
Team Leader/ Emergency Coordinator (EC)	Mines Manager
Team Member	Mines Foreman
Team Member	Mining Mate

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

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

Roles and responsibilities of emergency team –

(a) Emergency coordinator (EC)

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

(b) Incident controller (IC)

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

(c) Communication and advisory team

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

(d) Roll call coordinator

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

(e) Search and rescue team

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

(f) Emergency security controller

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

Emergency control procedure –

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

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

Proposed fire extinguishers at different locations –

The following type of fire extinguishers has been proposed at strategic locations within the mine.

TABLE 7.3: PROPOSED FIRE EXTINGUISHERS AT DIFFERENT LOCATIONS

LOCATION	TYPE OF FIRE EXTINGUISHERS
Electrical Equipment's	CO ₂ type, foam type, dry chemical powder type
Fuel Storage Area	CO ₂ type, foam type, dry chemical powder type, Sand bucket
Office Area	Dry chemical type, foam type

Alarm system to be followed during disaster –

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

7.4 CUMULATIVE IMPACT STUDY

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

TABLE 7.4: LIST OF QUARRIES WITHIN 500 METER RADIUS

PROPOSED QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
P1	Thiru.M.Devaraj	Kodangipal ayam	311/3 & 311/4B	1.60.5	Applied for quarry lease
P2	Thiru.A. Duraisamy	Kodangipal ayam	315/2B	1.08.0	Applied for quarry lease
P3	Thiru.R.Shanmugam	Kodangipal ayam	316/4	1.29.0	Applied for quarry lease
P4	Thiru.K.Selvakumar	Kodangipal ayam	311/2	1.16.5	Applied for quarry lease
P5	Thiru.K.Sivakumar	Kodangipal ayam	308/1B,38/2	1.69.0	Applied for quarry lease
	TOTAL EXTENT			6.83.0 Ha	
EXISTING QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
E-1	Thiru.S.Velusamy	Kodangipal ayam	324/2A	1.62.0	08.03.2022 to 07.03.2027
E-2	Thiru.M.Ramasamy	Kodangipal ayam	314/1A(P),314 /1B,324/2B & 324/2C	3.61.5	17.03.2022 to 16.03.2027
E-3	Thiru.P.Shanmugasundaram	Kodangipal ayam	315/A3B1,320 /2B2	0.74.39	EC Granted
E-4	Thiru.S.Thangavel	Kodangipal ayam	315/2D	2.22.0	EC Granted
	TOTAL EXTENT			8.19.89	
ABANDONED / EXPIRED QUARRIES					
Code	Name of the Owner	Village	S.F. Nos	Extent in Ha	Status
Ex-1	Thiru.M.Devaraj	Kodangipal ayam	312/3,313/1,31 3/2(P)	3.16.0	20.09.2018 to 19.09.2023

EX-2	Thiru.S.Rangasamy	Kodangipalayam	315/2A1,315/2 A3A	1.86.0	24.07.2014 to 27.08.2019
EX-3	Thiru.R.Shanmugam	Kodangipalayam	312/4	0.94	
	TOTAL EXTENT			5.96.0	
	TOTAL CLUSTER EXTENT			15.02.89	

- 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. M.Devaraj Rough stone and Gravel quarry				
S.F. No.	311/3 & 311/4B				
Extent	1.60.5 ha				
Village Taluk and District	Kodangipalayam Village, Palladam Taluk, Tiruppur District.				
Land Type	Proponent own patta land				
Land Ownership	It is a Patta lands. Registered in the name of the applicant (Thiru.M.Devaraj), vide Patta Nos. 2009 and 1989				
Previous lease details	It is a fresh application. But the applied area has been considered quarrying operation earlier				
	S.No	Name of Lessee	Ditric collector's Proceeding Number and date	Extent and S.F.Nos	Lease Period
	1	Thiru.K.R.Rathinasamy	Rc.No.1556/2005/MM2 Dated: 16.08.2005	1.60.5ha and 311/3&311/4B	14.09.2005 to 13.09.2010
	2	Thiru.K.R.Rathinasamy	Rc.No.655/Mines/2010 Dated: 26.02.2011	1.60.5Ha and 311/3&311/4B	26.02.2011 to 25.02.2016
Toposheet No	58 - E/04				
Latitude between	11° 00' 57.66"N to 11° 01' 04.72"N				
Longitude between	77° 12' 47.33"E to 77° 12' 50.78"E				
Elevation of the area	410m(Max) AMSL				
Lease period	5 Years				
Mining Plan period	5 years				
Proposed Depth of Mining	42m Bgl				
	Rough Stone in m³		Gravel m³		
Geological Resources	454744		2672		
Mineable Reserves	137627		608		
Year wise Production	137627		608		
Peak Production	29375		608		
Ultimate Pit Dimension	Pit I- 70m(L) x 22m(W) x 7m(D) Bgl Pit II- 123m(L) x 89m(W) x 42m(D) Bgl				

Water Level in the region	58-62m bgl	
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives	
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards Northwestern side. The altitude of the area is 410m (max) above Mean Sea level. The area is covered by gravel having an average thickness of 2m and followed by Massive Charnockite Which is clearly inferred from the adjacent existing quarry pit	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 Nos
	Excavator with Bucket and Rock Breaker	1 No
	Tipplers	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	22 Nos	
Project Cost	Rs.1,86,91,000/-	
EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs. 1,90,71,000/-	
CER Cost	Rs. 5,00,000/-	
Nearby Water Bodies	Odai	520m SW
	Odai	530m West
	Kuttai	720m NE
	Odai	2km NE
	Samalapuram Lake	6.0km NW
	Noyyal River	6.5km NW
Greenbelt Development Plan	Proposed to plant 810 Nos of trees considering 500 Nos of trees/ Ha criteria The plantation will be developed around the project site and nearby village roads	
Proposed Water Requirement	1.5 KLD	
Nearest Habitation	390m – North West	
Nearest Reserve Forest	Boluvampatti R.F I – 30.0 km – South West	
Nearest Wild Life Sanctuary	Nanjarayan bird Sanctuary – 22.7km – NE Sathiyamangalam Tiger Reserve- 50.8km NW	

TABLE 7.5: SALIENT FEATURES OF PROPOSAL “P2”

Name of the Project	Thiru.A.Duraisamy Rough stone and Gravel quarry
S.F. No.	315/2B
Extent	1.08.0 ha
Village Taluk and District	Kodangipalayam Village, Palladam Taluk, Tiruppur District.
Land Type	Proponent own patta land
Land Ownership	It is a Patta lands. Jointly registered in the name of the applicant Thiru.A.Duraisamy and Thiru.A.Thangavel, vide Patta Nos. 1447
Previous lease details	It is a fresh application. But the applied area has been considered quarrying operation earlier

	S.No	Name of Lessee	Ditric collector's Proceeding Number and date	Extent and S.F.Nos	Lease Period
	1	Thiru.A.Duraisamy	Rc.No.2335/2005/X1 Dated: 30.11.2005	1.08.0ha and 315/2B	30.11.2005 to 29.11.2010
Toposheet No	58 - E/04				
Latitude between	11° 00' 49.97"N to 11° 00' 58.85"N				
Longitude between	77° 12' 41.74"E to 77° 12' 43.50"E				
Elevation of the area	408m(Max) AMSL				
Lease period	5 Years				
Mining Plan period	5 years				
Proposed Depth of Mining	22m Bgl				
	Rough Stone in m³		Gravel m³		
Geological Resources	200648		13648		
Mineable Reserves	90371		8754		
Year wise Production	90371		8754		
Peak Production	18655		3392		
Ultimate Pit Dimension	254m(L) x 35m(W) x 22m(D) Bgl				
Water Level in the region	58-62 m bgl				
Method of Mining	Opencast Mechanized Mining Method involving small drilling and Controlled blasting using Slurry Explosives				
Topography	The lease applied area is situated in flat terrain. The area has gentle sloping towards North-Western side. The altitude of the area is 408m (max) above Mean Sea level. The area is covered by gravel having an average thickness of 2m and followed by Massive Charnockite Which is clearly inferred from the adjacent existing quarry pit				
Machinery proposed	Jack Hammer		3 Nos		
	Compressor		1 Nos		
	Excavator with Bucket and Rock Breaker		1 No		
	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	20 Nos				
Project Cost	Rs.1,10,10,000/-				
EMP Cost	Rs. 3,80,000/-				
Total Project cost	Rs. 1,16,18,000/-				
CER Cost	Rs. 5,00,000/-				
Nearby Water Bodies	Odai		240m SW		
	Odai		350m West		
	Kuttai		980m NE		
	Odai		2.2km NE		
	Samalapuram Lake		6.2km NW		
	Noyyal River		7.0km NW		
Greenbelt Development Plan	Proposed to plant 540Nos 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	310m – North West
Nearest Reserve Forest	Boluvampatti R.F I – 30.5 km – South West
Nearest Wild Life Sanctuary	Nanjarayan bird Sanctuary – 23km – NE Sathiyamangalam Tiger Reserve- 51km NW

Source: Approved Mining Plan

TABLE 7.10: SALIENT FEATURES OF PROPOSAL “P3”

Name of the Quarry	Thiru. R.Shanmugam Rough Stone & Gravel Quarry Project	
Toposheet No	58-E/04	
Latitude between	11°00' 59.06" to 11°01' 03.36" N	
Longitude between	77°12' 41.48" to 77°12' 45.36" E	
Highest Elevation	372 m AMSL	
Proposed Depth of Mining	52 m bgl (2 m Gravel + 50 m Rough Stone)	
Geological Resources	Rough Stone in m ³	Gravel m ³
	3,12,121	578
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	69,756	-
Ultimate Pit Dimension	99 m (L) * 87 m (W) * 52 m (D)	
Water Level in the surrounds area	65-70 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area exhibits flat terrain. The area has gentle sloping towards northern side. The altitude of the area is 372 m above mean sea level. The area is covered by 3m thickness of Gravel followed by Massive Charnockite which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	2 Nos
	Compressor	1 Nos
	Hydraulic Excavator	1 Nos
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	15 Nos	
Project Cost	Rs.88,75,000/-	
Total Project Cost	Rs.92,55,000/-	
CER Cost	Rs 5,00,000/-	
Greenbelt Development Plan	Proposed to plant 645 trees in the 7.5 m Safety Zone and Village roads	
Proposed Water Requirement	3.2KLD	
Nearest Habitation	1.0km North West	

Source: Approved Mining Plan

TABLE 7.10: SALIENT FEATURES OF PROPOSAL “P4”

Name of the Quarry	Thiru. M. Selvakumar Rough Stone & Gravel Quarry Project	
Toposheet No	58-E/04	
Latitude between	11°00'59.34" to 11°00'04.88" N	
Longitude between	77°12'44.00" to 77°12'47.67" E	
Highest Elevation	390 m AMSL	
Proposed Depth of Mining	42 m bgl (2 m Gravel + 40 m Rough Stone)	
Geological Resources	Rough Stone in m ³	Gravel m ³
	4,49,440	22,472
Mineable Reserves	Rough Stone in m ³	Gravel m ³

	73,870	2,688
Ultimate Pit Dimension	102 m (L) * 64 m (W) * 42 m (D)	
Water Level in the surrounds area	58 – 62 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area exhibits slightly undulated terrain. The area has gentle sloping towards southern side. The altitude of the area is 390m above mean sea level. The area is covered by 2m thickness of Gravel and Massive Charnockite is found after 2m (Gravel) which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	4 Nos
	Compressor	1 Nos
	Hydraulic Excavator	1 Nos
	Tippers	1 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	18 Nos	
Project Cost	Rs.83,05,593/-	
CER Cost @ 2% of Project Cost	Rs 1, 66,111/-	
Nearby Water Bodies	Kuttai	500 m South West
	Odai	3 km South East
	Sulur Lake	9.5 km North West
	Samalapuram Lake	6 km North West
	Noyyal river	7 km North West
Greenbelt Development Plan	Proposed to plant 200 trees in 1700 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	3 KLD	
Nearest Habitation	320 m North West	

TABLE 7.10: SALIENT FEATURES OF PROPOSAL “E1”

Name of the Quarry	Thiru. S. Velusamy Rough Stone & Gravel Quarry Project	
Toposheet No	58-E/04	
Latitude between	11°00'43.62" to 11°00'50.07" N	
Longitude between	77°12'38.45" to 77°12'41.36" E	
Highest Elevation	410 m AMSL	
Proposed Depth of Mining	38 m bgl (3 m Gravel + 35 m Rough Stone)	
Geological Resources	Rough Stone in m ³	Gravel m ³
	5,12,240	26,904
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	1,26,000	11,760
Ultimate Pit Dimension	148 m (L) * 70 m (W) * 38 m (D)	
Water Level in the surrounds area	58 – 62 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area exhibits flat terrain. The area has gentle sloping towards northern side. The altitude of the area is 410 m above mean sea level. The area is covered by 3m thickness of Gravel followed by Massive Charnockite which is clearly inferred from the existing quarry pits.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1 Nos
	Hydraulic Excavator	1 Nos
	Tippers	2 Nos

Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	21 Nos	
Project Cost	Rs.87,17,800/-	
CER Cost @ 2% of Project Cost	Rs 1, 74,356/-	
Nearby Water Bodies	Kuttai	200m West
	Odai	3km East
	Sulur Lake	9Km North West
	Samalapuram Lake	6.5Km North West
	Noyyal river	7.5Km North West
Greenbelt Development Plan	Proposed to plant 125 trees in 1200 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	4 KLD	
Nearest Habitation	500 m North West	

Source: Approved Mining Plan

TABLE 7.9: SALIENT FEATURES OF PROPOSAL “E2”

Name of the Quarry	Thiru. M. Ramasamy Rough Stone & Gravel Quarry Project	
Toposheet No	58-E/04	
Latitude between	11° 00' 44.02"N to 11°00' 52.53"N	
Longitude between	77° 12' 41.35"E to 77° 12' 48.04"E	
Highest Elevation	398 m AMSL	
Proposed Depth of Mining	47 m (2 m Gravel + 45 m Rough Stone)	
Geological Resources	Rough Stone in m ³	Gravel m ³
	16,26,750	72,300
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	3,01,402	2,262
Ultimate Pit Dimension	173 m (L) * 160 m (W) * 47 m (D)	
Water Level in the surrounds area	58 – 62 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits plain terrain. The area has gentle sloping towards northern side. The altitude of the area is 398 m (max) above mean sea level. The area is covered by 2 m thickness of Gravel Formation followed by Massive Charnockite which is clearly inferred from the nearby existing quarrying pit.	
Machinery proposed	Jack Hammer	6 Nos
	Compressor	2 Nos
	Hydraulic Excavator	1 Nos
	Tippers	3 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	32 Nos	
Project Cost	Rs.1, 70,52,500/-	
CER Cost @ 2% of Project Cost	Rs 3, 41,050 /-	
Nearby Water Bodies	Kuttai	280 m West
	Odai	3 km East
	Sulur Lake	9.5 km North West
	Samalapuram Lake	6.5 km North West
	Noyyal River	7.5 km North West
Greenbelt Development Plan	Proposed to plant 250 trees in 2500 Sq.m area in the 7.5 m Safety Zone	
Proposed Water Requirement	2.5 KLD	
Nearest Habitation	550 m North West	

Source: Approved Mining Plan

TABLE 7.9: SALIENT FEATURES OF PROPOSAL “E3”

Name of the Quarry	Thiru. P. Shanmugasundaram Rough Stone & Gravel Quarry Project		
Toposheet No	58-E/04		
Latitude between	11°00'49.83"N to 11°00'51.54" N		
Longitude between	77°12'34.37"E to 77°12'41.88" E		
Highest Elevation	383 m AMSL		
Proposed Depth of Mining	13 m bgl (1 m Topsoil + 2 m Gravel + 10 m Rough Stone)		
Geological Resources	Rough Stone in m ³	Gravel m ³	Topsoil m ³
	74,390	14878	7,439
Mineable Reserves	Rough Stone in m ³	Gravel m ³	Topsoil m ³
	13,815	6,662	3,331
Ultimate Pit Dimension	171 m (L) * 23 m (W) * 13 m (D)		
Water Level in the surrounds area	58 – 62 m bgl		
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting		
Topography	The lease applied area is exhibits flat terrain. The area has gentle sloping towards south east side. The altitude of the area is 383 m (max) above mean sea level. The area is covered by 1 m topsoil, 2 m thickness of Gravel Formation followed by Massive Charnockite which is clearly inferred from the nearby existing quarrying pit.		
Machinery proposed	Jack Hammer		1 Nos
	Compressor		1 Nos
	Hydraulic Excavator		1 Nos
	Tippers		1 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.		
Proposed Manpower Deployment	12 Nos		
Project Cost	Rs.43, 36,000/-		
CER Cost @ 2% of Project Cost	Rs 86,720 /-		
Nearby Water Bodies	Kuttai		130 m West
	Odai		3 km East
	Sulur Lake		9 km North West
	Samalapuram Lake		6.5 km North West
	Noyyal river		7.5 km North West
Greenbelt Development Plan	Proposed to plant 160 trees in 1400 Sq.m area in the 7.5 m Safety Zone		
Proposed Water Requirement	3.5 KLD		
Nearest Habitation	380 m North West		

Source: Approved Mining Plan

TABLE 7.7: SALIENT FEATURES OF PROPOSAL “E4”

Name of the Project	Thiru.S.Thangavel Rough stone and Gravel quarry
S.F. No.	315/2D
Extent	2.22.0 ha
Village Taluk and District	Kodangipalayam Village, Palladam Taluk, Tiruppur District.
Land Type	Proponent own patta land
Land Ownership	It is a Patta land. Registered in the name of applicant (S.Thangavel), vide Patta No.1182
Existing quarry operation	It is a fresh application; the area has been quarrying in earlier.
Toposheet No	58 - E/04
Latitude between	11°00'50.19"N to 11°00'58.82"N
Longitude between	77°12'43.01"E to 77°12'46.62"E
Elevation of the area	370m AMSL

Lease period	5 Years	
Scheme of Mining period	5 years	
Depth of Mining	47m	
Approved Quantity	Rough Stone in m ³	Gravel m ³
	235150m ³	13376m ³
Ultimate Pit Dimension	Pit I : 240m(L) x 78m(B) x 47m(D) below ground level	
Water Level in the region	50-45 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 topography. The area has gentle sloping towards Northern side. The altitude of the area is 370m (Max) above Mean sea level. The area is covered by the Gravel formation. The Gravel formation is about 2.0m. Massive charnockite is found after 2.0m (Gravel formation) which is clearly inferred from the existing quarrying pits.	
Machinery proposed	Jack Hammer	6Nos
	Compressor	2 No
	Excavator with Bucket and Rock Breaker	2Nos
	Tippers	3 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	28Nos	
Project Cost	Rs. 1,43,15,000/-	
EMP Cost	Rs. 3,80,000/-	
Total Project cost	Rs. 1,46,95,000	
CER Cost	Rs. 5,00,000/-	
Greenbelt Development Plan	Proposed to plant 1110Nos 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	3.0 KLD	
Nearest Habitation	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	137627	27525	92	8
P2	90371	18074	60	5
P3	69756	13951	47	4
P4	73870	14774	49	4
P5	-	-	-	-
Total	371624	74324	248	21
E1	126000	25200	84	7
E2	301402	60280	201	17

E3	13815	2763	9	1
E4	235150	47030	157	13
Total	676367	135273	451	38
Grand Total	1047991	209597	699	59

TABLE 7.12: CUMULATIVE PRODUCTION LOAD OF GRAVEL

Quarry	Production for one / three-year plan period	Per Year Production in m ³	Per Day Production in m ³	Number of Lorry Load Per Day
P1	608	608	2	1
P2	8754	2918	10	1
P3	-	-	-	-
P4	2,688	896	3	1
P5	-	-	-	-
Total	12050	4422	15	3
E1	11760	3920	13	1
E2	2262	754	3	1
E3	6662	2221	7	1
E4	1337	446	1	1
Total	22021	7341	24	4
Grand Total	34071	11763	39	7

On a cumulative basis considering the proposed quarry, it can be seen that the overall production of Rough Stone is 699m³ per day and overall production of Gravel is 39 m³ per day with a capacity of 59Trips of Rough Stone per day and 7 Trips per day of Gravel from the cluster.

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

Based on the above production quantities the emissions due to various activities in all mines includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.14.

TABLE 7.14: EMISSION ESTIMATION FROM CLUSTER QUARRIES WITHIN 500 METER RADIUS

EMISSION ESTIMATION FOR QUARRY “P1”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.091254631	g/s
	Blasting	Point Source	0.001530696	g/s
	Mineral Loading	Point Source	0.043515527	g/s
	Haul Road	Line Source	0.002494893	g/s/m
	Overall Mine	Area Source	0.060543171	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000877502	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000055013	g/s
EMISSION ESTIMATION FOR QUARRY “P2”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.070151617	g/s
	Blasting	Point Source	0.000410963	g/s
	Mineral Loading	Point Source	0.040018016	g/s
	Haul Road	Line Source	0.002487668	g/s/m

	Overall Mine	Area Source	0.045925490	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.00036078	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000012684	g/s
EMISSION ESTIMATION FOR QUARRY “P3”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.079151983	g/s
	Blasting	Point Source	0.000751490	g/s
	Mineral Loading	Point Source	0.041154605	g/s
	Haul Road	Line Source	0.002489449	g/s/m
	Overall Mine	Area Source	0.050311742	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000495456	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000021140	g/s
EMISSION ESTIMATION FOR QUARRY “P4”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.035535927	g/s
	Blasting	Point Source	0.000013707	g/s
	Mineral Loading	Point Source	0.038682461	g/s
	Haul Road	Line Source	0.002486083	g/s/m
	Overall Mine	Area Source	0.046209504	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000223263	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000008062	g/s
EMISSION ESTIMATION FOR QUARRY “E1”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.060829329	g/s
	Blasting	Point Source	0.000201456	g/s
	Mineral Loading	Point Source	0.038605263	g/s
	Haul Road	Line Source	0.002486005	g/s/m
	Overall Mine	Area Source	0.048980782	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000252885	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000010385	g/s
EMISSION ESTIMATION FOR QUARRY “E2”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.049321908	g/s
	Blasting	Point Source	0.000070601	g/s
	Mineral Loading	Point Source	0.035765516	g/s
	Haul Road	Line Source	0.00248395	g/s/m
	Overall Mine	Area Source	0.035201641	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000110276	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000002180	g/s
EMISSION ESTIMATION FOR QUARRY “E3”				
Estimated Emission Rate for PM ₁₀	Activity	Source type	Value	Unit
	Drilling	Point Source	0.085816323	g/s
	Blasting	Point Source	0.001125807	g/s
	Mineral Loading	Point Source	0.041990717	g/s
	Haul Road	Line Source	0.002491073	g/s/m
	Overall Mine	Area Source	0.062836506	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.000644729	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000044886	g/s

EMISSION ESTIMATION FOR QUARRY “E4”				
	Activity	Source type	Value	Unit
Estimated Emission Rate for PM ₁₀	Drilling	Point Source	0.070151617	g/s
	Blasting	Point Source	0.000410963	g/s
	Mineral Loading	Point Source	0.040018016	g/s
	Haul Road	Line Source	0.002487668	g/s/m
	Overall Mine	Area Source	0.045925490	g/s
Estimated Emission Rate for SO ₂	Overall Mine	Area Source	0.00036078	g/s
Estimated Emission Rate for NO _x	Overall Mine	Area Source	0.000012684	g/s

Source: Emission Calculation

TABLE 7.15: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM ₁₀ in µg/m ³	
Background	45.8
Incremental	15.25
Resultant	61.05
NAAQ Norms	100 µg/m ³
PM _{2.5} in µg/m ³	
Background	22.2
Incremental	8.30
Resultant	30.5
NAAQ Norms	60 µg/ m ³
So ₂ in µg/m ³	
Background	6.3
Incremental	2.20
Resultant	8.5
NAAQ Norms	80 µg/ m ³
No ₂ in µg/m ³	
Background	25.6
Incremental	11.23
Resultant	36.83
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.

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

Where:

L_{p1} & L_{p2} are sound levels at points located at distances r₁ & r₂ from the source.

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

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

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)	49.7	46.2	46.8	45.9	49.8	48.1	47.9
Incremental Value dB(A)	56.6	52.1	43.8	33.9	24.2	25.7	25.3
Total Predicted Noise level dB(A)	54.5	53.1	48.6	46.2	49.8	48.1	47.9

Source: Lab Monitoring Data

The incremental noise level is found within the range of 24.2 to 52.1 (Buffer zone) – 56.6 dB (A) in Core zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A) the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone) as per The Noise Pollution (Regulation And Control) Rules, 2000 (The Principal Rules were published in the Gazette of India, vide S.O.123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment(Protection) Act, 1986).

Ground Vibrations

Ground vibrations due to mining activities in the all the 6 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 6 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 6 mines respectively are as in below Table 7.17.

TABLE 7.17: NEAREST HABITATION FROM CLUSTER QUARRIES

Location ID	Distance & Direction
Habitation Near P1	390m – NW
Habitation Near P2	310m – NW
Habitation Near P3	1.0km -NW
Habitation Near P4	320 m - NW
Habitation Near P5	-
Habitation Near E1	500 m -NW
Habitation Near E2	550 m -NW
Habitation Near E3	380 m -NW
Habitation Near E4	1.0km-NW

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 CLUSTER QUARRIES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	20	390m – NW	0.393
P2	20	310m – NW	0.567
P3	20	1.0km -NW	0.087
P4	20	320 m - NW	0.539
P5	-	-	-
E1	20	500 m -NW	0.264
E2	20	550 m -NW	0.227
E3	20	380 m -NW	0.409
E4	20	1.0km-NW	0.087

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

TABLE 7.19: SOCIO ECONOMIC BENEFITS FROM CLUSTER QUARRIES

Location ID	Project Cost	CER
P1	Rs. 1,90,71,000/-	Rs.5,00,000
P2	Rs. 1,16,18,000/-	Rs.5,00,000
P3	Rs.92,55,000/-	Rs.5,00,000
P4	Rs.83,05,593/-	Rs.5,00,000
P5	-	-
E1	Rs.87,17,800/-	Rs.5,00,000
E2	Rs.1, 70,52,500/-	Rs.5,00,000
E3	Rs.43, 36,000/-	Rs.5,00,000
E4	Rs. 1,46,95,000	Rs.5,00,000
Total	Rs.9,30,50,893/-	Rs.40,00,000

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 20,00,000/-**
- Existing Projects shall fund towards **CER- Rs.20,00,000/-**

TABLE 7.20: EMPLOYMENT BENEFITS FROM CLUSTER QUARRIES

Description	Employment
P1	22
P2	20
P3	15
P4	18
P5	-
Total	75

E1	21
E2	32
E3	12
E4	28
Total	93
Grand Total	168

A total of 75 people will get employment due to one proposed mines in cluster and 93 people are already employed at existing mines.

TABLE 7.21: GREENBELT DEVELOPMENT BENEFITS FROM CLUSTER QUARRIES

CODE	No of Trees proposed to be planted	Area Covered Sq.m	Name of the Species
P1	810	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development	Neem, Vilvam, Ashokha, Panai, etc.,
P2	540		
P3	645		
P4	200		
P5	-		
Total	2195		
E1	125		
E2	250		
E3	160		
E4	1110		
Total	1645		
G. Total	3840		

Based on the Proposed Mining Plans it's anticipated that there shall growth of native species of Neem, Vilvam, Ashokha, Panai etc., in the Cluster at a rate of 3840 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 Kodangipalayam Village aims to produce about 2,27,998m³ Rough Stone over a period of 5 Years and Gravel 9,362m³ for period of Three years. This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits.

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

8.1 EMPLOYMENT POTENTIAL

It is proposed to provide employment to about 42 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 Kodangipalayam 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 Ichipatti 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.

Project Proponents intends to spent Rs 10,00,000/- towards CER for the Government School near the project site the details are given below:

TABLE 8.1 CER – ACTION PLAN FOR P1 &P2

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 10,00,000/-

9. ENVIRONMENTAL COST BENEFIT ANALYSIS

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

10. ENVIRONMENTAL MANAGEMENT PLAN-P1

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. M.Devaraj will –

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

Description of the Administration and Technical Setup –

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

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
 - Analysis of the water and air samples collected through external laboratory
 - Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
 - Co-ordination of the environment related activities within the project as well as with outside agencies
 - Collection of health statistics of the workers and population of the surrounding villages
 - Green belt development
 - Monitoring the progress of implementation of the environmental monitoring programme
-

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

10.2. LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir and the remaining part of the area (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation will be developed under greenbelt development programme.

TABLE 10.1. PROPOSED CONTROLS FOR LAND ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.3. SOIL MANAGEMENT

There overburden in the form of Gravel which will directly loaded into tippers for the filling and levelling of low-lying areas.

TABLE 10.2. PROPOSED CONTROLS FOR SOIL MANAGEMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.4. WATER MANAGEMENT

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

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

TABLE 10.3. PROPOSED CONTROLS FOR WATER ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.5. AIR QUALITY MANAGEMENT

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

TABLE 10.4. PROPOSED CONTROLS FOR AIR ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.6. NOISE POLLUTION CONTROL

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

Source: Proposed by FAE's & EIA Coordinator

10.7. GROUND VIBRATION AND FLY ROCK CONTROL

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

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

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

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

TABLE 10.7: PROPOSED GREENBELT ACTIVITIES

No. of tress proposed to be planted	Area to be covered in m ²	Name of the species
810	The safety zone along the boundary barrier has been identified to be utilized for Greenbelt development.	Neem, Vilvam, Panai, Ashokha, 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,
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S.No	Botanical Name	Local Name	Importance
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3	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
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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.

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

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

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

TABLE 10.9. MEDICAL EXAMINATION SCHEDULE

Sl.No	Activities	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
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A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
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A	Physical Check – up					
B	Audiometric Test					
C	Eye Check – up					
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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.
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- Dust generating sources will be identified and proper control measure will be adopted.
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- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness and harmony amongst employees and co quarry owners.

FIGURE 10.1.: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS



10.9.3: Health and Safety Training Programme

The Proponent will provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State and engage Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner as per Metalliferous Mines Regulation, 1961.

10.9.4.: Budgetary Provision for Environmental Management –

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.10 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.10: EMP BUDGET FOR PROPOSED PROJECT

Activities	Mitigation Measure	Provision for Implementation	Capital	Recurring
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	16050	16050
	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 - 4 Units	100000	10000
	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 Governors @ 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	32100

	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 / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	357830
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000

	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff managent	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	16050	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	321000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 810 Trees - 700 Inside Lease Area & 110 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)	140000	21000
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	33000	3300
	4. Implementation of Final Mine Closure Actity 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	69450	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	1238643	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) - 22 Employees	88000	22000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	22000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	3210
	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	80250	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 (1 st Class / 2 nd 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 MoEF & CC OM	500000	0
TOTAL			2264350	1469990.2

*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 Ten years. The EMP has been prepared for the entire **lease period of 5 years** for the peak production capacity of **1,37,627m³ of Rough stone**.

Year	Total Cost
1 st	₹ 37,34,340/-
2 nd	₹ 15,43,490/-
3 rd	₹ 16,20,664/-
4 th	₹ 17,01,697/-
5 th	₹ 18,56,232/-
Total	₹105 Lakhs

Cost inflation 5% per annum

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.

10. ENVIRONMENTAL MANAGEMENT PLAN- P2

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. A. Duraisamy will –

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

Description of the Administration and Technical Setup –

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

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
 - Analysis of the water and air samples collected through external laboratory
 - Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
 - Co-ordination of the environment related activities within the project as well as with outside agencies
 - Collection of health statistics of the workers and population of the surrounding villages
 - Green belt development
 - Monitoring the progress of implementation of the environmental monitoring programme
-

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

10.2. LAND ENVIRONMENT MANAGEMENT –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir and the remaining part of the area (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation will be developed under greenbelt development programme.

TABLE 10.1. PROPOSED CONTROLS FOR LAND ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.3. SOIL MANAGEMENT

There overburden in the form of Gravel which will directly loaded into tippers for the filling and levelling of low-lying areas.

TABLE 10.2. PROPOSED CONTROLS FOR SOIL MANAGEMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.4. WATER MANAGEMENT

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

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

TABLE 10.3. PROPOSED CONTROLS FOR WATER ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.5. AIR QUALITY MANAGEMENT

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

TABLE 10.4. PROPOSED CONTROLS FOR AIR ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.6. NOISE POLLUTION CONTROL

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

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- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
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 - 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 – P2

Activities	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	10800	10800
	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	75000	7500
	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 Governors @ 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	21600

	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 / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	234965
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000

	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff managent	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	10800	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	216000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 540 Trees - 300 Inside Lease Area & 240 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)	60000	9000
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	72000	7200
	4. Implementation of Final Mine Closure Actity 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	41550	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	813339	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) - 20 Employees	80000	20000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	20000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	2160
	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	54000	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 (1 st Class / 2 nd 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 MoEF & CC OM	500000	0
TOTAL			2048600	1315724.6

*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 Ten years. The EMP has been prepared for the entire **lease period of 5 years** for the peak production capacity of **90371m³ of Rough stone**.

Year	Total Cost
1 st	₹ 33,64,325/-
2 nd	₹ 13,81,511/-
3 rd	₹ 14,50,586/-
4 th	₹ 15,23,116/-
5 th	₹ 16,40,821/-
Total	₹94 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 Kodangipalayam Rough Stone and Gravel Cluster Quarries (Extent:15.02.89) 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- Dec 2024 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 42 people directly in the proposed projects and indirectly around 80 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 Kodangipalayam Roughstone and Cluster Quarries (Extent – 15.02.89 ha).

12. DISCLOSURE OF CONSULTANT

M/s Geo Exploration and Mining Solutions, an Accredited Organization under Quality Council of India – National Accreditation Board for Education & Training, New Delhi, for carrying out the EIA Study as per the ToR Issued for the proposed project.

Name and address of the consultancy:

GEO EXPLORATION AND MINING SOLUTIONS

No 17, Advaita Ashram Road,

Alagapuram, Salem – 636 004

Tamil Nadu, India

Email: info@geoexploration@gmail.com

Web: www.gemssalem.com

Phone: 0427 2431989.

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

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

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

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

This EIA/EMP for Kodangipalayam Roughstone and Gravel Cluster Quarries over an Extent of 15.02.89 ha in Kodangipalayam 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:

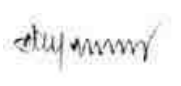
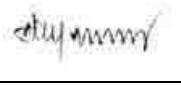


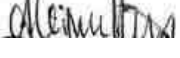
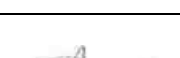
Period of Involvement: **June 2024 to till date**

Associated Team Member with EIA Coordinator:

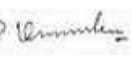
1. **Mr. S. Nagamani**
2. **Mr.P. Viswanathan**
3. **Mr. M. Santhoshkumar**
4. **Mr. S. Ilavarasan**

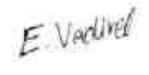
FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

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

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

LIST OF TEAM MEMBERS ENGAGED IN THIS PROJECT

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

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

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above-mentioned Functional Area Experts and Team Members prepared the Cluster EIA/EMP for Kodangipalayam Roughstone and Gravel cluster Quarries over an Extent of 15.02.89 ha in Kodangipalayam 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