

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENT MANAGEMENT PLAN

FOR OBTAINING

Environmental Clearance under EIA Notification – 2006

Schedule Sl. No. 1 (a) (i): Mining Project

“B1” CATEGORY-MINOR MINERAL-CLUSTER-NONFOREST LAND-FRESH QUARRY

CLUSTER EXTENT = 6.55.50 hectares

At

Maruthadu Village, Vandavasi Taluk,

Tiruvannamalai District, Tamil Nadu State

TOR File No. 12667 and ToR Identification No. TO25B0108TN5682706N Dated: 29.12.2025

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and address	Extent & S.F.No.	Production in m³ & Tons
M. Karthikeyan S/o. Manoharan, No. 2/21, West Street, Vadamalaipatti, Musiri Taluk, Thathiangarpet, Tiruchirappalli – 621 214.	1.96.03 ha & S.F. Nos. 973/1, 973/7B, 975/2, 977& 978/2	Rough stone 261380m ³ & 718795Ts Gravel 47070m ³ & 94140Ts

ENVIRONMENTAL CONSULTANT

GEO TECHNICAL MINING SOLUTIONS

No: 1/213-B, Ground Floor, Natesan Complex

Oddapatti, Collectorate Post office,

Dharmapuri-636705. Tamil Nadu.

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NABET ACC. NO: NABET/EIA/23-26/RA 0319



ENVIRONMENTAL LAB

INTERSTELLAR TESTING CENTRE Pvt. Ltd

Plot.No.2, Site No.12/2A,

Industrial Estate, Perungudi, Chennai, Tamil Nadu

NABL Certificate Number:TC-6952, Valid Until : 30.07.2026.

Baseline Study Period – Oct through Dec 2025

TERMS OF REFERENCE (ToR) COMPLIANCE

ToR File No.12667

ToR Identification No. TO25B0108TN5682706N, dated. 29/12/2025

Mr. M. Karthikeyan Rough Stone & Gravel Mining Lease

Specific Terms of Reference s for (Mining of Minerals)

1. Seac Conditions - Site Specific

S. No	Terms of Reference		Remarks
1.1	1	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental management, system of maintain the haul roads and village/panchayat roads, authorized blasting operation, Monitoring system of the environment & 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.	The PP will form a CMC and submit the affidavit including these conditions during the final EIA appraisal meeting.
	(ii)	The Organization chart of the Committee with defining the role of the members	
	(iii)	The 'Standard Operating Procedures' (SoP) executing the planned activities	
	2	The PP shall ensure the installation of CCTV at the proposed quarry site and ensure its inclusion during the EIA presentation.	The Photocopy of CCTV installation will be submitted in final EIA presentation.

2. Seac Standard Conditions

S. No	Terms of Reference		Remarks
2.1	1	In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following:	
	(i)	Original pit dimension	

		(ii)	Quantity achieved vs EC Approved Quantity	As it is a fresh quarry, these conditions are not applicable.
		(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 6m height and ultimate depth of not exceeding 50m.	
		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.	The VAO certificate is attached as Annexure IV, page no-275
	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		There are no permanent structures or any habitations within 500m radius of lease area, only two non-residing farm house situated beyond 300m distance.

		of residents, their profession and income, etc.	
	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.	Detailed hydrological study report will be submitted in the final EIA report.
	5	The Proponent shall carry out Bio-diversity study through reputed Institution and the same shall be included in EIA Report.	The Bio-diversity study report from the reputed institution will be submitted in the final EIA report.
	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.	The DFO letter will be submitted in the final EIA report.
	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	This is a fresh quarry lease.

	shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	
8	However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual ‘Slope Stability Plan’ for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level.	The approved and ultimate depth of this quarry is up to 30m below ground level only and will not extend beyond 30m. Hence, Slope Stability report might not require.
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.	The affidavit for blasting operation will be enclosed in the final EIA report.
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	A conceptual design of blasting has been given in Section 2.5.1 under Chapter II in the EIA report page 15.
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.	This is the only quarry in name of the lessee.
12	If the proponent has already carried out the mining activity in the proposed mining lease	Not applicable, it is a fresh quarry lease.

		area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,	
	13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	As it is a fresh quarry lease, these conditions are not applicable.
	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.	
	15	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Toposheet, 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).	All corner coordinates of the mine lease area have been superimposed on a high-resolution Google Earth Image, is shown in Figure 2.2 of Chapter II, page-9.

	16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.	The drone video will be submitted during final presentation.
	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.	Photographs of adequate fencing, green belt and safety distances of nearby quarries/lands will be included in final EIA Presentation.
	18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	The Resources and Reserves of Rough Stone were calculated based on cross-section method by plotting sections to cover the maximum lease area for the proposed project. The details reserve estimation has been shown in Table 2.5 under Chapter II in the EIA report page 12.
	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.	The chart including the role of statutory officials is prepared and given in Section – 2.8 of chapter-II of EIA report, page no-23.
	20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the	The hydro-geological study is discussed in the Section 3.2.2

		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.	under Chapter III in the EIA report page 43-53.
	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.	The baseline data was collected for the environmental components including land, soil, water, air, noise, biology, socio-economy, and traffic and the results have been discussed in Chapter III of EIA report, page 24-96.
	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.	Results of cumulative impact study due to mining operations are given in Section 7.4 under Chapter VII in the EIA report page 130-135.

23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	As part of rainwater harvesting measures, the rain water from garland drainage system will be diverted to nearby check dams after treating the water in settling tanks. The detailed rain water harvesting report will be included in final EIA report.
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.	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 has been discussed in Section 3.1.2 under Chapter III in the EIA report page 26-27. The details of surrounding sensitive ecological features have been provided in Table 3.36 under Chapter III in the EIA report page 95. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Table 2.9 under Chapter II in the EIA report page 18.

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, this rough stone and gravel is of 100% recovery. So, no waste rejects or dumps have been proposed in or outside the lease area. No requirement of R&R.
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.
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.	As part of rainwater harvesting measures, the rain water from garland drainage system will be diverted to nearby check dams after treating the water in settling tanks.
28	Impact on local transport infrastructure due to the Project should be indicated.	Details regarding impact of the project on traffic and transport infrastructure are given in Section 3.7 under Chapter III in the EIA report page 92-94.
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	A detailed tree survey was carried out within 300 m radius and the results have been discussed in

		buffer zone and its management during mining activity.	Section 3.5 under Chapter III in the EIA report page 66-76.
	30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	A progressive mine closure plan has given in chapter-IV, section-4.10, page-118-119. The budget details for the progressive mine closure plan are shown in Table 10.1 under Chapter X in the EIA report page 147.
	31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	The EIA coordinator and the FAE for ecology and biodiversity visited the study area and educated the local students about the importance of protecting the biological environment.
	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.	A detailed greenbelt development plan has been provided in Section 4.6 under Chapter IV in the EIA report page 114.
	33	Taller/one year old Saplings raised in appropriate size of bags; preferably ecofriendly bags should be planted as per the	The FAE of ecology and biodiversity has advised the project proponent that saplings of

		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.	one year old raised in the eco-friendly bags should be purchased and planted with the spacing of 3 m between each plant around the proposed project area as per the advice of local forest authorities/botanist. The green belt development plan including planting procedure is discussed in Section 7.4.4, page-135,136.
	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.	The disaster management plan for the project has been prepared and provided in Section 7.3 under Chapter VII in the EIA report page 129,130.
	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.	Risk assessment plan for the project has been prepared and provided in Section 7.2 under Chapter VII in the EIA report page 126-129.
	36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health impacts of the project and preventive measures have been discussed in detail in Section 4.8 under Chapter IV in the EIA report 116-118.

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.	No public health implications are anticipated due to this project. Details of CSR and CER activities have been discussed in Sections 8.6 and 8.7 under Chapter VIII in the EIA report page 139-140.
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.	No negative impact on socio-economic environment of the study area is anticipated and this project shall benefit the socio-economic environment by offering employment for 20 people directly as discussed in Section 8.2 under Chapter VIII in the EIA report page 138.
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 in any court 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.	The benefits of the project in all these aspects are discussed in the Chapter VIII in the EIA report page 138-140.
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	It is fresh lease area and the condition is not applicable.

		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.	A detailed environment management plan has been prepared following the suggestion made by SEAC, is added as Chapter X in the EIA report page 142-148. The sworn affidavit stating to abide the EMP for the entire life of mine will be submitted in final EIA report.
	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.	This EIA report has been prepared keeping in mind that, fact concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may lead to withdrawal of this terms of reference besides attracting penal provisions in the Environment (Protection) Act, 1986.

3. Seiaa Specific Conditions

S.No	Terms of Reference	Remarks
3.1	After detailed discussions, the Authority accepts the recommendation of SEAC-I and decided to grant Terms of Reference (ToR) along with Public Hearing for the quantity of 2,61,380m³ of Rough Stone & 47070 m³ of Gravel up to the depth of 30m BGL as per the approved mining plan, under cluster for undertaking the combined Environment Impact Assessment Study and preparation of separate Environment Management Plan subject to the conditions as recommended by SEAC-I & normal conditions & the SEIAA Standard conditions.	The proponent thanking the authorities for granting the ToR with Public Hearing for quantity of 2,61,380m ³ of Rough Stone & 47070 m ³ of Gravel up to the depth of 30m BGL, as per the approved mining plan. Will undergo a combined EIA study and prepare the EMP as per the recommendations.

4. Seiaa Standard Conditions:

S.No	Terms of Reference		Remarks
	Cluster Management Committee		
4.1	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.	A cluster management committee including all cluster proponents will be constituted by the proponent.
	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.	The members of the cluster management committee will coordinate among themselves in effective implementation of EMP.

	3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	The list of members of the committee formed will be submitted to AD/Mines before the execution of mining lease and updated every year.
	4	Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	The plan has prepared and information regarding haul roads as route map and network has been discussed in Section 2.5.2 under Chapter II in the EIA report page 17,18.
	5	The committee shall deliberate on risk 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.	The committee will frame the risk management plan including the evacuation plan in a holistic manner. However, quarrying will be stopped during the intense rain conditions.
	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.	It will be advised by the proponent to the cluster management committee 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 will be given in detail.

	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.	The proper action plan regarding the restoration will be framed and followed by the committee.
	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.	The health status of workers and the local people will be monitored and updated periodically.
	Agriculture & Agro-Biodiversity		
	9	Impact on surrounding agricultural fields around the proposed mining Area.	There shall be negligible air emissions or effluents from the project site. During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly, as shown in Section 4.6.4 under Chapter IV in the EIA report page 115.
	10	Impact on soil, flora & vegetation around the project site.	The details on flora have been provided in Section 3.5 under Chapter III in the EIA report page 69-76. There is no schedule I species of animals observed within study area. There is no endangered red list species found in the study area.

	11	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	Details of vegetation in the lease area have been provided in Section 3.6 under Chapter III in the EIA report page 66-76. Details about transplantation of plants have been provided in Section 4.6 under Chapter IV in the EIA report page 114.
	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.	The ecological details have been provided in Section 3.5 under Chapter III in the EIA report page 66-81 and measures have been provided in Section 4.6 under Chapter IV in the EIA report page 113-115.
	13	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	All the essential environmental protective measures will be followed by the proponent to manage the surrounding environment and restore the ecosystem, as discussed in Chapter IV in the EIA report page 97-119.
	14	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.	The impact of project on the land environment has been discussed in Section 4.1 under Chapter IV in the EIA report page 98,99.
	Forests		
	15	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	The project proponent will do barbed wire fencing work around

			the lease area to prevent wildlife from entering the site. A full-time watchman has been appointed in advance to restrict the movements of the local people nearby the quarry site.
	16	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	The impacts of the project on ecology and biodiversity have been discussed in Section 4.6 under Chapter IV in the EIA report page 113-115.
	17	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	The impacts of the project on standing trees and the existing trees have been discussed in Section 4.6 under Chapter IV in the EIA report page 113-115.
	18	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	There are no such areas nearby project site. Protected areas, National Parks, Corridors and Wildlife pathways near project site within 10 km radius has been provided in Table 3.36 under Chapter III in the EIA report page 95
	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.	The detailed hydro-geological study is carried out and results are discussed in chapter-III of EIA report page- 38-54
	20	Erosion Control measures.	Garland drainage structures will be constructed around the lease area to control the erosion and afforestation will be done in order to restore the stability of the terrain, discussed in Section 4.3 under Chapter IV in the EIA report page 101.
	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.	The impacts have been discussed and provided in Chapter IV of EIA report page 97-117
	22	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	An analysis for food chain in aquatic ecosystem is discussed in Section 3.5.3 under Chapter 3 in the EIA report page 79-81

	23	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	The impacts of the proposed project on the surrounding environment are discussed in Chapter IV in the EIA report page 97-119.
	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.	The impact of the proposed project on aquatic plants and animals in water bodies has been discussed in Section 4.6 under Chapter IV in the EIA report page 113-115.
	25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The impact of mining on soil environment has been discussed in Section 4.2 under Chapter IV in the EIA report page 99,100.
	26	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	The impacts on water bodies, streams, lakes have been discussed in Section 4.3 under Chapter IV in the EIA report page 100-102.
	27	The EIA shall include the impact of mining activity on the following:	
		a. Hydrothermal / Geothermal effect due to destruction in the Environment	The average geothermal gradient of earth is 25 ⁰ C/km. As the proposed depth of mining is 30m below the local ground level, the temperature will increase by 1.05 ⁰ C at the depth of mining. So, there will be no effect on environment.

		b. Bio-geochemical processes and its foot prints including environmental stress.	No Bio-geochemical processes are anticipated as the quarrying is of hard rock type. At the end of life of mine, the proposed quarry shall be left as an artificial reservoir structure to collect rain water and will enrich the ecosystem.
		c. Sediment geochemistry in the surface streams	There will be no effect on sediment geochemistry and are discussed in the Table 3.4 under Chapter III in the EIA report page 35.
	Energy		
	28	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilize the Energy shall be furnished.	The measures taken to control noise, air, water, and dust are furnished in Chapter IV of the EIA report page 100-110.
	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.	The carbon emission and the measures to mitigate carbon emission have been discussed in Section 4.6 under Chapter IV in the EIA report page 113-115.
	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.	These aspects have been discussed in Chapter III of the EIA report page 33-37.

	31	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	There will be no such emission impact to local livelihood from this quarry project. All the vehicles used for transportation of the quarry materials will be maintained regularly to keep the GHGs emission within statutory limits.
	Mine Closure Plan		
	32	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	This is a fresh lease; a progressive mine closure plan has been given in Chapter-IV, page-118,119. The budget details for the progressive mine closure plan are shown in Table 10.1 under Chapter X in the EIA report page 147.
	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.	A detailed Environment Management plan has been given as Chapter X in the EIA report page 142-148.
	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.	Environment Management plan with budget has been furnished in Tables 10.1 & 10.2 under Chapter X in the EIA report page 143-148.
Risk Assessment			

	35	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	The risk assessment and management plan for this project has been prepared and provided in Section 7.2 under Chapter VII in the EIA report page 126-129.
	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.	The disaster management plan for this project has been prepared and provided in Section 7.3 under Chapter VII in the EIA report page 129,130.
	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.	The VAO certificate is included as Annexure-IV, page-275.
	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 concerns raised during the public consultation will be submitted in final EIA report.

	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.	The plastic waste management has been discussed in Section 7.5 of Chapter VII in the EIA report page 137.

Standard Terms of Reference for (Mining of minerals)

1.

S.No	Terms of Reference	Remarks
1.1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable, this a fresh quarry lease.
1.2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The proposed site for quarrying is a private land. A copy of the document showing that the proponent is the rightful lessee has been enclosed as Annexure, pages-234-247.
1.3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All the documents are in the name of the lessee.

1.4	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).	All corner coordinates of the mine lease area have been superimposed on a high-resolution Google Earth Image, is shown in Figure 2.2 of Chapter II, page-9.
1.5	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.	Toposheets of Survey of India have been used for showing sampling locations of air, soil, water, and noise, is shown in Chapter III of EIA report, pages-34,39.
1.6	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 lease area was inspected by the officers of Department of Mining and Geology along with revenue officials and found that the land is fit for quarrying under the policy of State Government.
1.7	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	The proponent has framed Environmental Policy and the same has been furnished in Section 10.1 under Chapter X, pp.142,143.

	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.	
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 Manual 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 45 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.
1.9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	The study area considered for this study is of 5 km radius for air, soil, water, and noise level sample collections, while the study area is 10 km radius for ecology and biodiversity studies. All data contained in the EIA report is for life of the mine / Lease period.
1.10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory	Land use of the study area delineating the features has been discussed in Section 3.1.2 under Chapter III, pp.26,27.

	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.	The details of surrounding sensitive ecological features have been provided in Table 3.36 under Chapter III, p.95 Land use plan of the project area showing pre- operational, operational and post-operational phases are discussed in Table 2.9 under Chapter II, p 18.
1.11	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, the rough stone excavation is of 100% recovery, no dump or overburden will remain in or around the lease area.
1.12	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 State Expert Appraisal Committees.	Not applicable, as No forest land involved. The details have been given in Table 3.36 under Chapter III, p.95.
1.13	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present	Not applicable, as the proposed project area does not involve any forest land.

	value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	
1.14	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 as there are neither forests nor forest dwellers / forest dependent communities in the mine lease area. There shall be no forest impacted families (PF) or people (PP).
1.15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No Reserve Forest is found within the study area. The details of reserve forest within 10km have been tabulated in Table 3.36 under Chapter III, p.95. Flora and Fauna vegetation details are discussed in section 3.5.1 and 3.5.2 under chapter III, p.67-79.
1.16	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.	There is no any wildlife/protected area from the periphery of the project area. Information regarding wildlife /protected area within 10km has been given in Table 3.36 under Chapter III, page 95. Impact on Fauna and mitigation measures are given in section 4.6 under chapter IV, p.113-116
1.17	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	The details of National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km radius from the periphery of the project

	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.	area furnished in Table 3.36 of Chapter III, p.95.
1.18	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.	A detailed biological study was carried out in both core and buffer zones and the results have been discussed in Section 3.5 of Chapter III, pp.66-81.
1.19	Proximity to Areas declared as Critically Polluted or the Project areas likely to come under the Aravali Range, (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed	Not Applicable. Project area / Study area is not included in 'Critically Polluted' Area and does not come under 'Aravalli Range'.

	Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.	
1.20	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.
1.21	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	Not Applicable. There are no approved habitations of SCs/STs or any other weaker sections in the lease area. R&R Plan might not require.

	and socio-economic aspects should be discussed in the Report	
1.22	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 the period of October 2025 - December 2025 as per CPCB notification and MoEF & CC Guidelines. Primary baseline data and the results have been discussed in Sections 3.1-3.8 of Chapter III, pp. 25-96.
1.23	Air quality modeling 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 modeling should be	Air quality modelling for prediction of incremental GLCs of pollutants was carried out using AERMOD view 11.2.0. The model results have been discussed in Section 4.4 under the Chapter IV, pp.103-108.

	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.	
1.24	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.	The water requirement for the project, its availability and source have been provided in Table 2.11 under Chapter II, p.20.
1.25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not Applicable. Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved water vendors.
1.26	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.	Part of the working pit will be allowed to collect rain water during the spell of rain. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan has been prepared for converting the excavated pit into rain water harvesting structure will serve as water reservoir for nearby villages during droughts.

1.27	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 environment including surface water and ground water have been discussed in Section 4.3 under Chapter IV, pp. 100-102.
1.28	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 State Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished	Not Applicable. The ground water table is found at the depth of 65-60 m below ground level. The ultimate depth of quarry is 30m BGL Therefore, the mining activity will not intersect the ground water table. Data regarding the occurrence of groundwater table have been provided in Section 3.2 under Chapter III, pp.44-53.
1.29	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	Not Applicable. There are no streams, seasonal or other water bodies passing within the project area. Therefore, no modification or diversion of water bodies is anticipated.
1.30	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.	The highest elevation of the project area is 88m. Ultimate depth of the mine is 30m BGL. Depth to the water level in the area is 65-60m BGL.

		Schematic diagram for the same is included in chapter III, page no-53.
1.31	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.	Greenbelt development plan has given in Section 4.6 under Chapter IV, pp.113,114.
1.32	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.	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 are provided in Section 3.7 under Chapter III, p.92-94.

	Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	
1.33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities which are to be provided for mine workers has been discussed in Section 2.5.6 of Chapter II, page.20.
1.34	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.	Progressive mine closure plan has been prepared for this project and is given in under Section 4.10 under Chapter IV, p.118,119.
1.35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health impacts of the project and preventive measures have been explained in Section 4.8 of Chapter IV, pp.116-118.
1.36	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.	No public health implications are anticipated due to this project. The workers will be provided with face masks, helmets, rain coats, first aid kits etc. Regular health check-up will be conducted and medications will be provided, if needed.
1.37	Measures of socio-economic significance and influence to the local community	No negative impact on socio-economic environment of the study area is

	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.	anticipated and this project shall benefit the socio-economic environment by offering employment for 20 people directly as discussed in Section 4.7 under Chapter IV, p.116.
1.38	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	A detailed Environment Management Plan has been prepared and provided in Tables 10.1 & 10.2 of Chapter X, page-143-148.
1.39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project	The minutes of public hearing along with proponent responses will be included in final EIA report.
1.40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given	No litigation is pending in any court against this project.
1.41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out	Project Cost is Rs.83,68,000/- CER Cost is Rs. 5,00,000/- In order to implement the environmental protection measures, an amount of Rs. 26,16,012 as capital cost and recurring cost as Rs. 18,83,926 as recurring cost/annum is proposed considering present market price considering present

		market scenario for the proposed project. After the adjustment of 5% inflation per year, the overall EMP cost for 5 years will be Rs. 2,67,65,180, as shown in Tables 10.1 & 10.2 under Chapter X, pp.143-148.
1.42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report	The disaster management plan for this project has been prepared and provided in Section 7.3 of Chapter VII, page129-130.
1.43	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.	Benefits of the project in all aspects is given as Chapter VIII in EIA report page-138-140.
1.44	Besides the above, the below mentioned general points are also to be followed	
a)	All documents to be properly referenced with index and continuous page numbering	All the documents are properly referenced with index and continuous page numbering.
b)	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 have been mentioned.
c)	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.	All Original reports of Baseline samples analysis/testing will be included in final EIA report.
d)	Where the documents provided are in a language other than English, an English translation should be provided.	All the documents provided are in English language only.

e)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	The questionnaire will be included in final EIA report.
f)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF 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 4 th August, 2009 have been followed while preparing this EIA report.
g)	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.	No changes are made in the basic scope and the project parameters.
h)	As per the circular no. J 11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	It is a new lease area; this condition is not applicable.

	(i) The EIA report should also include (ii) Surface plan of the area indicating contours of main topographic features, drainage and mining area, (iii) Geological maps and sections, (iv) Sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	All the plans including surface & geological plans, and progressive closure plan have been included as Annexures, pages-264-270.

STANDARD TERMS OF REFERENCE

1.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable, it is fresh quarry lease.
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 proposed site for quarrying is a private land. A copy of the document showing that the proponent is the rightful lessee has been enclosed along with the approved mining plan in Annexure, pages-.233-247.
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All the documents are in the name of the lessee.

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).	All corner coordinates of the mine lease area have been superimposed on a high-resolution Google Earth Image, is shown in Figure 2.2 of Chapter II in the EIA report page 9.
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.	Toposheets of Survey of India have been used for showing sampling locations of air, soil, water, and noise, are shown in Chapter III in the EIA report page 34,39.
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 lease area was inspected by the officers of Department of Geology and Mining 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	The Environmental Policy is discussed in the Section 10.1 of Chapter X in the EIA report page 142.

	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	
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 Manual 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 45° bench angles. Quarrying activities will be carried out under the supervision of Competent Persons like Mines Manager, Mines Foreman and Mining Mate. Necessary permissions will be obtained from DGMS after obtaining Environmental Clearance.
9.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	The study area considered for this study is of 5 km radius for air, soil, water, and noise level sample collections, while the study area is 10 km radius for ecology and bio-diversity studies 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	Land use of the study area delineating features has been discussed in figure

	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.	3.1.2 under Chapter III in the EIA report page 26,27. The details of surrounding sensitive ecological features have been provided in Table 3.36 under Chapter III in the EIA report page 95. Land use plan of the project area showing pre- operational, operational and post- operational phases are tabulated in Table 2.9 under Chapter II in the EIA report page 18.
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.	It is not applicable, rough stone is of 100% recovery and no dumps have been proposed outside the lease area. The entire quarried rough stone will be transported to the needy customers. No raise of R&R
12.	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.	It is not applicable, as no forest land involved within the proposed project area. The details of RF nearby the lease area is given in Table 3.36 under Chapter III in the EIA report page 95.

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.	It is not applicable, as 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 as there are neither forests nor forest dwellers / forest dependent communities in the mine lease area.
15.	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	There is no any reserve forest in the study area. The details of reserve forest nearby are listed in the Table 3.36 under Chapter III in the EIA report page 95.
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.	There is no any wildlife/protected area within 10 km radius from the periphery of the project area. Information regarding the same has been given in Table 3.36 under Chapter III in the EIA report page 95.
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	There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/ Elephant Reserves within 10 km radius from the periphery of the project area.

	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.	Information regarding the same has been given in Table 3.36 under Chapter III in the EIA report page 95.
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.	A detailed biological study was carried out in both core and buffer zones and the results have been discussed in Section 3.5 under Chapter III in the EIA report page 66-81.
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	Not Applicable. Project area / Study area is not listed in 'Critically Polluted' Area and does not come under 'Aravalli Range'.

	Mining Department should be secured and 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 aspect should be discussed in the Report	Not Applicable. There are no approved habitations of SCs/STs and other weaker sections in the lease area. Therefore, R&R Plan / Compensation Plan might not require.

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 the period of October - December 2025 as per CPCB notification and MoEF & CC Guidelines. Primary baseline data and the results have been included and discussed in Sections 3.1-3.8 of Chapter III in the EIA report page 24-96.
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-	Air quality modelling for prediction of incremental GLCs of pollutants was carried out using AERMOD view 11.2.0. The model results have been given in Section 4.4 under the Chapter IV in the EIA report page 103-108.

	dominant wind direction may also be indicated on the map	
24.	The water requirement for the project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the project should be indicated.	The water requirement for the project, its availability and source have been provided in Table 2.11 under Chapter II in the EIA report page 20.
25.	Necessary clearance from the competent Authority for drawl of requisite quantity of water for the project should be provided.	Not Applicable. Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater /seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved local water vendors.
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.	Part of the working pit will be allowed to collect rain water during the spell of rain. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan has been prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for nearby villages during droughts.
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 environment including surface water and ground water have been discussed in Section 4.3 of Chapter IV in the EIA report page 100-102.

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 found at the depth of 60-65m below ground level. The ultimate depth of quarry is 30m BGL. Therefore, the mining activity will not intersect the ground water table. Data regarding the occurrence of groundwater table have been provided in Section 3.3 under Chapter III in the EIA report page 43-53.
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	Not Applicable. There are no streams, seasonal or other water bodies passing within the project area. Therefore, no modification or diversion of water bodies is anticipated.
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.	The highest elevation of the project area is 88m. The ultimate depth of quarry is 30m BGL. Depth to the water level in the area is 60-65m below the ground level. Schematic diagram is provided in Chapter-III, page-53.
31.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and	Greenbelt development plan has been prepared and given in Section 4.6 under

	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.	Chapter IV in the EIA report page 113-114.
32.	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Traffic density survey was carried out to 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 have been provided in Section 3.7 under Chapter III in the EIA report page 92-94.

33.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities which are to be provided for mine workers after the grant of quarry lease has been discussed in Section 2.5.6 under Chapter II in the EIA report page 20.
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.	Progressive mine closure plan has been prepared for this project and is given in Section 4.10 under Chapter IV in the EIA report page 118-119
35.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health impacts of the project and preventive measures have been explained in Section 4.8 under Chapter IV in the EIA report page 116-118.
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.	No public health implications are anticipated due to this project. The workers will be provided with face masks, helmets, rain coats, first aid kits etc. Regular health check-up will be conducted and medications will be provided, if needed.
37.	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should	No negative impact on socio-economic environment of the study area is anticipated and this project shall benefit

	be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	the socio-economic environment by offering employment for 20 people directly and many indirectly as discussed in Chapter VIII 138-140.
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.	A detailed Environment Management Plan has been prepared and provided in Table 10.1 & 10.2 under Chapter X in the EIA report page 143-148.
39.	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The minutes of public hearing and commitment of PP will be included in final EIA report.
40.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost is Rs. 83,68,000/- CER Cost is Rs. 5,00,000/- In order to implement the environmental protection measures, an amount of Rs. 26,16,012 as capital cost and recurring cost as Rs. 18,83,926 as recurring cost/annum is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per

		year, the overall EMP cost for 05 years will be Rs. 2,67,65,180 and shown in Tables 10.1 & 10.2 of Chapter X, pp.143-148.
42.	A disaster management plan shall be prepared and included in the EIA/EMP Report.	The disaster management plan for this project has been provided in Section 7.3 under Chapter VII in the EIA report page 129-130.
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.	Benefits of the project in all aspects have been given as Chapter VIII in the EIA report page 138-140.
44	Besides the above, the below mentioned general points are also to be followed:	
a)	Executive Summary of the EIA/EMP Report.	Executive summary has been enclosed as a separate booklet.
b)	All documents to be properly referenced with index and continuous page numbering.	All the documents have been 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 have been mentioned.
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.	All Original reports of Baseline sample analysis/testing will be submitted in the final EIA report.

e)	Where the documents provided are in a language other than English, an English translation should be provided.	All the documents provided here are in English language only.
f)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	The questionnaire will be submitted in the final EIA 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 4 th August, 2009 have been followed while preparing this EIA report.
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	No changes are made in the basic scope and the project parameters.
i)	As per the circular no. J-11011/618/2010- IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of	As it is a new lease area, this condition is not applicable.

	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.	All the plans including surface & geological plans, and progressive closure plan have been included as Annexures, pages- 264-270.

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CHAPTER I

INTRODUCTION

1.0 PREAMBLE

Environmental Impact Assessment (EIA) study is a process used to identify the environmental, social and economic impacts of a project prior to decision-making. EIA systematically examines both beneficial and adverse consequences of the proposed project and ensure that these impacts are considered during the project designing. According to the Ministry of Environment and Forests, Govt. of India, EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments the projects are categorized into A, B1 & B2 to determine the level of scrutiny and process. The mining projects whose extent is ≥ 5 ha or the cluster of quarries (if homogeneous mineral) within 500m radius extent is greater than 5ha falls under category B1. These projects require preparation and submission of an EIA report after public consultation to SEIAA to obtain environmental clearance as per the Office Memorandum F.No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018.

1.1 PURPOSE OF THE REPORT

The purpose of the report is to evaluate the project's potential environmental, social and economic effects of the before it is implemented adhering to the guidelines outlined in the MoEF & CC Notification, S.O. 996 (E) dated 10.04.2015 and MoEF & CC Office Memorandum dated 29.08.2017.

1.2 ENVIRONMENTAL CLEARANCE

The Environmental Clearance process for the project will comprise of four stages. These stages are screening, scoping, public consultation & appraisal.

Screening

The project had applied in PARIVESH 2.0 proposal no. SIA/TN/MIN/550052/2025, Dated:01.09.2025 to obtain terms of reference.

Scoping

The mechanism for issuing online system generated Standard ToR as well as reference to SEAC has been enabled on the PARIVESH Portal on the acceptance of the complete application online. The concerned Member Secretary of SEAC shall refer the project to the concerned SEAC for prescribing additional ToR as per the circular F.No. IA 3-22/15/2022-IA-III [Computer No 178038] Dated: 6th May 2022.

Public Consultation

In this stage, an application along with the draft EIA and EMP report will be made to the Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) and request to conduct Public Hearing as per EIA notification 2006. The outcome of the public hearing Details given in Final EIA Report.

Appraisal

In this stage, the final EIA report will submit in PARIVESH 2.0 to SEIAA, TN. Based on the recommendations of SEAC the SEIAA, TN will grant EC or castoff.

1.3 TERMS OF REFERENCE (ToR)

The total extent of quarries within the 500m radius is greater than 5 ha. The details of the quarries within the cluster are given in Table 1.1.

Table 1.1 Details of quarries within the cluster of 500m radius

Proposed Quarries					
Code	Name of the Owner	S.F. No	Village	Extent (ha)	Status
P1	M.Karthikeyan	973/1, 973/7B, 975/2, 977 & 978/2	Maruthadu	1.96.03	Proposed Area
P2	R.Arul	965/1A,965/1B,965/1C, 965/1D,965/2A1 & 965/2B1	Maruthadu	2.28.5	Applied Area
Existing Quarries					
E1	M/s.Dwarkamai Mines	942/4A, 973/2, 973/7A, 973/9, 973/10A,973/10B & 975/1	Maruthadu	2.30.97	10.02.2025 to 09.02.2030
Total Cluster Extent				6.55.50	---

Source: DD Letter: Rc.No.452/Kanimam/2025, Dated:17.07.2025

The file was appraised in 623th SEAC meeting on 23.09.2025 and issued terms of reference (ToR) identification no **TO25B0108TN5682706N** on **29.12.2025** by SEIAA, TN.

1.4 POST ENVIRONMENT CLEARANCE MONITORING

- The project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and the details of the website where it is displayed.

- The project proponent will submit a half-yearly compliance report of the stipulated environmental conditions to Regional Office, MoEF & CC & SEIAA on 1st June and 1st December of every year.

1.5 TRANSFERABILITY OF ENVIRONMENTAL CLEARANCE

The prior environmental clearance granted for a project or activity may be transferred as per the provisions of para 11 of the Environmental Impact Assessment Notification, 2006 and its subsequent amendments and the office memorandum File No. IA3-22/19/2023-IA.III [E226246] Dated: 3rd November 2023.

1.6 IDENTIFICATION OF THE PROJECT PROPONENT

The details of the project proponent are given in Table 1.2 below.

1.2 Details of Project Proponent

Name of the Project Proponent	M. Karthikeyan
Address	S/o. Manoharan, No. 2/21, West Street, Vadamalaipatti, Musiri Taluk, Thathiengarpur, Tiruchirappalli – 621 214.
Status	Proponent

1.7 BRIEF DESCRIPTION OF THE PROJECT

The method adopted for rough stone excavation is open cast semi mechanized method involving formation of benches with 5m height and 5m width and the overall bench slope is less than 65°. The quarry operation involves shallow jackhammer drilling, slurry blasting, excavation, loading and transportation.

The overall extent of the project site is 1.96.03ha and it is located in Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu.

The proposed project deals with excavation of rough stone and gravel which is primarily used in construction projects. The increasing demand for rough stone fueled by a booming construction industry presents a valuable opportunity. This project will not only meet the rising demand for rough stone but also create jobs for the surrounding villages.

1.8 SCOPE OF THE STUDY

The main scope of the EIA study is to quantify the cumulative impact of the quarries in the cluster and formulate the effective mitigation measures. The baseline monitoring study has been carried out during the period of **Oct to Dec 2025** for various environmental components such as land, soil, air, water, noise, ecology, etc. to assess the anticipated impacts of the cluster on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

1.9 Legislation Applicable to Mining of Mineral Sector

A few important legislations are given below:

- ❖ The Mines Act, 1952
- ❖ The Mines and Mineral (Development and Regulation) Act, 1957
- ❖ Mines Rules, 1955
- ❖ Mineral Concession Rules, 1960
- ❖ Mineral Conservation and Development Rules, 1988
- ❖ State Minor Mineral Concession Rules, 1960
- ❖ Granite Conservation and Development Rule, 1999
- ❖ The Water (Prevention and Control of pollution) Act, 1974
- ❖ The Air (Prevention and Control of pollution) Act, 1981
- ❖ The Environment (Protection) Act, 1986
- ❖ The Forest (Conservation) Act, 1988
- ❖ The Wildlife (Protection) Act, 1972.

CHAPTER II

PROJECT DESCRIPTION

2.0 DECSRIPTION OF THE PROJECT

The proponent M.Karthikeyan is involved in the mining and its auxiliary activities. The proponent had applied for quarry lease on 16.06.2025 to extract rough stone and gravel. The precise area communication letter was issued by Deputy Director of Geology and Mining, Tiruvannamalai vide (Roc.No.452/Mines/2025, Dated 14.07.2025). The mining plan thus prepared was approved by Deputy Director Department of Geology and Mining, Tiruvannamalai (Rc.No.452/Kanimam/2025 Dated 17.07.2025). The project area and the proposed excavation details were given in Table 2.1.

Table 2.1 Proposed project area and excavation details

Name of the Quarry	M.Karthikeyan	
Type of Land	Patta Land	
Extent	1.96.03ha	
S.F. No	973/1, 973/7B, 975/2, 977& 978/2	
Toposheet No	57 P/11	
Highest Elevation	88m AMSL	
Latitude	12°28'33.39"N to 12°28'38.60"N	
Longitude	79°40'6.30"E to 79°40'12.51"E	
Proposed depth as per ToR	30m BGL	
Ultimate depth for ten years	30m BGL	
Geological Resources	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	528687 & 1453889	58743 & 117486
Mineable Reserves	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	261380 & 718795	47070 & 94140
Proposed production for 10 years	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	261380 & 718795	47070 & 94140
Method of Mining	Open cast mechanized mining method	
Topography	Flat Terrain	
Machinery requirements	Jack hammer	2
	Excavator	1
	Compressor	1
	Tipper	8
Proposed Manpower Deployment	20	
Project Cost	Rs.83,68,000/-	
Proposed Water Requirement	3.5 KLD	

2.1 LOCATION AND ACCESSIBILITY

The proposed quarry project is located in Maruthadu village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu as shown in Figure 2.1.

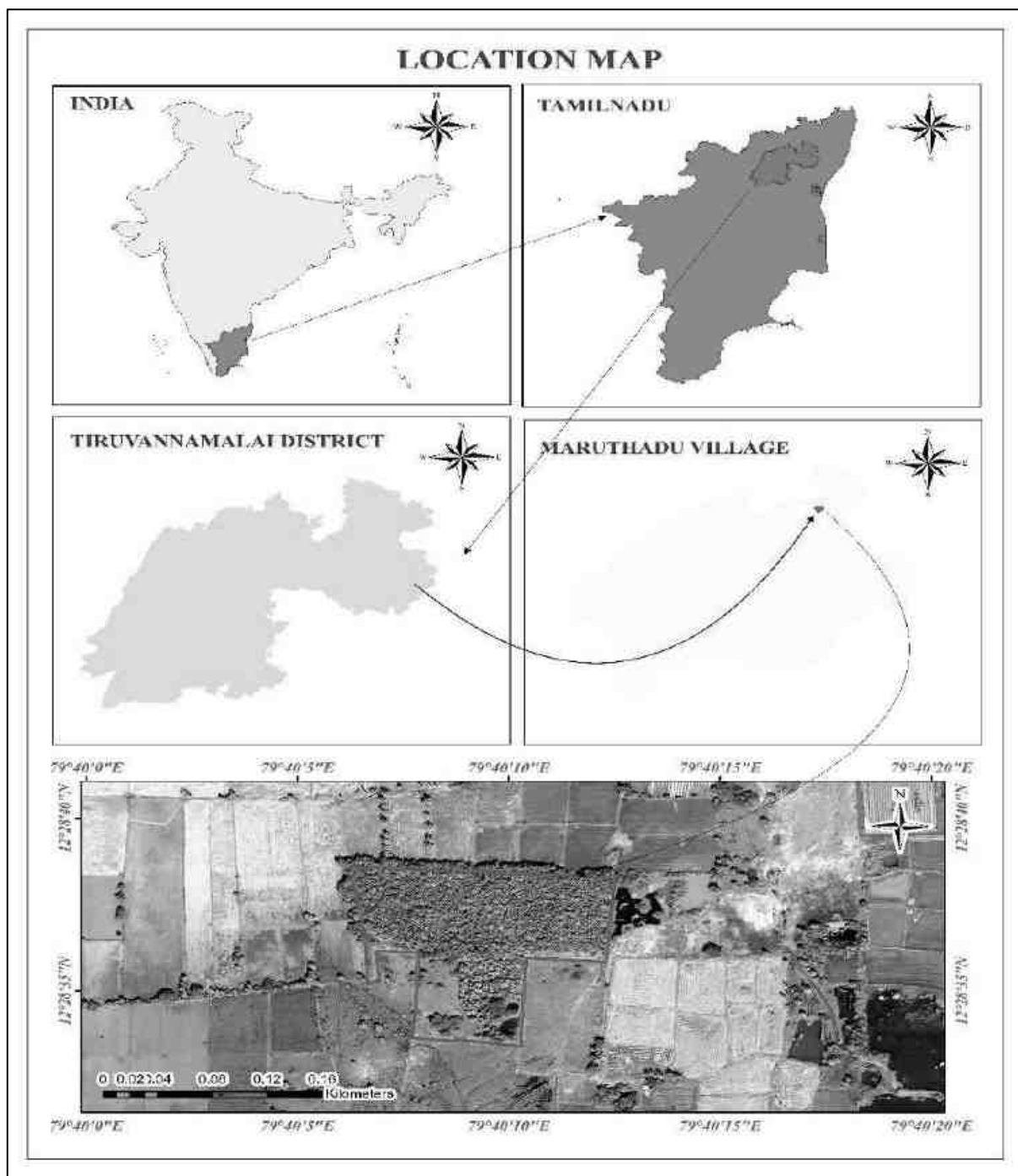


Figure 2.1 Key Map Showing Location of Project Site

The site can be reached through SH-115 (Vandavasi-Melmaruvathur road). By travelling 8.5km from Vandavasi in SH-115 turning right in Osur village road upto 1.5km and then a left turn into earthen road upto 1.3km to visit the site on left side. Accessibility details to the proposed project site have been given in Table 2.2.

Table 2.2 Site Connectivity to the Project Area

Type of Features	Name/Location	Distance (km)	Direction
Bituminous road	Osuri Village road	1.5	W
Nearest Roadways	SH – 115 (Vandavasi-Melmauvathur)	1.7	N
Nearest Town	Vandavasi	8.5	NW
Nearest Airport	Chennai	78.7	NE
Nearest Villages	Maruthadu	1.4	N
	Kottai	2.8	E
	punnai	1.6	S
	Kodanallur	2.5	W

2.2 LEASEHOLD AREA

The details of the field survey number, subdivision and their extent and the overall extent of the proposed project site is given in Table 2.3.

Table 2.3 Lease hold area details

Survey No	Sub Division	Total Extent in Hect	Patta No.	Village and Name of the Land Owner	Mine lease Applied S.F.No.	Mine lease Applied area out of total area in hect.
973	1	0.47.00	5309	Mr.A.Rakesh (@) Logeshwaran S/o.Arumugam	973/1	0.47.00
973	7B	0.03.23			973/7B	0.03.23
975	2	0.07.30			975/2	0.07.30
977	--	0.02.50			977	0.02.50
978	2	1.36.00			978/2	1.36.00
Total Extent		1.96.03	Applied lease area extent			1.96.03

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

The overall extent of the project area is 1.96.03Ha as per the precise area communication letter vide Roc.No.452/Mines/2025, dated 14.07.2025 issued by Dept of Geology and Mining, Tiruvannamalai District lies near the Maruthadu village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu. The breakup of the existing land use for mining and ancillary feature is given in Table 2.3a.

Table 2.3a Present Land use pattern of the project area

Sl. No.	Land Use	Present area (Hect.)
1.	Area under Mining	Nil
2	Infrastructure	Nil
3	Roads	Nil
4	Unutilized	1.96.03
5	Green Belt	Nil
6	Settling Tank & Drainage	Nil
	Grand Total	1.96.03

2.2.1 Geo Coordinates

The proposed lease area is Flat topography. The maximum elevation (88m) was observed West side of the site. The boundary corner and the intermediate stone geographic coordinates is given in Table 2.4 and shown in Figure 2.2.

The quarries within the cluster of 500m radius as per the letter Rc.No.452/kanimam/2025 dated: 17.07.2025 is enclosed as Annexure II is shown in Figure 2.3.

Table 2.4 Geographic coordinates of the Project area

Pillar No	Latitude	Longitude
1	12°28'38.28"N	79°40'12.51"E
2	12°28'35.84"N	79°40'12.30"E
3	12°28'35.96"N	79°40'10.43"E
4	12°28'33.65"N	79°40'10.29"E
5	12°28'33.39"N	79°40'10.31"E
6	12°28'33.60"N	79°40'8.75"E
7	12°28'33.55"N	79°40'8.73"E
8	12°28'33.64"N	79°40'7.72"E
9	12°28'34.36"N	79°40'7.79"E
10	12°28'36.13"N	79°40'7.87"E
11	12°28'36.16"N	79°40'6.88"E
12	12°28'35.31"N	79°40'6.94"E
13	12°28'35.21"N	79°40'6.65"E
14	12°28'36.17"N	79°40'6.64"E
15	12°28'38.60"N	79°40'6.30"E

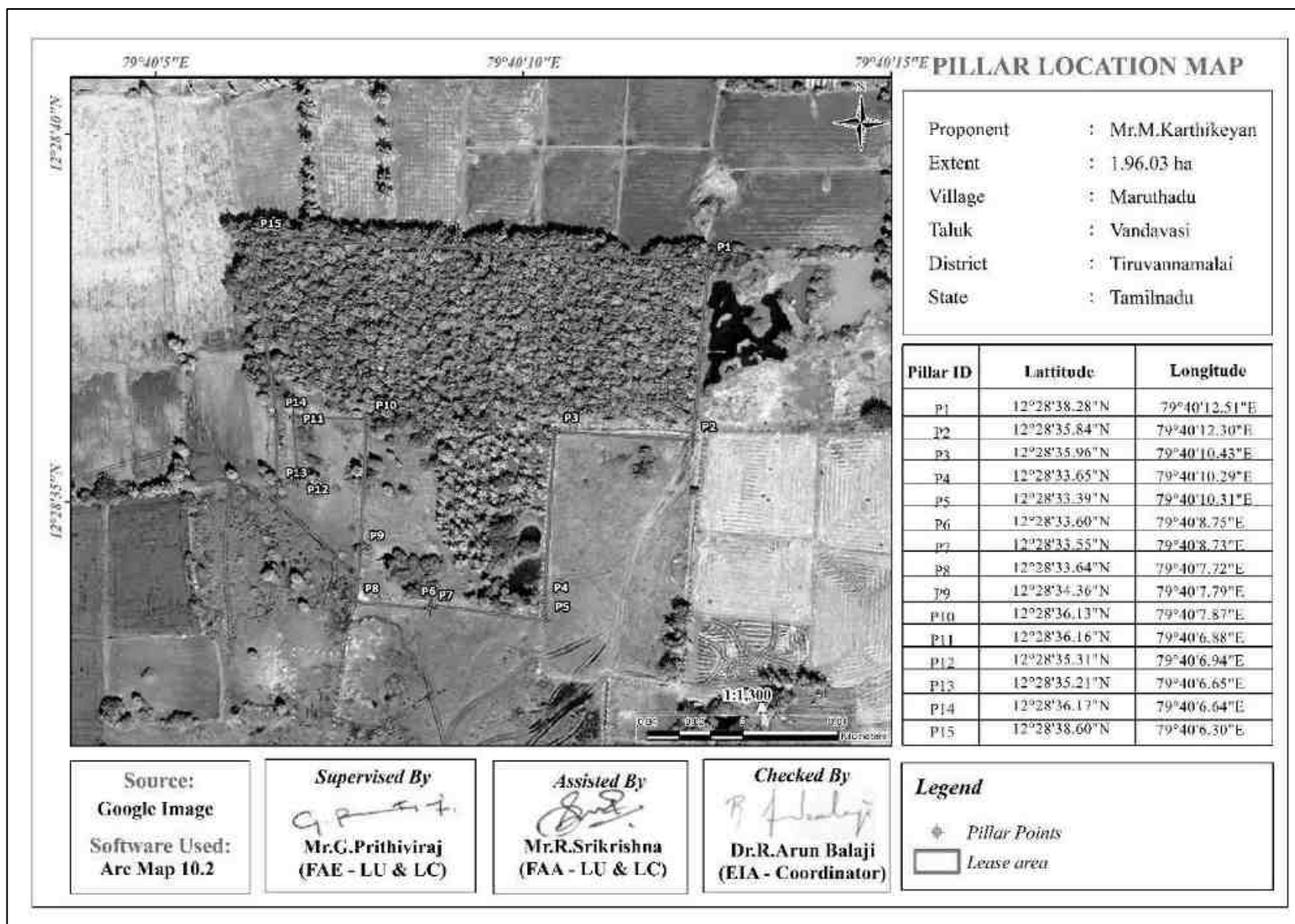


Figure 2.2 Google Earth Image Showing Pillar Coordinates of Lease Area

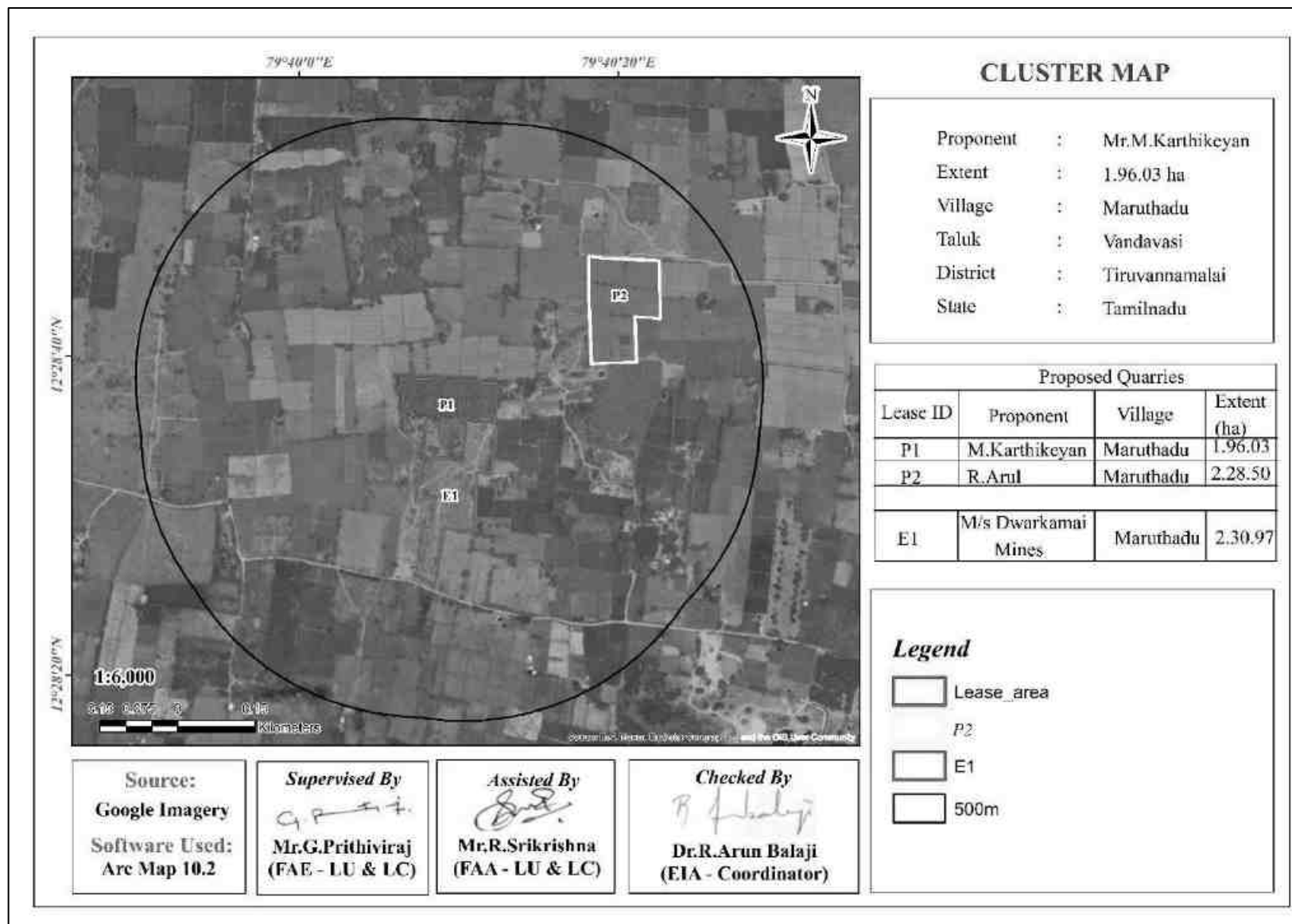


Figure 2.3 Google Earth Image of the cluster

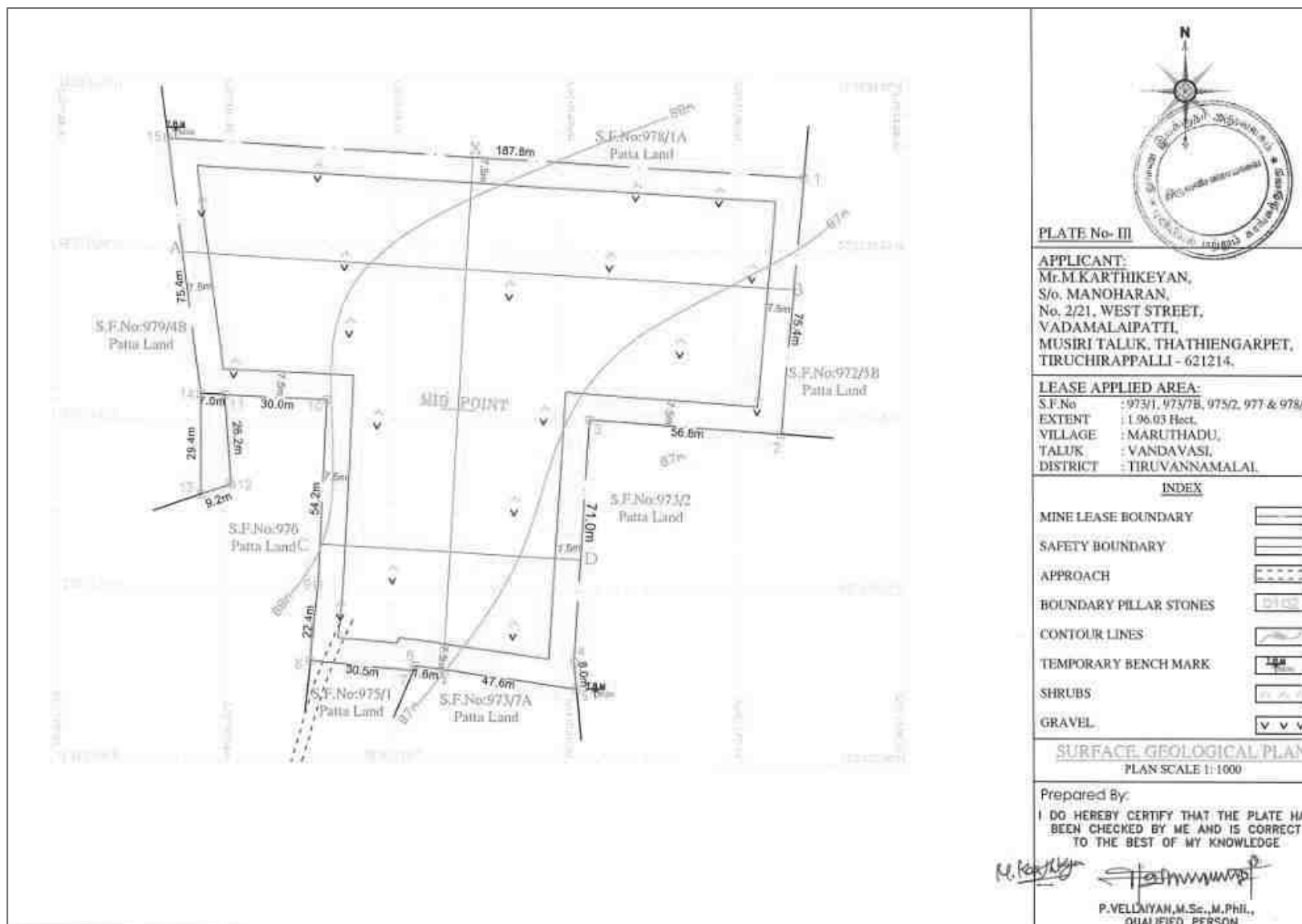


Figure 2.4 Surface & Geological Plan

2.3 GEOLOGY

The Archaean rocks in this area are represented by rocks of Eastern Ghats complex comprising Charnockites, Migmatite complex of composite gneiss. General characteristics of the rocks of this series has recorded that the rocks are in general bluish grey or darkish in colour and extremely fresh appearance with an even grained granular structure. Charnockite, any member of a series of metamorphic rocks with variable chemical composition, the term is often limited to the characteristic ortho pyroxene granite of the series. The alkali feldspar may be intermediate between microcline and orthoclase, the fine micro perthitic texture being common.

Order of superposition of the proposed lease is given below,

Age	Group	Rock Formation
Recent to Sub recent	----	Gravel
Archean	Charnockite Group	Charnockites

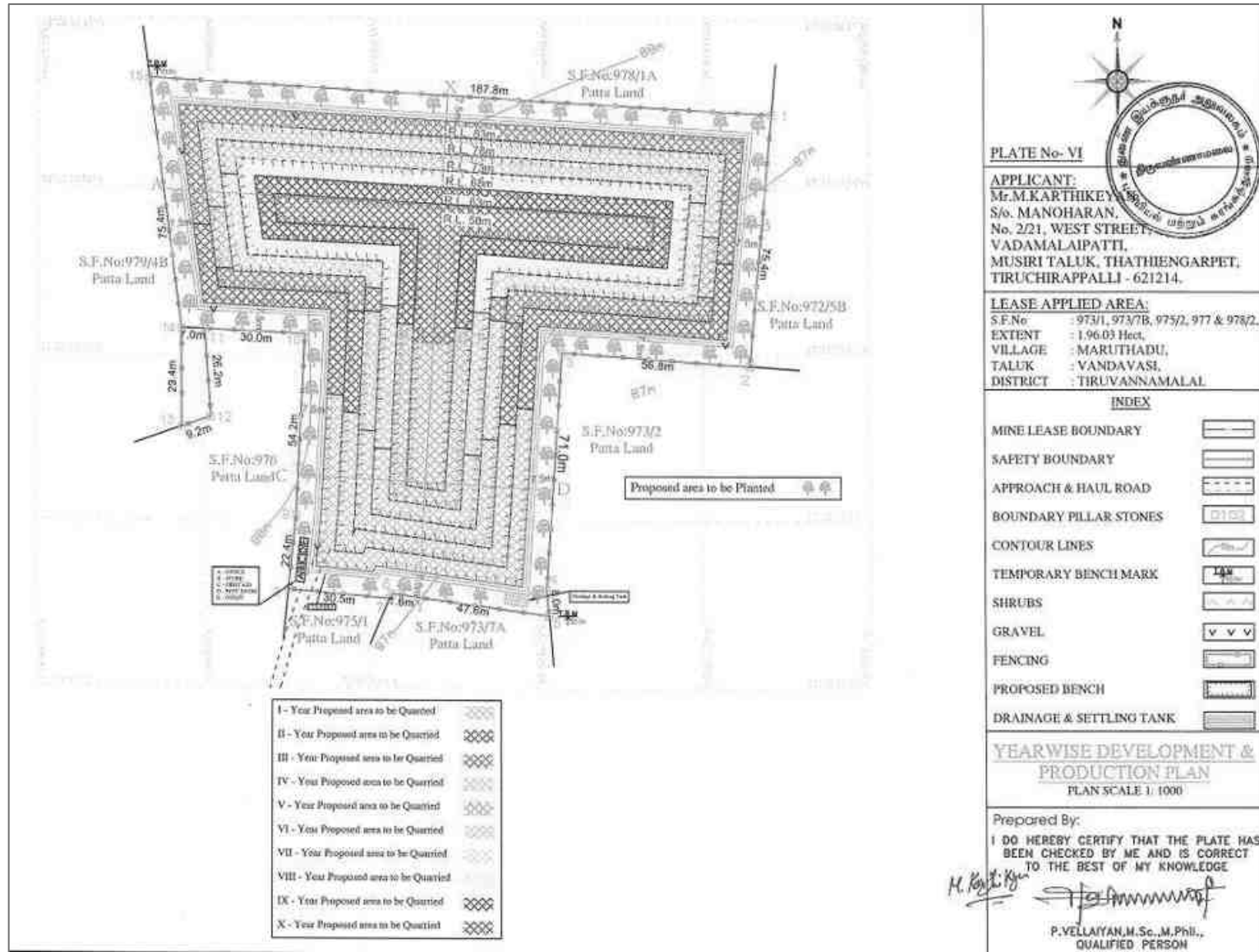
2.4 QUANTITY OF RESERVES

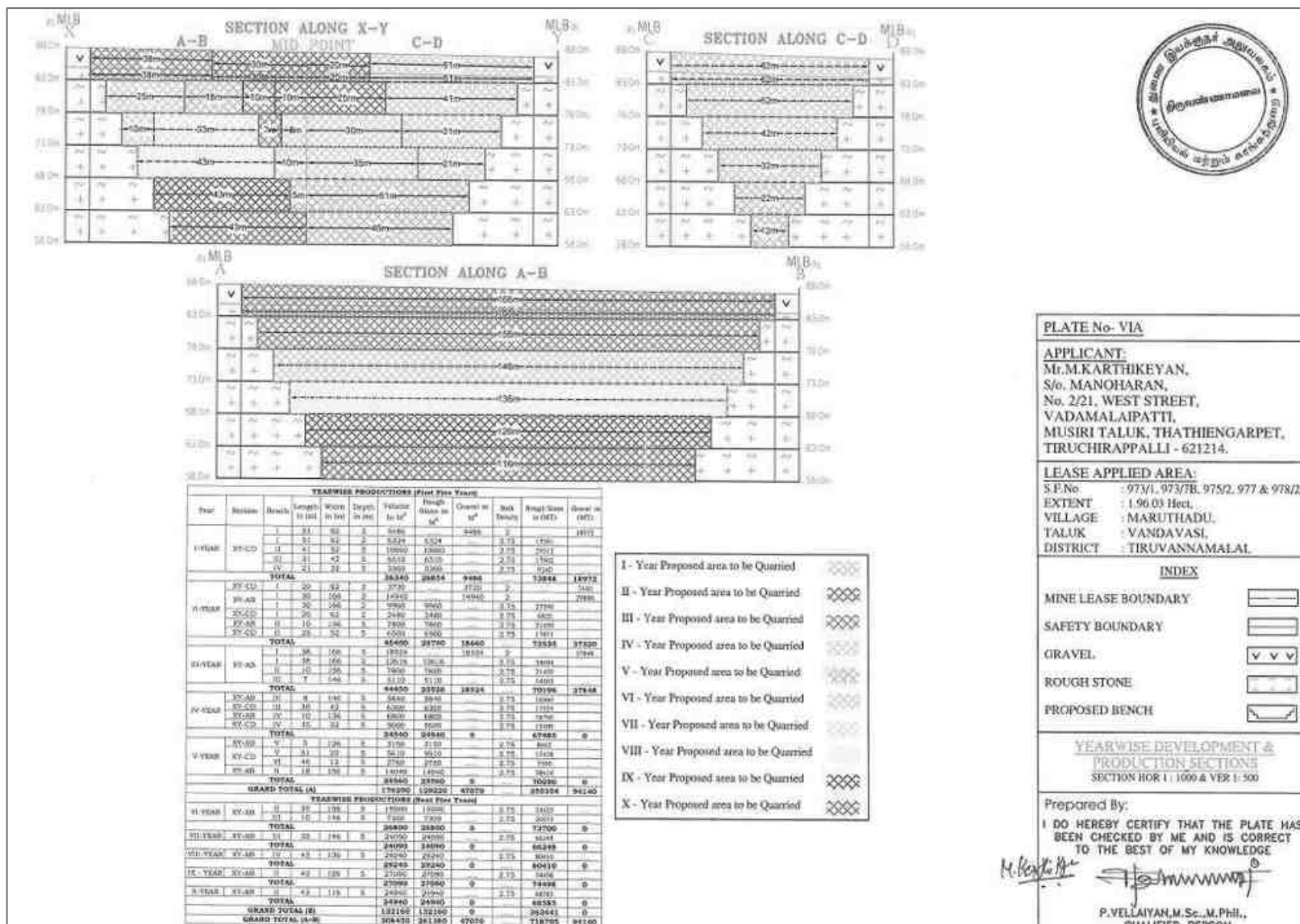
The resources and reserves of rough stone and gravel were calculated based on cross-section method by plotting sections to cover the maximum lease area for the proposed project. Based on the availability of geological resources, the mineable reserves are calculated by considering excavation system of bench formation and leaving essential safety margins, as shown in Figure 2.5 and deducting the locked-up reserves during bench formation (also called as Bench Loss). The mineable reserves are calculated up to the depth of 30m BGL considering there is no waste / overburden / side burden (100% Recovery anticipated) for the proposed project. The results of geological resources and reserves is given in Table 2.5 and the approved year wise development plan is enclosed as Figure 2.5 & 2.5a.

Table 2.5 Estimated Resources and Reserves of the Project

Resource Type	Rough Stone in m ³ & Tons	Gravel in m ³ & Tons
Geological Resource in (m ³ & Ts)	528687 & 1453889	58743 & 117486
Mineable Reserves in (m ³ & Ts)	261380 & 718795	47070 & 94140
Proposed production for 10 years (m ³ & Ts)	261380 & 718795	47070 & 94140

Source: Approved Mining Plan & ToR





2.5 MINING METHOD

The Quarrying operation is proposed to be carried out by open cast mechanized mining method with the bench height and width of 5 m each. The open cast mechanized method involving drilling and blasting is proposed to extract rough stone. The extracted rough stone will be loaded to the trucks to the nearby stone crushing units. Due permission from D.G.M.S, will be taken as per Rule 106 of MMR 1961 is proposed. Mining operation is proposed in one shift i.e. 8 AM to 4 PM. The average number of working days in a year would be 270 days/yr excluding Sunday & holidays. The production will be slow down trend during monsoon period. In this project, NONEL blasting will be adopted to extract rough stone.

2.5.1 Conceptual Blasting Design

In this project, NONEL blasting will be employed to win rough stone. This method will involve closed spaced perimeter holes to reduce the overbreak/backbreak on a blast. The objective of the blasting design is to prevent fly rocks from damaging the nearby structures.

Rules of Thumb for Blast Design

Based on practical experience and technical information, a set of rules for blasting have been provided as below (Chapter8 (nps.gov)). These rules will be applied to blast rocks in the proposed project.

Rule 1: The detonation velocity (VOD) of the explosive should be close to the same value of the sonic velocity (VSO) of the rock to be blasted.

The sonic velocity of a rock is considered to be a reliable indicator of its structural integrity and resistance to fragmentation. As the VOD of the explosive approaches close to the VSO of the rock, the blasting would result in relatively smaller size of fragmentation with uniformity. There is no value in using an explosive that has a VOD greatly in excess of the VSO of the rock, since there is little or no improvement in fragmentation above the VSO. When selecting an explosive to match up the VSO of a rock mass, variance of < 10% in the velocities is acceptable.

Rule 2: Generally, select the densest explosive possible.

When the density of explosives is higher, the potential energy of the explosives can be greater and the more of it can be placed within a borehole of a given size.

Rule 3: Select explosives according to the characteristics of the rock formation to be blasted.

When planes of separation in the rock are smaller than the degree of fragmentation required, the rock can often be blasted by using lower density and lower detonation velocity explosives.

Rule 4: When using slurry or water gel explosives, always determine the critical temperature below which the explosive will fail to reliably detonate.

Almost all slurry explosives have a critical temperature below which they may not detonate, or may not sustain detonation in elongated columns. The explosives should not be used when the temperature of the explosive at time of loading is below that critical temperature.

Rule 5: The distance between holes (spacing) should not be greater than one-half the depth of the borehole.

When the distance between holes in a row is greater than one-half the depth of the hole, the angles of breakage intersect above the bottom of the holes. This causes both a great deal of vertical throw and a very uneven bottom.

Rule 6: Stemming should be equal to the burden.

Stemming is useful to confine and maximize efficient use of the explosive's energy. It also reduces noise as much as possible. If the stemming is greater than the burden, the rock at the top of the borehole will have less cracking from reflection and refraction of compressive and tensile waves. Therefore, stemming should be equal to burden. Drill fines can be used for loading the borehole.

Rule 7: Subdrill (if necessary) should be between 0.3 and 0.5 of spacing/burden.

Subdrill should be equal to 0.3 of burden. It will work when there is row-for-row delay. In blasts where the delay system is both row-for-row and hole-for-hole, the subdrill should be determined by the largest dimension, which can be the spacing or the burden. An average subdrill of 0.4 of spacing is best to use for planning purposes. Based on the above-mentioned rules, blasting design has been conceptualized is given in Table 2.6.

Table 2.6 Conceptual Blasting Design

Blasthole Diameter (D) in mm	32
Burden (B) in m	1.5
Spacing (S) in m	1.30
Subdrill in m	0.45
Charge length (C) in m	0.64
Stemming	1.5
Hole Length (L) in m	2.6
Bench Height (BH) in m	2.1
Stemming material size in mm	3.2
Burden stiffness ratio	1.43
Blast volume/hole in m ³	4.16
Number of blastholes/day	23
Blasthole pattern	Staggered
Mass of explosive /day in kg	9.32
Powder factor in kg/m ³	0.10
Type of explosives	Slurry
Initiation system	NONEL

Statutory Provision & Precaution during Blasting: -

- Blasting permission from DGMS will be taken by the proponent within 6 months from the date of execution of mine.
- Control blasting will be carried out by using delay detonators during multi rows blasting
- No secondary blasting will be carried out.
- Stemming column will be half of the depth of hole with coarse sand.
- Only Statutory designated Blaster will supervise the blasting operation.
- All persons in the radius of minimum 300m from the blasting site will be removed by siren.
- Blasting operation will be carried out during day time only particularly at noon time.

2.5.2 Magnitude of Operation

Based on the results of estimated production the details about the size of operation had provided in Table 2.7.

Table 2.7 Operational Details for Proposed Project

	Rough Stone (m³) & Ts / 10 years	Gravel (m³) & Ts / 3 years
Proposed production	261380 & 718795	47070 & 94140
Number of Working Days	270	270
Production /Day (m ³) & Ts	97 & 266	58 & 116
No. of Lorry Loads	16	10

2.5.3 Extent of Mechanization

List of machineries proposed for the quarrying operation is given in Table 2.8.

Table 2.8 Machinery Details

S. No.	Type	No. of Unit	Size/Capacity	Dia of Hole (mm)	Motive Power
1	Jack Hammers	2	Hand Held	32mm	Diesel
2	Compressor	1	AIR	---	Diesel
3	Excavator	1	2.9 - 4.5 m ³	---	Diesel
Haulage & Transport Equipment					
4	Tipper	8	---	---	Diesel

2.5.4 Post mining land use

The land use at present, at the end of plan period & at the end of conceptual period is given in Table 2.9 below

Table 2.9 Land Use at the end of mine Life

Description	Present area (Hect.)	Area at the end of life of quarry (ha)
Area under quarry	Nil	1.44.85
Infrastructure	Nil	0.02.0
Roads	Nil	0.03.0
Green Belt	Nil	0.39.73
Un utilized Area	1.96.03	Nil
Drainage & Settling Tank	Nil	0.06.45
Total	1.96.03	1.96.03

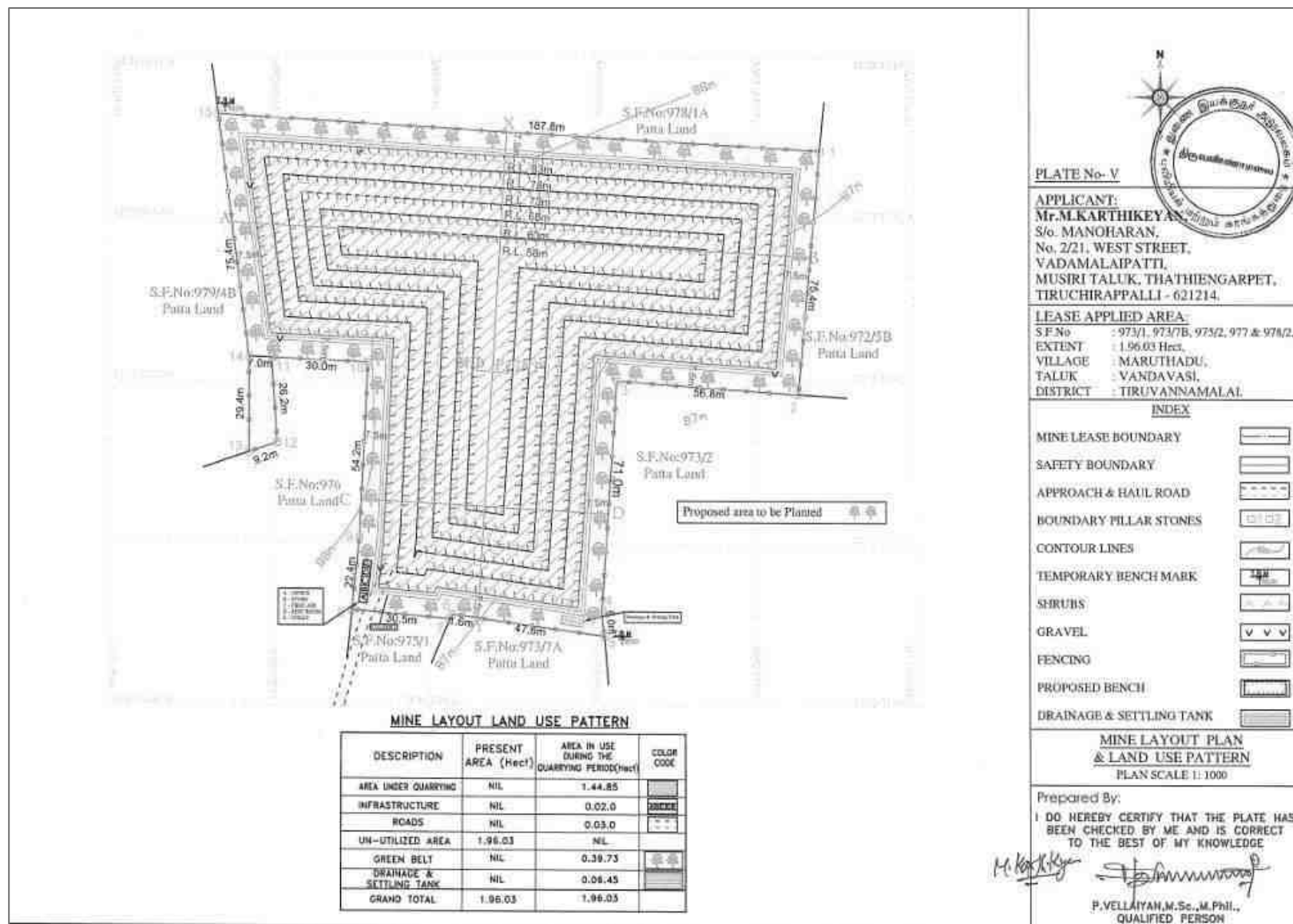


Figure 2.6 Mine Layout Plan and Land Use Pattern

2.5.5 Conceptual Mining Plan

The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc. The ultimate pit dimension is provided in Table 2.10.

Table 2.10 Ultimate Pit Dimension

Pit	Length (m)	Width (m)	Depth (m)
I	71	166	30

Source: Approved Mining Plan & ToR

2.5.6 Infrastructures

Infrastructures like mines office, temporary rest shelters for workers, latrine and urinal facilities have been proposed as per the mine rule and will be established after the grant of quarry lease. There is no proposal for the mineral processing or ore beneficiation plants in this project.

Other Infrastructure Requirement

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

2.5.7 Water Requirement

Details of water requirement in 3.5 KLD is given in Table 2.11.

Table 2.11 Water Requirement for the Project

Purpose	Quantity	Source
Dust Suppression	1.2 KLD	Existing bore wells nearby the lease area
Green Belt development	1.3 KLD	Existing bore wells nearby the lease area
Drinking & Domestic	1.0 KLD	Existing bore wells and approved water vendors
Total	3.5 KLD	

Source: Prefeasibility Report

2.5.8 Energy Requirement

High speed Diesel (HSD) will be used for quarrying machineries. As per the data shown in Table 2.12 Around **12,67,794 litres of HSD** will be used for rough stone extraction during 10 years plan period. The diesel will be brought to the site from nearby diesel pumps.

Table 2.12 Fuel Requirement Details

Fuel Requirement for Excavator			
Details	Rough Stone (261380 m³)	Gravel (47070m³)	Total Diesel (litre)
Average Rate of Fuel Consumption (l/hr)	16	10	---
Working Capacity (m ³ /hr)	20	60	---
Time Required (hours)	13,069	785	---
Total Diesel Consumption for 10 years (litre)	2,09,104	7,850	2,16,954
Fuel Requirement for Compressor			
Average Rate of Fuel Consumption/hole (litre)	0.4	---	---
Number of Drillholes/day	23	---	---
Total Diesel Consumption for 10 years (litre)	62,100	---	24,840
Fuel Requirement for Tipper			
Average Rate of Fuel Consumption/Trip (litre)	20	20	---
Carrying Capacity in m ³	6	6	---
Number of Trips / days	16	10	---
Number of Trips / 10 years	43,200	8,100	---
Total Diesel Consumption for 10 years (litre)	8,64,000	1,62,000	10,26,000
Total Diesel Consumption by Excavator, Compressor and Tipper			12,67,794

2.5.9 Capital Requirement

The project proponent will invest Rs. **83,68,000** to the project. The breakup summary of the investment has been given in Table 2.13.

Table 2.13 Capital Requirement Details

S. No.	Description	Cost (Rs.)
1	Fixed Asset	33,00,000
2	Machinery	25,00,000
3	EMP	25,68,000
	Total Project Cost	83,68,000

Source: *Approved Mining Plan*

2.6 MANPOWER REQUIREMENT

The skilled, competent qualified statutory persons will be engaged for quarrying operation, preference will be given to the local community. Number of employees required for this project have been provided in Table 2.14.

Table 2.14 Employment Potential for the Proposed Project

S. No.	Category	Role	Nos
1	Highly Skilled	Mines Manager	1
		Mine Engineer	1
		Mine Geologist	1
		Blaster	1
2	Unskilled	Musdoor/ Labours	16
Total			20

Source: Prefeasibility Report

2.7 PROJECT IMPLEMENTATION SCHEDULE

The commercial operation will commence after the grant of Environmental Clearance. CTO and CTE will be obtained from the Tamil Nadu State Pollution Control Board. The conditions imposed during the environmental clearance will be compiled before the start of mining operation. Expected time schedule for the quarrying operation is given in Table 2.15.

Table 2.15 Expected Time Schedule

S. No.	Particulars	Time Schedule (in Months)					Remarks if any
		1 st	2 nd	3 rd	4 th	5 th	
1	Environmental Clearance						
2	Consent to Establish						Project Establishment Period
3	Consent to operate						Production starting period.
Time line may vary; subjected to rules and regulations /& other unforeseen circumstances							

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

2.8 ORGANIZATION CHART FOR THE PROJECT

The organization chart which allocates the duties and responsibilities of the individuals involved in this project is displayed below,

S.No.	Statutory Official /Competent Person	Role / Responsibility
1	Project Proponent	• Overall incharge for the mining and administration activities, • instructing the manager and other officials regarding the safety precautions, • inspecting the mining area, labour sheds and sanitation facilities regularly, • ensuring safe working environment.
2	Mine Manager	• Executing the instructions given by the proponent, • ensuring the availability of first aid kits and other safety provisions, • arrangement of safe and pure drinking water, • supervising the overall activities of the labours in the mine site.
3	Mine Geologist	• Ensuring the mining activity as per the approved mining plan.
4	Mine Engineer	• Ensuring the safe working of the machineries like DG sets, excavators, compressor drillers etc. in the mine site, • maintenance of loading vehicles and check the smoke emissions, • ensuring the working of the CCTV cameras in the mine site.
5	Blaster/Foreman	• Carryout the controlled and safe blasting in mine site, • alerting the mining area before the blasting, • maintaining the regular time for blasting, • ensuring the travel of fly rock within the planned area.
6	Watchman/Security	• Restricting the entry of the public in the mine site, • recording the movements of the loading and other vehicles into the mine site, • ensuring the loaded vehicle covered with tarpaulin while passing out the gate.
7	Labour 1	• Maintenance of labour sheds, toilets, mines office, garland drainage and settling tank, regular sprinkling on roads, • watering of plants regularly and maintain the green belt.
8	Other labours	• Carry out the mining work as per the instructions.

CHAPTER III

DESCRIPTION OF THE ENVIRONMENT

3.0 GENERAL

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as land, water, air, noise, biological and socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering **October through December 2025 with CPCB** guidelines. Environmental baseline data were collected by an NABL accredited and MoEF notified **Interstellar Testing Centre Pvt. Ltd** for the environmental attributes including soil, water, air, and noise and by FAEs for ecology and biodiversity, traffic, and socio-economy.

Study Area

The study area has been divided into two zones: core zone and buffer zone. Core zone is considered as lease area and buffer zone as 5 km radius from the periphery of the cluster, except for ecological study, which considers 10 km as buffer zone. Both core and buffer zones are taken as the study area. The data was collected from the study area to understand the existing environment conditions of the above-mentioned environmental components. Sampling methodologies for the various environmental parameters, including frequency of sampling, method of sample analysis, etc., are briefly given in 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	Once during the study period	Study Area	Satellite Imagery & Primary Survey
*Soil	Physico- Chemical characteristics	Once during the study period	5 (1 in core & 4 in 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	4 (2 surface water & 2 ground water)	IS 10500& CPCB Standards

Meteorology	Wind speed Wind direction Temperature Cloud cover Dry bulb temperature Rainfall	1 hourly continuous mechanical/automatic weather station	1	Site specific primary data & secondary data from IMD Station
*Ambient Air Quality	PM ₁₀ PM _{2.5} SO ₂ NO _x	24 hours, twice a week	5 (1 core & 4 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient noise	Hourly observation for 24 hours per location	6 (1 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.

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

3.1 LAND ENVIRONMENT

3.1.1 Geology and Geomorphology

Geology: The geology of the study area (figure 3.1) showcases a uniform geology with ancient Archaean crystalline rocks. The Archaean rocks in this area represented by rocks of eastern ghat complex comprising charnockites, migmatite complex of composite gneiss. The general characteristics of the rocks of this series has recorded that the rocks are in general bluish grey or darkish in colour and extremely fresh in appearance with an even grained granular structure. Charnockite, any member of a series of metamorphic rocks with variable chemical composition, the term is often limited to the characteristic ortho pyroxene granite of series. The alkali feldspar may be intermediate microcline and orthoclase, the fine micro perthitic texture being common.

The order of superposition of the proposed area is,

Age	Group	Rock formation
Recent to Sub-recent	---	Gravel
Archaean	Charnockite Group	Charnockites

Geomorphology:

The geomorphology of study area is characterized by a hard rock terrain primarily dominated by a **pediment-pediplain complex** which covers a significant portion of the area. The landscape is mostly flat with a general slope from west to east.

The key geomorphological features of the region include:

- **Landforms:** The predominant features are pediments, shallow pediments and buried pediments.
- **Drainage:** The area is drained by the seasonal cheyyar river which is a major tributary of the Palar River. The drainage pattern is generally dendritic.
- **Soil Type:** The region is characterized by deep red soil, thin red soil, clayey soil and gravelly soil with red soil being the most predominant.

The geomorphology of the study area is given in Figure 3.2.

3.1.2 Land Use/ Land Cover

The study area (5 km radius approximately **8169.33 ha**) around the proposed mine site was classified into seven LULC classes using Sentinel II imagery. The rapid population growth drives significant land-use/land-cover (LULC) changes primarily increasing built-up areas at the expense of agricultural land and water bodies leading to habitat loss, increased land surface temperature (LST) and strain on resources though improved agricultural tech has somewhat reduced pressure on cultivated land. The overall trend shows conversion from natural/agricultural uses to urban infrastructure.

Aerial Coverage by LULC Class

- Crop Land: The dominant feature, comprising the maximum area of 6935.86ha (84.90%).
- Built-up Area: The second largest class covering 678.01 ha (8.30%).
- Fallow Land: FL Accounts for 114.20 ha (1.40 %) of the landscape.
- Water Bodies: Including major flows and small tanks totalling 336.61 ha (4.12%).
- Mining Area: Covers 11.25 ha, representing the least percentage of the total area (0.14%).
- Sparse Vegetation: Covers 16.38 ha (0.20%).
- Barren Land: The second smallest naturally occurring class, with 77.01 ha (0.94%).

Table 3.2 LULC Statistics of the Study Area

S. No.	Classification	2025	
		Area in Hectares	Area in %
1	Water Bodies	336.61	4.12
2	Vegetation cover	16.38	0.20
3	Bare Land	77.01	0.94

4	Crop Land	6935.86	84.90
5	Built-up area	678.01	8.30
6	Fallow Land	114.20	1.40
7	Mining Area	11.25	0.14
Total		8169.33	100

Source: Sentinel II Satellite Imagery

The LULC changes within a 5 km radius study area between 2020 and 2025 is given in Table 3.2a.

Table 3.2a Comparison of LULC 2020 – 2025

S. No.	Classification	LU in 2020		LU in 2025	
		in Ha	in %	in Ha	in %
1	Water Bodies	196.45	2.40	336.61	4.12
2	Vegetation	27.24	0.33	16.38	0.20
3	Bare Land	0.88	0.01	77.01	0.94
4	Crop Land	7159.43	87.64	6935.86	84.90
5	Built-up area	607.09	7.43	678.01	8.30
6	Fallow Land	178.23	2.18	114.20	1.40
7	Mining Area	0.0	0.0	11.25	0.14
Total		8169.33	100	8169.33	100

The study area (8,169 Ha) underwent insignificant transitions between 2020 and 2025. The primary trend is a shift from agricultural dominance toward urbanization and industrial activities accompanied by an unexpected increase in water bodies.

3.1.3 Topography

The Toposheet 57 P/11 is a specific Survey of India (SoI) topographical map at a 1:50,000 scale, where 1 cm on the map = 500 meters on the ground. Based on the geographical grid this sheet primarily covers parts of Northern Tamil Nadu specifically within the Tiruvannamalai and Kanchipuram districts and given in Figure 3.5.

3.1.4 Drainage Pattern

The drainage pattern in study area is influenced by two major seasonal rivers. The drainage pattern is concordant and is characterized by a **sub-dendritic system** with first-order streams. **Toposheet 57 P/11** (Vandavasi/Cheyyar region) reveals a landscape primarily defined by its drainage network and subtle elevation changes which directly influence the LULC shifts observed.

3.1.5 Seismic Sensitivity

The proposed lease area is situated in a Seismic Zone II, as defined by National Centre for Seismology ([Official Website of National Centre of Seismology](#)). The Zone II is defined as the region where only minor damage is expected from seismic events. In this respect, the proposed lease area is located in a low earthquake hazard area.

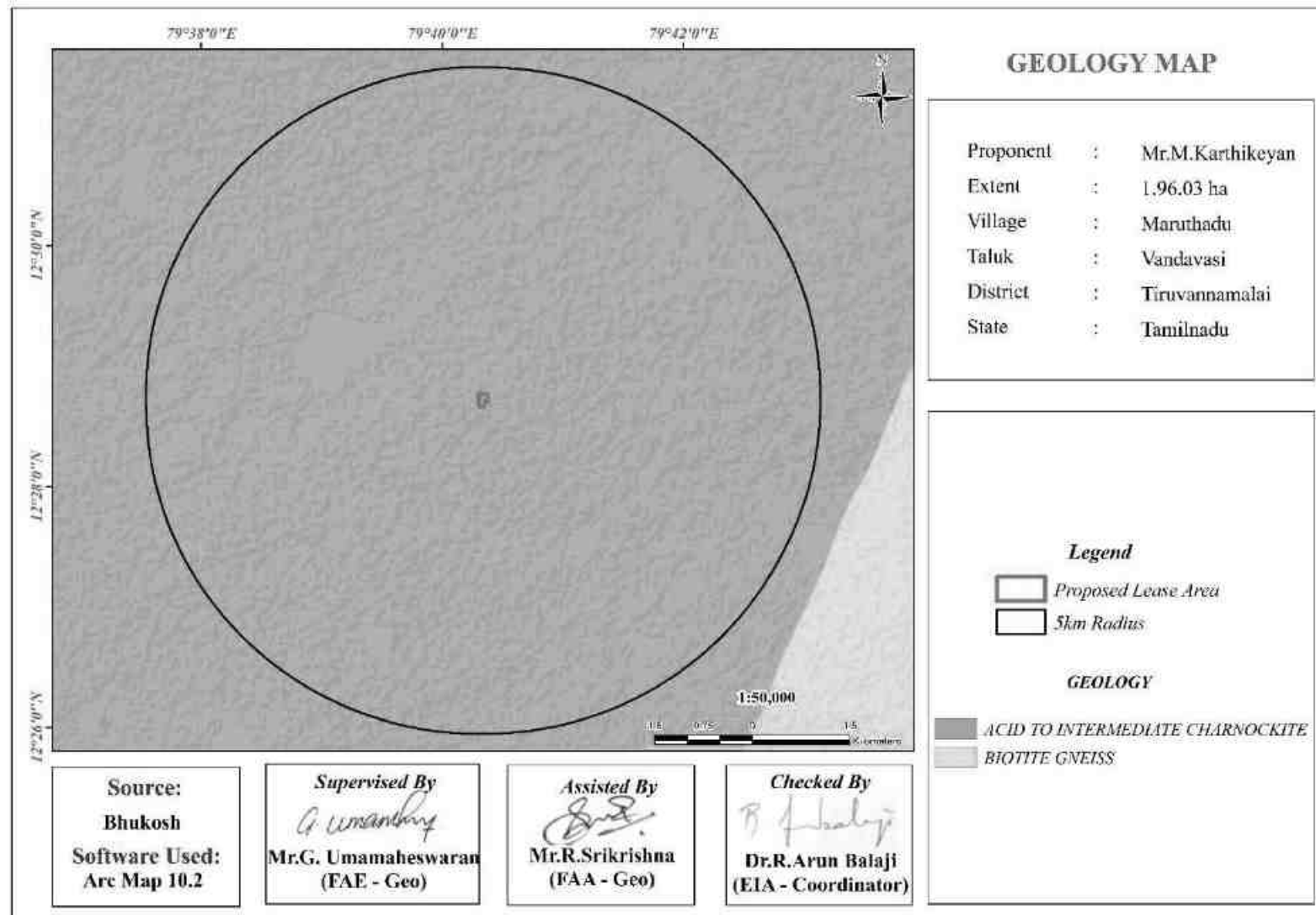


Figure 3.1 Geology Map with 5km Radius around Proposed Project Site

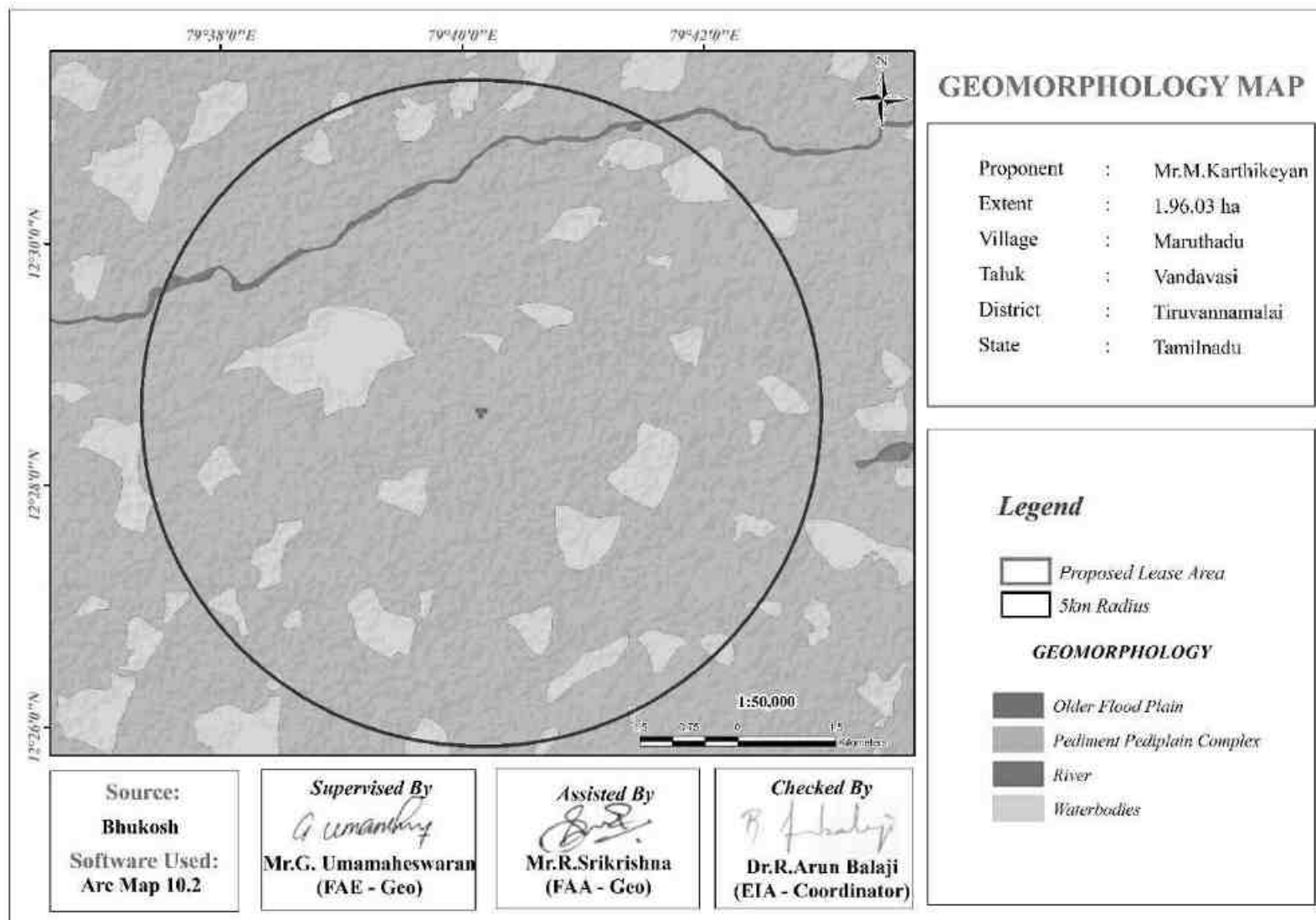


Figure 3.2 Geomorphology Map with 5km Radius around Proposed Project Site

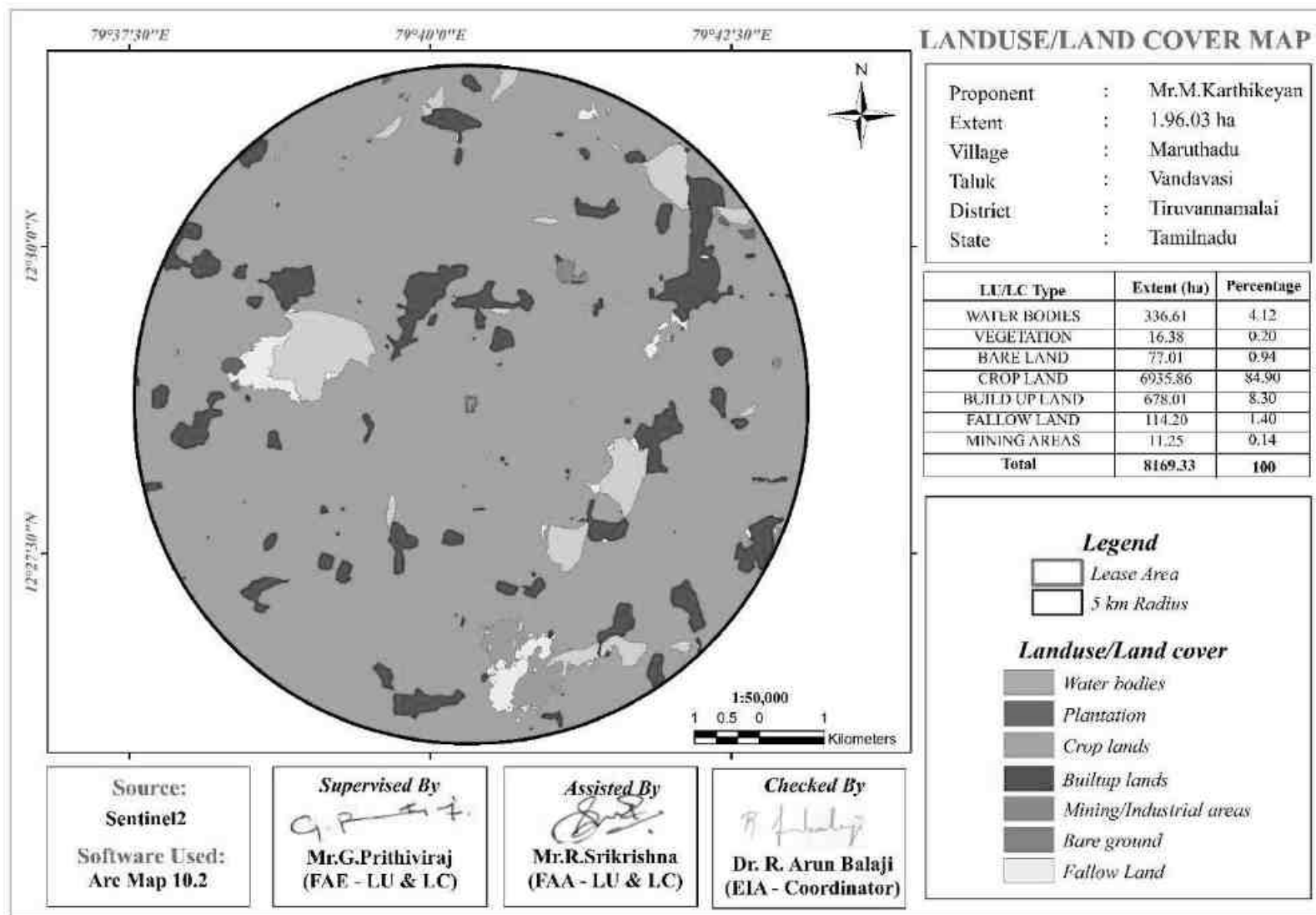


Figure 3.3 LULC Map with 5km Radius around Proposed Project Site (2025)

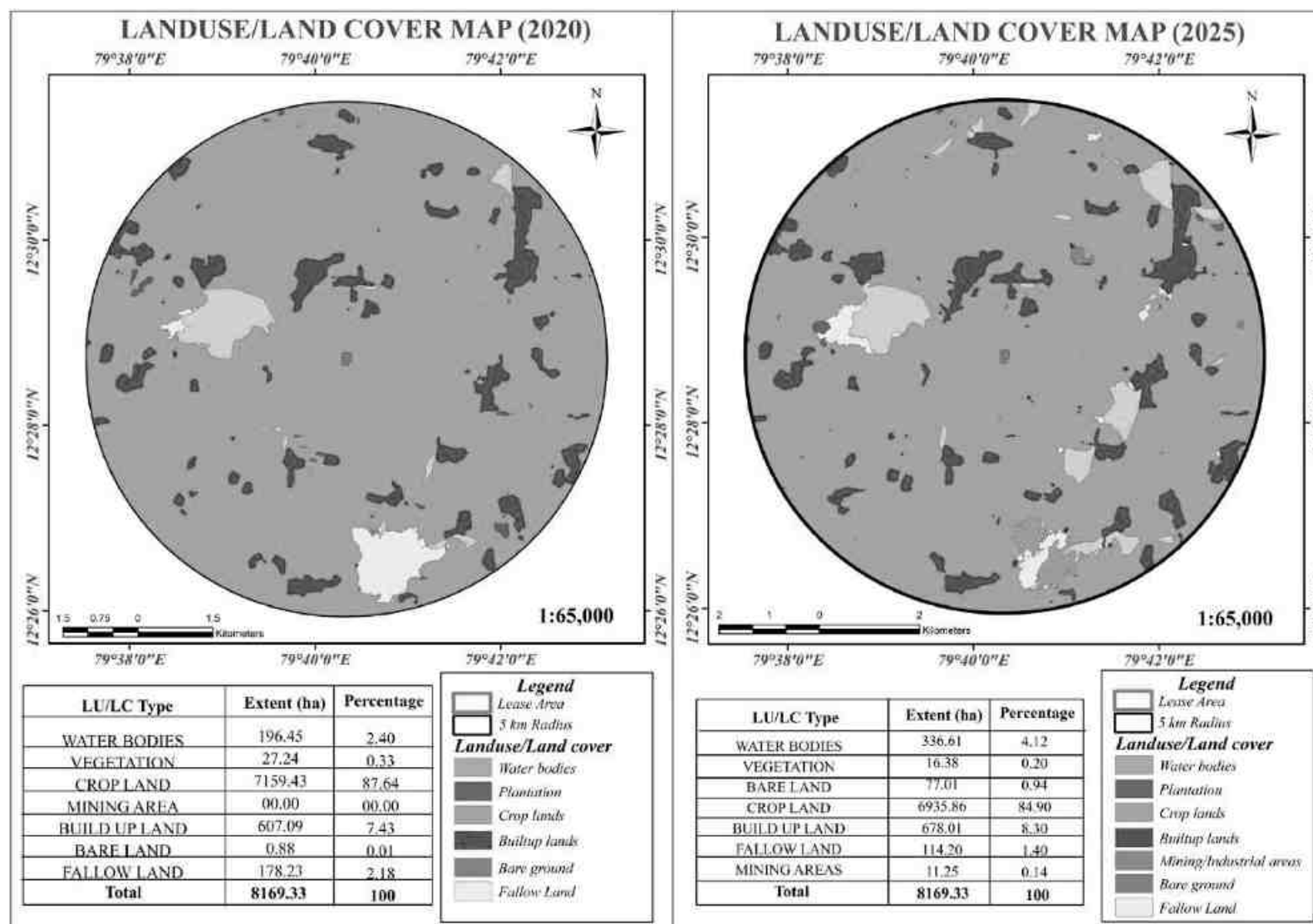


Figure 3.3a Comparison Map of LULC with 5km Radius around Proposed Project Site (2020 & 2025)

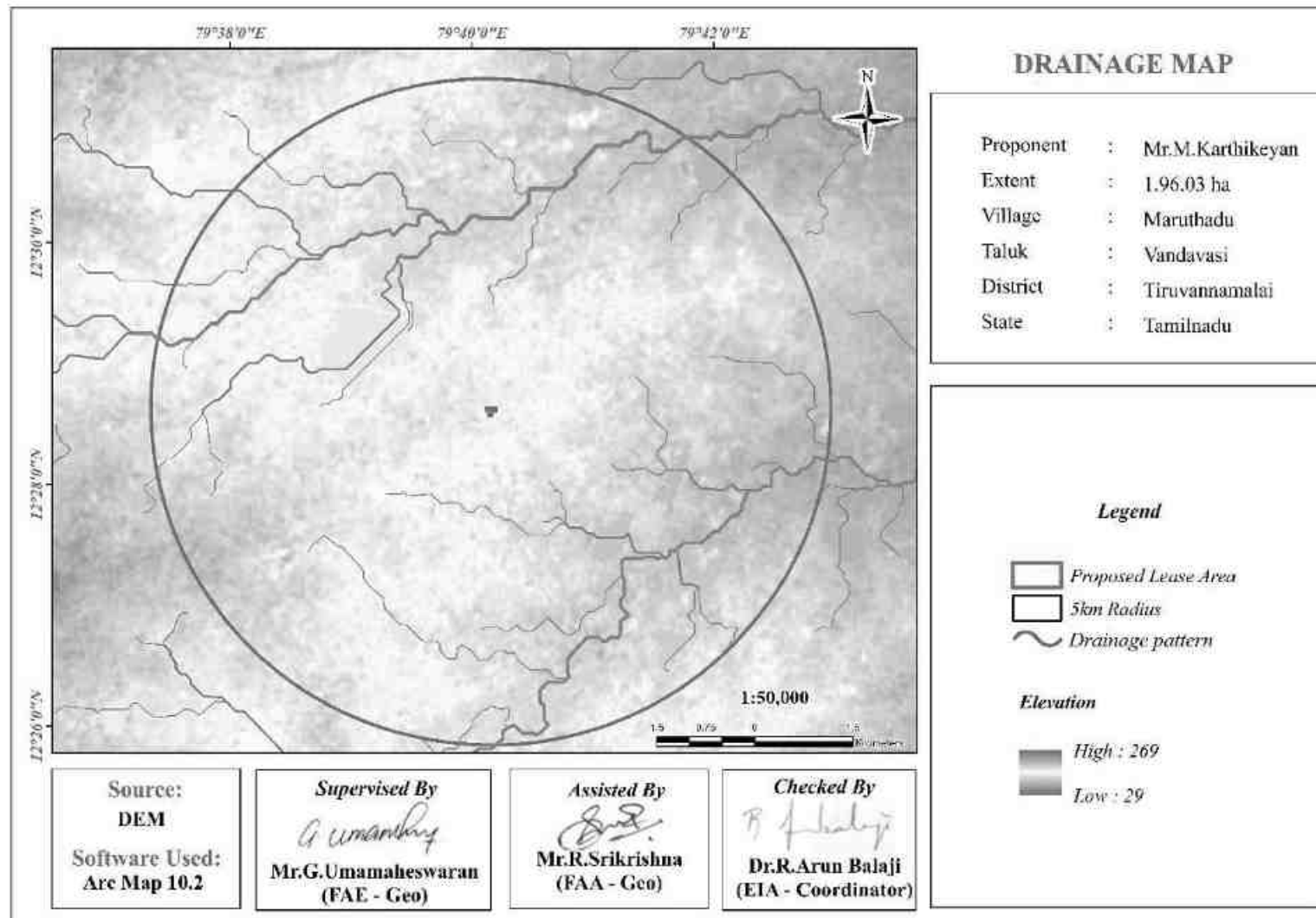


Figure 3.4 Drainage Map with 5km Radius around Proposed Project Site

3.1.6 Soil

Composite soil samples were collected from 5 locations of the study area to determine the baseline soil characteristics of the soil. The locations were selected for soil sampling based on soil types, vegetative cover, and industrial & residential activities including infrastructure facilities. Soil samples were collected up to 90 cm depth, filled in polythene bags, coded and sent to laboratory for analysis. The locations of the sampling sites are shown in Table 3.3 and Figure 3.5. The samples thus collected were analysed for physical and chemical characteristics. The physical and chemical characteristic results of soil samples are provided in Table 3.4.

Table 3.3 Soil Sampling Locations

Sampling ID	Location	Distance (km)	Direction	Coordinates
S01	Near Core	0.14	N	12°28'42.91"N, 79°40'10.10"E
S02	Marudhadu	0.95	W	12°28'31.30"N, 79°39'35.45"E
S03	Nathamangalam	1.45	SE	12°27'51.19"N, 79°40'31.07"E
S04	Kilkodungalur	1.44	NE	12°29'21.40"N, 79°40'31.59"E
S05	Kottai	1.74	E	12°28'37.50"N, 79°41'9.86"E

Source: On-site monitoring/sampling Interstellar Testing Centre Pvt. Ltd., in association with GTMS.

The interpretation of the analytical results for the five soil samples (S1–S5) is as follows

Parameter	Result Range	Interpretation
Organic Matter	0.14 – 0.36%	Critically Low. It requires heavy composting.
Nitrogen (N)	0.046 – 0.078%	Deficient and requires fertilization.
CEC	15.8 – 28.1	Moderate/High shows good nutrient retention potential.
pH	7.22 – 8.72	Neutral to Alkaline except S3. S3 may need sulfur to lower pH.
Texture	Sandy Loam	Well-aerated but dries out quickly.

These are hungry soils. They have a solid physical foundation and a good capacity to store nutrients (CEC) but they currently contain almost no organic fuel or essential nutrients (N-P-K). Significant application of organic manure and balanced N-P-K fertilizers is essential for any agricultural use.

The Total Organic Matter (TOM) and Total Organic Carbon (TOC) in soil samples indicates a critically depleted state that significantly limits agricultural productivity.

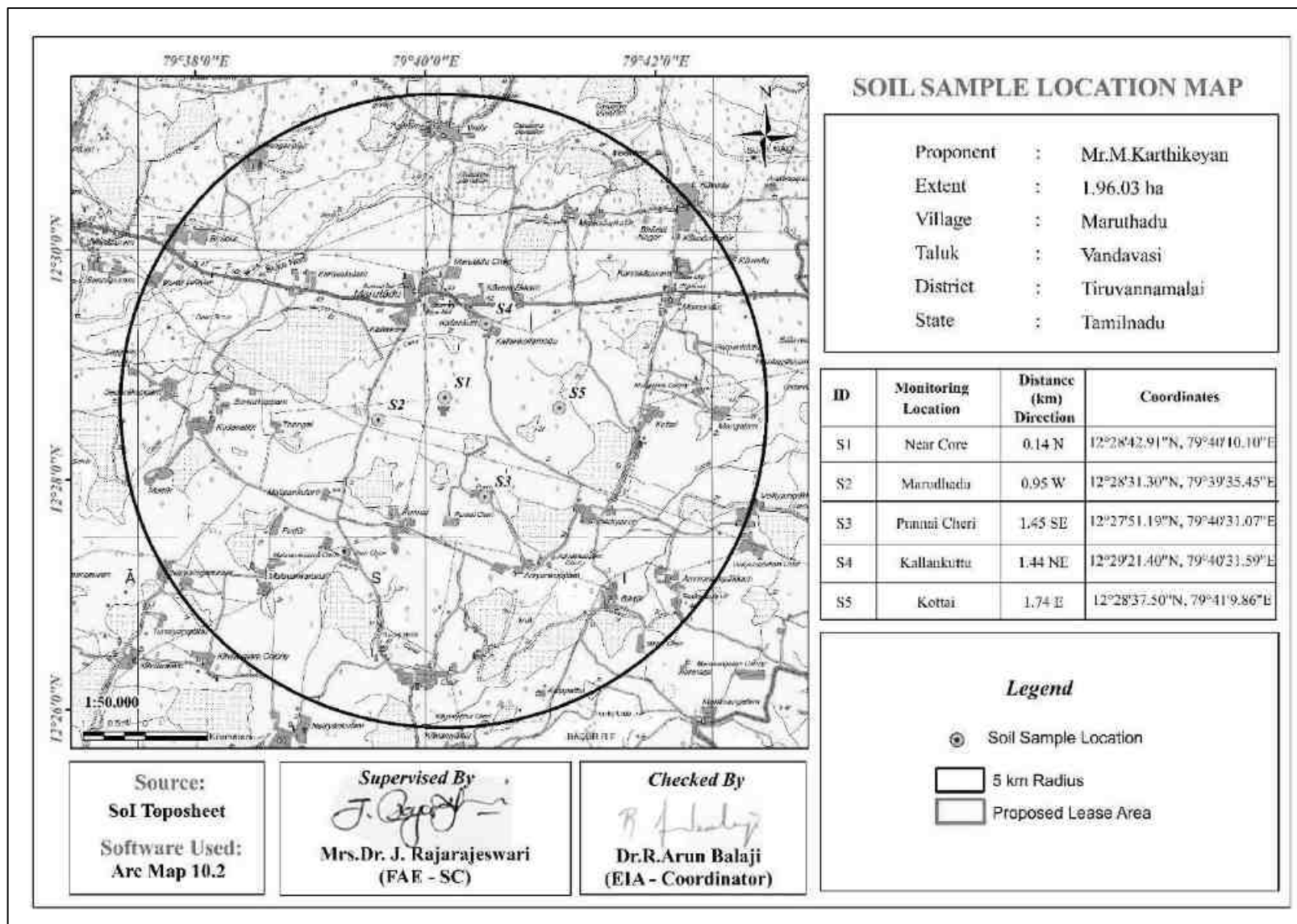


Figure 3.5 Map Showing Soil Sampling Locations within 5km Radius around Proposed Project Site

Table 3.4 Soil Quality of the Study Area

S. No	Parameters	Unit	S1	S2	S3	S4	S5
1	Total organic matter	%	0.310	0.190	0.360	0.140	0.260
2	Calcium as Ca	Mg/kg	1558	786	1128	1646	928
3	Moisture content	%	5.8	7.6	11.4	7.6	8.4
4	PH	NA	7.68	8.12	8.72	7.24	7.22
5	Magnesium as Mg	mg/kg	706	288	322	408	306
6	Total Nitrogen as N	(%)	0.078	0.052	0.046	0.062	0.052
7	Potassium as K	(%)	0.0108	0.0216	0.0148	0.0088	0.0092
8	Total Phosphate as P	(%)	0.0016	0.0028	0.0022	0.0034	0.0029
9	Total soluble Sulphate as So4	(%)	0.0064	0.0082	0.0166	0.0098	0.0106
10	Chloride as Cl	(%)	0.0038	0.0066	0.0026	0.0042	0.0032
11	Total Organic Carbon	(%)	0.18	0.11	0.21	0.08	0.15
12	Cation Exchange Capacity	(meq/100g)	22.6	15.80	20.66	18.80	28.10
13	Sand	(%)	62.40	59.8	64.2	61.8	63.4
14	Silt	(%)	19.0	20.6	16.8	18.6	17.4
15	Clay	(%)	18.6	19.6	19.0	19.6	19.2
16	Textural Class		Sandy loam	Sandy clay loam	Sandy loam	Sandy loam	Sandy loam
17	Bulk Density	(g/cc)	1.092	1.108	1.066	0.998	1.122
18	Electrical Conductivity	(mS/m)	0.192	0.224	0.166	0.308	0.206

Source: On-site monitoring/ Sampling Results by Interstellar Testing Centre Pvt. Ltd in association with GTMS.

Based on standard soil rating charts the samples fall into the very low category across the board.

Sample	TOC (%)	TOM (%)	Rating
S1	0.18	0.31	Very Low
S2	0.11	0.19	Very Low
S3	0.21	0.36	Very Low
S4	0.08	0.14	Very Low
S5	0.15	0.26	Very Low

Productive agricultural topsoil typically contains **1% to 6%** organic matter. Sample S3 at 0.36% is still well below the minimum threshold for healthy soil function. The data follows the standard **Van Bemmelen factor** $TOM \approx TOC \times 1.724$ assuming organic matter is roughly 58% carbon. The soil is **well-suited for many horticultural crops**, especially fruit trees and specific vegetables than for traditional wet-paddy cultivation, primarily due to its sandy texture and drainage characteristics.

Feature	Paddy Suitability	Horticulture Suitability
Texture (Sandy Loam)	Low (Poor water retention)	High (Good drainage/aeration)
pH (7.2 - 8.7)	Moderate (Prefers acidic 5.5-6.5)	High (Suits citrus, pomegranate, guava)
Organic Matter	Critically Low (Needs massive input)	Low (Requires regular composting)
Nutrients (NPK)	Deficient (Needs heavy fertilization)	Deficient (Needs balanced application)

Stress Relaxation:

Based on the sandy loam texture and physical properties such as low organic matter (<0.36%) and moderate CEC the expected stress relaxation is likely to exhibit rapid initial relaxation with a relatively high residual stress compared to organic-rich soils which would continue to relax over much longer periods.

The cumulative stress from vehicle movement on soil sample **S1** (Sandy Loam) significantly degrades soil quality by increasing the silt fraction and decreasing particulate organic matter which directly impairs plant growth.

Increasing Silt and Particulate Matter

Vehicle induced stress physically alters soil texture through a process known as particle crushing and aggregate fragmentation.

- The high dynamic stress from tires (concentrated in the top 0–20 cm) acts like a mechanical mill on sandy loam.
- Larger sand grains (62.4% in S1) and coarse particles collide and fracture under pressure shifting the grain size distribution toward finer silt-sized particles.
- Silt accumulated on the surface from this physical breakdown is easily suspended by tires increasing PM10 emissions and reducing the available topsoil nutrients.

Impact on Plant Growth

The shift toward a denser siltier structure creates a hostile environment for vegetation

- As the silt fraction increases the soil fills its remaining macropores rapidly raising its Bulk Density (currently 1.092 g/cc). This increased mechanical strength restricts root elongation leading to stunted shallower root systems named root impedance.
- Poor aeration in silt-rich soils have a fine pore structure that results in poor drainage and low oxygen (hypoxia). In S1 this lack of aeration can cause a drop in root respiration and a 12% to 41% reduction in grain yield.

To prevent this siltation effect, it is essential to keep surface pressure below 150 kPa and avoid traffic when soil moisture is high (near 7-12%) as wetness acts as a lubricant that accelerates silt formation and deep-seated compaction.

Summary of vehicle stress effects on soil S1 are

Soil Component	Change Due to Stress	Effect on Plant Growth
Silt Content	Increases via grain crushing	Increases soil strength blocks root penetration.
Bulk Density	Increases rapidly	Reduces air/water movement leads to waterlogging.
Organic Matter	Fractures and decomposes	Loss of nutrient-holding capacity and structural resilience.
Pore Structure	Loss of macropores	Causes oxygen deficiency (hypoxia) in roots.

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 baseline quality of surface and ground water. Effective analysis depends on proper site selection, appropriate container types and immediate preservation techniques to prevent chemical or biological changes during transport. Grab Sampling method was adopted to collect the water samples. It is used for relatively constant sources like groundwater or well-mixed surface water.

Table 3.5 Water Sampling Locations

Sampling ID	Location	Distance (km)	Direction	Coordinates	
				Latitude	Longitude
SW1	Kodungalur Lake	0.73	SE	12°28'11.49"N	79°40'20.78"E
SW2	Kaveripakkam Lake	0.21	SE	12°29'11.87"N	79°40'17.32"E
OW1	Near Core	0.58	E	12°28'35.07"N	79°40'31.49"E
OW2	Near Core	0.21	S	12°28'26.65"N	79°40'7.19"E

Source: On-site monitoring/sampling Interstellar Testing Centre Pvt. Ltd, in association with GTMS.

3.2.1 Ground and Surface Water Quality Resources and Result

The data provided in table 3.6 the assessment were carried out based on **IS 10500:2012** drinking water standard and **IS 11624:2019** Indian Standard for Irrigation Water.

Open-well samples are within safe limits and exhibit better quality than the surface water samples (SW1/SW2).

- **Safety Rating:** Highly Suitable. Both are well within the "Permissible" BIS limits.
- **TDS & Taste:** OW1 (**470 mg/L**) and OW2 (**550 mg/L**) are around the 500 mg/L acceptable limit. While safe to drink directly, they may have a slightly mineralized taste.
- **Hardness:** OW1 (**179 mg/L**) and OW2 (**198 mg/L**) are comfortably under the 200 mg/L "Acceptable" limit.
- **Health:** Essential minerals like Calcium and Magnesium are present at levels that are healthy for the body without being excessively hard.

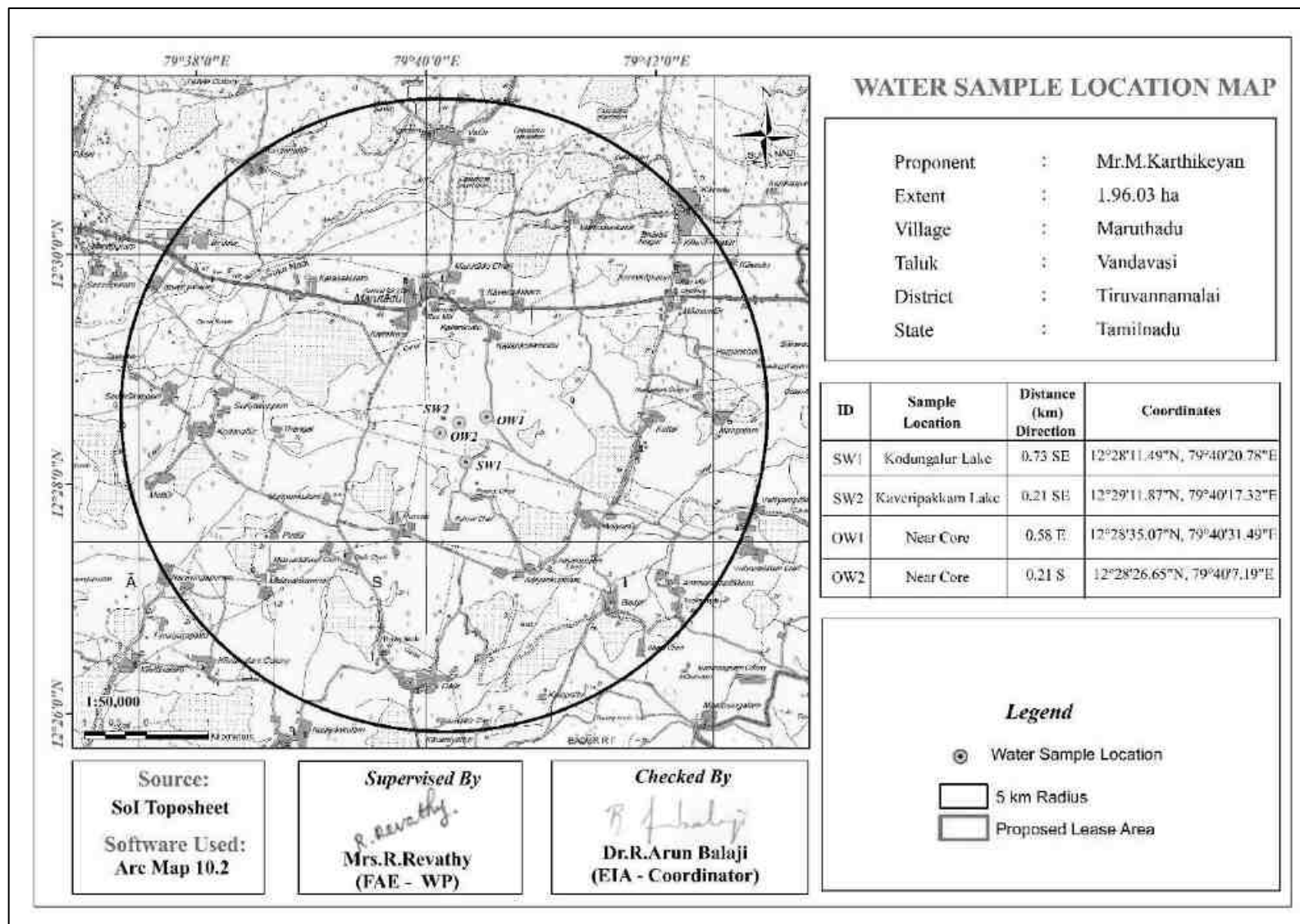


Figure 3.6 Map Showing Water Sampling Locations within 5km Radius around Proposed Project Site

Table 3.6 Ground and Surface Water Quality Resources and Result

S. No .	Parameters	Units	Results				Permissible Limits as Per IS 10500:2012	
			SW1	SW2	OW1	OW2	Acceptable	Permissible
1	Odour	NA	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
2	pH @25 ⁰ C	NA	6.87	7.12	8.08	7.67	6.5-8.5	No Relaxation
3	Colour	Hazen	10	10	5.0	5.0	5	15
4	Taste	NA	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5	Turbidity	NTU	1.2	1.6	0.7	0.4	1.0	5.
6	TDS	mg/L	603	722	470	550	500	2000
7	Calcium (as Ca)	mg/L	90.4	108.3	70.5	82.5	75	200
8	Iron as Fe	mg/L	0.36	0.42	0.28	0.28	1	No Relaxation
9	Magnesium as Mg	mg/L	5.4	6.5	4.2	5.0	30	100
10	Chloride as Cl	mg/L	168.8	202.2	131.6	154.1	250	1000
11	Sulphate as SO4	mg/L	35.5	42.5	27.7	32.4	200	400
12	Free residual chlorine	mg/L	BLQ (LOQ:0.1)	BLQ (LOQ:0.1)	BLQ (LOQ:0.1)	BLQ (LOQ:0.1)	0.2	1.0
13	Fluoride as F	mg/L	0.48	0.56	0.32	0.26	1.0	1.5
14	Nitrate as NO3	mg/L	11.45	13.7	8.93	10.45	45	No Relaxation
15	Total alkalinity as CaCO3	mg/L	169	173	146	132	200	600
16	Total Hardness as CaCO3	mg/L	205	231	179	198	200	600
17	Ammonia as NH3	mg/L	BLQ (LOQ:0.1)	BLQ (LOQ:0.1)	BLQ (LOQ:0.1)	BLQ (LOQ:0.1)	Not Specified	Not Specified

18	Biochemical Oxygen Demand for 3 days at 27 ^o c	mg/L	BLQ (LOQ:1.0)	BLQ (LOQ:1.0)	BLQ (LOQ:1.0)	BLQ (LOQ:1.0)	Not Specified	Not Specified
19	Carbonate Hardness (as CaCO ₃)	mg/L	169	182	141	132	Not Specified	Not Specified
20	Chemical Oxygen Demand	mg/L	BLQ (LOQ:5.0)	BLQ (LOQ:5.0)	BLQ (LOQ:5.0)	BLQ (LOQ:5.0)	Not Specified	Not Specified
21	Dissolved Oxygen	mg/L	6.1	6.4	6.9	6.6	Not Specified	Not Specified
22	Phenolphthalein Alkalinity (as CaCO ₃)	mg/L	BLQ (LOQ:1.0)	BLQ (LOQ:1.0)	BLQ (LOQ:1.0)	BLQ (LOQ:1.0)	Not Specified	Not Specified
23	Non-Carbonate Hardness (as CaCO ₃)	mg/L	36	58	33	66	Not Specified	Not Specified
24	Electrical Conductivity @ 25°C	µmhos/cm	988	1245	746	902	Not Specified	Not Specified
25	Phosphate (as PO ₄)	mg/L	BLQ (LOQ:0.05)	BLQ (LOQ:0.05)	BLQ (LOQ:0.05)	BLQ (LOQ:0.05)	Not Specified	Not Specified
26	Appearance	NA	Clear Liquid	Colourless Liquid	Clear Liquid	Colourless Liquid	Not Specified	Not Specified
27	Silica as SiO ₂	mg/L	14.06	10.8	7.60	12.40	Not Specified	Not Specified
28	E. coli	MPN/100m 1	<2	<2	<2	<2	Not Specified	Not Specified
29	Total Coliform	MPN/100m 1	<2	<2	<2	<2	Not Specified	Not Specified

Source: On-site monitoring/ Sampling Results by Interstellar Testing Centre Pvt. Ltd in association with GTMS

Interpretation of Water Quality Results

Parameter	Observed Range (All Samples)	IS 10500 Acceptable Limit	IS 10500 Permissible Limit*	Status & Interpretation
pH @ 25°C	6.87 – 8.08	6.5 – 8.5	No Relaxation	Safe. All samples are within the ideal range for drinking and household use.
Turbidity (NTU)	0.4 – 1.6	1.0	5.0	Exceeds Acceptable (SW1, SW2). Levels above 1.0 NTU can interfere with disinfection and indicate suspended matter.
Color (Hazen)	5.0 – 10.0	5.0	15.0	Exceeds Acceptable (SW1, SW2). While safe, values above 5 Hazen may be aesthetically unappealing.
TDS (mg/L)	470 – 722	500	2000	Exceeds Acceptable (SW1, SW2). High TDS affects taste and may cause gastrointestinal irritation in some individuals.
Calcium (as Ca)	70.5 – 108.3	75	200	Exceeds Acceptable (SW1, SW2, OW2). Contributes to water hardness and scaling in pipes/utensils.
Total Hardness	179 – 231	200	600	Exceeds Acceptable (SW1, SW2). Classified as "Hard" water; requires more soap for lather and causes scaling.
Chloride (as Cl)	131.6 – 202.2	250	1000	Safe. All samples are well within acceptable limits.
Fluoride (as F)	0.26 – 0.56	1.0	1.5	Safe. Levels are ideal for preventing dental caries without risk of fluorosis.
Nitrate (as NO ₃)	8.93 – 13.7	45	No Relaxation	Safe. All samples are well below the limit for health risks.
Iron (as Fe)	0.28 – 0.42	0.3	No Relaxation	Slightly Above (SW1, SW2). Values above 0.3 mg/L may cause a metallic taste or slight staining.
E.coli / Coliform	<2 MPN/100ml	Absent	Absent	Satisfactory. Minimal detectable levels suggest the water is largely free of fecal contamination.

**Permissible limit in the absence of an alternate source.*

According to Indian standards for irrigation (IS 11624:2019) the water is categorized as Excellent to Good for crops.

- Electrical Conductivity (EC) of OW1 (746 $\mu\text{mhos/cm}$) and OW2 (902 $\mu\text{mhos/cm}$) fall into the Medium (250–750) to High (750–2250) salinity classes. Slight salinity in water can sometimes actually increase the sugar content (sweetness) of watermelons though it may slightly reduce the overall fruit size if it exceeds 1.5 dS/m
- Specific ions such as chloride and sulphate levels are very low, posing no risk of leaf burn even if using sprinkler irrigation. The **drip irrigation** for water melon ensures you occasionally flush the soil with extra water to prevent salts from building up near the roots.

Paddy suitability assessment:

Parameter	OW1 (Result)	OW2 (Result)	Recommended Limit (Paddy)	Suitability Rating
EC (mhos/cm)	746	902	< 1,500 (Low Hazard)	Excellent
TDS (mg/L)	470	550	< 600 (High productivity)	Ideal
pH @ 25°C	8.08	7.67	6.5 – 8.4 (FAO Standard)	Normal
Iron as Fe (mg/L)	0.28	0.28	< 5.0 (FAO/WHO limit)	Highly Safe
Fluoride as F (mg/L)	0.32	0.26	< 1.0 (Standard)	Safe
Calcium (mg/L)	70.5	82.5	Balanced with Magnesium	Healthy

3.2.2 Hydrogeological Studies

The area within 2 km radius consists of numerous open wells and deep wells. Groundwater level data were collected both from open wells and bore wells for two monsoon seasons as discussed in the following section.

Rainfall

Rainfall data for the study area were collected for the period of 2004-2024([POWER | Data Access Viewer \(nasa.gov\)](#)). Long term monthly average rainfall was estimated from the data of 2004-2024 and compared with the monthly rainfall for the year 2024, shown in Figure 3.7. The Figure 3.7 shows that rainfall is generally high in the months of September through November in every year. Particularly, rainfall in July through August and October, December of 2022 is higher than the previous years.

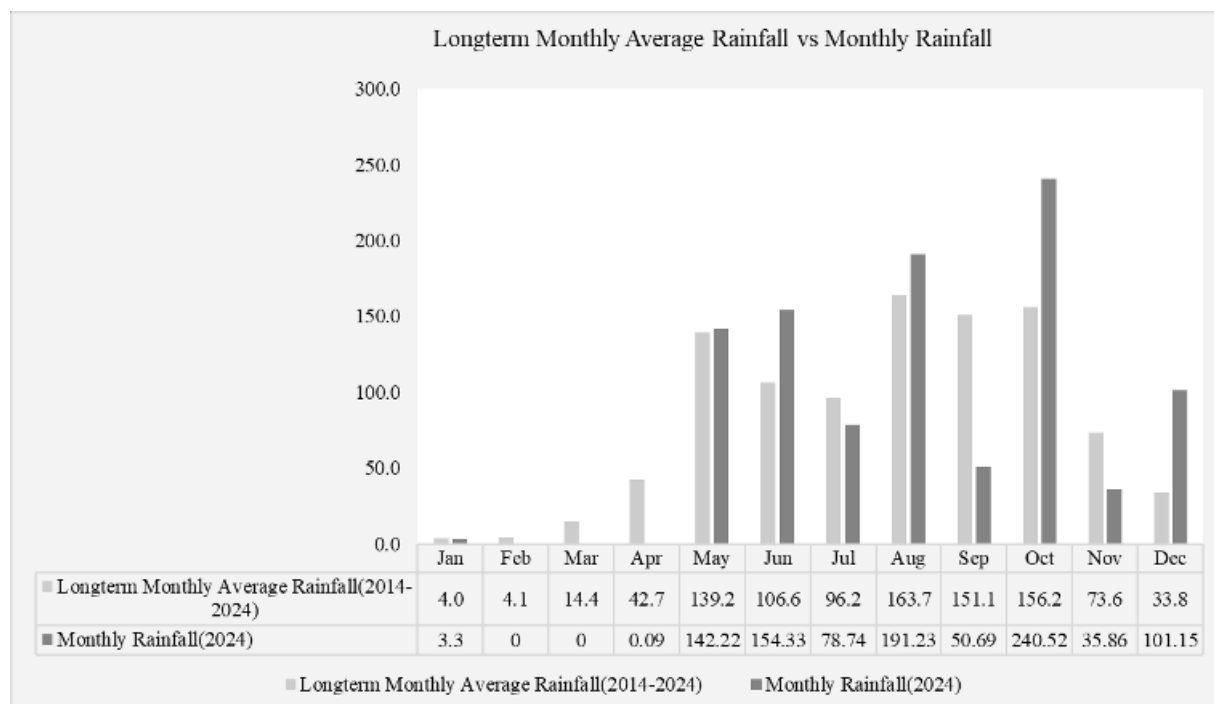


Figure 3.7 Long-Term Monthly Average Rainfall Vs Monthly Rainfall

3.2.3.1 Groundwater Levels and Flow Direction

Data regarding depth to groundwater levels are essential to infer the direction of groundwater movement within the study area. Knowledge of groundwater flow direction is must in choosing location for background groundwater quality monitoring well and in locating recharge and discharge areas. Therefore, data regarding groundwater elevations were collected from 8 open wells and 8 bore wells at various locations within 2 km radius around the proposed project sites for the period from March through May 2025 (Pre-Monsoon Season) and from October through December 2025, (Post Monsoon Season).

Groundwater Levels data 2025 Data

- Open Wells:
 - Pre-Monsoon (March–May): 11.63 to 13.67 m BGL.
 - Post-Monsoon (October–December): 10.77 to 12.57 m BGL.
- Bore Wells:
 - Pre-Monsoon (March–May): 52.6 to 56.8 m BGL.
 - Post-Monsoon (October–December): 52.8 to 57.4 m BGL.

Groundwater Flow Direction

- **Open Wells:** Groundwater generally flows towards the **South** (Open Well 5) and the **East** (Open Well 2) relative to the proposed project site.

- **Bore Wells:** Groundwater flows towards the **Northeast** (Bore Well 8) of the project site.

Water Management Strategy

- **Daily Requirement:** Estimated at **3.5 KLD** for drinking, domestic use, green belt maintenance, and dust suppression.
- **Supply:** Drinking water will be outsourced or treated via an onsite RO plant.
- **Harvesting:** A garland drain system will connect excavated pits to collect rainwater. Rooftop harvesting from labor sheds will also be implemented to recharge the aquifer and reduce dependency on local wells.

Monitoring Recommendation

Open wells 2 and 5 and bore well 8 have been identified as primary locations for water quality monitoring because their positions downstream of the flow direction make them most susceptible to potential contaminants from mining activities.

Water Balance management & artificial recharge in site

The following eco-friendly water management plan will be implemented:

1. Water Demand and Supply

- The total water requirement is 3.5 KLD covering drinking, domestic needs, green belt maintenance and dust suppression.
- To ensure safety drinking water will be sourced from external vendors or processed through an on-site RO plant.

2. Rainwater Harvesting & Storage

Excavated pits near the site will be interconnected via a garland drain system to capture surface runoff.

Rainwater from labor sheds and permanent structures will be diverted into the excavated pits.

Captured water will be prioritized for non-potable uses such as dust suppression and green belt irrigation to minimize the extraction of local groundwater.

3. Artificial & Natural Recharge

Harvesting structures are specifically planned for the Northeast section of the site, aligning with the bore well groundwater flow direction.

Soil resistivity data indicates specific porous and permeable zones within the site. These areas will be preserved to facilitate natural aquifer recharge during monsoon seasons.

4. Impact Mitigation

By reducing dependency on the 16 monitored wells (8 open, 8 bore) within the 2 km radius this strategy aims to maintain the local water balance and prevent depletion of the static water table which averaged between 10.77m and 57.4m BGL in 2025.

Table 3.7 Pre-Monsoon Water Level of Open Wells within 2 km Radius

Station ID	Depth to Static Water Table BGL(m)				Latitude	Longitude
	Mar-25	Apr-25	May-25	Average		
DW01	12.9	13.4	14.7	13.67	12°44'40.76"N	79°42'54.11"E
DW02	10.9	11.3	13.7	11.97	12°44'58.24"N	79°42'40.84"E
DW03	13.5	13.9	13.3	13.57	12°45'9.59"N	12°45'9.59"N
DW04	11.8	12.3	12.7	12.27	12°44'16.78"N	79°43'22.89"E
DW05	10.5	10.9	13.5	11.63	12°44'13.24"N	79°42'35.98"E
DW06	12.4	12.7	13.2	12.77	12°43'35.54"N	79°42'47.31"E
DW07	11.4	11.6	11.9	11.63	12°44'16.37"N	79°43'56.73"E
DW08	11.8	12.3	12.7	12.27	12°43'37.78"N	79°43'45.05"E

Table 3.8 Post-Monsoon Water Level of Open Wells within 2 km Radius

Station ID	Depth to Static Water Table BGL(m)				Latitude	Longitude
	Oct-25	Nov-25	Dec-25	Average		
DW01	12.12	10.98	9.21	10.77	12°44'40.76"N	9°42'54.11"E
DW02	12.22	11.02	9.55	10.93	2°44'58.24"N	79°42'40.84"E
DW03	14.85	12.62	10.25	12.57	12°45'9.59"N	12°45'9.59"N
DW04	12.44	11.35	10.02	11.27	12°44'16.78"N	79°43'22.89"E
DW05	13.01	11.89	10.08	11.66	2°44'13.24"N	9°42'35.98"E
DW06	13.65	12.55	10.11	12.1	12°43'35.54"N	79°42'47.31"E
DW07	12.44	11.35	10.02	11.27	2°44'16.37"N	9°43'56.73"E
DW08	12.65	11.42	10.08	11.38	12°43'37.78"N	79°43'45.05"E

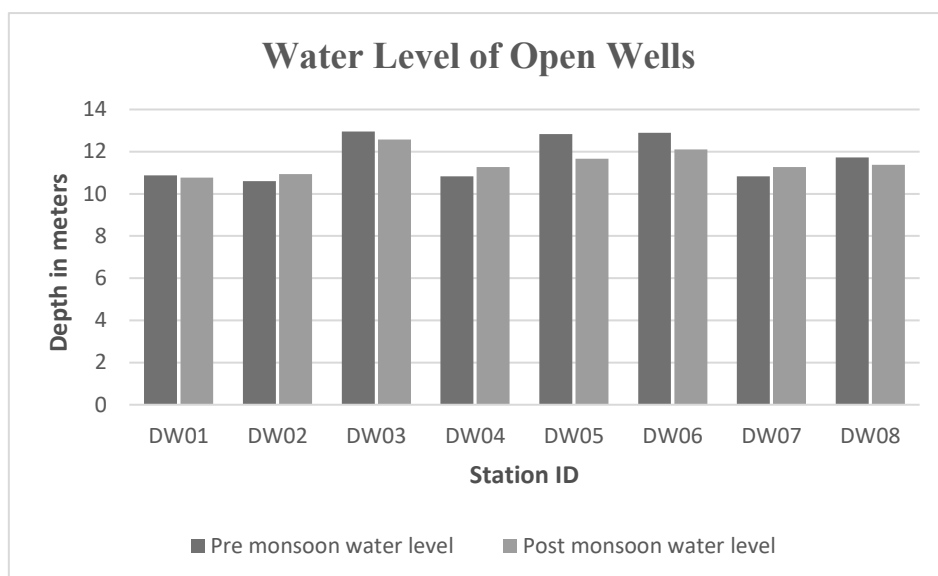


Table 3.9 Pre-Monsoon Water Level of Bore Wells within 2 km Radius

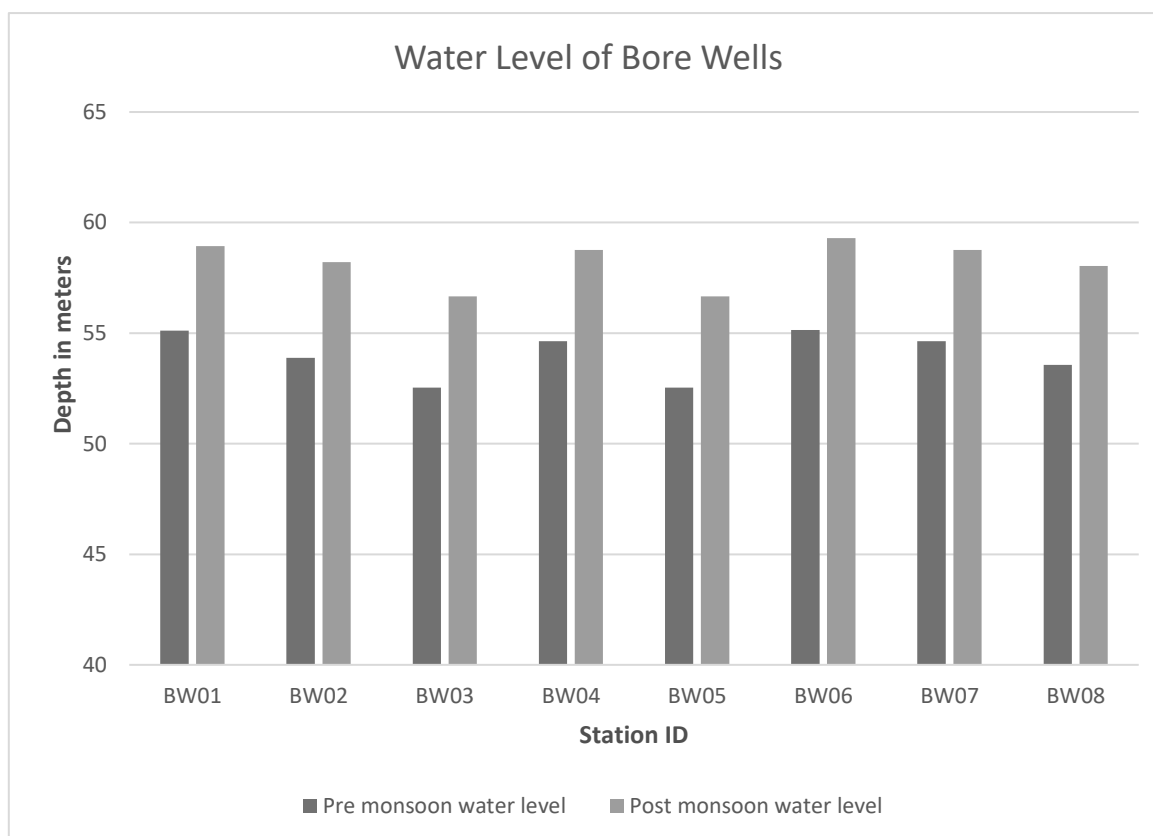
Station ID	Depth to Static Potentiometric Surface BGL(m)				Latitude	Longitude
	Mar-2025	Apr-2025	May- 2025	Average		
BW01	54.9	55.3	55.8	55.3	2°44'42.61"N	79°43'41.38"E
BW02	53.4	53.7	54.1	53.7	12°44'0.07"N	79°43'40.46"E
BW03	52.8	53.2	53.9	53.3	12°44'7.91"N	79°43'8.66"E
BW04	56.2	56.8	57.4	56.8	12°44'22.24"N	79°44'2.80"E
BW05	54.2	54.8	55.3	54.8	12°43'29.18"N	79°43'25.23"E
BW06	55.6	55.8	56.3	55.9	12°44'7.88"N	79°42'17.72"E
BW07	53.4	53.9	54.4	53.9	12°44'46.82"N	79°42'28.21"E
BW08	52.3	52.5	53.1	52.6	12°45'19.25"N	79°42'46.06"E

Source: Onsite monitoring data

Table 3.10 Post-Monsoon Water Level of Bore Wells within 2 km Radius

Station ID	Depth to Static Potentiometric Surface BGL (m)				Latitude	Longitude
	Oct-25	Nov-25	Dec-25	Average		
BW01	56.5	54.2	53.7	54.8	12°44'42.61"N	79°43'41.38"E
BW02	56.9	53.5	52.7	54.4	12°44'0.07"N	79°43'40.46"E
BW03	56.8	53.4	52.8	54.3	12°44'7.91"N	79°43'8.66"E
BW04	58.2	56.8	56.1	57.0	12°44'22.24"N	79°44'2.80"E
BW05	54.9	54.2	53.7	54.3	12°43'29.18"N	79°43'25.23"E
BW06	55.7	55.2	54.8	55.2	12°44'7.88"N	79°42'17.72"E
BW07	55.2	53.9	53.2	54.1	12°44'46.82"N	79°42'28.21"E
BW08	54.9	52.1	51.4	52.8	12°45'19.25"N	79°42'46.06"E

Source: Onsite monitoring data



According to the data average depth to the static water table in open wells range from 11.63 to 13.67m BGL in pre-monsoon and 11.4 to 13.5m BGL in post monsoon. The bore well data thus collected onsite are provided in Tables 3.9 and 3.10. The average depth to static potentiometric surface in bore wells for the period of October 2025 through December 2025 (Post Monsoon Season) vary from 52.8 to 57.4m and from 52.6 to 56.8 m for the period of March through May, 2025 (Pre-Monsoon Season).

Groundwater flows naturally from areas of high hydraulic head to low hydraulic head a process governed by the hydraulic gradient and influenced by the aquifer's hydraulic conductivity. Groundwater velocity is higher when the hydraulic gradient or hydraulic conductivity is greater. A potentiometric map uses contour lines to represent equipotential hydraulic head and groundwater flow is always perpendicular to these equipotential lines moving from higher to lower head values shown in Figures 3.8-3.9 for open wells and 3.10-3.11 for bore wells.

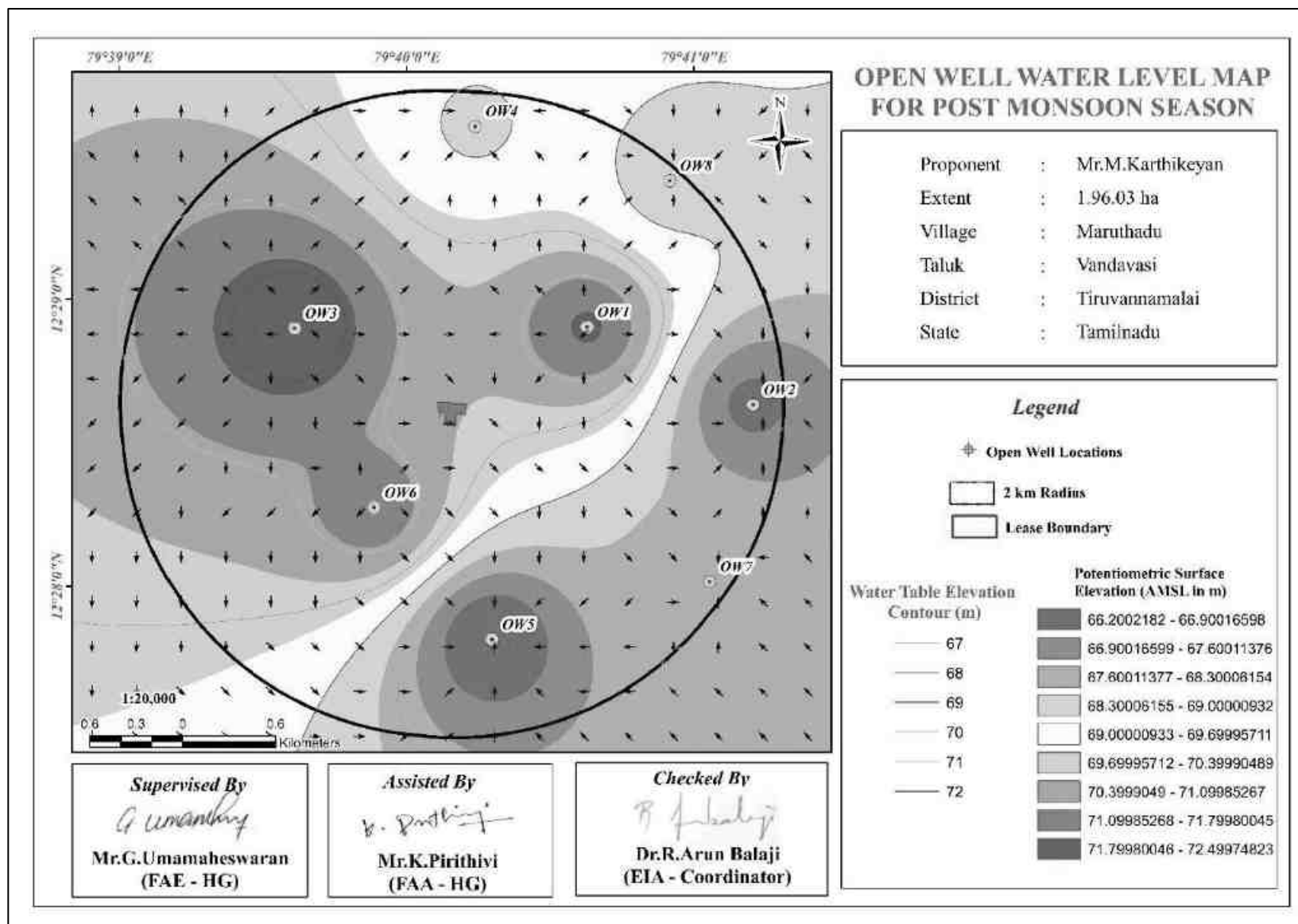


Figure 3.8 Open Well Static Groundwater Elevation Map Showing Direction of Groundwater Flow during Pre-Monsoon Season

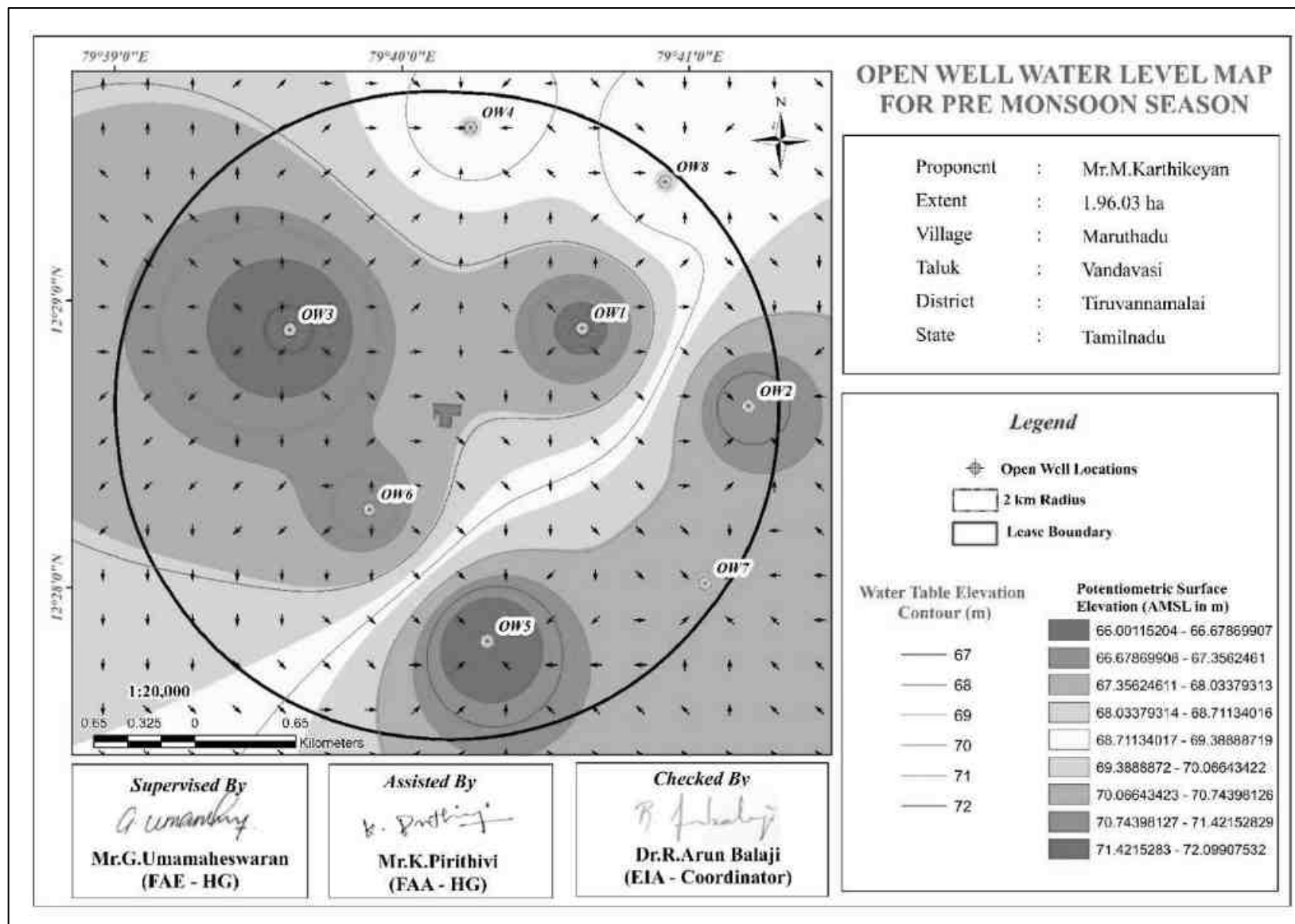


Figure 3.9 Open Well Static Groundwater Elevation Map Showing Direction of Groundwater Flow during Post-Monsoon Season

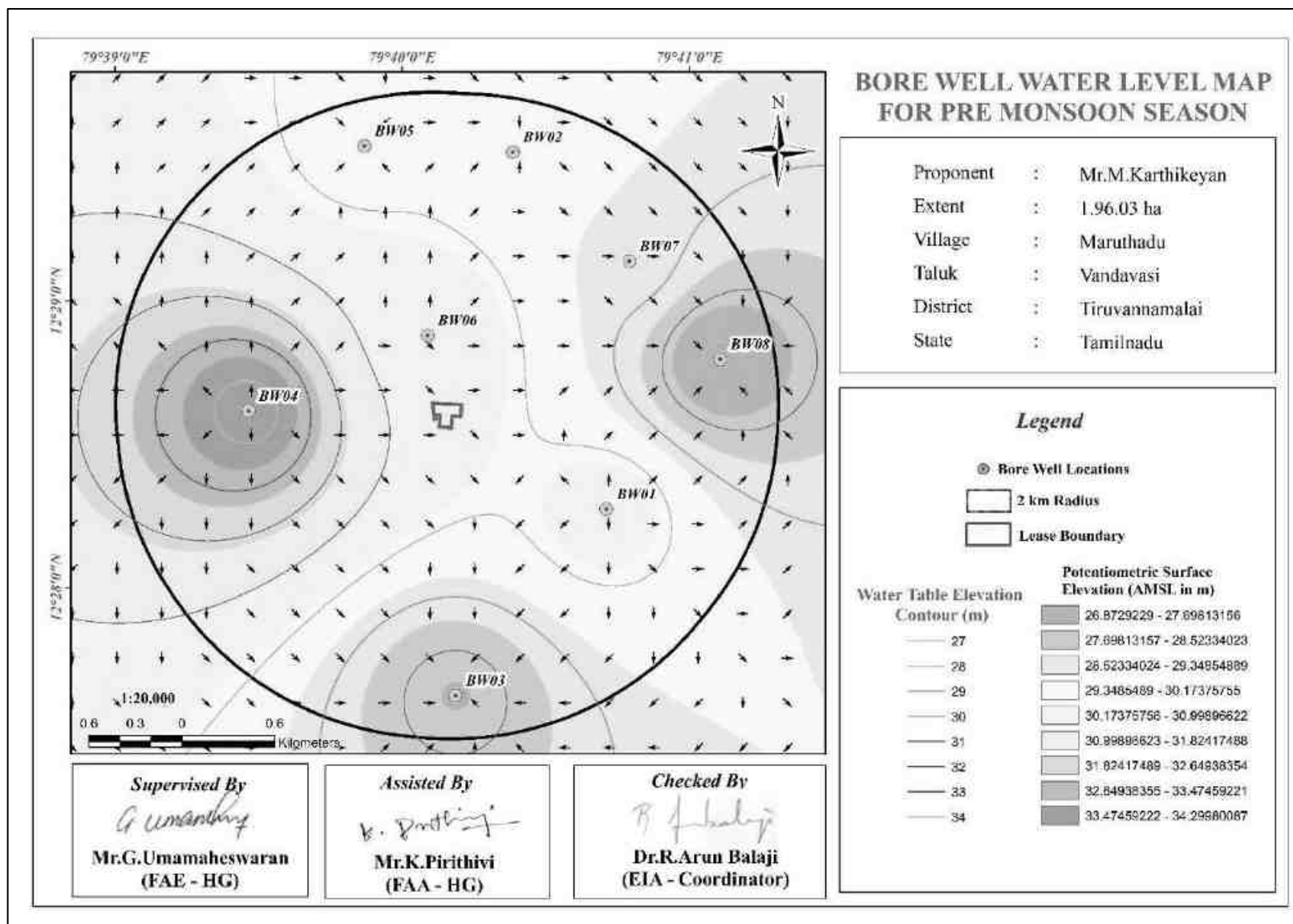


Figure 3.10 Borewell Static Groundwater Elevation Map Showing Direction of Groundwater Flow during Pre-Monsoon Season

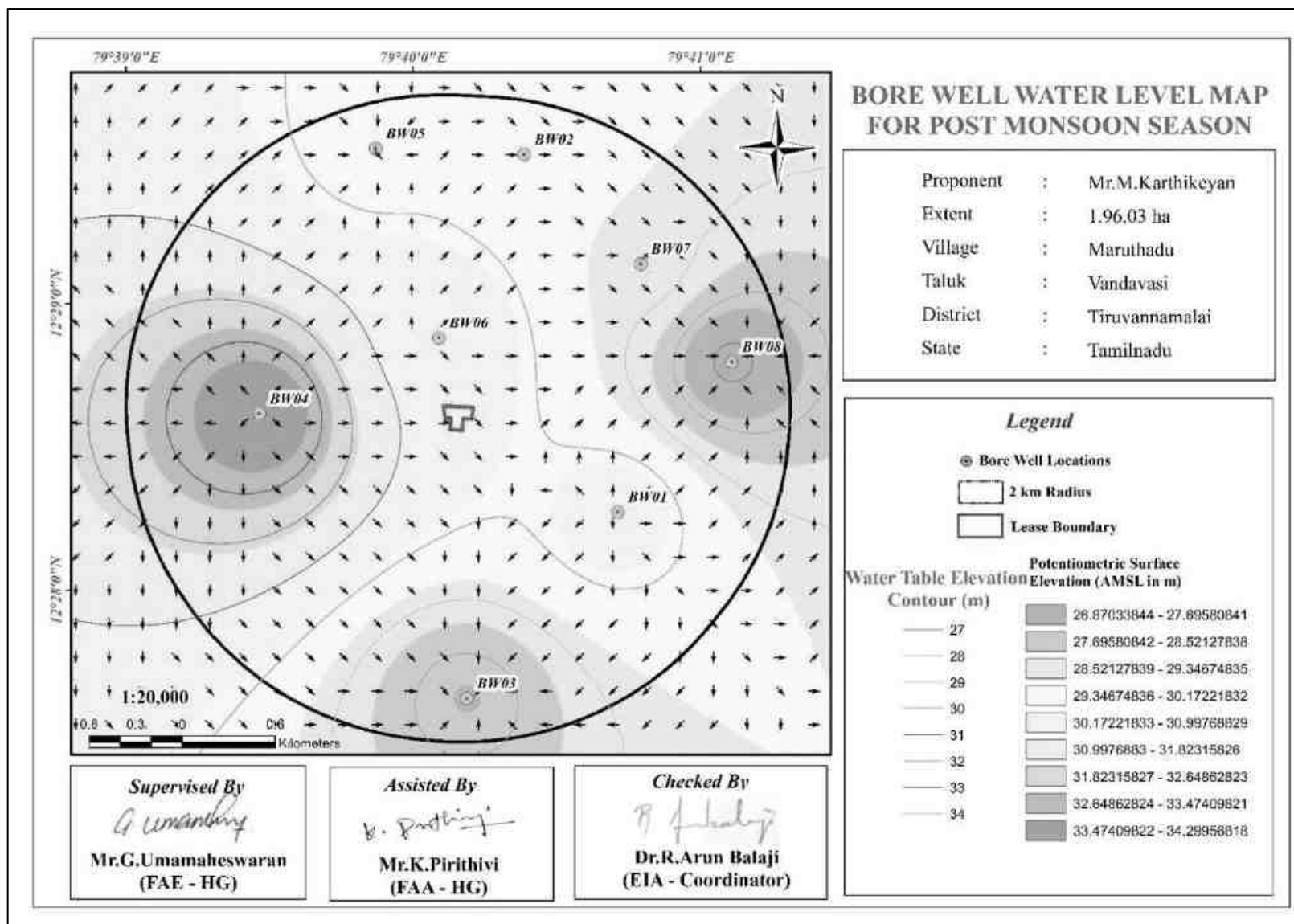


Figure 3.11 Borewell Static Groundwater Elevation Map Showing Direction of Groundwater Flow during Post-Monsoon Season

Ground Water Table Vs Working Depth

Proponent	: Mr.M.Karthikeyan
Extent	: 1.96.03 ha
Village	: Maruthadu
Taluk	: Vandavasi
District	: Tiruvannamalai
State	: Tamilnadu

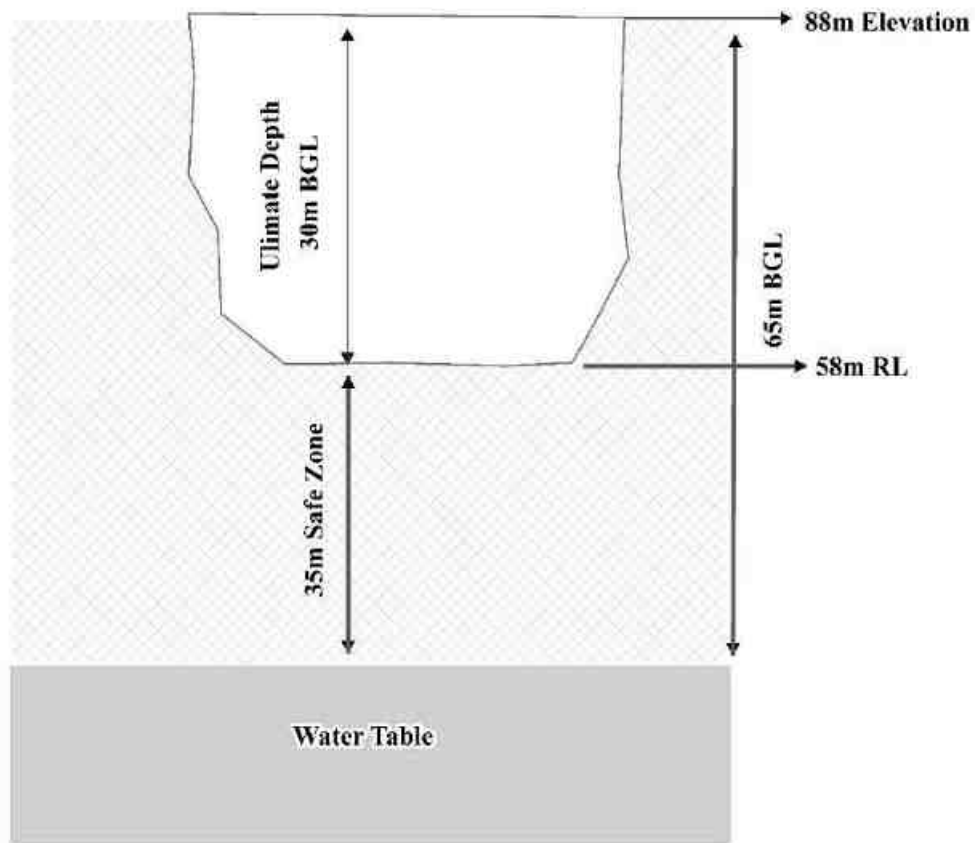


Figure 3.12 Schematic diagram for working depth vs ground water table

3.2.3.2 Electrical Resistivity Investigation

Electrical resistivity investigation is especially useful in the areas where there are no adequate exploratory well data about the aquifer conditions. The present study makes use of vertical electric sounding (VES) to delineate earth's subsurface layers. The electrical resistivity investigation uses four electrodes set up where current is sent through outer electrodes into the ground and the inner electrodes measure the potential difference.

Result

The Geophysical VES data obtained from the project site have been shown in Table 3.11. The field data obtained from a detailed geophysical investigation were plotted using excel spreadsheet for interpretation. The plot for the purpose of interpretation has been shown in Figure 3.13.

Table 3.11 Vertical Electrical Sounding Data

Location Coordinates - 12°44'36.48"N 79°43'13.05"E					
S. No.	AB/2 (m)	MN/2 (m)	Geometrical Factor (G)	Resistance in Ω	Apparent Resistivity in Ωm
1	2	1	4.71	18.459	87
2	4	1	23.55	8.752	206
3	6	1	54.95	4.716	259
4	8	1	98.91	3.274	324
5	10	1	155.45	2.648	412
6	10	5	23.55	15.88	374
7	15	5	62.80	7.418	466
8	20	5	117.75	4.173	491
9	30	5	274.75	2.253	619
10	40	5	494.55	1.489	784
11	50	5	777.15	1.023	625
12	60	5	1122.55	0.558	810
13	70	5	1530.75	0.649	993
14	80	5	2001.75	0.731	1463
15	90	5	2535.55	0.647	1641

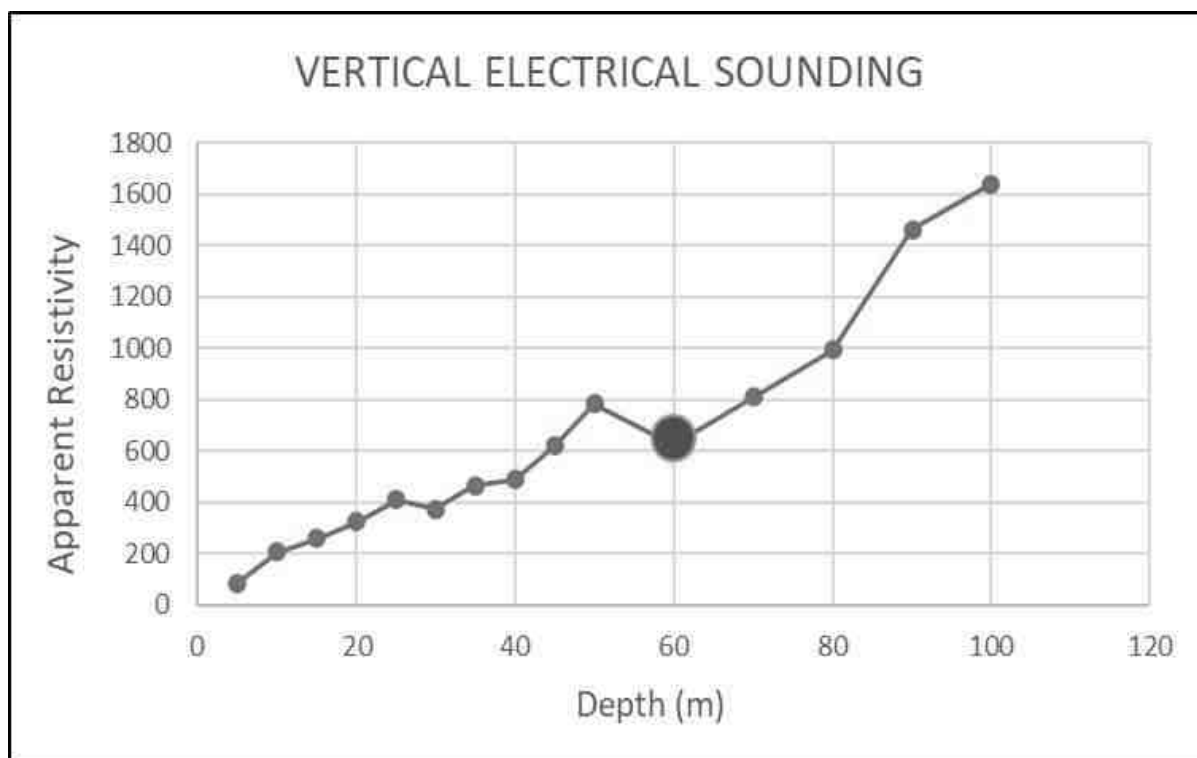


Figure 3.13 Graph Showing Occurrence of Water Bearing Fracture Zones at the Depth of 60-65m Below Ground Level in Proposed Project

The low resistance values indicate occurrence of water at the depth of about 60m below ground level. The maximum depth proposed for the proposed project is 30 BGL. Therefore, the mining operation will not affect the aquifer throughout the entire mine life period.

3.3 AIR ENVIRONMENT

The baseline studies on air environment include identification of specific air pollutants and their existing levels in ambient air. The sources of air pollution in the region are mostly due to vehicular traffic, dust arising from unpaved village road and domestic & agricultural activities.

3.3.1 Meteorology

3.3.1.1 Climatic Variables

A temporary meteorological station was installed at the project sites by covering cluster quarries. The station was installed at a height of 3m above the ground level as there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature. Meteorological data obtained from the onsite monitoring station are provided in Table 3.12.

Table 3.12 Onsite Meteorological Data

S. No.	Parameters		OCT,25	NOV,25	DEC,25
1	Temperature (⁰ C)	Min	20.62	17.81	16.16
		Max	33.65	31.83	30.24
		Avg	26.31	24.48	23.41
2	Relative Humidity (%)	Min	48.68	57.16	48.79
		Max	100.00	100.00	100.00
		Avg	84.92	85.25	84.04
3	Wind Speed (m/s)	Min	0.07	0.13	0.68
		Max	4.98	7.32	5.07
		Avg	1.46	2.45	2.21
4	Wind Direction (degree)	Min	0.70	0.30	0.40
		Max	359.40	359.50	359.60
		Avg	163.81	118.39	115.78
5	Surface Pressure(kPa)	Min	98.44	98.66	98.71
		Max	99.48	99.75	99.88
		Avg	99.01	99.32	99.36

Source: On-site monitoring/sampling by Interstellar Testing Centre Pvt. Ltd in association with GTMS

Temperature:

2025 is officially categorized as the second or third warmest year on record globally. The first half of 2025 saw record-breaking monthly temperatures especially in January followed by a slight cooling in the latter half as the climate transitioned to La Niña conditions.

- Pre-monsoon (March-May): Average maximum reached ~35-36°C nationwide.
- Monsoon (June-September): Average maximum fluctuated around 31-34°C.
- Post-monsoon (Oct-Dec): Dropped from 33.65°C (Oct) to 30.24°C (Dec) as per your local data.

Relative Humidity:

Humidity levels remained exceptionally high during the monsoon and post-monsoon seasons frequently reaching 100% as reflected in the Oct–Dec data. Typical of a year with above normal rainfall where annual averages generally range from 60% in dry months to 85%+ in the latter half of the year.

Rainfall & Winds:

The country received **above-normal rainfall** overall in 2025. 6.1% above normal cumulative rainfall by August's end. Significant excess was noted with October receiving **49% above normal** rainfall. The transition to the Northeast Monsoon in the final quarter saw

average speeds of **1.5 to 2.5 m/s** with peak gusts up to 7.32 m/s in November occurring during the transition period. The measured average wind velocity during the study period is 2.02m/s.

Surface Pressure (kPa):

Atmospheric pressure typically follows a seasonal "U" curve in India being lowest during the peak of the summer/monsoon (May–August) and rising during the cooler months. The data shows this rise in action moving from **99.01 kPa** (Oct) to **99.36 kPa** (Dec) as the air becomes cooler and denser.

A wind direction graph **was generated** using annual average values.

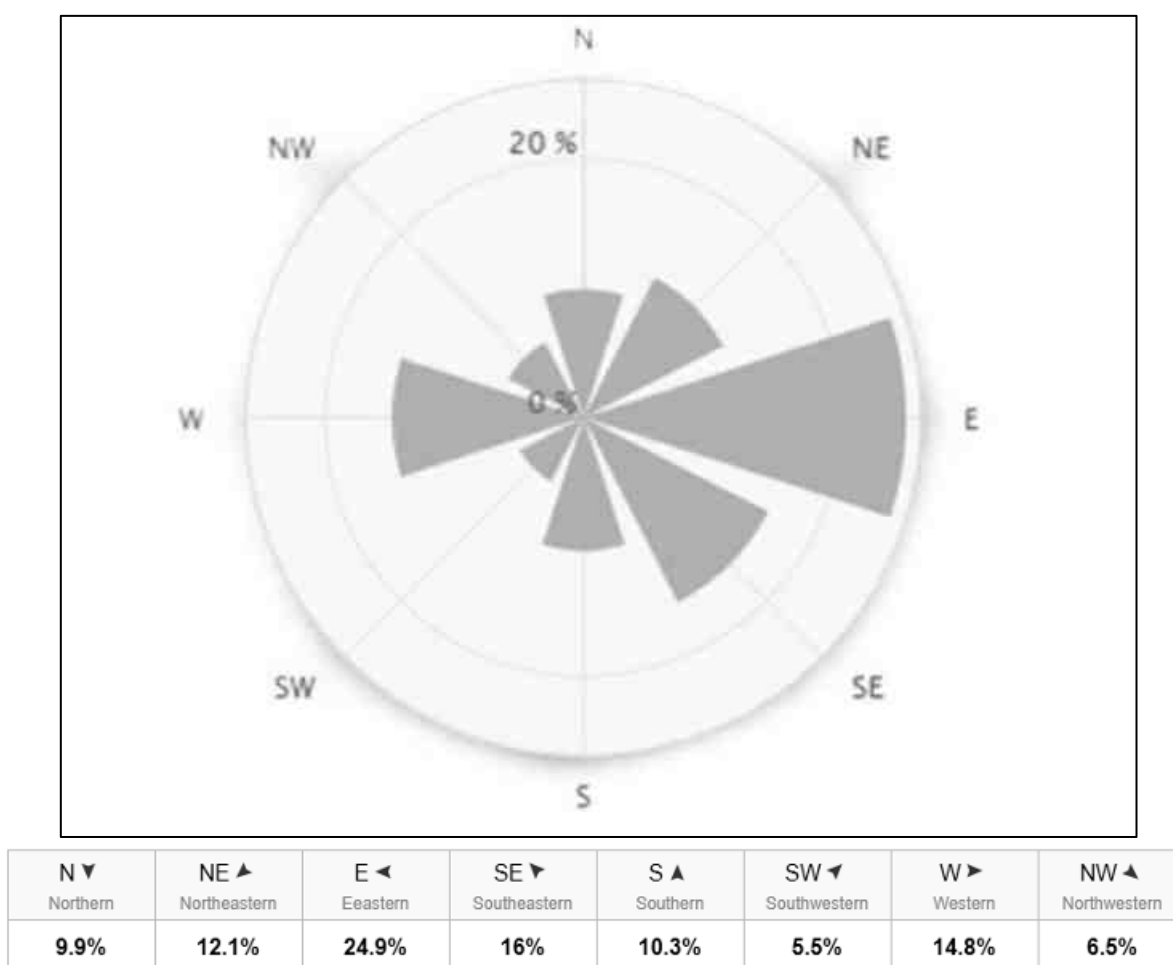


Figure 3.14 Onsite Wind Rose Diagram

3.3.2 Ambient Air Quality Study

The baseline ambient air quality is studied 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

Table 3.13 Methodology and Instrument Used for AAQ Analysis

Parameter	Method	Instrument
PM _{2.5}	Gravimetric method Beta attenuation method	Fine Particulate Sampler
PM ₁₀	Gravimetric method Beta attenuation method	Respirable Dust Sampler
SO ₂	IS-5182 Part II (Improved West & Gaeke method)	Respirable Dust Sampler with gaseous attachment
NO _x	IS-5182 Part II (Jacob & Hoch heiser modified method)	Respirable Dust Sampler with gaseous attachment

Source: Sampling Methodology based Interstellar Testing Centre Pvt. Ltd & CPCB Notification

Table 3.14 National Ambient Air Quality Standards

Pollutant	Time Weighted Average	Concentration in ambient air	
		Industrial, Residential, Rural & other areas	Ecologically Sensitive area (Notified by Central Govt.)
SO ₂ (µg/m ³)	Annual Avg.* 24 hours**	50.0 80.0	20.0 80.0
NO _x (µg/m ³)	Annual Avg. 24 hours	40.0 80.0	30.0 80.0
PM ₁₀ (µg/m ³)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
PM _{2.5} (µg/m ³)	Annual Avg. 24 hours	40.0 60.0	40.0 60.0
Ozone (O ₃) µg/m ³	8 hours	100.0	100.0

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

Methodology

- Monitoring was conducted twice a week at five locations using a 24-hour continuous schedule. This schedule is typically divided into three 8-hour shifts to ensure comprehensive daily data.
- Equipment was positioned at a height of **3 ± 0.5 meters** above ground level to minimize the influence of wind-blown ground dust.
- Stations were placed in open spaces at least 20 meters away from trees and vegetation to prevent these sinks from artificially lowering pollutant readings.

Table 3.15 Ambient Air Quality (AAQ) Monitoring Locations

Sampling ID	Location	Distance (km)	Direction	Coordinates	
				Latitude	Longitude
AAQ1	Kaveripakkam	1.15	NE	12°29'10.03"N	79°40'32.97"E
AAQ2	Marudhadu	1.08	W	12°28'33.24"N	79°39'30.68"E
AAQ3	Kodungalur	2.72	E	12°28'27.27"N	79°41'42.07"E
AAQ4	Punnai	1.63	SW	12°27'44.37"N	79°39'47.68"E
AAQ5	Andiyan Kuppam	2.73	SE	12°27'15.06"N	79°40'52.70"E

Source: On-site monitoring/sampling Interstellar Testing Centre Pvt. Ltd in association with GTMS

The study generated baseline data for four key parameters:

- Particulate Matter (PM_{2.5} and PM₁₀): Fine and coarse inhalable particles.
- Gaseous Pollutants: Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO_x)

Table 3.15 summarizes the average concentrations of the four pollutants ((PM_{2.5}, PM₁₀, SO₂ and NO_x) recorded across the five stations during the three-month period.

Figure 3.15 shows the map identifying the five specific sampling locations and Figures 3.16–3.20a give the graphical representations showing pollutant trends or comparisons for each monitoring station.

Table 3.16 Summary of AAQ Result**Particulate Matter (µg/m³)**

Station ID	PM _{2.5} (Mean)	PM _{2.5} (98th %)	PM ₁₀ (Mean)	PM ₁₀ (98th %)
AAQ1	16.92	18.07	43.58	45.03
AAQ2	16.08	17.51	41.44	45.53
AAQ3	17.44	18.11	44.93	48.14
AAQ4	17.40	19.00	44.83	49.39
AAQ5	17.93	19.73	46.20	51.02

Gaseous Pollutants (µg/m³)

Station ID	SO ₂ (Mean)	SO ₂ (98th %)	NO _x (Mean)	NO _x (98th %)
AAQ1	5.17	5.47	10.35	10.94
AAQ2	4.97	5.42	9.94	10.84
AAQ3	5.36	5.74	10.78	11.59
AAQ4	5.51	5.75	11.06	11.76
AAQ5	5.55	5.89	11.12	12.15

The station AAQ5 has the highest mean and 98th percentile for all four pollutants suggesting it may be located near a higher-intensity emission source like a major traffic intersection or industrial area. The **98th percentile** values represent the levels that 98% of the data falls below. Since these values (e.g., PM_{2.5} max of 19.73 µg/m³ at AAQ5) are close to the mean it suggests a stable environment without extreme daily pollution spikes.

Pollutant correlation:

- The PM₁₀ levels (41.44–46.20 µg/m³) are roughly 2.5 times higher than PM_{2.5} levels, which is typical in areas where coarse dust (construction, road dust) contributes more than fine combustion particles.
- SO₂ and NO_x levels are closely linked likely originating from common vehicular or industrial sources.

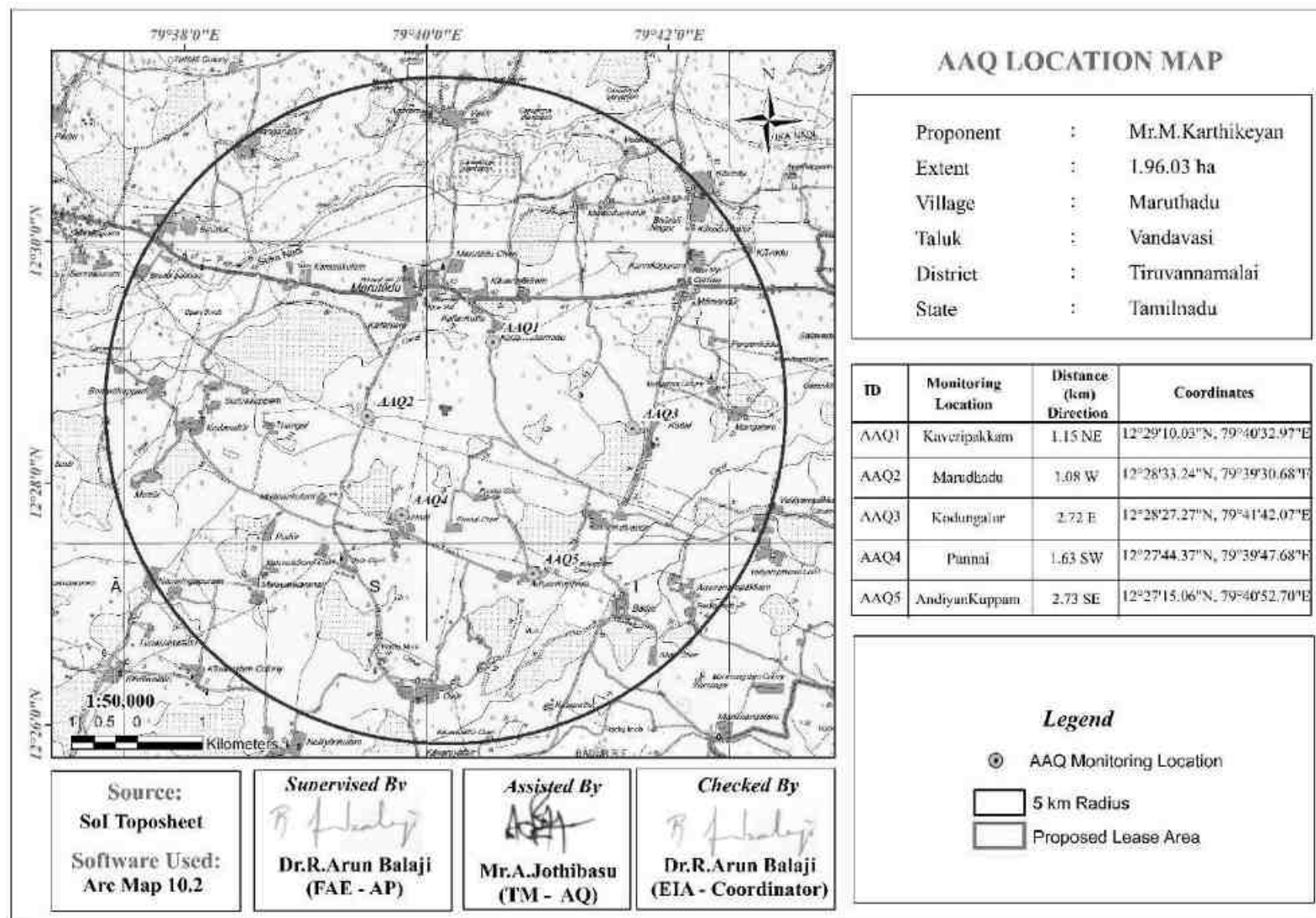


Figure 3.15 Map Showing Ambient Air Quality Monitoring Station Locations Around 5 km Radius from Proposed Project Site

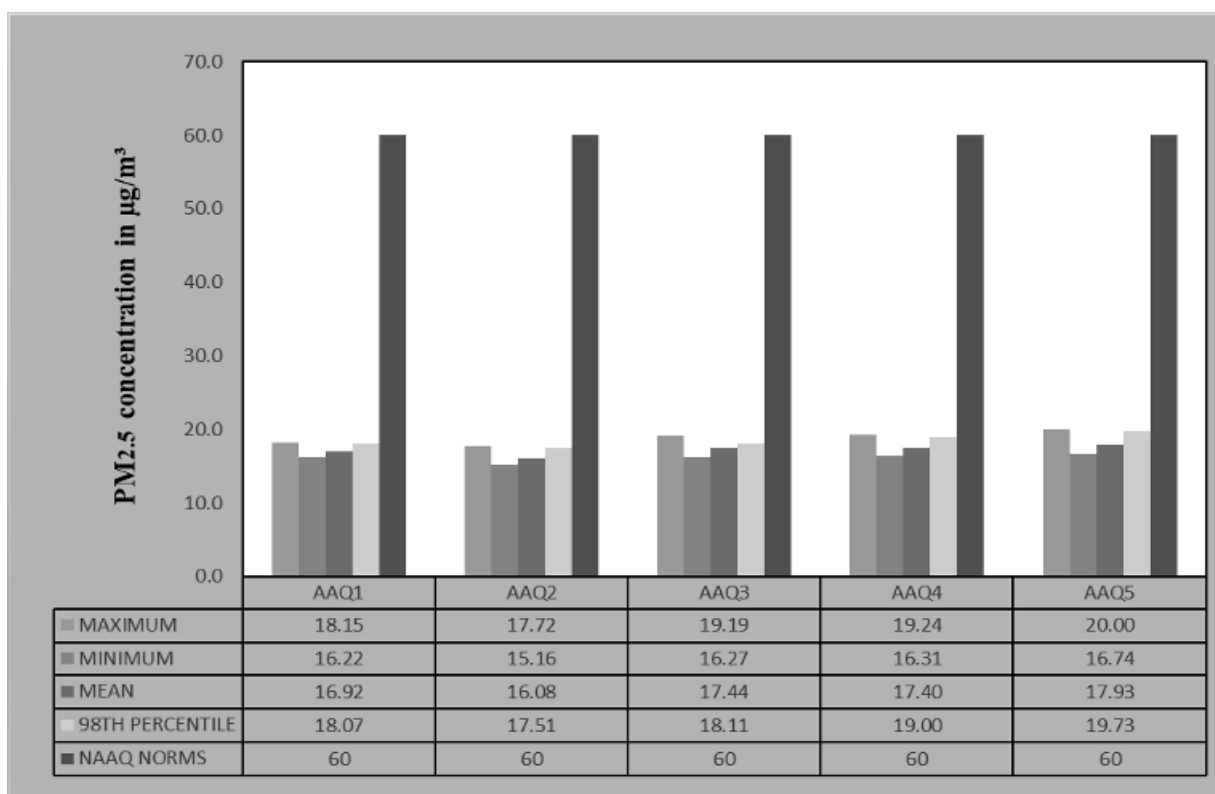


Figure 3.16 Bar Chart Showing Maximum, Minimum, and Average Concentrations of PM_{2.5} Measured from 5 Air Quality Monitoring Stations within 5km Radius

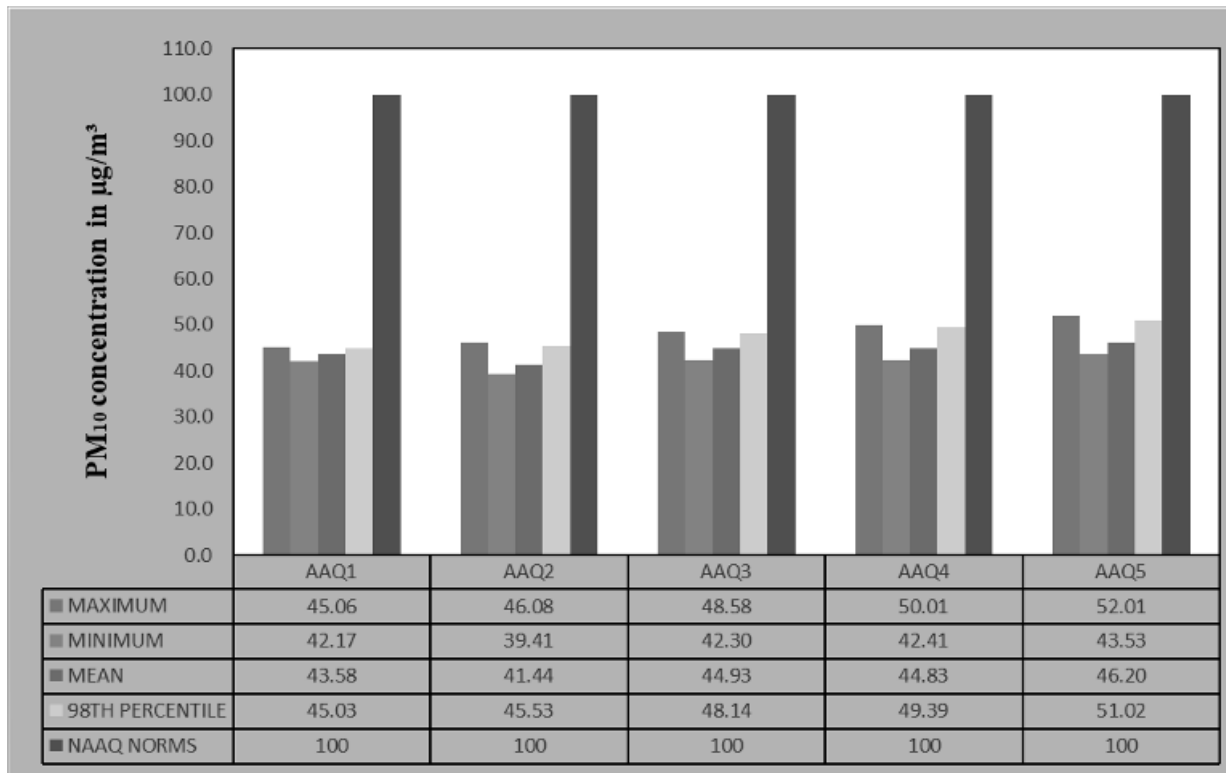


Figure 3.17 Bar Chart Showing Maximum, Minimum, and Average Concentrations of PM₁₀ Measured from 5 Air Quality Monitoring Stations within 5km Radius

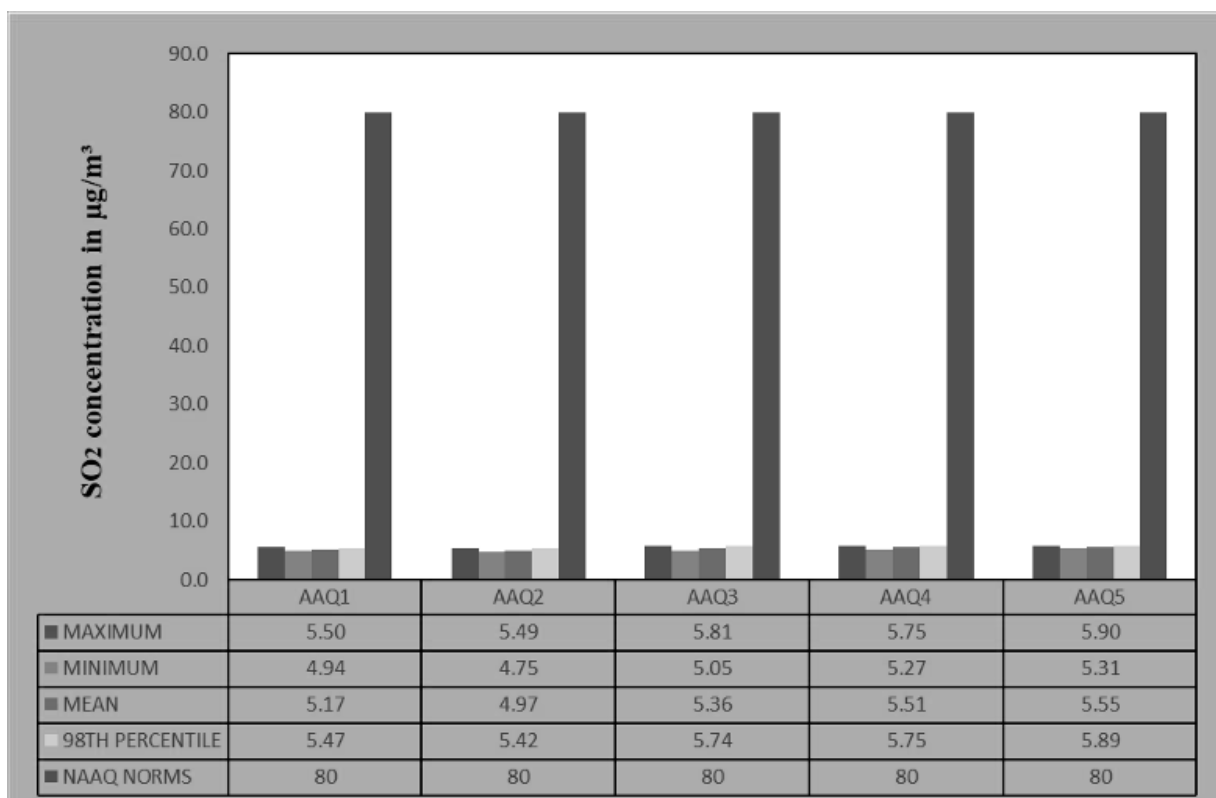


Figure 3.18 Bar Chart Showing Maximum, Minimum, and Average Concentrations of SO₂ Measured from 5 Air Quality Monitoring Stations within 5km Radius

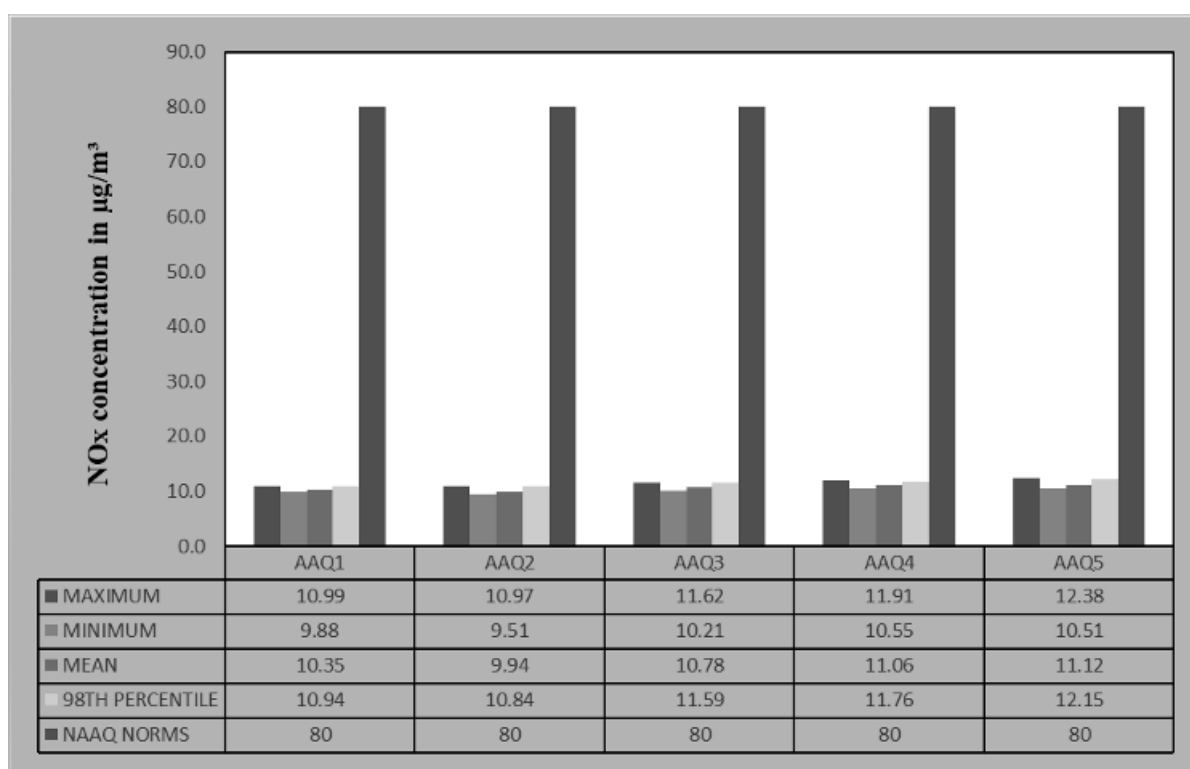


Figure 3.19 Bar Chart Showing Maximum, Minimum, and Average Concentrations of NO_x Measured from 5 Air Quality Monitoring Stations within 5km Radius

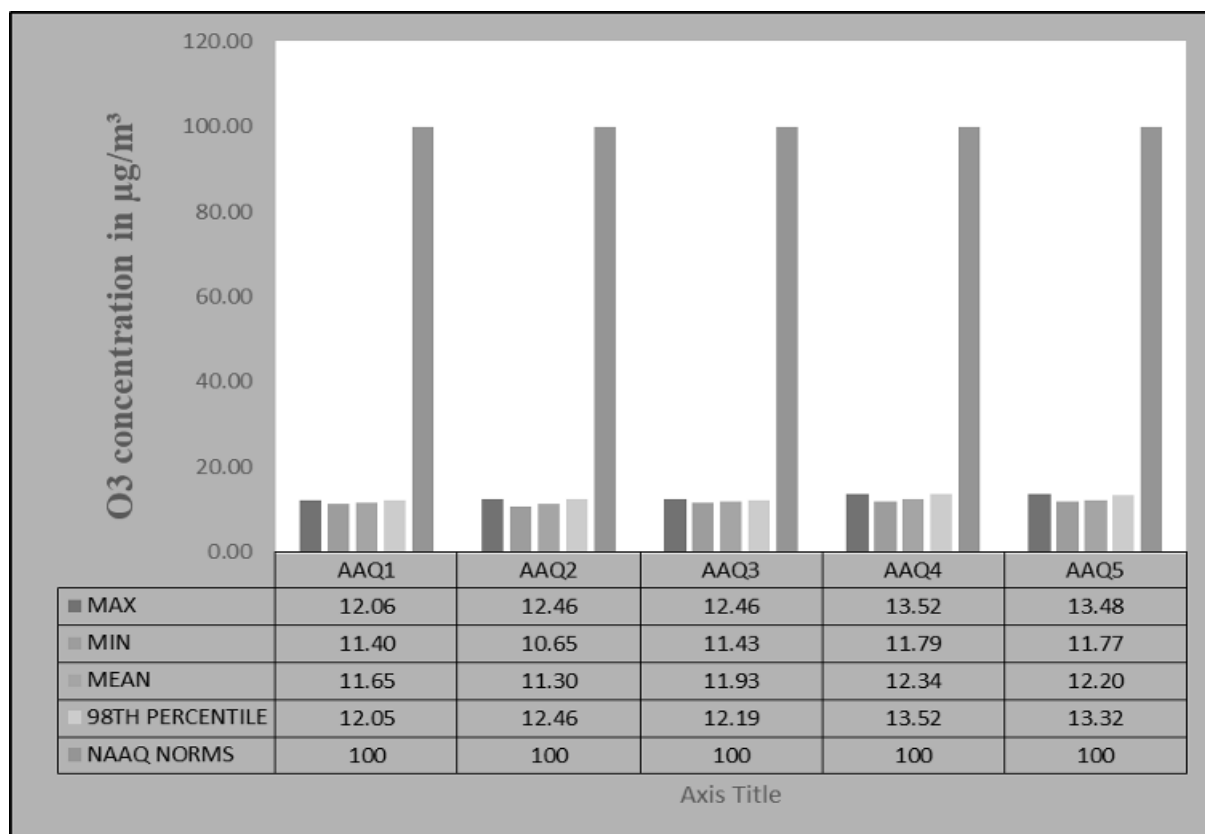


Figure 3.20 Bar Chart Showing Maximum, Minimum, and Average Concentrations of O₃ Measured from 5 Air Quality Monitoring Stations within 5km Radius

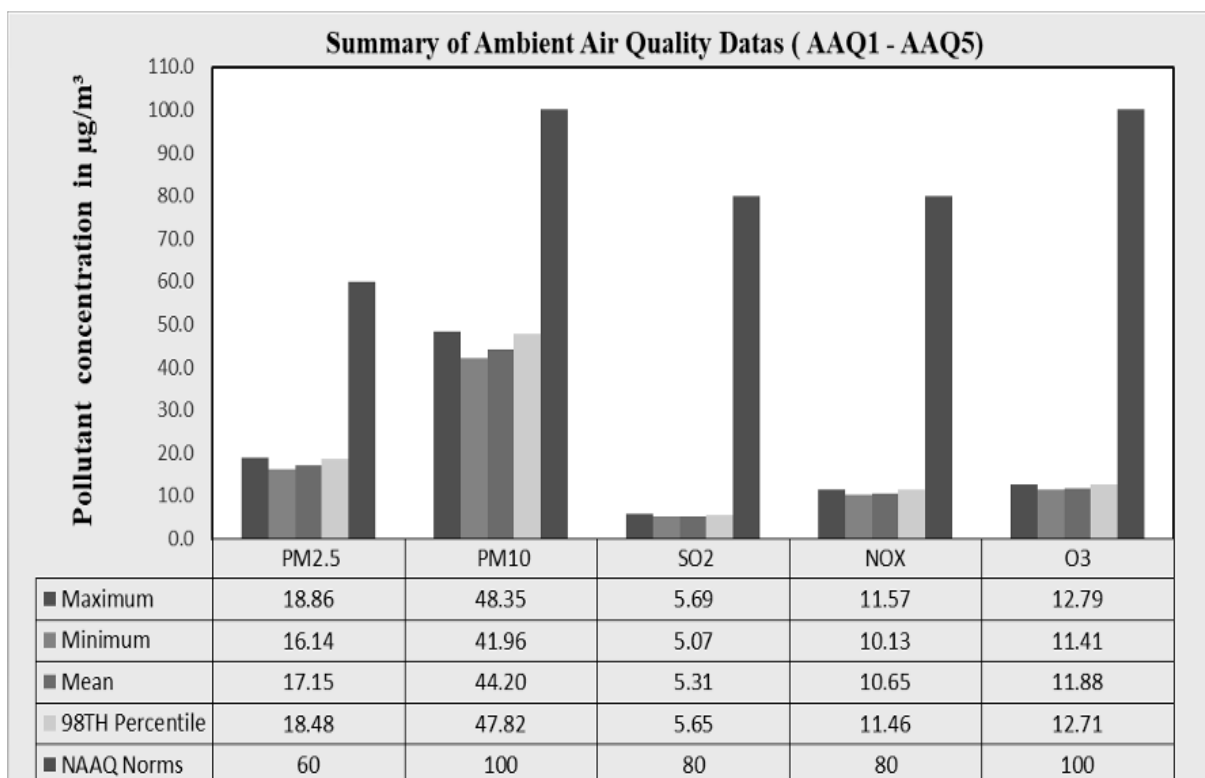


Figure 3.20a Bar Chart Showing Maximum, Minimum, And Average Concentrations of Pollutants in Atmosphere within 5km Radius

3.4 NOISE ENVIRONMENT

The vehicular movement on road and mining activities is the major sources of noise in the study area. The main objective of noise monitoring in the study area is to establish the baseline noise level, which will in turn be used to assess the impact of the total noise expected to be generated during the project operations around the project site. In order to assess the ambient noise levels within the study area noise monitoring was carried out at six (06) locations covering commercial, residential and rural areas within the radius of 5 km. Details of noise monitoring locations are provided in Table 3.17 and spatial occurrence of the locations are shown in Figure 3.21.

Table 3.17 Noise Monitoring Locations

Sampling ID	Location	Distance (km)	Direction	Coordinates	
				Latitude	Longitude
N1	Near Core	0.11	E	12°28'36.93"N	79°40'15.82"E
N2	Marudhadu	1.11	SW	12°28'32.25"N	79°39'30.23"E
N3	Kallankuthu	1.69	N	12°29'31.98"N	79°40'23.58"E
N4	Kodungalur	2.95	E	12°28'23.87"N	79°41'49.51"E
N5	Punnai	1.95	SW	12°27'34.89"N	79°39'43.44"E
N6	AndiyanKuppam	2.75	SE	12°27'12.96"N	79°40'50.40"E

Table 3.18 Ambient Noise Quality Result

Station ID	Location	Environment al setting	Average day noise level (dB(A))	Average night noise level (dB(A))	Day time (6.00 AM – 10.00 PM)	Night time (10.00 PM – 6.00 AM)
					Standard (L _{eq} in dB (A))	
N1	Near Core	Industrial Area	46.2	40.8	75	70
N2	Marudhadu	Residential Area	42.6	40.1	55	45
N3	Kallankuthu		40.1	36.6		
N4	Kodungalur		44.5	41.8		
N5	Punnai		41.9	39.5		
N6	AndiyanKuppam		45.1	41.0		

Source: On-site monitoring/sampling by Interstellar Testing Centre Pvt. Ltd

The monitoring stations N2 through N6 (Marudhadu, Kallankuthu, kodungalur, Punnai and AndiyanKuppam) are situated in village locations they are primarily governed by the **Residential Area** noise standards under Indian law. The results are also depicted below in Figures 3.22 and 3.23.

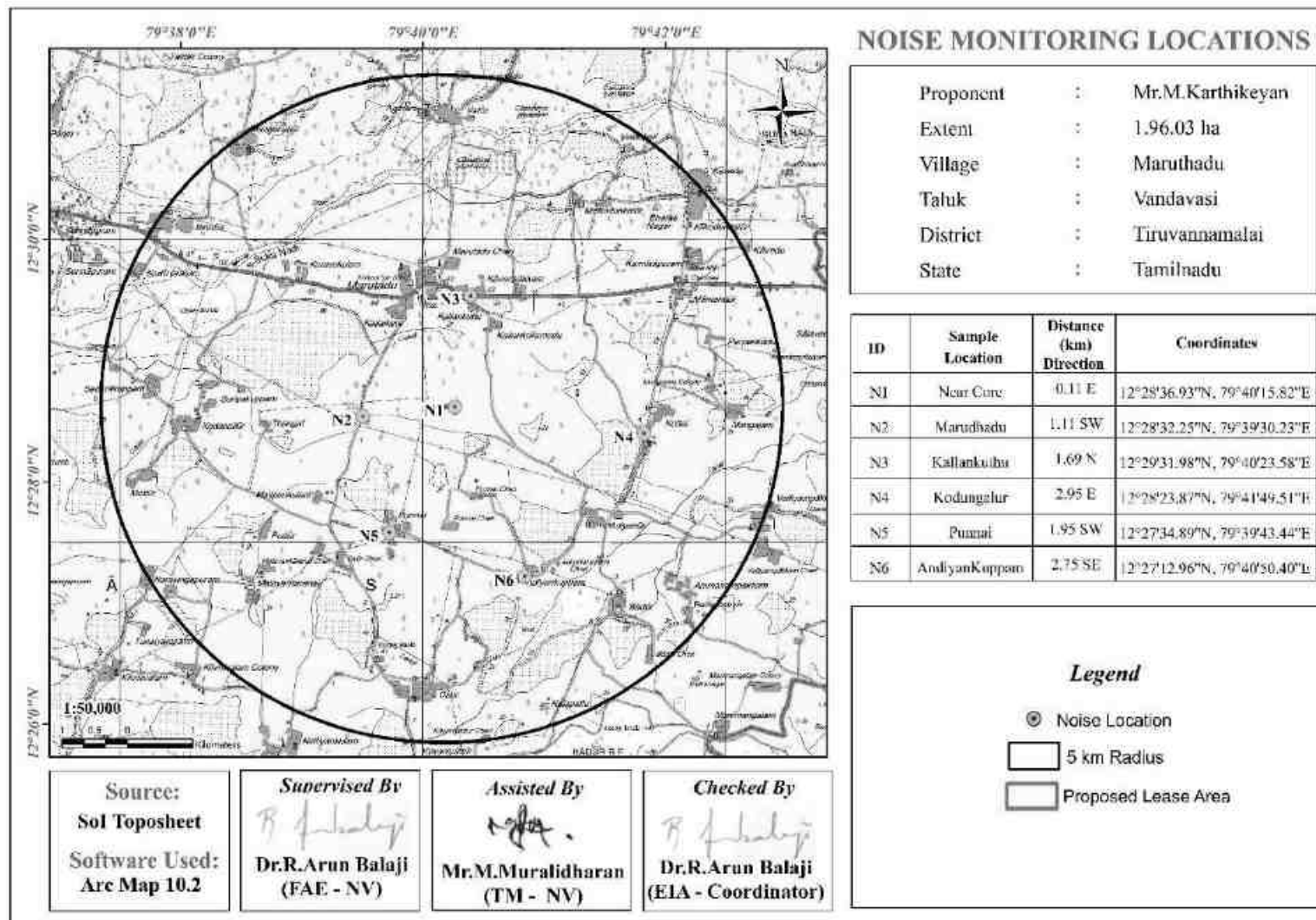


Figure 3.21 Map Showing Noise Level Monitoring Station Locations around 5 km Radius from Proposed Project Site

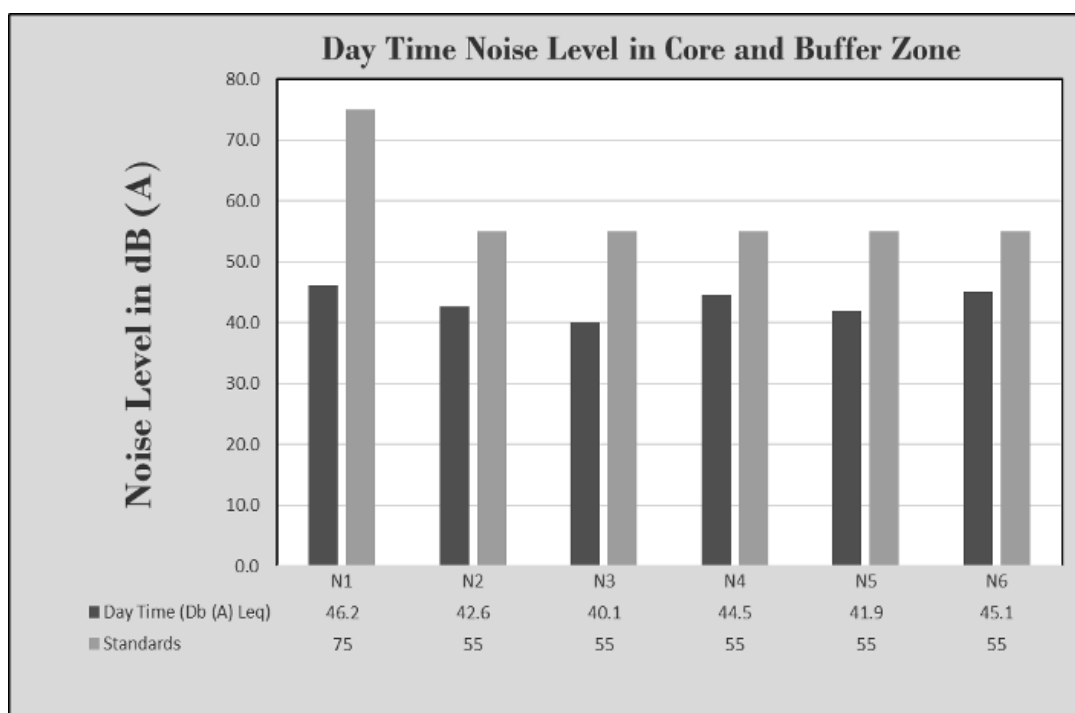


Figure 3.22 Bar Chart Showing Day Time Noise Levels Measured in Core and Buffer Zones

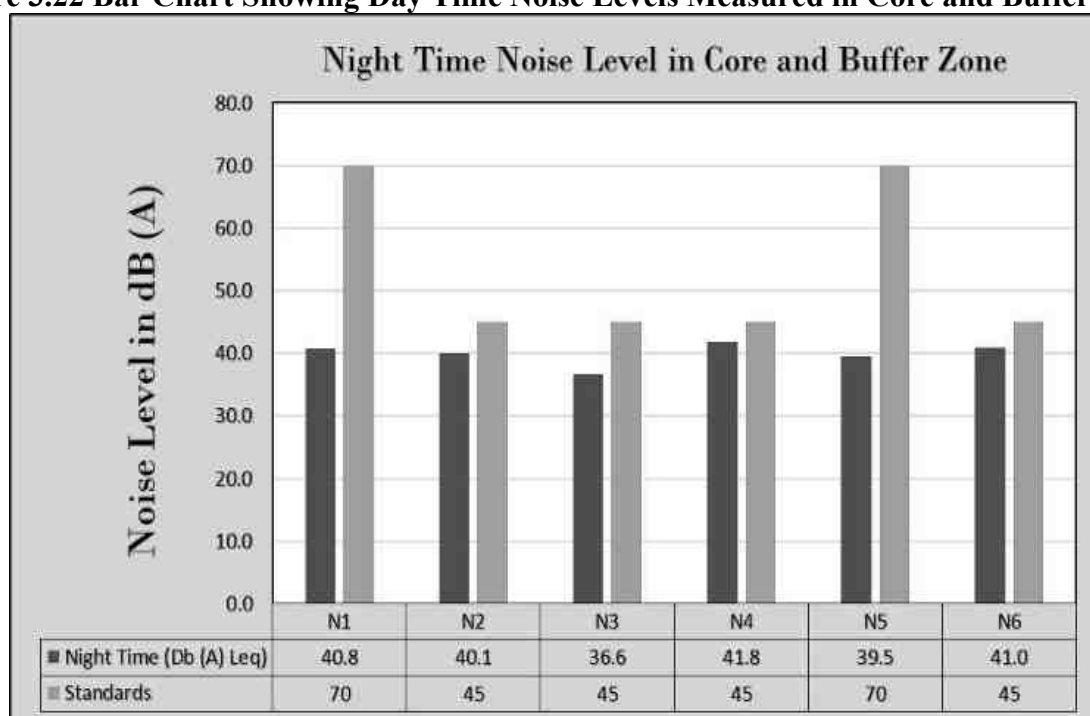


Figure 3.23 Bar Chart Showing Night Time Noise Levels Measured in Core and Buffer Zones

3.5 BIOLOGICAL ENVIRONMENT

Collection of comprehensive baseline information on flora and fauna is a prerequisite for assessment of impacts of any extractive industries/ activities. Biological environment is an important component of the environment of any area. It covers flora & fauna in the region, details of forests and wildlife sanctuaries in the region, with list of endangered species. Over the years ecological and along with it the loss of biological diversity has become a national and a global concern. Ecological assessment therefore is very critical for decision making and for

the setting of a developmental project or an industry. An ecological study of the ecosystem is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the area. Studies on various aspects of ecosystem play an important role in identifying sensitive issues for undertaking appropriate action to mitigate the impact, if any.

The objective of this Section is to characterize and understand the present status of the ecosystems in the study area to assess the bio-diversity and to identify the critical areas. The present study was undertaken as a part of EIA report to understand the present status of ecosystem prevailing in the study area, to compare it with the past condition with the help of available data, to predict changes as a result of present activities and to suggest measures for maintaining the conditions.



Figure 3.24 Quadrates Sampling Methods of Flora

3.5.1 Flora

3.5.1.1 Objectives of the Study

The ecological study of the area was conducted in order to understand the existing status of the flora and fauna to generate baseline information and evaluate the possible impacts on biological environment. The present study highlights the various issues pertaining to floristic diversity and faunal wealth in the surrounding area up to 10km radius from the proposed expansion project.

3.5.1.2 Study Approach & Methodology

The baseline study for existing ecological environment was carried out during study period. A participatory and consultative approach was followed. Field visits were under taken for survey of the aquatic and terrestrial vegetation and animals in the study area.

Nested quadrat sampling method was used for the study of community structure of the vegetation. The sampling consisted of randomly placed quadrats of 10m × 10m were laid down

to assess trees, and sub quadrats of 5 m × 5 m were laid down for shrubs, 1m x 1m were laid done for herbs. The size and number of quadrats needed were determined using the species-area curve (Misra, 1968). The data on vegetation were quantitatively analysed for abundance, density, frequency as per Curtis & McIntosh (1950). The Important Value Index (IVI) for trees was determined as the sum of relative density, relative frequency and relative dominance (Curtis, 1959).

3.5.1.3 Survey Methodology

The baseline study for existing biological environmental was carried out in Nov 2025. Study of flora and fauna carried out as per prescribed method addressed in SOP. Field visits were under taken for survey of the vegetation and animals in the study area. The study area is divided into three parts as project site area along with 500m from all direction surrounding site is being considered as core area and rest of 5km study area is buffer part of the study area.

3.5.1.4 Important Value Index (IVI)

The concept of ‘Important Value Index (IVI)’ has been developed for expressing the dominance and ecological success of any species, with a single value (Mishra, 1968, Sharma, 2005). This index utilizes three characteristics, they are (i) Relative frequency and (ii) Relative density. The three characteristics computed using frequency, density and abundance for all the species falling in all the quadrat by using the following formula. The relative frequency, relative density and relative abundance has been calculated to calculate the IVI value

$$IVI = \text{Relative frequency} + \text{Relative abundance} + \text{Relative density} [RF + RA + RD]$$

Relative Value Index (RVI) = Relative Density + Relative Frequency [RD + RF].

Relative Value Index used for Expressing dominance and Ecological success of Shrub and herb Species in a particular area.

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 takes into account 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 **Shannon Diversity Index** (sometimes called the Shannon-Wiener Index) is a way to measure the diversity of species in a community.

The species diversity index (H) for floral and faunal diversity is calculated by the use of Shannon Wiener Index (Shannon Wiener, 1963) as:

$$H = - \sum (n_i/n) \times \ln (n_i/n)$$

- ✚ Where, n_i is individual density of a species and n is total density of all the species
- ✚ The Evenness Index (E) is calculated by using Shannon's Evenness formula (Magurran, 2004).

✚ The higher the value of H , the higher the diversity of species in a particular community. The lower the value of H , the lower the diversity. A value of $H = 0$ indicates a community that only has one species

$$\text{Evenness Index (E)} = H / \ln(S)$$

Where, H is Shannon Wiener Diversity index; S is number of species

The Shannon evenness Index is a way to measure the evenness of species in a community. The term “evenness” simply refers to how similar the abundances of different species are in the community.

3.5.1.5 Floral diversity Analysis

Flora study was conducted using the above said methodology to inventory the existing terrestrial plants in both core and buffer zones. Details of plants have been described in the succeeding sections.

Flora in core zone

There are no trees in inside of the mining lease area, but there are 60 *Borassus flabellifer* trees, *Morinda citrifolia* 5 and *Azadirachta indica* 4 within a 7.5-meter safety zone.

Flora in 300m radius

Taxonomically, a total of 33 species belonging to 19 families have been recorded from the 300m radius from the mining lease area. The species in the 300m radius include herbs (18), trees (08), shrubs (05), the 19 families, Fabaceae and Lamiaceae are the main dominating species in the study area, Species Richness (margalef Index) in the study area it mentioned in Table 3.19-3.21 Moreover, no species are found as threatened category. There is government land around 300 meters. *Vachelia leucophylla* is the dominant tree followed by *Phoenix sylvestris* tree, *Carissa carandas*, *Casapella thevetia* and *Lantana camara* tree.

Flora in 10km radius zone

In the buffer zone, a total of 81 species belonging to 41 families were recorded. Among them are trees (32), shrubs (14), herbs (38), climbers (09), creepers (5), grasses (4), and cactus (1). Majority of the species belongs to the family of Fabaceae and Poaceae, as mentioned in Table 3.28. Species Richness (margalef Index) in the study area it mentioned in Table 3.22 Moreover, no species are found as threatened category.

Table 3.19 Flora in 300m Radius

S.No.	Local Name	Scientific name	Family name	Total No. of species	Total of Quadrants with	Total No. of Quadrants	Density	Frequency (%)	Abundance	Relative Density	Relative Frequency	IVI	IUCN Conservation Status
Trees													
1	Velikathan maram	<i>Prosopis juliflora</i>	Fabaceae	6	5	10	0.6	50.0	1.2	12.8	12.8	25.6	Not Listed
2	Panai maram	<i>Borassus flabellifer</i>	Arecaceae	5	4	10	0.5	40.0	1.3	10.6	10.3	20.9	Not Listed
3	Nuna maram	<i>Morinda citrifolia</i>	Rubiaceae	7	6	10	0.7	60.0	1.2	14.9	15.4	30.3	Not Listed
4	Vembu	<i>Azadirachta indica</i>	Meliaceae	6	5	10	0.6	50.0	1.2	12.8	12.8	25.6	Not Listed
5	Vagai	<i>Albizia lebbek</i>	Fabaceae	5	4	10	0.5	40.0	1.3	10.6	10.3	20.9	Not Listed
6	Eshamaram	<i>Phoenix Reclinata</i>	Arecaceae	7	6	10	0.7	60.0	1.2	14.9	15.4	30.3	Not Listed
7	Teaku	<i>Tectona grandis</i>	Lamiaceae	6	5	10	0.6	50.0	1.2	12.8	12.8	25.6	Not Listed
8	Veallai vealan	<i>Vachellia leucophloea</i>	Fabaceae	5	4	10	0.5	40.0	1.3	10.6	10.3	20.9	Lest Concern
Shrubs													
9	Erukku	<i>Calotropis gigantea</i>	Apocynaceae	9	8	15	0.6	53.3	1.1	22.0	22.2	44.2	Not Listed
10	Kela chadi	<i>Carissa carandas</i>	Apocynaceae	8	7	15	0.5	46.7	1.1	19.5	19.4	39.0	Not Listed
11	Arali	<i>Casapella thevetia</i>	Apocynaceae	7	6	15	0.5	40.0	1.2	17.1	16.7	33.7	Not Listed
12	Sappathikalli	<i>Cereus pterogonus</i>	Cactaceae	9	8	15	0.6	53.3	1.1	22.0	22.2	44.2	Not Listed
13	Unichedi	<i>Lantana camara</i>	Verbenaceae	8	7	15	0.5	46.7	1.1	19.5	19.4	39.0	Not Listed

<i>Herbs, Climbers & Grass</i>													
14	Thumbai	<i>Leucas aspera</i>	Lamiaceae	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed
15	Katang kathrikai	<i>Solanum virginianum</i>	Solanaceae	7	6	20	0.4	30.0	1.2	4.8	4.7	9.4	Not Listed
16	Arugampul	<i>Cynodon dactylon</i>	Poaceae	10	9	20	0.5	45.0	1.1	6.8	7.0	13.8	Not Listed
17	Poolai poondu	<i>Aerva lanata</i>	Amaranthaceae	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed
18	Korai	<i>Cyperus rotundus</i>	Cyperaceae	6	5	20	0.3	25.0	1.2	4.1	3.9	8.0	Not Listed
19	Nearunji	<i>Tribulus terrestris</i>	Zygophyllales	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed
20	Nayuruvi	<i>Achyranthes aspera</i>	Amaranthaceae	7	6	20	0.4	30.0	1.2	4.8	4.7	9.4	Not Listed
21	Vilaiti tulsi	<i>hyptis suaveolens</i>	Lamiaceae	11	10	20	0.6	50.0	1.1	7.5	7.8	15.2	Not Listed
22	Pink Blumea	<i>Blumea axillaris</i>	Asteraceae	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed
23	Rail poondu	<i>Croton bonplandianus</i>	Euphorbiaceae	7	6	20	0.4	30.0	1.2	4.8	4.7	9.4	Not Listed
24	Communist pacha	<i>Chromolaena odorata</i>	Asteraceae	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed
25	Veattukaya poondu	<i>Tridax Procumbens</i>	Asteraceae	9	8	20	0.5	40.0	1.1	6.1	6.2	12.3	Not Listed
26	Kundumani	<i>Abrus precatorius</i>	Fabaceae	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed
27	Mosukkattan	<i>Passiflora foetida</i>	Passifloraceae	7	6	20	0.4	30.0	1.2	4.8	4.7	9.4	Not Listed
28	Perandai	<i>Cissus quadrangularis</i>	Vitaceae	10	9	20	0.5	45.0	1.1	6.8	7.0	13.8	Not Listed
29	Kandakathari	<i>Solanum xanthocarpum</i>	Solanaceae	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed
30	Arugam Pill	<i>Cynodon dactylon</i>	Poaceae	9	8	20	0.5	40.0	1.1	6.1	6.2	12.3	Not Listed
31	Paspalum	<i>Paspalum quadrifarium</i>	Poaceae	8	7	20	0.4	35.0	1.1	5.4	5.4	10.9	Not Listed

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, VU- Vulnerable indirect assessment of its risk of extinction based on its distribution and/or population status].

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

Table 3.20 Calculation of Species Diversity in 300m Radius

S. No	Common name	Scientific name	No. of Species	Pi	ln (Pi)	Pi x ln (Pi)
Tree						
1	Velikathan maram	<i>Prosopis juliflora</i>	6	0.13	-2.06	-0.26
2	Panai maram	<i>Borassus flabellifer</i>	5	0.11	-2.24	-0.24
3	Nuna maram	<i>Morinda citrifolia</i>	7	0.15	-1.90	-0.28
4	Vembu	<i>Azadirachta indica</i>	6	0.13	-2.06	-0.26
5	Vagai	<i>Albizia lebbek</i>	5	0.11	-2.24	-0.24
6	Eshamaram	<i>Phoenix reclinata</i>	7	0.15	-1.90	-0.28
7	Teaku	<i>Tectona grandis</i>	6	0.13	-2.06	-0.26
8	Veallai vealan	<i>Vachellia leucophloea</i>	5	0.11	-2.24	-0.24
H (Shannon Diversity Index) =2.07						
Shrubs						
9	Erukku	<i>Calotropis gigantea</i>	9	0.22	-1.52	-0.33
10	Kela chadi	<i>Carissa carandas</i>	8	0.20	-1.63	-0.32
11	Arali	<i>Casapella thevetia</i>	7	0.17	-1.77	-0.30
12	Sappathikalli	<i>Cereus pterogonus</i>	9	0.22	-1.52	-0.33
13	Unichedi	<i>Lantana camara</i>	8	0.20	-1.63	-0.32
H (Shannon Diversity Index) =1.61						
Herbs						
14	Thumbai	<i>Leucas aspera</i>	8	0.05	-2.91	-0.16
15	Katang kathrikai	<i>Solanum virginianum</i>	7	0.05	-3.04	-0.14
16	Arugampul	<i>Cynodon dactylon</i>	10	0.07	-2.69	-0.18
17	Poolai poondu	<i>Aerva lanata</i>	8	0.05	-2.91	-0.16
18	Korai	<i>Cyperus rotundus</i>	6	0.04	-3.20	-0.13
19	Nerunji	<i>Tribulus terrestris</i>	8	0.05	-2.91	-0.16
20	Nayuruv	<i>Achyranthes aspera</i>	7	0.05	-3.04	-0.14
21	Vilaiti tulsi	<i>Hyptis suaveolens</i>	11	0.07	-2.59	-0.19
22	Pink Blumea	<i>Blumea axillaris</i>	8	0.05	-2.91	-0.16
23	Rail Pindu	<i>Croton bonplandianus</i>	7	0.05	-3.04	-0.14
24	Communist pacha	<i>Chromolaena odorata</i>	8	0.05	-2.91	-0.16
25	veattukayapundu	<i>Tridax Procumbens</i>	9	0.06	-2.79	-0.17
26	Kundumani	<i>Abrus precatorius</i>	8	0.05	-2.91	-0.16
27	Mosukkattan	<i>Passiflora foetida</i>	7	0.05	-3.04	-0.14

28	Perandai	<i>Cissus quadrangularis</i>	10	0.07	-2.69	-0.18
29	Kandakathari	<i>Solanum xanthocarpum</i>	8	0.05	-2.91	-0.16
30	Arugam Pill	<i>Cynodon dactylon</i>	9	0.06	-2.79	-0.17
31	paspalum	<i>Paspalum quadrifarium</i>	8	0.05	-2.91	-0.16
H (Shannon Diversity Index) =2.88						

Table 3.21 Species Richness (Index) in 300m Radius

Details	H	H max	Evenness	Species Richness
Tree	2.07	2.08	1.00	1.82
Herbs	1.61	1.61	1.00	1.08
Shrubs	2.88	2.89	1.00	3.41

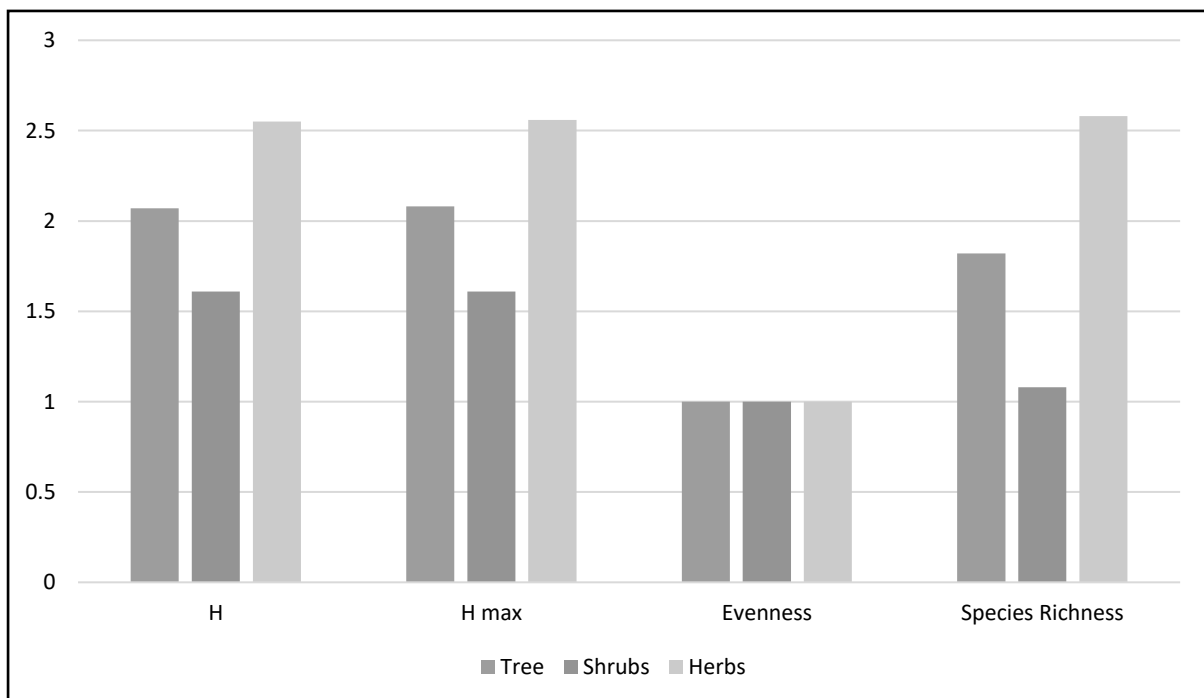


Figure 3.25 Floral Diversity Species Richness (Index) 300m Radius

From the above, it can be interpreted that herb community has higher diversity. While the tree community shows less diversity. It is also observed that most of the quadrates have controlled generation of plant species with older strands. Higher herb species diversity can be interpreted as a greater number of successful species and a more stable ecosystem where more ecological niches are available, environmental change is less likely to be damaging to the ecosystem as a whole. Species richness is high for herb community when compared with tree and shrubs.

Table 3.22 Flora in 10km radius

S.No	Local Name	Scientific name	Family name	Total No. of species	Total of Quadrants with species	Total No. of Quadrants	Density	Frequency (%)	Abundance	Relative Density	Relative Frequency	IVI	IUCN Conservation Status
Trees													
1	Vembu	<i>Azadirachta indica</i>	Meliaceae	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
2	Pongam oiltree	<i>Pongamia pinnata</i>	Fabaceae	4	3	10	0.4	30.0	1.3	2.3	2.2	4.5	Not Listed
3	Karuvelam	<i>Acacia nilotica</i>	Mimosaceae	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
4	Thennai maram	<i>Cocos nucifera</i>	Arecaceae	4	3	10	0.4	30.0	1.3	2.3	2.2	4.5	Not Listed
5	Puliyamaram	<i>Tamarindus indica</i>	Legumes	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
6	Athi	<i>Ficus recemosa</i>	Moraceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
7	Vazhaimaram	<i>Musa</i>	Musaceae	4	3	10	0.4	30.0	1.3	2.3	2.2	4.5	Not Listed
8	Nettilinkam	<i>Polylathia longifolia</i>	Annonaceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
9	Amanakku	<i>Ricinus communis</i>	Euphorbiaceae	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
10	Perumungil	<i>Bambusa bambos</i>	Poaceae	4	3	10	0.4	30.0	1.3	2.3	2.2	4.5	Not Listed
11	Karungali	<i>Acacia sundra</i>	Legumes	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
12	Sapota	<i>Manilkara zapota</i>	Sapotaceae	7	6	10	0.7	60.0	1.2	4.1	4.3	8.4	Not Listed
13	Eucalyptus	<i>Eucalyptus globules</i>	Myrtaceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
14	Navalmaram	<i>Sygygium cumini</i>	Myrtaceae	7	6	10	0.7	60.0	1.2	4.1	4.3	8.4	Not Listed
15	Ezhumuchaipalam	<i>Citrus lemon</i>	Rutaceae	8	7	10	0.8	70.0	1.1	4.7	5.0	9.7	Not Listed
16	Alamaram	<i>Ficus benghalensis</i>	Moraceae	3	2	10	0.3	20.0	1.5	1.8	1.4	3.2	Not Listed
17	Panai maram	<i>Borassus flabellifer</i>	Arecaceae	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
18	Manga	<i>Mangifera indica</i>	Anacardiaceae	7	6	10	0.7	60.0	1.2	4.1	4.3	8.4	Not Listed
19	Thekku	<i>Tectona grandis</i>	Verbenaceae	4	3	10	0.4	30.0	1.3	2.3	2.2	4.5	Not Listed
20	Nelli	<i>Embllica officinalis</i>	Phyllanthaceae	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
21	Karuvelam maram	<i>Vachellia nilotica</i>	Fabaceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
22	Vadanarayani	<i>Delonix elata</i>	Fabaceae	4	3	10	0.4	30.0	1.3	2.3	2.2	4.5	Not Listed
23	Marudaani	<i>Lawsonia inermis</i>	Lythraceae	7	6	10	0.7	60.0	1.2	4.1	4.3	8.4	Not Listed

24	Pappali maram	<i>Carica papaya L</i>	Caricaceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
25	Nochi	<i>Vitex negundo</i>	Verbenaceae	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
26	Vilvam	<i>Aegle marmelos</i>	Rutaceae	4	3	10	0.4	30.0	1.3	2.3	2.2	4.5	Not Listed
27	Nuna maram	<i>Morinda citrifolia</i>	Rubiaceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
28	Koyya	<i>Psidium guajava</i>	Myrtaceae	7	6	10	0.7	60.0	1.2	4.1	4.3	8.4	Not Listed
29	Seethapazham	<i>Annona reticulata</i>	Annonaceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
30	Vagai	<i>Albizia lebbbeck</i>	Fabaceae	5	4	10	0.5	40.0	1.3	2.9	2.9	5.8	Not Listed
31	Teaku	<i>Tectona grandis</i>	Lamiaceae	6	5	10	0.6	50.0	1.2	3.5	3.6	7.1	Not Listed
32	Teanai Maram	<i>Cocos nucifera</i>	Arecaceae	3	2	10	0.3	20.0	1.5	1.8	1.4	3.2	Not Listed
Shrubs													
33	Avarai	<i>Senna auriculata</i>	Fabaceae	8	7	15	0.5	46.7	1.1	7.6	7.7	15.3	Not Listed
34	Sundaika	<i>Solanum torvum</i>	Solanaceae	9	8	15	0.6	53.3	1.1	8.6	8.8	17.4	Not Listed
35	Arali	<i>Nerium indicum</i>	Apocynaceae	7	6	15	0.5	40.0	1.2	6.7	6.6	13.3	Not Listed
36	Idlipoo	<i>Xorococ cineia</i>	Rubiaceae	6	5	15	0.4	33.3	1.2	5.7	5.5	11.2	Not Listed
37	Neermulli	<i>Hydrophila auriculata</i>	Acanthaceae	7	6	15	0.5	40.0	1.2	6.7	6.6	13.3	Not Listed
38	Icham	<i>Phoenix pusilla</i>	Arecaceae	8	7	15	0.5	46.7	1.1	7.6	7.7	15.3	Not Listed
39	Chaturakalli	<i>Euphorbia antiquorum</i>	Euphorbiaceae	6	5	15	0.4	33.3	1.2	5.7	5.5	11.2	Not Listed
40	Kattamanakku	<i>Jatropha curcas</i>	Euphorbiaceae	7	6	15	0.5	40.0	1.2	6.7	6.6	13.3	Not Listed
41	Thuthi	<i>Abutilon indicum</i>	Meliaceae	9	8	15	0.6	53.3	1.1	8.6	8.8	17.4	Not Listed
42	Chemparuthi	<i>Hibiscu rosa-sinensis</i>	Malvaceae	8	7	15	0.5	46.7	1.1	7.6	7.7	15.3	Not Listed
43	Kundumani	<i>Abrus precatorius</i>	Fabaceae	6	5	15	0.4	33.3	1.2	5.7	5.5	11.2	Not Listed
44	Erukku	<i>Calotropis gigantea</i>	Apocynaceae	8	7	15	0.5	46.7	1.1	7.6	7.7	15.3	Not Listed
45	Bulangan	<i>Gmelina asiatica L.</i>	Lamiaceae	9	8	15	0.6	53.3	1.1	8.6	8.8	17.4	Not Listed
46	mottled spurge	<i>Euphorbia lactea</i>	Euphorbiaceae	7	6	15	0.5	40.0	1.2	6.7	6.6	13.3	Not Listed
Herbs, Climber, Creeper & Grasses													
47	Nayuruv	<i>Achyranthes aspera</i>	Amaranthaceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
48	Vetukaayapoondur	<i>Tridax procumbens</i>	Asteraceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
49	Koraikkilangu	<i>Cyperus articulatus</i>	Cyperaceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
50	Kuppaimeni	<i>Acalypha indica</i>	Euphorbiaceae	9	8	20	0.5	40.0	1.1	3.2	3.2	6.4	Not Listed
51	Manjal	<i>Curcuma longa</i>	Zingiberaceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
52	Chempu	<i>Colocasia indica</i>	Araceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
53	Karisilanganni	<i>Eclipta prostrata</i>	Asteraceae	9	8	20	0.5	40.0	1.1	3.2	3.2	6.4	Not Listed
54	Korai	<i>Cyperus rotundus</i>	Cyperaceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
55	Kunnakora	<i>Cyperus compressus</i>	Cyperaceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed

56	Milagai	<i>Capsicum frutescens</i>	Solanaceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
57	Kanamvazha	<i>Commelina benghalensis</i>	Commelinaceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
58	Nai kadugu	<i>Celome viscosa</i>	Capparidaceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
59	Thumbai	<i>Leucas aspera</i>	Lamiaceae	9	8	20	0.5	40.0	1.1	3.2	3.2	6.4	Not Listed
60	Parttiniyam	<i>Parthenium hysterophorus</i>	Asteraceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
61	Mukurattai	<i>Boerhavia diffusa</i>	Nyctaginaceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
62	Thulasi	<i>Ocimum tenuiflorum</i>	Lamiaceae	11	10	20	0.6	50.0	1.1	3.9	4.0	7.9	Not Listed
63	Manathakkali	<i>Solanumnigrum</i>	Solanaceae	7	8	20	0.4	40.0	0.9	2.5	3.2	5.7	Not Listed
64	Kumipoondu	<i>Gomphrena celosioides</i>	Amaranthaceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
65	Kattuthulasi	<i>Ocimum sanctum</i>	Lamiaceae	10	9	20	0.5	45.0	1.1	3.5	3.6	7.1	Not Listed
66	Kovai	<i>Coccinia grandis</i>	Cucurbitaceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
67	Perandai	<i>Cissus quadrangularis</i>	Vitaceae	9	8	20	0.5	40.0	1.1	3.2	3.2	6.4	Not Listed
68	Mudakkotan	<i>Cardiospermum helicacabum</i>	Sapindaceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
69	Karkakartum	<i>Clitoria ternatea</i>	Fabaceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
70	Nannari	<i>Hemidesmus indicus</i>	Asclepiadaceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
71	Kovakkai	<i>Trichosanthes dioica</i>	Cucurbitaceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
72	Malli	<i>Jasminum augustifolium</i>	Oleaceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
73	Musumusukkai	<i>Mukia maderaspatana</i>	Cucurbitaceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
74	Mosukkattan	<i>Passiflora foetida</i>	Passifloraceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
75	Vallikeerai	<i>Ipomoea aquatica</i>	Convolvulaceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
76	Siru puladi	<i>Desmodium triflorum</i>	Fabaceae	9	8	20	0.5	40.0	1.1	3.2	3.2	6.4	Not Listed
77	Sithrapaalavi	<i>Euphorbia prostrata</i>	Euphorbiaceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
78	Korai	<i>Cyperus rotandus</i>	Poaceae	6	5	20	0.3	25.0	1.2	2.1	2.0	4.1	Not Listed
79	mookuthi poondu	<i>Wedelia trilobata</i>	Asteraceae	7	6	20	0.4	30.0	1.2	2.5	2.4	4.9	Not Listed
80	Nellu	<i>Oryza sativa</i>	Poaceae	9	8	20	0.5	40.0	1.1	3.2	3.2	6.4	Not Listed
81	Pullu	<i>Eragrostis ferruginea</i>	Poaceae	12	11	20	0.6	55.0	1.1	4.2	4.4	8.6	Not Listed
82	Chevvarakupul	<i>Chloris barbata</i>	Amaranthaceae	8	7	20	0.4	35.0	1.1	2.8	2.8	5.6	Not Listed
83	Arugampul	<i>Cynodon dactylon</i>	Poaceae	13	12	20	0.7	60.0	1.1	4.6	4.8	9.4	Not Listed
84	Sapathikalli	<i>Opuntia dillenii</i>	Cactaceae	9	8	20	0.5	40.0	1.1	3.2	3.2	6.4	Not Listed

3.5.2 Fauna

The faunal survey was carried out for Mammals, Birds, Reptiles, Amphibians and Butterflies. There are no rare, endangered, threatened (RET) and endemic species present in core area.

Table 3.23 Methodology applied during survey of fauna

S. No	Taxa	Method of Sampling	References
1	Insects	Random walk, Opportunistic observations	Pollard (1977); Kunte (2000)
2	Reptiles	Visual encounter survey (Direct Search)	Daniel J.C (2002)
3	Amphibians	Visual encounter survey (Direct Search)	
4	Mammals	Tracks and Signs	Menon V (2014)
5	Avian	Random walk, Opportunistic observations.	Grimmett R (2011); ALI S (1941)

The fauna is studied for 10 km radius around the project site. Project site and 2 km around the project site is considered as core zone and from 2 km to 10 km radius, it is considered as buffer zone.

Fauna Composition in the Core Zone

A total of 22 species belonging to 15 families were observed in the core zone (Table 3.24). Among them are 9 species of Insects, 3 species of Reptiles, 1 species of Mammals, and 9 species of Avian. None of these species are threatened or endemic in the study area and surroundings. There are no Schedule I species and 8 species are under schedule IV according to Indian wild life Act, 1972. There are no critically endangered, endangered, vulnerable and endemic species in the core zone.

Fauna Composition in the Buffer Zone

A total of 44 species belonging to 34 families were recorded from the buffer area. Among them were 20 species of Birds, 13 species of Insects, 3 species of Reptiles, 1 species of Mammals, and 9 species of Amphibians, as mentioned in Table 3.25. There are four species under Schedule II and twenty-six species under schedule IV according to Indian wild life Act 1972. And there are no critically endangered, vulnerable and endemic species in the buffer area. There is no schedule I Species in study area and there are no critically endangered, endangered, vulnerable and endemic species.

Table 3.24 Fauna in the Core zone

S. No.	Common name/English Name	Family Name	Scientific Name	Schedule List Wildlife Protection Act, 1972	IUCN Red List data
INSECTS					
1	Common Tiger	Nymphalidae	<i>Danaus genutia</i>	NL	NL
2	Red-veined darter	Libellulidae	<i>Sympetrum fonscolombii</i>	NL	LC

3	Grasshopper	Acrididae	<i>Hieroglyphus sp</i>	NL	LC
4	Blue tiger	Nymphalidae	<i>Tirumala limniace</i>	Schedule IV	LC
5	Stick insect	Lonchodidae	<i>carausius morosus</i>	NL	LC
6	Mottled emigrant	Peridae	<i>Catopsilia pyranthe</i>	NL	LC
7	Praying mantis	Mantidae	<i>Mantis religiosa</i>	NL	NL
8	Striped tiger	Nymphalidae	<i>Danaus plexippus</i>	Schedule IV	LC
9	Acraea violae	Nymphalidae	<i>Acraea violae</i>	NL	LC
REPTILES					
10	Garden lizard	Agamidae	<i>Calotes versicolor</i>	NL	LC
11	Common house gecko	Gekkonidae	<i>Hemidactylus frenatus</i>	NL	LC
12	Fan-Throated Lizard	Agamidae	<i>Sitanaponticeriana</i>	NL	LC
MAMMALS					
1	Indian Field Mouse	Muridae	<i>Mus booduga</i>	Schedule IV	NL
AVES					
1	Green bee-eater	Meropidae	<i>Merops orientalis</i>	NL	LC
2	Koel	Cuculidae	<i>Eudynamys</i>	Schedule IV	LC
3	Common myna	Sturnidae	<i>Acridotheres tristis</i>	NL	LC
4	Cattle egret	Ardeidae	<i>Bubulcus ibis</i>	NL	LC
5	House crow	Corvidae	<i>Corvus splendens</i>	NL	LC
6	Koel	Cuculidae	<i>Eudynamys scolopaceus</i>	Schedule IV	LC
7	Crow Pheasant	Cuculidae	<i>Centropus sinensis</i>	Schedule IV	LC
8	Indian pond heron	Ardeidae	<i>Ardeola grayii</i>	Schedule IV	LC
9	Grey drongo	Dicruridae	<i>Dicrurus leucophaeus</i>	Schedule IV	LC

Table 3.25 Fauna in the buffer zone

S. No.	Common Name/English Name	Family Name	Scientific Name	Schedule List Wildlife Protection Act 1972	IUCN Red List Data
INSECTS					
1	Tawny costar	Nymphalidae	<i>Danaus chrysippus</i>	Schedule IV	LC
2	Milkweed butterfly	Nymphalidae	<i>Danainae</i>	NL	LC
3	Blue tiger	Nymphalidae	<i>Tirumala limniace</i>	Schedule IV	LC
4	Common Indian Crow	Nymphalidae	<i>Euploea core</i>	Schedule IV	LC
5	Green marsh hawk	Libellulidae	<i>Orthetrum sabina</i>	NL	LC
6	Mottled emigrant	Peridae	<i>Catopsilia pyranthe</i>	NL	LC
7	Striped tiger	Nymphalidae	<i>Danaus plexippus</i>	Schedule IV	LC
8	Ant	Formicidae	<i>Camponotus Vicinus</i>	NL	NL
9	Red-veined darter	Libellulidae	<i>Sympetrum fonscolombii</i>	NL	LC
10	Lesser grass blue	Lycaenidae	<i>Zizina otis indica</i>	Schedule IV	LC
11	Praying mantis	Mantidae	<i>mantis religiosa</i>	NL	NL
12	Grasshopper	Acrididae	<i>Hieroglyphus sp</i>	NL	LC
13	Common Tiger	Nymphalidae	<i>Danaus genutia</i>	Schedule IV	LC
REPTILES					
1	Chameleon	Chamaeleonidae	<i>Chameleonzeylanicus</i>	Sch II (Part II)	LC
2	Garden lizard	Agamidae	<i>Calotes versicolor</i>	NL	LC
3	Green Vine snake	Colubridae	<i>Ahaetulla nasuta</i>	Schedule IV	LC

4	Common housegecko	Gekkonidae	<i>Hemidactylus frenatus</i>	NL	LC
5	Rat snake	Colubridae	<i>Ptyas mucosa</i>	Sch II (Part II)	LC
MAMMALS					
1	palmsquirrel	Sciuridae	<i>Funambulus palmarum</i>	Schedule IV	LC
2	Indian FieldMouse	Muridae	<i>Mus booduga</i>	Schedule IV	LC
3	Home mouse	Muridae	<i>Mus musculus tytleri</i>	NL	LC
AVES					
1	House crow	Corvidae	<i>Corvus splendens</i>	NL	LC
2	Cattle egret	Ardeidae	<i>Bubulcus ibis</i>	NL	LC
3	Black drongo	Dicruridae	<i>Dicrurus macrocercus</i>	Schedule IV	LC
4	Red-vented Bulbul	Pycnonotidae	<i>Pycnonotus cafer</i>	Schedule IV	LC
5	Indian pond heron	Ardeidae	<i>Ardeola grayii</i>	Schedule IV	LC
6	green bee-eater	Meropidae	<i>Merops orientalis</i>	NL	LC
7	Small Sunbird	Nectariniidae	<i>Nectarinia asiatica</i>	Schedule IV	LC
8	Common myna	Sturnidae	<i>Acridotheres tristis</i>	NL	LC
9	Blue Rock Pigeon	Columbidae	<i>Columba livia</i>	Schedule IV	LC
10	Common Coot	Rallidae	<i>Fulica atra</i>	Schedule IV	LC
11	Small Sunbird	Nectariniidae	<i>Nectarinia asiatica</i>	Schedule IV	LC

3.5.3 Aquatic Vegetation

The field survey for assessing the aquatic vegetation was also undertaken during the study period. The list of aquatic plants observed in the study area is given in table 3.26.

Table 3.26 Aquatic Vegetation

S. No.	Scientific Name	Common Name	Vernacular Name (Tamil)	IUCN Red List of Threatened Species
1	<i>Eichornia Crassipe</i>	Water Hyacinth	Agayatamarai	NA
2	<i>Aponogeton natans</i>	Floating Lace Plant	Kottikizhangu	NA
3	<i>Nymphaea Nouchali</i>	Blue Water Lily	Nellambal	LC
4	<i>Carex Cruciata</i>	Cross Grass	Koraipullu	NA
5	<i>Cynodon Dactylon</i>	Scutch Grass	Arugampullu	LC
6	<i>Cyperus Exaltatus</i>	Tall Flat Sedge	Koraikizhangu	LC

*Lc- Least Concern, Na-Not Yet Assessed

Food chain

The food chain in aquatic ecosystems often begins with the algae or phytoplankton producers, and then the zooplankton that feed on them. This type of food chain is found in Noyal River by phytoplankton, zooplankton, fish and Artiola gray.

Ex: Phytoplankton → Zooplankton → small fish → large fish

Endangered and endemic species as per the IUCN Red List

There are no rare, endangered and endemic species found in the study area

3.5.4 Agriculture & Horticulture in Tiruvannamalai district

The pre-monsoon rainfall is almost uniform throughout the district. The coastal taluks get more rains rather than the interior regions. This district is mainly depending on the seasonal rains, the distress conditions prevail in the event of the failure of rains. Northeast and Southwest monsoon are the major donors with 54% and 36% contribution each to the total annual rainfall. Agriculture is the main occupation of the people with 20% of the population engaged in it. Paddy

is the major crop cultivated in this district. Groundnuts, Sugarcane, Cereals and Millets and Pulses are the other major crops. Paddy is the major crop cultivated in this district. Groundnuts, Sugarcane, Cereals & Millets and Pulses are the other major crops cultivated.

3.5.4.1 Major Agricultural Crops 1km radius

Major horticulture crops cultivated in this district are vegetables crops like tomato, brinjal, chillies, onion and turmeric. Details of major field crops and horticulture in 1km radius is given in Table. 3.27.

Table 3.27 Major Crops in 1km radius

S. No	Major crops	Scientific name	Families
1	Sorghum	<i>Sorghum bicolor</i>	Poaceae
2	Gingelly	<i>Sesamum indicum</i>	Pedaliaceae
3	Groundnut	<i>Arachis hypogaea</i>	Legumes
4	Sugarcane	<i>Saccharum officinarum</i>	Poaceae
5	Proso Millets	<i>Panicum miliaceum L</i>	Poaceae
6	Cotton	<i>Gossypium herbaceum</i>	Malvaceae

3.5.4.2 Major Horticulture Crops 1km radius

Horticulture includes cultivation of fruits, vegetables, nuts, seeds, herbs, sprouts, mushrooms, algae, flowers, seaweeds and non-food crops such as grass and ornamental trees and plants. It also includes plant conservation, landscape restoration, landscape and garden design.

3.5.4.3 Horticulture 1km radius

Major horticulture crops cultivated in Tiruvannamalai district are fruit crops like banana, Sapota and guava, vegetables like tomato, brinjal, Veandai, chillies, onion and tapioca, spices like turmeric. Details of major field crops and horticulture cultivation in 1km radius is given in Table 3.28.

Table 3.28 Major Field Crops & Horticulture cultivation in 1km radius.

S. No	Common Name	Scientific Name	Family
Major Horticultural Crops			
1	Guava	<i>Psidium guajava</i>	Myrtaceae
2	Sapota	<i>Manilkara zapota</i>	Sapotaceae
3	Lemon	<i>Citrus × limon</i>	Rutaceae
4	Papaya	<i>Carica papaya</i>	Caricaceae
Vegetables			
5	Onion	<i>Allium cepa</i>	Amaryllidaceae
6	Tapioca	<i>Manihot esculenta</i>	Spurges
7	Brinjal	<i>Solanum melongena</i>	Nightshade
8	Tomato	<i>Solanum lycopersicum</i>	Nightshade
9	Bottle Gourd	<i>Lagenaria siceraria</i>	Cucurbits
10	Veandai kai	<i>Abelmoschus esculentus</i>	Mallows
11	Moringa	<i>Moringa oleifera</i>	Moringaceae

Results

Biological assessment of the site was done to identify ecologically sensitive areas and whether there are any rare, endangered, endemic or threatened (REET) species of flora & fauna in the core area as well its buffer zone to be impacted. The study has also been designed to suggest suitable mitigation measures, if necessary, for protection of wildlife habitats and conservation of REET species if any. The study found that there is no endemic, endangered migratory fauna found in the area. This area is not also a migratory path of any faunal species. Hence, this small mining operation over short period of time will not have any significant impact on the surrounding flora and fauna.

3.6 SOCIO-ECONOMIC ENVIRONMENT

The major developmental activities of the mining and industrial sector are crucial for economic development and the creation of direct and indirect employment opportunities. These activities also fulfil society's basic and modern needs of the society, ultimately improving the quality of life through advancements in social, economic, health, education, and nutritional status within the project region, state, and country. In this manner all developmental projects have direct as well as indirect relationships with socioeconomic aspects, which also include public acceptability for developmental projects. Thus, the study of socio-economic environment component incorporating various sides related to prevailing social and cultural conditions and economic status of the rough stone mining quarries project region is an important part of the EIA study. The study of these parameters helps in identification, prediction and evaluation of the likely impacts on the socio-economics and parameters of human interest due to the project.

3.6.1 Objectives of the Study

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

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

3.6.2 Methodology

The study employed cluster sampling to outline two zones around the proposed project site: Zone 1 (Core Zone, 0-1 km radius) and Zone 2 (Low Impact Zone, 1–5 km radius). The primary data collection was conducted through structured interviews, field observation, and focus group discussions with the local people of in Maruthadu Village, Cheyyar Taluk,

Tiruvannamalai District, Tamil Nadu. The secondary data were collected from the Census report 2011 and official records, covering demographics and basic services including information on population, number of households, literacy rates, sex ratios, worker details and the availability of basic services. This study covers the positive and negative impacts of the project's establishment, and provides recommendations for analysing and mitigating adverse effects. The study areas are illustrated in Figure 3.26.

3.6.3 Demographic Profile of Tiruvannamalai District

Tiruvannamalai District is geographically bounded by Vellore and Ranipet districts to the north, Tirupathur district to the west, Kallakurichi district to the south, Chengalpattu district to the east, Villupuram district to the southeast, and Kanchipuram district to the northeast. Administratively, the district is divided into 12 taluks, which are further subdivided into 18 blocks, comprising a total of 860 villages. According to the 2011 Census, Tiruvannamalai District had a total population of 2,464,875, of which 1,235,889 were males and, 1,228,986 were females respectively. In comparison, the 2001 Census recorded a population of 2,186,125, including 1,095,859 males and 1,090,266 females, indicating a significant population growth over the decade. This indicates a population growth of approximately 12.8 percent over the decade, reflecting steady demographic expansion in the district.

The average literacy rate of the district in 2011 was 84.41%, with male literacy at 90.80% and female literacy at 78.13%. In terms of the number of literates, there were 1,626,813 literate individuals, comprising 909,803 males and 717,010 females. However, gender disparities in education remain evident, as the male and female literacy rates stood at 81.18% and 62.05%, respectively. The sex ratio in Tiruvannamalai District was 994 females per 1000 males in 2011, showing a marginal decline from 995 in 2001, yet remaining considerably higher than the national average of 940. The child sex ratio was 930 girls per 1000 boys in 2011, reflecting a decrease from 948 in 2001, suggesting a continuing gender imbalance among the child population. The demographic characteristics of Tiruvannamalai District reflect moderate population growth, improving literacy levels, and a relatively balanced adult sex ratio, though the decline in the child sex ratio highlights the need for sustained gender-sensitive interventions and continued focus on educational equity and social awareness.

Source: <https://www.census2011.co.in/census/district/26-tiruvannamalai.html>

3.6.4 Profile of Maruthadu Village

Maruthadu village is located in the Vandavasi Block of Tiruvannamalai District, Tamil Nadu. Vandavasi is nearest town to Marudhadu village for all major economic activities, which is approximately 6km away. As per the 2011 Census, the village comprises 2017 households with a total population of 8103 individuals 4002 males and 4001 females. Children aged 0–6

years account for 821 individuals, representing about 10% of the total population. The average sex ratio in Maruthadu is 1024 females per 1,000 males, which is higher than the Tamil Nadu state average of 996.

Literacy levels in the village are slightly lower than the state average. The overall literacy rate in 2011 was only 73.77%, compared to 80.09% for Tamil Nadu. Male literacy stood at 83.71%, while female literacy was 64.10%, indicating minimal gender disparity but highlighting the need for educational development in the area. The Schedule Caste constitutes 22.34% while Schedule Tribes were 1.41% of total population in this village. The profile of Maruthadu Village includes demographic details such as the number of households, population statistics, literacy levels, child population (0–6 years), caste composition, and workforce, as furnished in Table 3.29.

Table. 3.29 Demographic Status of Maruthadu Village

Particulars	Total	Male	Female
Total No. of Houses	2017	-	-
Population	8103	4002	4101
Child (0-6)	821	411	410
Schedule Caste	1810	890	920
Schedule Tribe	114	59	55
Literacy %	73.77%	83.71%	64.10%
Total Workers	4485	2579	1906
Main Worker	3204	-	-
Marginal Worker	1281	592	689

Source: <https://www.census2011.co.in/data/village/631514-marudhadu-tamil-nadu.html>

3.6.5 Working Population- Maruthadu Village

In Maruthadu village out of total population, 4485 were engaged in work activities. 71.44 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 28.56 % were involved in Marginal activity providing livelihood for less than 6 months. Of 4485 workers engaged in Main Work, 671 were cultivators (owner or co-owner) while 1698 were Agricultural labourer.

Benefits

The local people have been provided with either direct employments or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities such as medical facilities, conveyance, free education, drinking water supply

etc. The number of villages and human settlements within a radius of 5 km from the project site along with population, their education level etc. Connectivity plays a major role in improving access, opportunities, and overall development of villages like Marudhadu. As per the 2011 statistics, Marudhadu had access to public bus service, private bus services within the village and railway station at 22km distance. Table 3.30 presents detailed demographic, social, and economic indicators for villages in the study area.

Social structure of study area villages

The study area comprises of 14 villages, with total population of these villages varies considerably, ranging from small settlements such as Koilkuppam (34 households) and Agaram (97 households) to larger villages like Kodungalur KIL (1121 households) and Kottai (571 households). Children aged 0–6 generally account for approximately 10.1 % of the total population, indicating a relatively young demographic profile in most villages.

Scheduled Castes (SC) are notably present in villages such as Kodungalur KIL, Birudur, Vazhur and Mamandur³ with Kottai having the largest SC population. Of all SC population comprises of 33.7% and Koilkuppam with no SC population and Scheduled Tribes (ST) of 2.7% with zero count of ST population in Kodungalur MEL, Agaram, Koilkuppam, Ariyathur, Sathanoor, Kilpakkam and Kavedu villages.

Literacy rate in study area villages

In terms of literacy, the study area villages exhibit a notable number of 67.9% with a minimum gender gap of male literacy at 37.7% and female literacy at 30.2%. Kodungalur KIL leads in literacy rates, while other villages like Kottai, vazhur, Birudur and Kilpakkam show relatively higher literacy. Some smaller villages report very low literacy levels due to limited educational resources. However, 32.1% of illiterate population is of serious concern in the study area villages.

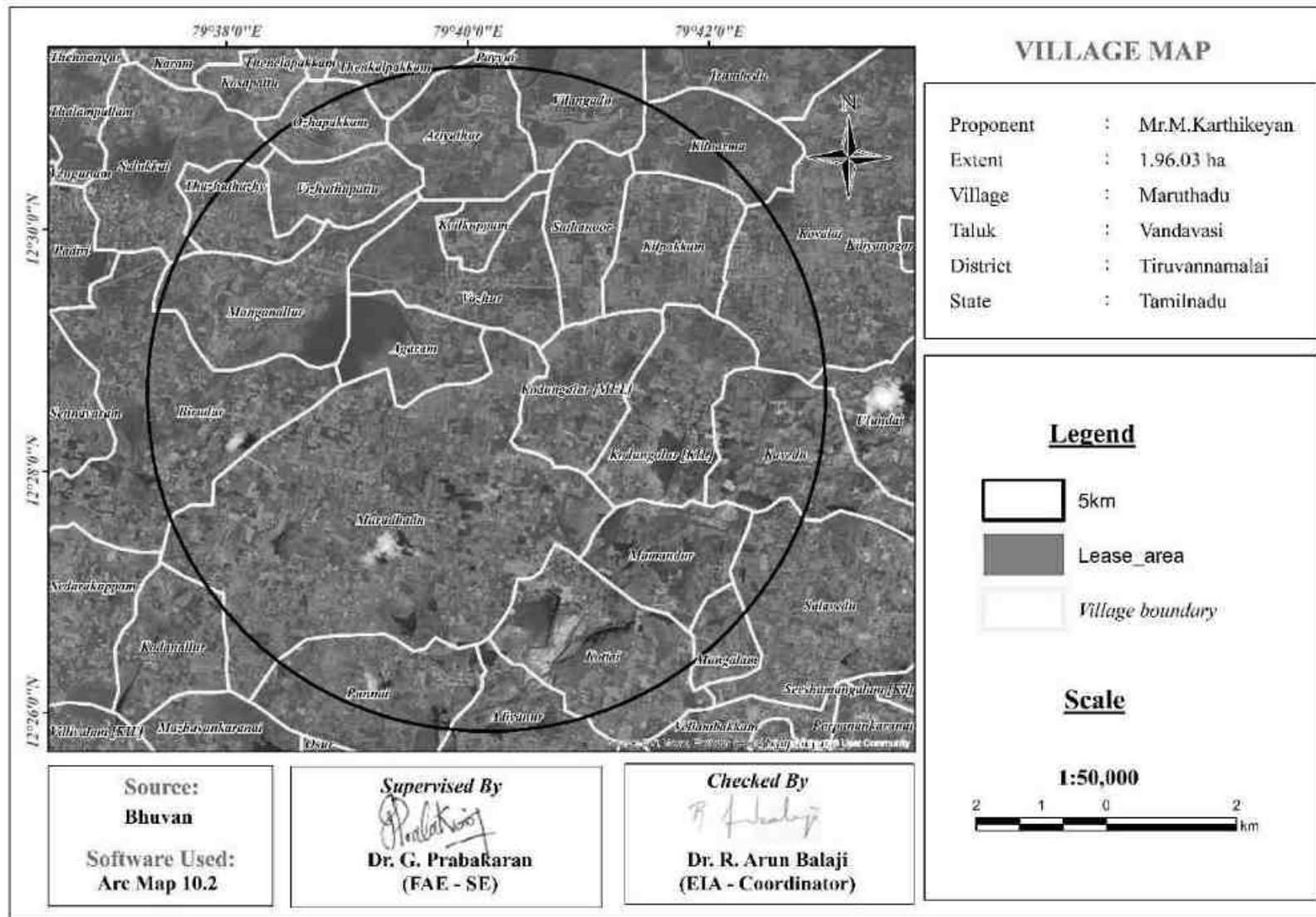


Figure 3.26 Details Village Boundaries within 5 km Radius of the Project Lease Area

Table 3.30 Demographic Structure and Literacy Rate of the villages (5 km radius)

Village Name	No. of Houses	Population in Gender wise		Child (0-6years)		Schedule Caste		Schedule Tribe		Literacy Rate		Total Workers	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Kodungalur MEL	289	593	608	64	74	276	263	0	0	425	319	396	316
Kodungalur KIL	1121	2250	2281	222	229	534	578	110	109	1693	1400	1408	619
Agaram	97	205	183	29	9	23	16	0	0	140	108	138	95
Birudur	498	933	1022	107	107	313	303	44	61	694	621	610	298
Manganallur	270	562	569	81	70	229	228	42	54	386	303	350	220
Vizhuthupattu	186	413	372	49	34	238	214	14	14	310	233	252	173
Vazhur	470	988	965	86	79	538	502	4	3	770	604	688	543
Koilkuppam	34	69	75	2	7	0	0	0	0	62	55	49	23
Ariyathur	274	607	588	81	61	180	178	0	0	455	340	393	243
Sathanoor	162	344	343	31	32	199	198	0	0	247	190	233	151
Kilpakkam	304	601	644	46	52	79	87	0	0	509	425	399	312
Mamandur	265	612	590	73	54	285	280	11	13	485	401	343	50
Kavedu	419	851	833	65	68	12	11	0	0	673	510	585	501
Kottai	571	1173	1170	134	109	568	571	42	38	869	660	728	489
Total	4960	10201	10243	1070	985	3474	3429	267	292	7718	6169	6572	4033

Source: Tamil Nadu districts Census Reports – 2011.

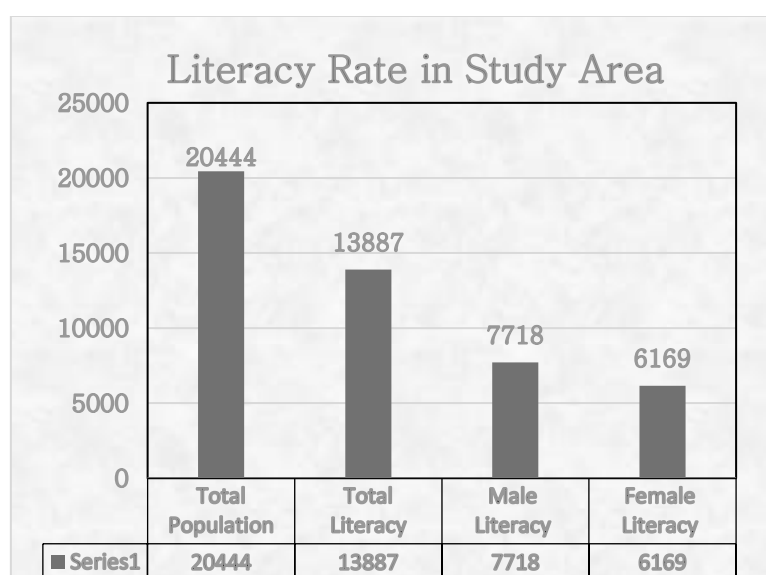
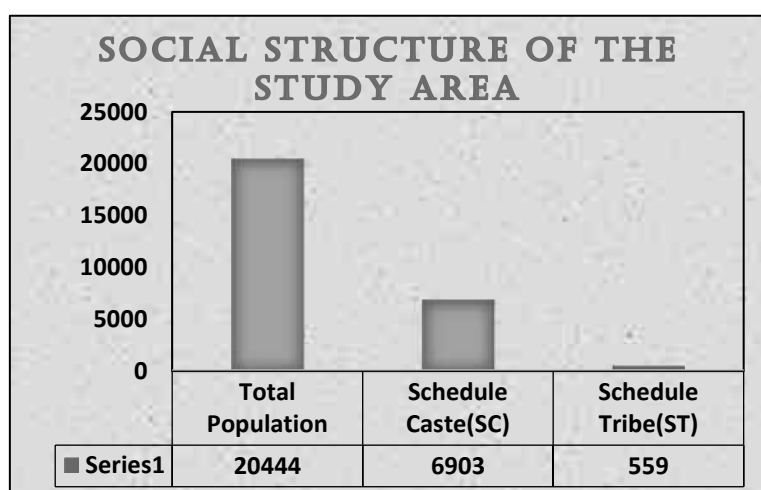
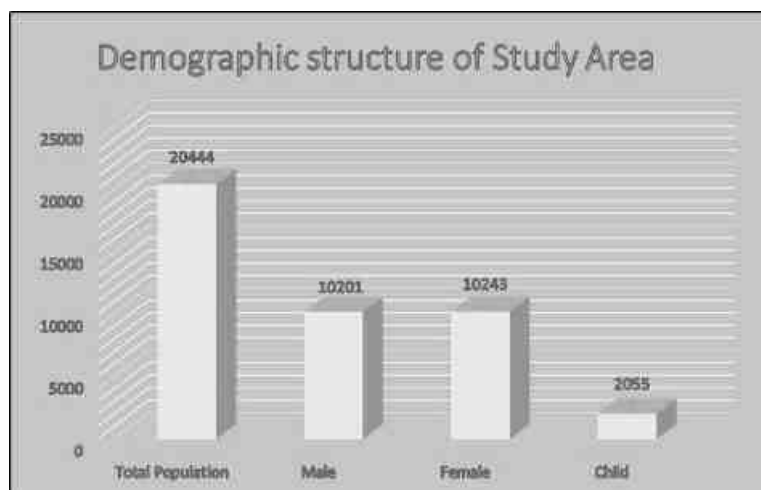


Figure 3.27: Demographic Details – Population, Social Groups, and Literacy Rate in the Study Villages

Table 3.31 Details of Workforce Participation of the Study Area

Village Name	Total Worker	Total Male Workers	Total Female Workers	Total Main Workers	Total Main Cultivators	Total Main Agricultural Labourers	Total Other Workers	Total Non-Workers
Kodungalur MEL	712	396	316	583	82	316	184	489
Kodungalur KIL	2027	1408	619	1340	69	319	826	2504
Agaram	233	138	95	231	116	81	34	155
Birudur	908	610	298	493	77	134	263	1047
Manganallur	570	350	220	455	316	52	81	561
Vizhuthupattu	425	252	173	423	90	201	129	360
Vazhur	1231	688	543	914	80	524	272	722
Koilkuppam	72	49	23	72	31	17	24	72
Ariyathur	636	393	243	355	144	95	114	559
Sathanoor	384	233	151	382	87	232	63	303
Kilpakkam	711	399	312	351	105	143	101	534
Mamandur	393	343	50	370	19	213	125	809
Kavedu	1086	585	501	1072	204	665	199	598
Kottai	1217	728	489	1215	215	793	207	1126
Total	10605	6572	4033	8256	1635	3785	2622	9839

Source: Tamil Nadu districts Census Reports – 2011

3.6.6 Workforce Participation of study area villages

The workforce distribution across various villages in terms of the total workers, main workers, cultivators, agricultural laborers, other workers, and non-workers. The worker distribution across the study area highlights significant variation in labour participation between villages. Of all 10605 working population, Kodungalur KIL (2027 workers), Vazhur (1231), Kavedu (1086) and Kottai (1217) lead with the highest number of workers, likely due to their agricultural base or labor-intensive industries. In contrast, Koilkuppam (72 workers) shown minimal worker participation, possibly due to low population densities or limited employment opportunities. Villages like Birudur (908), Kodungalur MEL (712) and Kilpakkam (711) exhibit notable worker populations as well, suggesting a blend of agricultural and small-scale industrial activities.

When looking at main workers those engaged in a primary occupation for over six months. Agriculture remains the primary occupation, with many individuals employed as cultivators or agricultural labours. Villages such as Manganallur, Kottai and Kavedu have a notable proportion of their workforce involved in cultivation as main occupation and Kodungalur KIL, Vazhur, Kottai and Kavedu indicating higher number of agricultural labours. Non-agricultural employment, classified as ‘other workers,’ is relatively limited, suggesting low economic diversification and limited availability of alternative income sources.

Agriculture continues to dominate in most of the villages, as seen in Kottai and Vazhur where agricultural laborers are the majority. The number of non-workers is substantial in most villages, particularly larger ones, indicating high dependency ratios and a significant portion of the population reliant on the working population for livelihood. Smaller villages, such as Koilkuppam and Agaram exhibit low workforce numbers, which may reflect either limited local employment opportunities or demographic factors such as higher proportions of children and elderly residents. Gender disparities in workforce participation are also visible, with males typically more involved in work, although villages like Kodungalur MEL, Kilpakkam, Kavedu show similar female participation.

Additionally, the study finds that while certain villages are progressing with diverse employment and better gender inclusion, others remain heavily reliant on agriculture and have limited workforce engagement. Encouraging non-farm employment, particularly in rural and semi-urban areas, could bridge economic disparities. Skill development programs for women and youth, infrastructure enhancement, and local job creation through MSMEs or agro-

processing units would help balance workforce participation and stimulate rural development across the district.

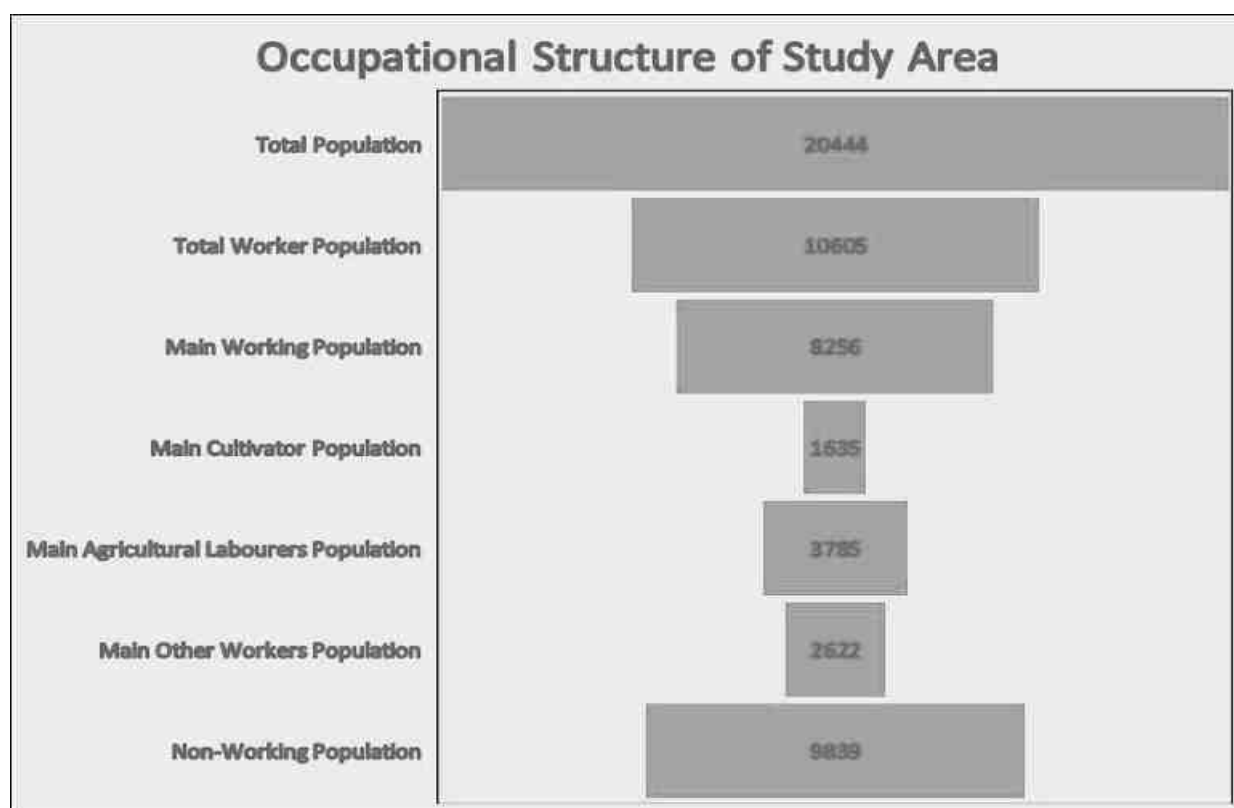


Figure 3.28 Details of Workforce participation in the Study Villages

Additionally, the study finds that while certain villages are progressing with diverse employment and better gender inclusion, others remain heavily reliant on agriculture and have limited workforce engagement. Encouraging non-farm employment, particularly in rural and semi-urban areas, could bridge economic disparities. Skill development programs for women and youth, infrastructure enhancement, and local job creation through MSMEs or agro-processing units would help balance workforce participation and stimulate rural development across the district.

CSR and DMR funds for Development

As per SEAC recommendation the project proponent should spend minimum of 5 lakhs to the nearby school from the proposed project site as part of CER cost. Also, the village panchayat will get direct benefit from the government through District mineral Resource fund (DMF) for infrastructure development activities.

- ❖ Awareness and Opinion of the People About the Project, to assess public awareness and opinions regarding the proposed project, the following key observations were recorded:

- ❖ During the survey, it was observed that only residents of nearby villages were aware of the proposed project, while those in more distant villages were largely unaware.
- ❖ People in the region expressed expectations that the project would generate employment opportunities and lead to improvements in education, transportation, and sanitation facilities provided by the project authorities.

Recommendation and Suggestions

The village development plans are made in consultation with the community through Gram Sabha; these appear to address the needs of the community. However, it may be noted that at the implementation stage these plans often are fraught with problem of inadequate funds, lack of proper planning, corruption, vested interests and political agendas. Hence while ascertaining the scope for convergence with the government activities, care must be taken to ascertain realistic possibilities for implementation.

- Women empowerment: Home based income generation activities, vocational training programs and common education centre for increasing the literacy rate.
- Education: Free uniform, construction of common rooms and library, computer education and physical education, furniture and equipment in schools, up-gradation of existing school infrastructure through the CSR funds.
- Agriculture/livestock: Infrastructure such as agricultural practices, electricity connections, assistance with buying improved tools and equipment, capacity building, supply and/or knowledge of better variety of seeds, pasture land development and trainings on animal husbandry & facility of veterinary doctor.
- Health: Improvements in sanitary conditions of villages, assistance with construction of latrines, improvement in drainage system, health camps and awareness campaigns for diseases like common cold, malaria, typhoid, tuberculosis, yellow fever and pneumonia. Repairing of PHCs and Anganwadi centres.
- People with disability: Establishment of centre for special education, sensitization of the community towards disabled and awareness on Government schemes.
- Marginalized Communities and Vulnerable Groups: 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.
- Connectivity: Transport connectivity to easiness accessibility to the region.
- Greenbelt: Establish a greenbelt and plant saplings around quarry boundaries, village schools, and village roads.

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 Conclusion

This study was carried out the baseline socio-economic conditions of the study area. It examined parameters including the population, number of households, literacy rate, sex ratio, workforce details, and the availability of essential amenities like transportation, drinking water, road connectivity, and educational facilities in the study area. The study revealed both positive and negative socio-economic implications associated with the proposed project and cluster quarries. While potential environmental and social impacts must be addressed, the project is expected to provide significant economic benefits in terms of local employment and improved livelihood opportunities in directly and indirectly.

Therefore, with the implementation of effective mitigation and management measures, the project can contribute positively to the socio-economic development of the area while minimizing adverse impacts.

3.7 TRAFFIC DENSITY

The traffic survey conducted based on the transportation route of material, the Rough Stone and gravel is proposed to be transported mainly through Village Road and SH - 115 (Vandavasi - Melmaruvathur) and NH – 32 (Kumbakonam – Chennai) as shown in Table 3.32-3.35 and in Figure 3.29. Traffic density measurements were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., Heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station. During each shift one person on either direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken.

Table 3.32 Traffic Survey Locations

Station Code	Road Name	Distance and Direction
TS1	Osar Village Road	1.5km - West
TS2	SH - 115 (Vandavasi-Melmaruvathur)	1.69km - N
TS3	NH – 32 (Kumbakonam – Chennai)	18.35km - SE

Source: On-site monitoring by GTMS FAE & TM

Table 3.33 Existing Traffic Volume

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	35	105	51	83	105	42	230
TS2	134	402	108	108	172	86	596
TS3	162	486	190	190	188	94	770

Source: On-site monitoring by GTMS FAE & TM

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

Table 3.34 Rough Stone Transportation Requirement

Transportation of Rough Stone Per day		
Capacity of trucks	No. of Trips per day	Volume in PCU
15 tonnes	26	78

Source: Approved Mining plan

Table 3.35 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
TS1	230	81	311	1200
TS2	596	81	677	1200
TS3	770	81	851	1500

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

- Due to these projects the existing traffic volume will not exceed the traffic limit. 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

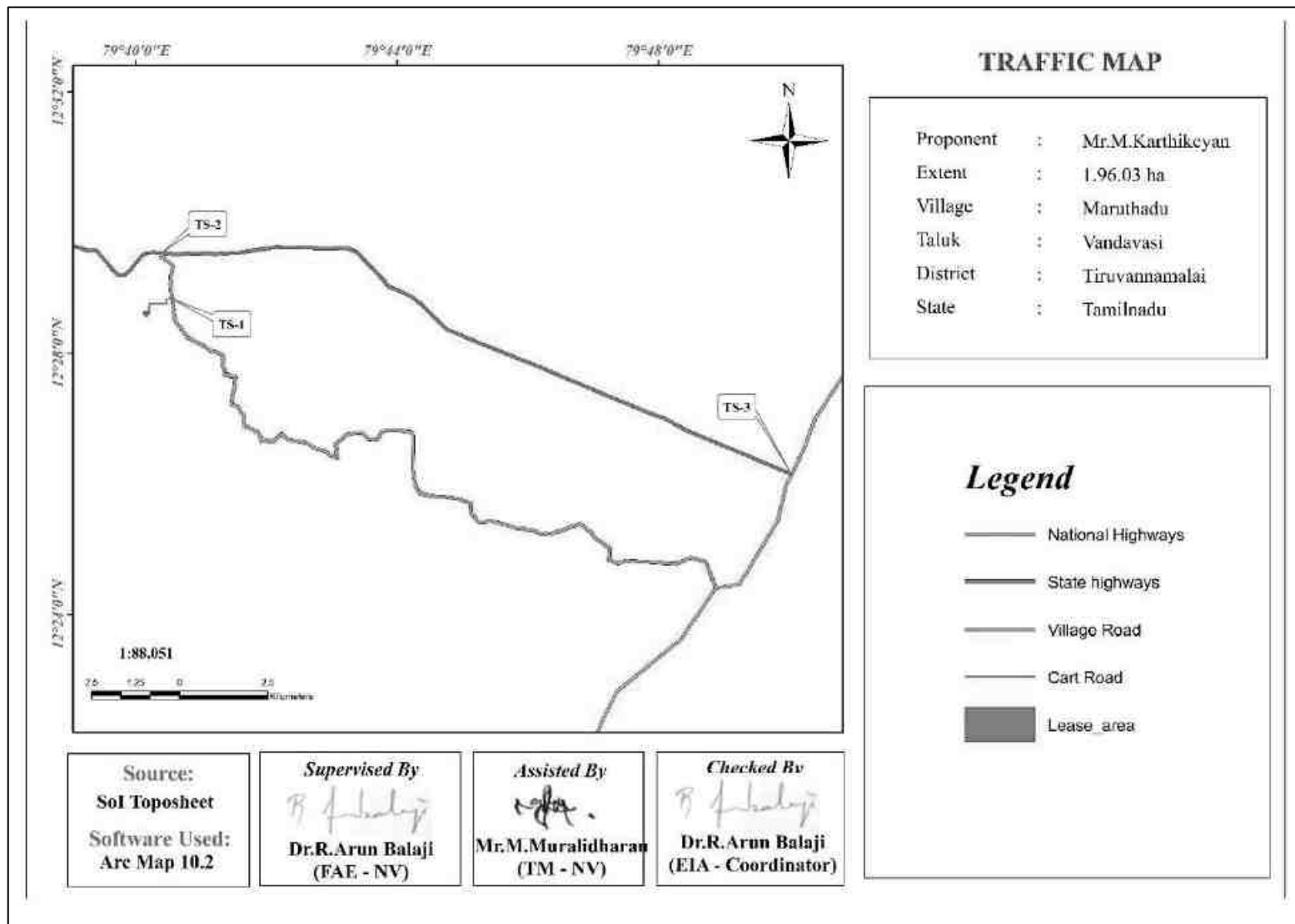


Figure 3.29 Traffic Density Map

3.8 SITE SPECIFIC FEATURES

There are no Wildlife Sanctuaries and National Park within 10 km radius. Therefore, there will be no need of acquisition/diversion of forest land. The details related to the environmentally sensitive areas around the proposed mine lease area i.e., 10 km radius and the nearby water bodies are given in the Table 3.36.

Table 3.36 Details of Environmentally Sensitive Ecological Features in the Study Area

S. No.	Sensitive Ecological Features	Name	Areal Distance in km
1	National Park / Wild life Sanctuaries	None	Nil within 10 km radius
2	Reserve Forest	Badur RF	5.59km SE
		Rajapalayam RF	7.43km SE
		Vengunam RF	8.68km SW
		Kattugudalur RF	10.52km E
		Ponnur RF	13.9km W
		Koliyalam RF	15.63km NE
		Gudalur A. RF	16.42km E
		Acharapakkam RF	16.08km SE
3	Lakes/ Reservoirs/ Dams/Streams/Rivers	Andaleri Lake	0.88km N
		Srirangarajapuram Lake	1.07km SW
		Adhiyanur Lake	1.75km SE
		Marudhadu Lake	1.57km NW
		Kottai Lake	2.13km SE
		Mazhuvankarai Lake	3.7km SW
		Subam River	3.25km NW
4	Tiger Reserve/Elephant Reserve/ Biosphere Reserve	None	Nil within 10 km radius
5	Densely Polluted Areas	None	Nil within 10 km radius
6	Mangroves	None	Nil within 10 km radius
7	Mountains/Hills	None	Nil within 10 km radius
8	Centrally Protected Archaeological Sites	None	Nil within 10 km radius
9	Industries/ Thermal Power Plants	None	Nil within 10 km radius
10	Defence Installation	None	Nil within 10 km radius

Source: Survey of India Toposheet



Figure 3.30 Field Study Photographs

CHAPTER IV

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

The identification of potential environmental impacts is indeed the crucial first step in the Environmental Impact Assessment (EIA) process utilizing various techniques such as checklists, matrices and network diagrams to understand a project's effects. The matrix method used in this study provides a structured way to identify and assess the impacts ensuring the project can be implemented in an eco-friendly manner. This chapter discusses the anticipated impacts on land, soil, water, air, noise, biological and socioeconomic environments.

The proposed stone mining project involves blasting, drilling and screening operations which contribute to environmental impacts is given in Table 4.1. The project is designed to minimize these impacts by implementing mitigation measures and ensuring a marginal environmental footprint with a detailed analysis to follow in subsequent tables.

Table 4.1 Impact identification matrix.

Activities	Environmental Attributes								OHS
	Land	Soil	Water	Air	Noise	Ecology	Socio Economics	Aesthetics	
Site clearing & Site services	√	√		√		√			
Development of Greenbelt						√		√	
Operation Phase (Drilling, Blasting Loading and unloading, Transportation)	√	√		√	√	√			√
	√	√		√	√	√			√
	√	√		√	√	√			√
Employment and the material usage							√		
Mine closure (Removal of machineries, structures and Danger due to inadvertent entry)				√	√		√		√

√ Indicates Impact

4.1 LAND ENVIRONMENT

Anticipated Impacts

- ❖ Converting barren land of 1.96.03 hectares to rough stone and gravel mining creates a significant and usually irreversible change in land use and land cover involving the physical alteration of the land's surface, potential deforestation, loss of biodiversity, altered topography from pits and spoil dumps.
- ❖ Heavy vehicle movement causes significant problems to nearby agriculture and human habitation. These pollutants can degrade soil quality and introduce heavy metals into the environment.
- ❖ During transportation the tippers damage the bituminous roads. The primary damage is caused by the fourth power law (*The law posits that if you double an axle's load, the damage caused to the pavement increases by a factor of 2x4 or 16 times*) where pavement damage increases with the fourth power of the axle load. The immense weight of heavy payloads on an axle exerts a concentrated and repetitive stress on the road surface leading to permanent strain, premature failure and a cumulative damage.
- ❖ Rain drops hitting stone crushing waste can break apart the particles and flowing water detaches them from the surface transports and redeposits these particles especially from sloped surfaces. This a form of splash erosion followed by sheet erosion which can lead to environmental issues.

Mitigation measures

- ❖ After mining there is a huge void of 1.44.85 hectares upto a depth of 30m is useful for rain water storage structure has an advantage for local farmers. The artificial pond boundary shall be fences to avoid any mishaps.
- ❖ Union ministry of road transport and highways on July 16th 2018 increased the maximum cap of axle load limit by 20 to 25 percent cross various categories to keep the limit “at par with international standards”.

Maximum Safe Axle Weight		
Sl. No.	Axle Type	Maximum Safe Axle Weight
1.	Single Axle	
1.1	Single Axle with single Tyre	3.0 tonnes
1.2	Single Axle with two Tyres	7.5 tonnes
1.3	Single Axle with four Tyres	11.5 tonnes*
2.	Tandem Axles (Two axles) (where the distance between two axles is less than 1.8 Mtr.)	
2.1	Tandem axle for rigid vehicles, trailers and semi-trailers	21 tonnes*
2.2	Tandem axle for Puller tractors for hydraulic and pneumatic trailers	28.5 tonnes
3.	Tri-axes (Three axles) (where the distance between outer axles is less than 3 Mtr.)	
3.1	Tri-axle for rigid vehicles, trailers and semi-trailers	27 tonnes*
4.	Axle Row (two axles with four tyres each) in Modular Hydraulic trailers (9 tonnes load shall be permissible for single axle)	18 tonnes
* Note: If the vehicle is fitted with pneumatic suspension, 1 tonne extra load is permitted for each axle.		

MoRTH knows that previously built Indian roads are made keeping standard axle loads. The new national and state highways along with expressways can be built by using new norms but for the existing roads the life will be reduced on average by one year.

- ❖ 6-wheel tipper generally has a maximum legal speed limit which can be up to 60 km/h and speeds should be reduced for loaded conditions. The mine management should take care of the speed of vehicles i.e up to 40km/h in village roads constructed under Pradhan Mantri Gram Sadak Yojana and other district roads developed by Highways and Minor Ports Department, Government of Tamil Nadu as each time a truck passes the concentrated stress causes a small amount of permanent strain on the pavement. Over time these small strains accumulate and lead to significant fatigue and eventual failure.
- ❖ 6-wheel tippers of not more than 9tons payload capacity covered with tarpaulin to stop the spillage and dust should use.
- ❖ Protective measures such as establish plants like grasses, cover crops and trees to form a dense layer over the dump absorbing raindrop energy and holding particles in place.

4.2 SOIL ENVIRONMENT

Anticipated Impacts

- ❖ The fertility status of the soil near by the lease area may affect due to extra dust deposition on the soil. Dust deposition from a lease area can harm soil fertility by physically blocking soil pores, reducing aeration and water infiltration, and potentially altering the soil's chemical properties. This damage to the topsoil negatively impacts plant growth by interfering with photosynthesis and nutrient uptake ultimately decreasing crop production.
- ❖ Topsoil will be scraped from the area of 1.98.0 hectares in the project site will store in safety area left for 7.5m in the western side as shown in mining plan.

Mitigation measures

- ❖ When stock piling of top soil is done the mound should not be higher than 1.2m and 3.0m.
- ❖ To minimize surface runoff and erosion the topography of a graded surface should be designed to create terraces or benches that follow land contours which intercept sheet flow. Additionally, a bulldozer's tracks can be used to create a fine-scale roughened surface perpendicular to the slope and stockpiles should be constructed with a rough surface to improve drainage, reduce erosion and encourage revegetation.
- ❖ Efforts will be made to minimize the storage time to prevent nutrient loss.

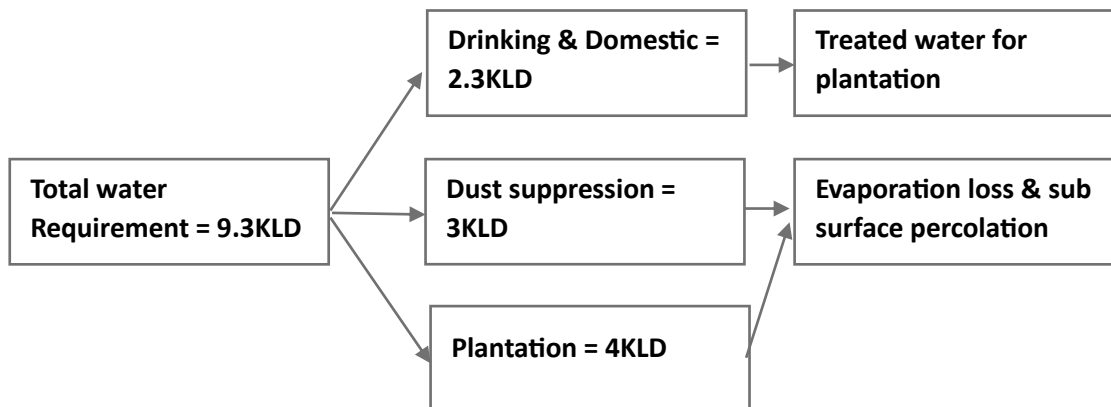
- ❖ To protect the quality of stockpiled topsoil immediate re-vegetation is crucial. Temporary seeding should be done within 30 days of stockpile formation to control erosion, prevent weed growth and maintain healthy soil microbes.
- ❖ If the stockpile will not be reused within 12 months it must be stabilized with permanent vegetation to ensure long-term erosion and weed control.
- ❖ The stored topsoil will be utilized for plantations in later phases during the progressive and final closure of the mine.

4.3 WATER ENVIRONMENT

Anticipated Impacts

- ❖ 9.3KLD (9300 liters per day) water requirement for drinking, domestic, dust suppression and plantation.

Water Balance Chart of the Mine



- ❖ The domestic effluents being generated during mine operation.
- ❖ Major impact of opencast mining on groundwater regime is quality deterioration. The proposed mining activities shall be carried out upto a depth of 30m from average ground level. The specific water table depth in the core and buffer zone is between 10.8m and 13.7 meters below ground level.
- ❖ The volume of rain water entering to the mine and accumulating in the quarry has been estimated on the basis of direct catchment area, maximum daily precipitation and the run-off coefficient. $(Q = A \times H \times \bar{d})$ **cubic meters/day**.

Where A- catchment area in m²

H- Max daily precipitation in mm

$\bar{d}$ - Run-off Co-efficient.

The run off co-efficient for mined out area is 1.46.75. The all-time record for maximum daily precipitation in Tiruvannamalai district was 468mm on September 30, 2018 as

reported by CEIC Data. More recent rainfall records are 110mm on October 17, 2025. The maximum broken area is 1.46.75hectares in the sixth year and estimation for make of water done on the quarry parameters for sixth year onwards.

$$Q = 1.96.03\text{hecatres} \times 10000 \times 0.175 \times 0.60 \text{ m}^3.$$

$$Q = 2079\text{m}^3.$$

Total accumulated water in the pit is 2058m^3 .

Additionally, 20% of water from seepage is 411.6m^3 .

Total water estimated for pumping requirement = **2469.6m^3** .

If we take the all-time record then the total water estimated for pumping = **2469.6m^3** .

To manage rain water runoff into quarry a 5 HP diesel operated pump will be placed at the site during the monsoon.

Mitigation Measures

- ❖ The hard rock itself has very few interconnected pore spaces, limiting the amount of water it can store or transmit. Groundwater flow and storage occur primarily in secondary openings such as joints, cracks and fissures. The thickness of the weathered layer, where more significant porosity can develop, is typically limited to 1-3 meters, particularly in low-lying topographic areas. The groundwater in these shallow zones is under unconfined (or water table) conditions, meaning it is directly connected to the surface and not confined by impermeable layers.
- ❖ The storm water discharge coming out of quarries and dump through a network of garland drains is expected to contain solid particles. These solid particles shall be removed by settling in the settling pond before being used for dust suppression and plantation. Hence, there shall be no change in drainage system due to this mining project in buffer zone.
- ❖ Domestic sewage from site office will be discharged in MAK Anaerobic bacteria digestion bio-septic tank. The treated water will be utilized for watering and maintaining the green belt.
- ❖ Groundwater development efforts would need to focus on the weathered and fractured zones near the surface in the buffer zone.
- ❖ Periodic (every 6 month once) analysis of ground water level and quality from the open well DW8 and bore well BW3 as shown in Figure 3.8 & 3.10 to find the change due to quarrying.

- ❖ The average annual rainfall of the project area is 998.13mm and the runoff coefficient factors have been taken as per guidelines of Manual on Norms and Standards for Environmental Clearances by MoEF & CC, Govt. of India.

The total annual runoff can be calculated as:

$$\text{Runoff} = \text{Rainfall} \times \text{Catchment Area} \times \text{Runoff Coefficient}$$

Annual Rainfall = 998.13mm

Total Project Area = 19603sq.m

Coefficient of Run off for Rooftop (Inclined) = 0.90

Coefficient of Run off for Rooftop (Flat) = 0.80

Coefficient of Run off for Road/Paved Area = 0.70

Coefficient of Run off for Open Area = 0.25

Coefficient of Run off for Greenbelt Area = 0.15 Rain water can effectively be collected from Maximum size of void in 6th year of mining = 14485sq. m.

Top soil dump area = 3973sq.m

Road & Infrastructure = 500sq.m

Runoff from Void pit area = 14485sq.m x 0.805 m x 0.25 = 2915m³

Runoff from Top soil dump area = 0.80m x 3973sq. m x 0.25 = 794.6m³

Runoff from Road & Infrastructure = 0.805m x 500sq. m x 0.70 = 281.75m³

Total Runoff from Project Area = 3991.35m³

The annual runoff generated in the project site is 3991.35m³. By considering the loss of 20% due to evaporation, spillage and wastage the effective runoff that can be harvested inside the project area is **3193.08m³**.

Daily water requirement (except drinking purpose) is 8m³. So, with 300 working days the water requirement will be = 9.3m³ X 300 = **2790m³**

The surface runoff being generated from the project area will be channelized to rain water harvesting pond of 2m x 2m x 2m through network of drainage system 1m x 1m. The bottom of the ponds is naked and natural seepage from the bottom will recharge the ground water regime. Hence the storage pond will act as recharging structure. Even though rain water will be sufficient to fulfil the daily requirement of water but in the initial years of mining when the mining pit is smaller in size or in the year with deficit rainfall surface water will be collected with due permission.

4.4 AIR ENVIRONMENT

Anticipated Impact

The main cause of air pollution in open-cast mining is the generation of airborne particulate matter (dust) from various mining activities including drilling, blasting, excavation, loading/unloading, vehicle movement on haul roads and the dumps. These activities release large quantities of fugitive dust which are then carried by the wind and can contribute to respiratory health problems for nearby communities and miners. The source of pollution is given in table below.

Activities	Air pollutants
Drilling	PM ₁₀ , PM _{2.5}
Blasting	PM ₁₀ , PM _{2.5} , SO _x , NO _x
Loading & unloading	PM ₁₀ , PM _{2.5}
Haul road	PM ₁₀ , PM _{2.5}
Transportation	PM ₁₀ , PM _{2.5} , SO _x , NO _x , CO
Waste/Top soil handling	PM ₁₀ , PM _{2.5}

The air dispersion modelling study was conducted using the AERMOD Cloud remote version for assessment of incremental Ground level concentration (GLC) for the proposed production. Area source model taken into consideration taking into consideration of the conceptual quarry area and dump area. Further line source model was taken into consideration for transportation of material through haul road. Model Setup is given in Table below

Parameter	Details
Model Name	Aermod
Model Type	Steady state Gaussian plume air dispersion model
Topography	Plain terrain
Average Time	24 hours
Source Type	Area source
Boundary limit	5km X 5km
Surface Meteorological Data	Site specific data processed by AERMET
Receptor Height	0
Anemometer height	10m

The air pollution modelling correctly focuses on particulate matter as the key pollutant for a mining project given that dust from mining operations and transportation is the primary source of air pollution in such industries rather than SO_x or NO_x which are typically associated with vehicular emissions. The incremental Ground Level Concentrations (GLCs) predicted are specifically for particulate matter reflecting the anticipated contribution of the proposed mining project to local air quality.

Emission Estimation

Emission resulting from different mining activities is estimated using relevant empirical formula developed by Chaulya et al.,2001 and Jyothi Prabha, Gurdeep Singh and I.N.Sinha, 2003 “Emission Factor Equations for Haul roads: The Indian Perspective”, Indian Journal of Air Pollution Control Vol. VI No. I March pp 37- 43. The equations used for fugitive emission estimation have been given in Table 4.2.

Table 4.2 Empirical Formula for Emission Rate from Overall Mine

	Pollutant	Source Type	Empirical Equation	Parameters
Overall Mine	SPM	Area	$E = [u^{0.4} a^{0.2} \{9.7 + 0.01p + b/(4+0.3b)\}]$	u = Wind speed(m/s). p = Mineral production (Mt/yr). b = Overburden handling (Mm ³ /yr). a = Lease area(km ²). E = Emission rate(g/s).
Transportation through roads	Fugitive dust	line	$E = [\{(100-m)/m\}^{0.8} \{s/(100-s)\}^{0.1} u^{0.3} \{2663 + 0.1(v+fc)\} 10^{-6}]$	E = Emission Rate (g/sec/m) m = Moisture Content of the road = 10%, s = Silt Content of the Road = 10% u = Wind Speed v = Average Vehicle Speed f = frequency of Vehicle movement in number per hour c = Capacity of the dumper in tons = 12 ton

The emission rate thus calculated using the empirical formula is used as one of the inputs in the AERMOD modelling. It is important to note that PM₁₀ emission rate is derived from the SPM estimation in the background that PM₁₀ constitutes 52% of SPM emission. The PM_{2.5}, PM₁₀ emission results have been given in Table 4.3.

Table 4.3 Estimated Emission Rate

Activity	Pollutant	Calculated Value (g/s)	Lease Area in m ²	Calculated Value (g/s/m ²)
Overall Mine	PM _{2.5}	0.507133898	19603	2.58702E-05
Overall Mine	PM ₁₀	1.014267796	19603	5.17404E-05

4.4.1 Modelling of Incremental Concentration

The post project resultant concentrations of PM₁₀, PM_{2.5} is given in Tables 4.4 - 4.5.

Table 4.4 Incremental & Resultant GLC of PM_{2.5}

Station ID	Distance to core area (km)	PM _{2.5} concentrations(µg/m ³)				Comparison against air quality standard (60 µg/m ³)	Magnitude of change (%)	Limit
		Direction	Baseline	Predicted	Total			
AAQ1	1.15	NE	16.92	0.3	17.22	Below standard	1.8	60
AAQ2	1.08	W	16.08	0.6	16.68		3.7	60
AAQ3	2.72	E	17.44	5	22.44		28.7	60
AAQ4	1.63	SW	17.40	5	22.4		28.7	60
AAQ5	2.73	SE	17.93	5	22.93		27.9	60

Table 4.5 Incremental & Resultant GLC of PM₁₀

Station ID	Distance to core area	PM ₁₀ concentrations(µg/m ³)				Comparison against air quality standard (100 µg/m ³)	Magnitude of change (%)	Limit
		Direction	Baseline	Predicted	Total			
AAQ1	1.15	NE	43.58	1	44.58	Below standard	2.3	100
AAQ2	1.08	W	41.44	3	44.44		7.2	100
AAQ3	2.72	E	44.93	1	45.93		2.2	100
AAQ4	1.63	SW	44.83	3	47.83		6.7	100
AAQ5	2.73	SE	46.20	3	49.2		6.5	100

The Air Quality index for the baseline and predicted values of PM_{2.5} and PM₁₀ are given in table below.

Station ID	Distance to core area (km)	Direction	PM _{2.5} (µg/m ³)		AQI for PM _{2.5}	PM ₁₀ (µg/m ³)		AQI for PM ₁₀
			Baseline Conc.	Total (Baseline + Predicted GLC)		Baseline Conc.	Total (Baseline + Predicted GLC)	
AAQ1	1.15	NE	16.92	17.22	66	43.58	44.58	41
AAQ2	1.08	W	16.08	16.68	65	41.44	44.44	41
AAQ3	2.72	E	17.44	22.44	76	44.93	45.93	42
AAQ4	1.63	SW	17.40	22.4	76	44.83	47.83	44
AAQ5	2.73	SE	17.93	22.93	77	46.20	49.2	44

<https://www.airnow.gov/aqi/aqi-calculator-concentration/>

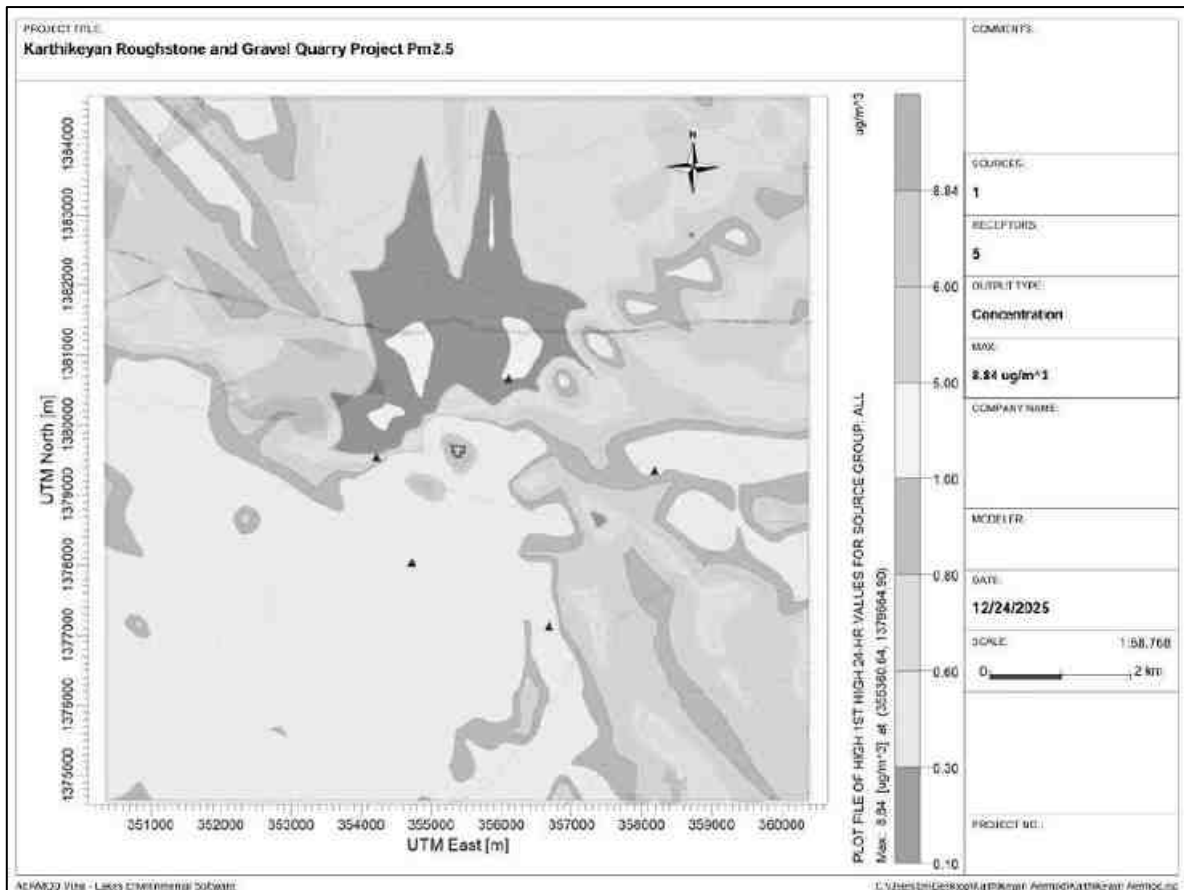


Figure 4.1 Predicted Incremental Concentration of PM2.5

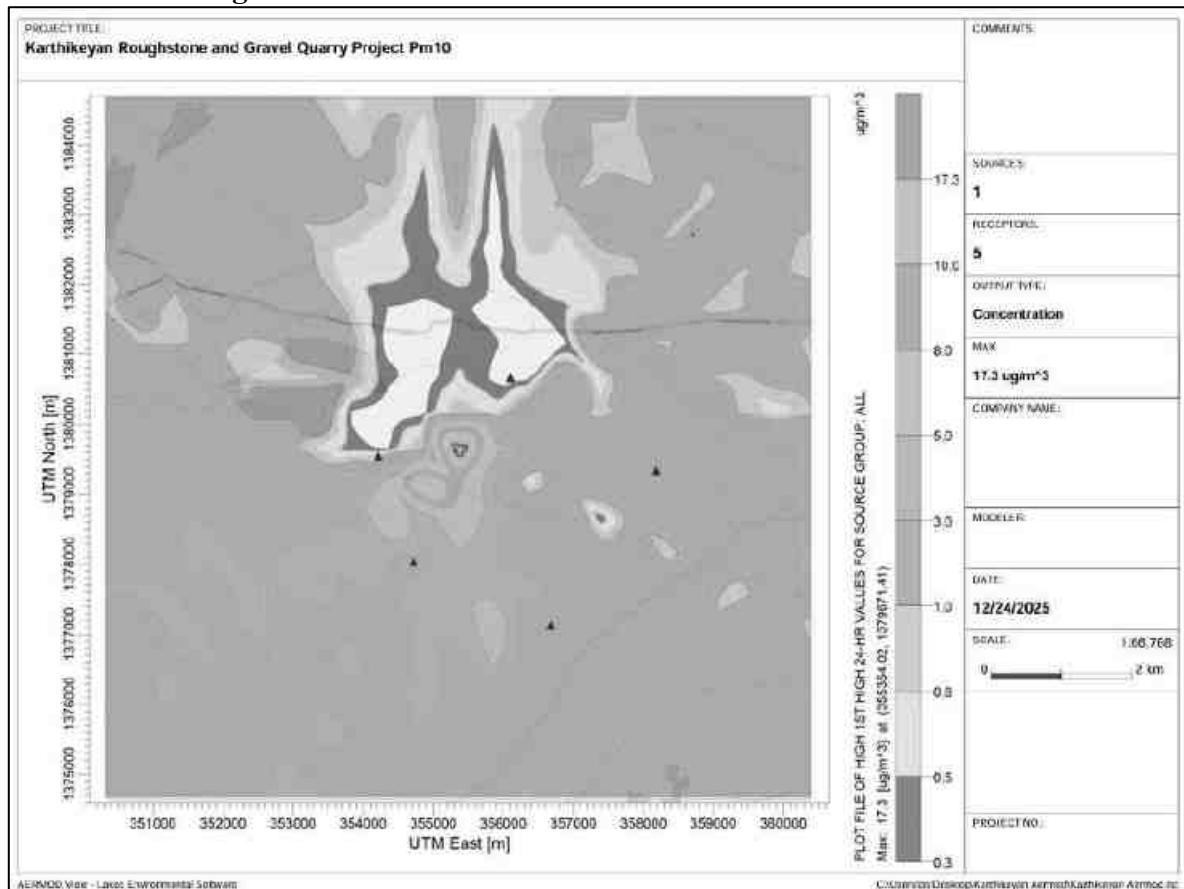


Figure 4.2 Predicted Incremental Concentration of PM10

In the present study American Meteorological Society and the United States Environmental Protection Agency Dispersion Model (AERMOD) air quality model was run for premonsoon season under maximum atmospheric temperature conditions. The AERMOD has been run for PM₁₀ and PM_{2.5} distribution with 24-Hr maximum concentration and concentration contours were obtained as given in Figure 4.1 and 4.2. From these Isopleths plots it is observed that the highest pollutants concentrations predicted by AERMOD was near the major source in the core area and a maximum of 62.4µg/m³ of PM₁₀ and 32.6µg/m³ of PM_{2.5} were found to be below the prescribed NAAQS near the source. The impact assessment matrix of PM_{2.5} was tabled below

Station	Impact Scale	Standard Compliance	Magnitude
AAQ1	High	Below Standard	Significant (35.8%)
AAQ2	Low	Below Standard	Negligible (5.0%)
AAQ3	Low	Below Standard	Negligible (2.6%)
AAQ4	Low	Below Standard	Negligible (2.4%)
AAQ5	Low	Below Standard	Negligible (4.8%)

Leopold Matrix: Air Quality Impact

The Leopold Matrix is used to cross-reference project activities against environmental factors. Based on the PM_{2.5} data the project activities impact the environmental factor air quality. Scale: 1 (Lowest) to 10 (Highest). Magnitude is negative (-) for adverse impacts. Example for AAQ1 (Total 32.6µg/m³): If magnitude is -6 and importance is 6 the resulting -36 indicates a moderate negative impact that requires specific mitigation measures.

Environmental Factor	Project Activity: Construction	Project Activity: Operation
Physical: Air Quality	-4/5	-6/7
Biological: Health	-3/4	-5/8
Social: Aesthetics	-2/2	-3/4

Mitigation Measures: Air Quality Mitigation & Management Plan (2026).

In accordance with 2026 **National Clean Air Programme (NCAP)** targets which aim for a 40% reduction in particulate matter by the end of 2026. These measures focus on reducing PM_{2.5} at the source.

Table 4.6 Proposed Mitigation Measures for Air pollution

Impacted Area	Leopold Score (M/I)	Targeted Mitigation Measure	Implementation Frequency
AAQ1 (High Change)	-7 / 6	Permanent Water sprinkler	Continuous during high-dust activities
Core Area (AAQ2)	-5 / 8	Install continuous wind-breaking walls (min. 3m height) to shield the core area.	Fixed throughout project phase
Transport Routes	-4 / 5	Strictly enforce a 10 km/h limit for heavy vehicles to reduce dust resuspension.	All vehicle movements
Stockpiles	-3 / 4	Use tarpaulins or plastic sheets to cover all sand, cement and loose debris.	Daily at close of work
Site Entry/Exit	-2 / 3	Tire wash unit to prevent track-out onto public roads.	Every vehicle exit

Compliance Requirements

- **Real-Time Monitoring:** As of 2026 large construction sites are required to link low-cost air quality sensors directly to state pollution control board (SPCB) dashboards for live compliance tracking.
- **Emission Norms:** Ensure all on-site machinery and diesel generators (DG sets) meet the latest BS-VI or equivalent standards to minimize $PM_{2.5}$ and NO_x emissions.
- **Emergency Response:** If $PM_{2.5}$ exceeds the $60 \mu g/m^3$ limit trigger the Graded Response Action Plan (GRAP) which may require temporary suspension of excavation or demolition.

4.5 NOISE ENVIRONMENT

According to DGMS Technical Circular No. 18 of 1975 and No.5 of 1990 on “Protection of Workers against noise” it is brought to the knowledge of all concerned that Noise is emerging as an important and challenging health hazard for mine workers. Source data has been computed taking into account of all the machinery and activities used in the open cast mining process had listed in Table 4.7.

Table 4.7 Activity and Noise Produced by Machinery in open cast mines

S. No.	Machinery / activity	Distance of measurement	Noise level dB(A)	
			Idling	Fully accelerated
1.	Jack hammer	1	80	97
2.	Compressor	1	-	96
3.	Bulldozer	2	84	100
4.	Tipper	2	75	92
5.	Drill	1	85	90

The permissible noise exposure levels in Indian mines are based on OSHA standards adapted and enforced by the Indian government through the Factories Act and CPCB norms are given in Table 4.8 below.

Table 4.8 Permissible noise levels adopted by CPCB, 2000 and OSHA

Maximum Exposure Noise level Time per Working Day in hours	Noise level	
	CPCB, 2000 in dB (International Standard Organization)	OSHA code in dB (Occupational Safety and Health Act)
8	90	90
4	93	95
2	96	100
1	99	105
0.5	102	110
0.25	105	115

A noise level of 90 dB causes disruption, leading to annoyance, cognitive errors, and temporary hearing loss, while 85 dB is considered an upper comfort level with potential for cognitive decrements in tasks requiring decision-making with hearing loss possible at 300-1200 Hz frequencies in that range. Prolonged exposure to sounds at or above 85 dB can damage hearing over time. The mitigation measures to minimize the noise pollution are given in Table below.

Impact	Mitigation Measures
Noise impact due to mining activities. Noise impact due to vehicular movement. Auditory impact (hearing impairment resulting from excessive noise exposure)	❖ Diesel powered machineries which are major source of noise in open cast environment will be properly maintained as per maintenance schedule to prevent undesirable noise. ❖ Attention shall be paid towards rigorous maintenance of silencers of diesel engines. ❖ Static diesel engines shall be housed as far as possible (not made of sheet metals or surrounded by baffles). If possible, they will be placed on vibration isolators. ❖ Drill machine operators, blasters and dumper drivers will be issued earplugs and earmuffs. Duty hours of operators of noisy machinery will be regulated to keep their noise exposure levels within limits. ❖ Provision of sound proof cabins for the workers deployed on machines producing higher level of sound like dumpers, shovels etc.

	❖ 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 ❖ Greenbelt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise ❖ Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured through training and awareness ❖ Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects.

4.5.1 Ground Vibrations due to blasting

The major source of ground vibration from the quarry is blasting. The ground vibrations due to the blasting in the quarry are calculated using the empirical equation for assessment of peak particle velocity (PPV) is given below

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

where,

V = peak particle velocity (mm/s), K = site and rock factor constant (500)

Q = maximum instantaneous charge (kg)

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

R = distance from charge (m)

Table 4.9 Predicted PPV values due to Blasting

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s	Fly rock distance in m	Air Blast	
					Pressure (kPa)	Sound Level (dB)
P1	9.32	380	0.222	19	0.04	126

Table 4.10 Predicted PPV values due to Blasting at 100-500m radius

Location ID	Maximum Charge in kgs	Radial Distance in m	PPV in mm/s	Fly rock distance in m	Air Blast	
					Pressure (kPa)	Sound Level (dB)
P1	9.32	100	1.881	19	0.19	140
		200	0.621		0.08	132

		300	0.324		0.05	128
		400	0.205		0.04	125
		500	0.143		0.03	123

The PPV results shows that the ground vibration is well below the permissible limits set by DGMS in the circular 7, 1997.

Mitigation Measures

- ❖ The blasting operations in the cluster quarries are carried out without deep hole drilling and blasting using delay detonators which reduce the ground vibrations
- ❖ Proper quantity of explosives, 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
- ❖ 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.
- ❖ Sufficient angular stemming material will be used to confine the explosive force and minimise environmental disturbance caused by venting / misfire.
- ❖ The detonators will be connected in a predetermined sequence to ensure that only one charge is detonated at any one time and a NONEL or similar type initiation system will be used
- ❖ The detonation delay sequence shall be designed so as to ensure that firing of the holes is in the direction of free faces so as to minimise vibration effects
- ❖ Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices.
- ❖ Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders
- ❖ Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained
- ❖ The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system.

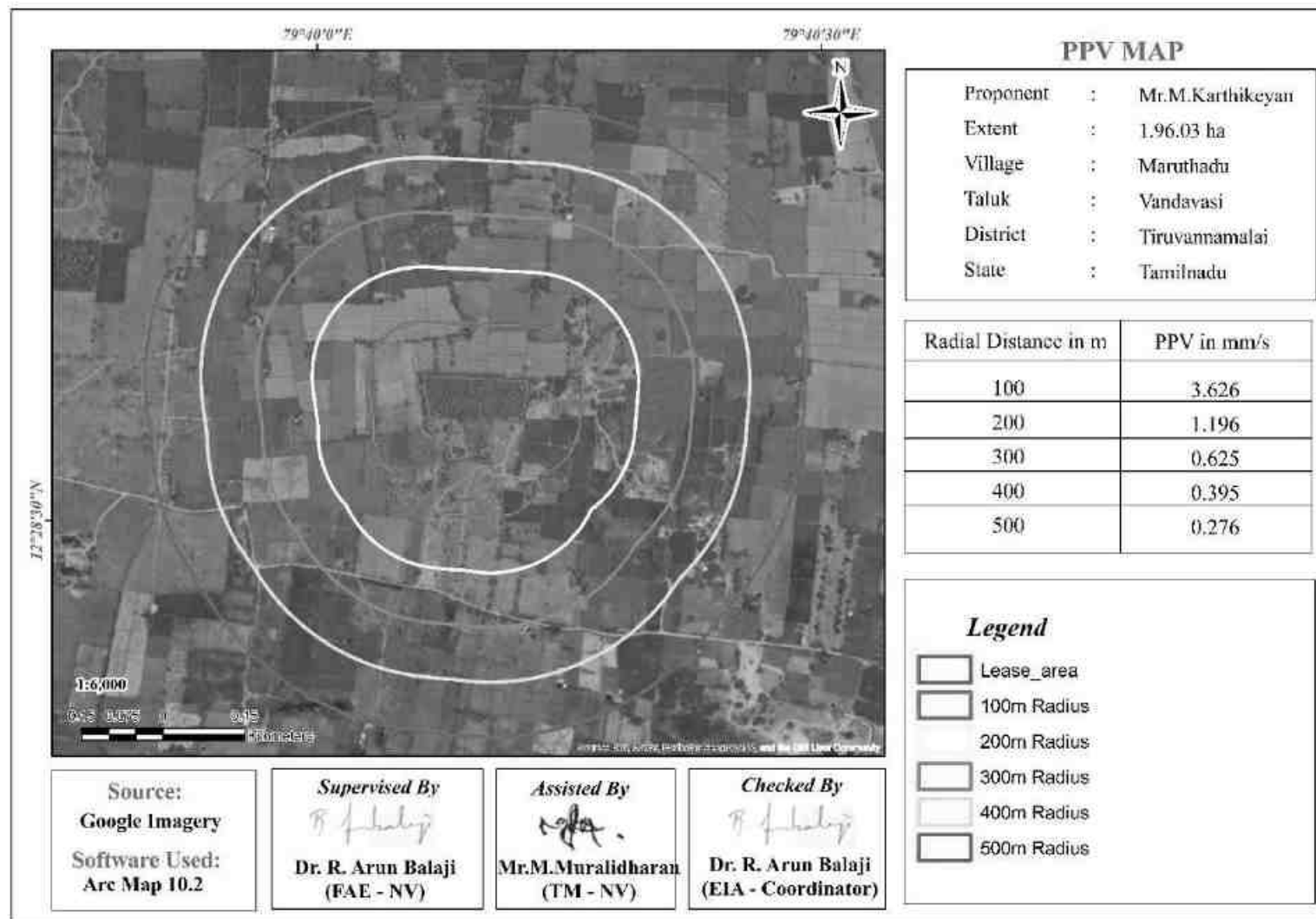


Figure 4.3 100-500m PPV Map

4.6 ECOLOGY AND BIODIVERSITY

4.6.1 *Impact on Ecology and Biodiversity*

- ❖ During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly
- ❖ The Number of plants in the mining lease area is given in Chapter III Table 3.21 which vegetation in the lease area may be affected during mining.
- ❖ Carbon released from quarrying machineries and tippers during quarrying would be 320kg per day, 86400kg per year and 864000kg over ten years, as provided in Table 4.11.

Table 4.11 Carbon Released During Ten Years of Rough Stone and Gravel Production

	Per day	Per year	Per ten years
Fuel consumption of excavator	77	20910	209104
Fuel consumption of tipper	320	86400	864000
Total fuel consumption in Liters	470	126779	1267794
CO ₂ emission in kg	1260	340200	3402000

4.6.2 *Mitigation Measures on Flora*

- ❖ During conceptual stage, the top bench will be re-vegetated by planting local /native species and lower benches will be converted into rainwater harvesting structure following completion of mining activities, which will replace habitat resources for fauna species in this locality over a longer time.
- ❖ None of the plants in the lease area will be cut during operational phase of the mine. we recommend uprooting and planting of the 10 trees along the 7.5 m safety zone to prevent environmental pollution during quarrying. As the survival rate due to uprooting was only 30%, 100 seedlings will be procured at the rate of 10 seedlings per tree and planted in 7.5 m safety zone.
- ❖ Existing roads will be used and new roads will not be constructed to reduce impact on flora.
- ❖ Green belt of adequate width will develop around the project site. Dust catching species like *Alstonia scholaris*, *Bombax ceiba*, *Terminalia arjuna*, *Cassia fistula*, *Bombax ceiba*, *Azadirachta indica*, *Nyctanthes arbor-tristis*, *Psidium guajava*, *Tectona grandis* etc will be planted in green belt.
- ❖ To mitigate carbon emission due to mining activities, we recommend planting trees around the quarry to offset the carbon emission during quarrying. A tree can sequester 19911kg of carbon per year. Therefore, we recommend 500 planting large number of

trees around the quarry and near school campuses, government wasteland, roadsides etc.

- ❖ As per the greenbelt development plan as recommended by SEAC (Table 4.13) about 980 trees (Table 4.14) will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 2603643kg of the total carbon as provided in Table 4.12.

Table 4.12 CO₂ Sequestration

CO ₂ sequestration in kg	87	23500	117500
Remaining CO ₂ not sequestered in kg	1927	520728	2603643
Trees required for environmental compensation	21681		
Area required for environmental compensation in hectares	43		

Table 4.13 Recommended Species for Greenbelt Development Plan

S. No	Botanical Name of the Plant	Family Name	Common Name	Category	Dust Capturing Efficiency Features
1	<i>Azadirachta indica</i>	Meliaceae	Neem,Vembu	Tree	Well distinct thick at both the layer well distinct in Palisade & Spongy parenchyma. Spongy parenchyma is present at lower epidermis Many vascular bundles arranged almost parallel series.
2	<i>Tectona grandis</i>	Lamiaceae	Teak	Tree	
3	<i>Polyalthia longifolia</i>	Annonaceae	Nettilingam	Tree	
4	<i>Albizia lebbeck</i>	Fabaceae	Vagai	Tree	
5	<i>Delonix regia</i>	Fabaceae	Cemmayir-konrai	Tree	
6	<i>Bauhinia racemose</i>	Fabaceae	Aathi	Tree	
7	<i>Cassia fistula</i>	Fabaceae	Sarakondrai	Tree	
8	<i>Aegle marmelos</i>	Fabaceae	Vilvam	Tree	
9	<i>Pongamia pinnata</i>	Fabaceae	Pungam	Tree	
10	<i>Thespesia populnea</i>	Malvaceae	Puvarasu	Tree	

Table 4.14 Greenbelt Development Plan

	No. of trees proposed for plantation	No. of trees expected to survive @ 80%	Area to be covered (m ²)
Plantation in the construction phase (3 months)	Number of plants inside the mine lease area		
	392	314	3528
	Number of plants outside the mine lease area		
	588	470	5293
Total	980	784	8821

4.6.3. *Anticipated Impact on Fauna*

- ❖ Direct impact is anticipated on fauna of core zone
- ❖ Insignificant impact is anticipated on fauna in the buffer area due to air emissions, noise, vibration, transportation, waste water discharges, and changes in land use
- ❖ Berigai R.F. located on 280m north west of the mine lease area. There is a possibility that birds will be affected by mining activities and migrate.

Mitigation Measures on Fauna

- ❖ Fencing will be constructed around the proposed mine lease area to restrict the entry of stray animals
- ❖ The workers shall be trained not to harm any wildlife near the project site
- ❖ The quarry operation using in NONAL blasting Method Technic so controlled in sound and vibration.

4.6.4 *Impact on agriculture and horticulture crops in 1km Radius*

- ❖ Problems to agricultural and horticulture land due to dust caused by movement of heavy vehicles.
- ❖ Soil erosion and sediment deposition in the nearby water bodies due to earthworks during the rainy season.
- ❖ The fugitive dust released from the mining operations may cause effect on the agricultural and horticulture land who are directly exposed to the fugitive dust.
- ❖ Dust from the quarries is likely to affect reproductive systems in nearby agricultural and horticulture lands.
- ❖ Dust from quarries can affect plant growth and reduce vegetable yields.

4.6.5 *Mitigation Measures on agriculture and horticulture crops.*

- ❖ The main objective of the green belt is to provide a barrier between the source of pollution and the surrounding areas. In order to compensate the loss of vegetation cover, it is suggested to carry out afforestation program mainly inside and outside of the lease area in different phases.
- ❖ A green belt will be created in 7.5m & 10m safety zone around the quarry to contain the dust from the quarry and prevent the dust from spreading to the adjacent agricultural land.
- ❖ Transportation of material will be carried out during day time and material will be covered with tarpaulin

4.7 SOCIO ECONOMIC ENVIRONMENT

Anticipated Impact from Proposed and Existing Projects

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

Common Mitigation Measures for Proposed Project

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

4.8 OCCUPATIONAL HEALTH AND SAFETY

Social and occupational health mitigation is a critical requirement for projects showing a significant magnitude of change such as your 35.8% increase at AAQ1. Under updated Tamil Nadu Occupational Safety and Health Rules and NCAP 2026 targets the following measures are recommended.

Social & Worker Health Mitigation Plan

Category	Mitigation Measure	Purpose
Respiratory Safety	Mandatory N95/FFP2 Masks: Required for all workers during drilling and blasting, loading.	Prevent deep lung penetration of <i>PM2.5</i> .

Health Surveillance	Quarterly Health Camps: Conduct lung function tests (Spirometry) for workers in High Change zones (AAQ1).	Early detection of respiratory illness.
Real-time Monitoring	Wearable AQ Sensors: Deploy wearable sensors for site supervisors in dust-heavy zones to track individual exposure.	Immediate alerts for unhealthy exposure limits.
Workplace Design	Rotation & Scheduling: Limit individual work duration in high-pollution zones and shift dust-heavy work to cooler hours.	Reduce cumulative pollutant load on workers.
Community Engagement	Live AQ Dashboards: Install a public display board at the site entry showing current $PM_{2.5}$ vs. the $60\mu g/m^3$ standard.	Build transparency with local residents near AAQ2

4.8.1 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 85dB(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 85dB(A) the peak sound levels reach 140dB(C) or the average maximum sound level reaches 110dB(A)
- ❖ Ear muffs provided will be capable of reducing sound levels at the ear to at least 85dB(A)
- ❖ Periodic medical hearing checks will be performed on workers exposed to high noise levels.

4.8.2 Physical Hazards

The following measures are proposed for control of physical hazards

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

4.8.3 Occupational Health Survey

All the persons will undergo pre-employment and periodic medical examination. Employees will be monitored for occupational diseases by conducting the following tests: general physical tests, audiometric tests, full chest, X-ray, Lung function tests, spirometry tests, periodic medical examination – yearly, lung function test – yearly, those who are exposed to dust, and 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.

4.9 Mine Waste Management

No waste is anticipated from any of the proposed quarries.

4.10 Mine Closure

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. Therefore, progressive mine closure plan should be specifically dealt with in the mining plan and is to be reviewed along with mining plan. As progressive mine closure is a continuous series of activities, it is obvious that the proposals of scientific mining have included most of the activities to be included in the closure plan. While formulating the closure objectives for the site, it is important to consider the existing or the pre mining land use of the site and how the operation will affect this activity.

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

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

4.10.1 Mine Closure Criteria

The criteria involved in mine closure are discussed below:

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.,

Chemical Stability

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

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.
- ❖ Where it is desirable to get a quick growth response from the native flora during those times.

when moisture is not a limiting factor. For example, development of green barriers the Mine closure plan should be as per the approved mining plan. The mine closure is a part of approved mine plan and activities of closure shall be carried out as per the process described in mine closure plan.

CHAPTER V

ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.0 INTRODUCTION

Consideration of alternatives to a proposed project is a requirement of EIA process. During the scoping process, alternatives to a proposed project 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 proposed project is site specific and has the 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 area. 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.
- ❖ As the proposed project 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 the mine site is mineral specific.

5.3 FACTORS BEHIND SELECTION OF PROPOSED TECHNOLOGY

Manual open cast mining method with secondary blasting will be applied to extract rough stone and gravel in the area. The proposed mining lease areas have following advantages:

- ❖ As the mineral deposition is homogeneous and batholith formation, opencast method of working is preferred over underground method.
- ❖ The material will be loaded with the help of excavators into tractors/tippers and transported to the need by customers.
- ❖ Semi-skilled labours fit for quarrying operations are easily available around the nearby villages

5.4 ANALYSIS OF ALTERNATIVE TECHNOLOGY

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

CHAPTER VI

ENVIRONMENTAL MONITORING PROGRAMME

6.0 GENERAL

The monitoring and evaluation of environmental parameters indicates potential changes occurring in the environment, which paves way for implementation of rectifying measures wherever required to maintain the status of the natural environment. Evaluation is also a very effective tool to judge the effectiveness or deficiency of the measures adopted and provides insight for future corrections. The main objective of environmental monitoring is to ensure that the obtained results in respect of environmental attributes and prevailing conditions during operation stage are in conformity with the prediction during the planning stage. In case of substantial deviation from the earlier prediction of results, this forms as base data to identify the cause and suggest remedial measures. Environmental monitoring is mandatory to meet compliance of statutory provisions under the Environment (Protection) Act, 1986, relevant conditions regarding monitoring covered under EC orders issued by the SEIAA-TN as well as the conditions set forth under the order issued by Tamil Nadu Pollution Control Board while granting CTE/CTO.

6.1 METHODOLOGY OF MONITORING MECHANISM

Implementation of EMP and periodic monitoring will be carried out by respective project proponents. A comprehensive monitoring mechanism has been devised for monitoring of impacts due to proposed project; Environmental protection measures like dust suppression, control of noise and blast vibrations, maintenance of machinery and vehicles, housekeeping in the mine premises, plantation, implementation of Environmental Management Plan and environmental clearance conditions will be monitored by the respective mine management. On the other hand, implementation of area level protection measures like green belt development, environmental quality monitoring etc., are taken up by a senior executive who reports to their Mine Management. An Environment monitoring cell (EMC) will be constituted to monitor the implementation of EMP and other environmental protection measures in the proposed quarry. The responsibilities of this cell will be:

- ❖ Implementation of pollution control measures
- ❖ Monitoring programme implementation
- ❖ Post-plantation care
- ❖ To check the efficiency of pollution control measures taken
- ❖ Any other activity as may be related to environment

- ❖ Seeking expert's advice when needed.

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

The sampling and analysis report of the monitored environmental attributes will be submitted to the Tamil Nadu Pollution Control Board (TNPCB) at a frequency of half-yearly and yearly by the proposed project proponent. The half-yearly reports are submitted to Ministry of Environment and Forest, Regional Office and SEIAA-TN 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). The Environmental Monitoring Cell will be formed for the proposed project. The structure of the cell will be as shown in Figure 6.1.

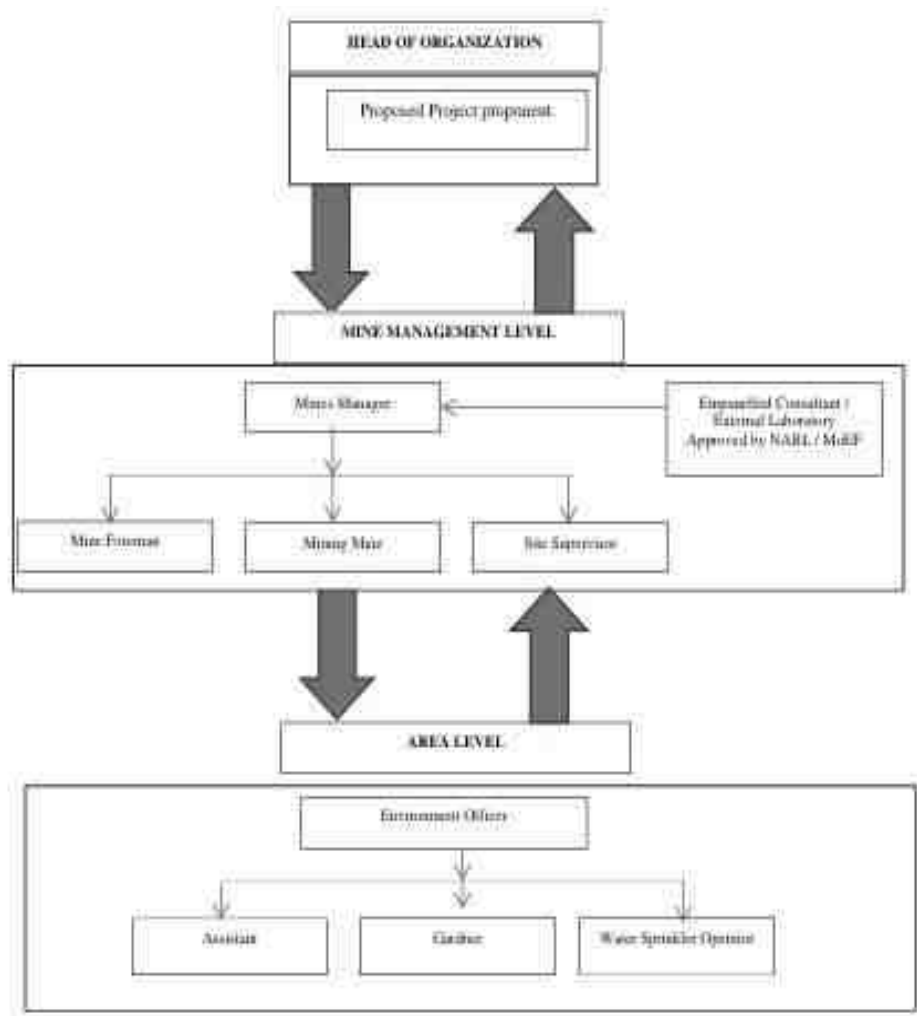


Figure 6.1 Proposed environmental monitoring chart

6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

The mitigation measures proposed in chapter IV 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 for Proposed Project

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

6.3 MONITORING SCHEDULE AND FREQUENCY

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

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

- ❖ Air quality
- ❖ Water and wastewater quality
- ❖ Noise levels
- ❖ Soil quality and
- ❖ Greenbelt development
- ❖ The details of proposed monitoring schedule have been provided in Table 6.2.

Table 6.2 Proposed Monitoring Schedule Post EC for the Proposed Quarry

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

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

6.4 BUDGETARY PROVISION FOR ENVIRONMENT MONITORING PROGRAM

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 recurring cost for Environmental Monitoring Programme is **Rs 2,95,000** /- per annum for the proposed project site.

Table 6.3 Environment Monitoring Budget

S. No.	Parameter	Capital Cost	Recurring Cost per annum
1	Air Quality	-	Rs 60,000/-
2	Meteorology	-	Rs 15,000/-
3	Water Quality	-	Rs 20,000/-
4	Water Level Monitoring	-	Rs 10,000/-
5	Soil Quality	-	Rs 20,000/-
6	Noise Quality	-	Rs 10,000/-
7	Vibration Study	-	Rs 1,50,000/-
8	Greenbelt	-	Rs 10,000/-
Total		-	Rs 2,95,000 /-

Source: Field Data

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.

CHAPTER VII

ADDITIONAL STUDIES

7.0 GENERAL

Additional studies deal with:

- ❖ Public Consultation for Proposed Project
- ❖ Risk Assessment
- ❖ Disaster Management Plan
- ❖ Cumulative Impact Study
- ❖ Plastic Waste Management

7.1 PUBLIC CONSULTATION FOR PROPOSED PROJECT

Application to the Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the district was made and the public opinions on the proposed project will be updated in the final EIA/EMP report.

7.2 RISK ASSESSMENT FOR PROPOSED PROJECT

Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening. The methodology for the risk assessment is 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 proposed project.

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 Table 7.1.

Table 7.1 Risk Assessment & Control Measures for Proposed Project

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;	✓ 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,

		Drill Rod may break;	✓ Drilling shall not be carried on simultaneously on the benches at places directly one above the other. ✓ Periodical preventive maintenance and replacement of worn-out accessories in the compressor and drill equipment as per operator manual. ✓ All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition. ✓ Operator shall regularly use all the personal protective equipment.
3	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/ fining of blast holes Vibration due to movement of vehicles	✓ The maximum charge per delay and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blast can be conducted safely. ✓ SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation ✓ Shots are fired during daytime only. ✓ All holes charged on any one day shall be fired on the same day. ✓ The danger zone is and will be distinctly demarcated (by means of red flags)
4	Transportation	Potential hazards and unsafe workings contributing to accident and injuries Overloading of material	✓ Before commencing work, drivers personally check the 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.

		While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	✓ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. ✓ Concave mirrors should be kept at all corners ✓ All vehicles should be fitted with reverse horn with one spotter at every tipping point ✓ Loading according to the vehicle capacity ✓ Periodical maintenance of vehicles as per operator manual
5	Natural calamities	Unexpected happenings	✓ Escape Routes will be provided to prevent inundation of storm water ✓ Fire Extinguishers & Sand buckets
6	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	✓ Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m.

Source: Analysed and proposed by FAE & EC

7.3 DISASTER MANAGEMENT PLAN FOR PROPOSED PROJECT

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. Structure of the team has been shown in Figure 7.1.

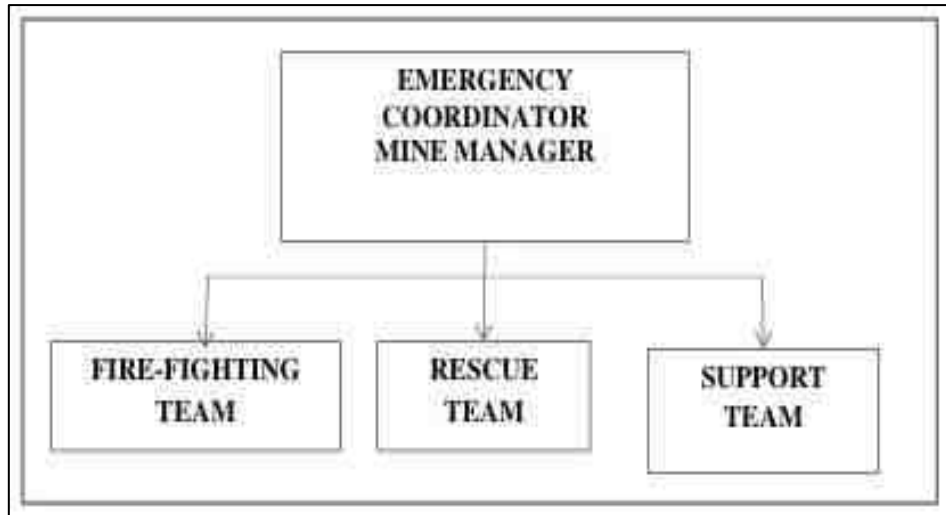


Figure 7.1 Disaster management team layout for proposed project

7.3.1 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

7.4 CUMULATIVE IMPACT STUDY

The Cumulative Impact is mainly anticipated due to drilling & blasting and excavation and transportation activities in all the projects within the cluster and major impact anticipated is on Air & Noise Environment and Ground Vibrations due to blasting. For this cumulative

study, the proposed project, known as P1, P2 & E1 are taken into consideration. The details of P1, P2 & E1 have been given in Table 7.2, 7.3 & 7.4.

Table 7.2 Salient Features of the Cluster P1

Name of the Quarry	M.Karthikeyan	
Type of Land	Patta Land	
Extent	1.96.03ha	
S.F. No	973/1, 973/7B, 975/2, 977 & 978/2	
Toposheet No	57 P/11	
Highest Elevation	88m AMSL	
Latitude	12°28'33.39"N to 12°28'38.60"N	
Longitude	79°40'6.30"E to 79°40'12.51"E	
Proposed depth as per ToR	30m BGL	
Ultimate depth for ten years	30m BGL	
Geological Resources	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	528687 & 1453889	58743 & 117486
Mineable Reserves	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	261380 & 718795	47070 & 94140
Proposed production for 10 years	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	261380 & 718795	47070 & 94140
Method of Mining	Open cast mechanized mining method	
Topography	Flat Terrain	
Machinery requirements	Jack hammer	2
	Excavator	1
	Compressor	1
	Tipper	8
Proposed Manpower Deployment	20	
Project Cost	Rs.83,68,000/-	
Proposed Water Requirement	3.5 KLD	

Table 7.3 Salient Features of the Cluster P2

Name of the Quarry	R.Arul
Type of Land	Patta Land
Extent	2.28.50ha
S.F. No	965/1A,965/1B,965/1C,965/1D,965/2A1 & 965/2B1
Toposheet No	57 P/11

Highest Elevation	88m AMSL	
Latitude	12°28'39.50"N to 12°28'46.21"N	
Longitude	79°40'18.15"E to 79°40'22.65"E	
Proposed depth as per ToR	45m BGL	
Ultimate depth for ten years	45m BGL	
Geological Resources	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	908280 & 2497770	113535 & 227070
Mineable Reserves	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	294585 & 810109	91770 & 183540
Proposed production for 10 years	Rough stone in m ³ & Tons	Gravel in m ³ & Tons
	294585 & 810109	91770 & 183540
Method of Mining	Open cast mechanized mining method	
Topography	Flat Terrain	
Machinery requirements	Jack hammer	2
	Excavator	1
	Compressor	1
	Tipper	8
Proposed Manpower Deployment	20	
Project Cost	Rs.61,93,000/-	
Proposed Water Requirement	3.5 KLD	

Table 7.4 Salient Features of the Cluster E1

Name of the Quarry	M/s.Dwarkamai Mines	
Type of Land	Patta Land	
Extent	2.30.97 ha	
S.F. No	942/4A,973/2,973/7A,973/9,973/10A,973/10B & 975/1	
Toposheet No	57 P/11	
Highest Elevation	85m AMSL	
Latitude	12°28'25.62"N to 12°28'36.20"N	
Longitude	79°40'7.26"E to 79°40'12.48"E	
Ultimate depth for five years	35m BGL	
Geological Resources	Rough stone (m ³) & Tons	Gravel (m ³) & Tons
	762036 & 2095599	46184 & 92368
Mineable Reserves	Rough stone (m ³) & Tons	Gravel (m ³) & Tons
	207863 & 571623	31422 & 62844
Proposed production for 5 years	Rough stone (m ³) & Tons	Gravel (m ³) & Tons

	207863 & 571623	31422 & 62844
Method of Mining	Open cast mechanized mining method	
Topography	Flat Terrain	
Machinery proposed	Jack hammer	2
	Excavator	1
	Compressor	1
	Tipper	8
Proposed Manpower Deployment	20	
Project Cost	Rs.99,58,000/-	
Proposed Water Requirement	3.5 KLD	

7.4.1 Air Environment

As the production of rough stone and gravel plays a vital role in affecting the air environment. The data on the cumulative production resulting from the proposed project have been given in Tables 7.5 and 7.6.

Table 7.5 Cumulative Production Load of Rough Stone

Proposed Production Details				
Quarry	10 Years in (m ³ & Ts)	Per Year in (m ³ & Ts)	Per Day in (m ³ & Ts)	Number of Lorry Load Per Day
P1	261380 & 718795	26138 & 71880	97 & 266	16
P2	294585 & 810109	29459 & 81011	109 & 300	18
E1	207863 & 571623	41573 & 114325	154 & 423	26
Grand Total	763828 & 2100527	97170 & 267216	360 & 989	60

Table 7.6 Cumulative Production Load of Gravel

Proposed Production Details				
Quarry	3 Years in (m ³ & Ts)	Per Year in (m ³ & Ts)	Per Day in (m ³ & Ts)	Number of Lorry Load Per Day
P1	47070 & 94140	15690 & 31380	58 & 116	10
P2	91770 & 183540	30590 & 61180	113 & 227	18
E1	31422 & 62844	10474 & 20948	39 & 78	7
Grand Total	170262 & 340524	56754 & 113508	210 & 421	35

The cumulative study shows that the overall production of rough stone from the quarry is 360 m³ or 989 Ts per day with a capacity of 60 trips of rough stone per day and gravel from the quarry is 210m³ or 421 Ts per day with a capacity of 35 trips of gravel per day.

7.4.1.1 Cumulative Impact of Air Pollutants

The results on the cumulative impact of the proposed project on air environment of the cluster have been provided in Table 7.7. The cumulative values resulting from the project for each pollutant do not exceed the permissible limits set by CPCB.

Table 7.7 Cumulative Impact Results from the proposed project

Pollutants	Baseline Data (µg/m ³)	Incremental Values (µg/m ³)		Cumulative Value (µg/m ³)
		P1	P2	
PM _{2.5}	17.15	8.84	7.17	33.16
PM ₁₀	44.20	17.3	14.4	75.90

7.4.2 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.

Table.7.8 Cumulative Impact of Noise for one Cluster Projects

Table 7.7.6 Cumulative Impact of Noise for one Cluster Projects						
Location ID	Distance (m)	Direction	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	1100	SE	42.6	23.1	42.65	55
Habitation Near P2	1450	SE		20.7	42.63	
Habitation Near E1	1150	E		22.7	42.64	
Cumulative Noise (dB (A))					47.41	

Source: Lab Monitoring Data

The cumulative analysis of noise due to cluster project shows that habitation will receive about 47.41dB(A) respectively. The cumulative results for all the villages in consideration do not exceed the limit set by CPCB for residential areas for day time.

Ground Vibrations

Cumulative results of ground vibrations due to mining activities from the cluster project have been shown in Table 7.9.

Table 7.9 Cumulative Effect of Ground Vibrations Resulting from cluster Project

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	9.32	1100	0.03
P2	10.50	1450	0.029
E1	14.82	1150	0.055
Total			0.114

Results from the above indicate that the cumulative PPV value of each habitation 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.

7.4.3 Socio Economic Environment

Socio Economic benefits of the proposed project were calculated and the results have been shown in Table 7.10 the project together will contribute Rs. 15,00,000/-towards CER fund.

Table 7.10 Socio Economic Benefits from the Cluster Project

Location ID	Project Cost	CER Cost
P1	Rs.83,68,000/-	Rs.5,00,000
P2	Rs.61,93,000/-	Rs.5,00,000
E1	Rs.99,58,000/-	Rs.5,00,000
Grand Total	Rs. 2,45,19,000/-	Rs.15,00,000

Table 7.11 Employment Benefits for Cluster Project

Location ID	Employment
P1	20
P2	20
E1	20
Grand Total	60

A total of 60 people will get employment from the cluster project.

7.4.4 Ecological Environment

"Gap Plantation" procedure:

Developing a three-tier green belt of native plant species around industrial peripheries is a vital environmental guideline for mitigating pollution and enhancing ecosystem services. Dig pits of substantial dimensions (1m x 1m x 1m for large trees, half for smaller

ones) fill them with a mixture of earth, sand, silt and manure and then water the saplings generously. Care for the first three years involves nutrient supplementation, plant protection, managing water stress and ensuring exposure to normal atmospheric conditions.

The chosen species should be fast-growing, deep-rooted, wind-firm possess a dense and potentially permeable canopy, tolerate air pollution (SO₂, NO₂) and ideally be indigenous.

Additional preferred characteristics include long-lasting foliage, large, sturdy leaves, abundant stomata, rough bark and a general ability to withstand local environmental stresses such as drought or inundation while also contributing positively to the environment through soil improvement, aesthetic appeal and attracting wildlife.

Activities for Maintenance:

- Regular pruning
- Watering
- Weed removal
- Manuring
- The growing plants are cared at least for the first 3 years under favourable condition of climate and irrigation.
- For healthy and vigorous growth adequate nutrient will be supplied
- To avoid water stress condition regular watering will be done.

Table 7.12 Greenbelt Development

Code	Number of Trees proposed	Area to be covered (m ²)	No. of Trees expected to be grown @ 80% survival rate	Species recommended
P1	980	8821	784	<i>Azadirachta indica</i> , <i>Albizia lebbeck</i> , <i>Delonix regia</i> , <i>Tectona grandis</i> , etc.,
P2	1143	10283	914	
E1	1155	10394	924	
Total	3278	29498	2622	

Cumulative studies show that the proposed project proponent will plant about 3278 native tree species like *Azadirachta indica*, *Albizia lebbeck*, *Delonix regia*, *Tectona grandis*, etc inside and outside the lease area. It is expected that 80% of trees, i.e., 2622 trees will survive in this green belt development program.

7.5 PLASTIC WASTE MANAGEMENT PLAN FOR PROPOSED PROJECT

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

7.5.1 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.

A detailed action plan to manage plastic waste has been provided in Table 7.13.

Table 7.13 Action Plan to Manage Plastic Waste

S. 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 FAEs and EC

CHAPTER VIII

PROJECT BENEFITS

8.0 GENERAL

The proposed project at Maruthadu Village, aims to produce 261380m³ or 718795 Ts of rough stone and 47070m³ or 94140 Ts of gravel over a period of 10 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 20 persons for carrying out mining operations and give preference to the local people in providing employment in this cluster. In addition, there will be an opportunity for indirect employment to the form of contractual jobs, business opportunities, and service facilities etc. Because of this, the economic status of the local people will improve.

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 project is located in Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu. The area has already well-established communications roads and other facilities. The following physical infrastructure facilities will further improve due to proposed project.

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

8.4 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

Employment is expected during civil construction period, in trade, garbage lifting, sanitation and other ancillary services, Employment in these sectors will be primarily temporary or contractual and involvement of unskilled labour will be more. A major part of the

labour force will be mainly from local villagers who are expected to engage themselves both in agriculture and mining activities. This will enhance their income and lead to overall economic growth of the area.

8.5 OTHER TANGIBLE BENEFITS

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

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

8.6 CORPORATE SOCIAL RESPONSIBILITY

Individual project proponents will take responsibility to develop awareness among all levels of their staff about CSR activities and the integration of social processes with business processes. Those involved with the undertaking of CSR activities will be provided with adequate training and re-orientation.

Under this programme, the project proponents will take-up following programmes for social and economic development of villages within 5 km of the project site. For this purpose, separate budget will be provided every year. For finalization of these schemes, proponent will interact with LSG. The schemes will be selected from the following broad areas –

- ❖ Health Services Social Development
- ❖ Infrastructure Development
- ❖ Education & Sports
- ❖ Self-Employment
- ❖ CSR Cost Estimation
- ❖ CSR activities mainly contributing to education, health, training of women self-help groups and infrastructure etc., will be taken up in the Maruthadu Village. CSR budget is allocated.

8.7 CORPORATE ENVIRONMENT RESPONSIBILITY

Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III dated 01.05.2018. As per para 6 (II) of the office memorandum, being a green field project & capital investment is ≤ 100 crores, the proposed project shall contribute 2% of capital investment towards CER as per directions of EAC/SEAC. However, the SEAC has suggested to allocate CER fund on the basis of the extent of the project. Therefore, Rs. 5,00,000 is allocated for CER. The proposed utilization of the budget of CER activities is given in Table 8.1.

Table 8.1 CER Action Plan

S. No.	Activity	Budget (Rs.in Lakh)
1	The applicant Indents to involve in corporate environment responsibilities (CER) activities such as renovation of existing toilet, plantation within the school premises, donating environment related books to the nearby school library, etc.	Rs.5,00,000
	Total	Rs.5,00,000

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

8.8 SUMMARY OF PROJECT BENEFITS

The project would pay about **Rs.3,18,92,144** to the state government through various ways, as provided in Table 8.2.

Table 8.2 Project Benefits to the State Government

Particulars	Budget for Rough Stone (Rs.)	Budget for Gravel (Rs.)
CER	5,00,000	
Seigniorage @ Rs.90/m ³ of rough stone / Rs.56/m ³ of gravel	2,35,24,200	26,35,920
District Mineral Foundation Tax @ 110% of Seigniorage	23,52,420	2,63,592
Green Tax @ 10% of Seigniorage	23,52,420	2,63,592
Total	2,87,29,040	31,63,104

CHAPTER IX

ENVIRONMENTAL COST BENEFIT ANALYSIS

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

CHAPTER X

ENVIRONMENTAL MANAGEMENT PLAN

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of environmental management plan will ensure to keep all the environmental parameters of the project in respect of ambient air quality, water quality, socio economic improvement standards. Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The project proponent is committed to conduct all its operations and activities in an environmentally responsible manner and to continually improve environmental performance. The Proponent M.Karthikeyan 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 programs 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.

10.1.1 Description of the Administration and Technical Setup

The environment monitoring cell discussed under chapter VI 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 program.
- ❖ 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 Budgetary Provision for Environmental Management

Adequate budgetary provision has been made by the company for execution of Environmental Management Plan. The Table 10.1 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

Table 10.1 EMP Budget for Proposed Project

Attribute	Mitigation measures	Provision for Implementation	Capital Cost	Recurring Cost/annum
			(Rs.)	(Rs.)
Air Environment	Compaction, gradation and drainage on both sides	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare and yearly maintenance @ Rs. 10,000/- per hectare	19603	19603
	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
	Air quality will be regularly monitored as per norms within ML area & ambient area	Yearly compliance as per CPCB norms	0	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. 2,500 per unit recurring cost for maintenance	50000	5000
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin to avoid escape of fines to the atmosphere	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. 5,000/- per tipper/dumper deployed	40000	0
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes	0	10000
	Regular sweeping and maintenance of roads for at least about 200 m from quarry entrance	Provision for 2 labours @ Rs.10,000/labour (Contractual) / hectare	0	39206
	Installing wheel wash system near exit gate of quarry	Installation + Maintenance + Supervision	50000	20000
Total Air Environment			959603	213809
Noise Environment	Source of noise will be transportation vehicles, and 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 implementations that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Competent Person	0	0
	Provision for Portable blaster shed	Installation of portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 tons of blasted material	0	731864
Total Noise Environment			50000	733864
Water Environment	Water Management	Provision for garland drain @ Rs. 10,000/- per hectare with maintenance of Rs. 5,000/- per annum	19603	9801
Total Water Environment			19603	9801
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency (capital cost, recurring	25000	20000

		cost for collection /disposal).		
		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
Total Waste Management			30000	22000
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	10000	1000
Total Implementation of EC, Mining Plan			10000	1000
Occupational Health and Safety	Workers will be provided with Personal Protective Equipment	Provision of PPE @ Rs. 4,000/- per employee with recurring based on wear and tear (say, @ Rs. 1,000/- per employee)	80000	20000
	Health checkup for workers will be provisioned	IME & PME Health checkup @ Rs. 1,000/- per employee	0	20000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2,000/-	0	7841
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	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	392060	19603
	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	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	98015	19603

	be deployed for traffic management			
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
Total Occupational Health and Safety			610075	874047
Development of Green Belt	Green belt development - 500 trees per hectare (200 Inside Lease Area & 300 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))"	78412	11762
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	176427	17642
Total Development of Green Belt			254839	29404
Mine Closure	Closure includes 10% of the amount allotted for Greenbelt development, wire fencing, and garland drainage (Rule 27 in MCDR 2017 for Cat B mines will pay 2 lakhs per hectare or minimum amount of financial assurance of 5 lakhs)		0	66650

	G.O.(Ms)No.23, Dated: 28.09.2021	Section IVA of TNMMCR 1959 (@10% of Seigniorage Fee) (Seigniorage Fee for Rough stone = Rs.90)	2616012	0
TOTAL			2616012	1883926

Table 10.2 Estimation of Overall EMP Budget after Adjusting 5% Annual Inflation

Ist Year	IInd Year	IIIrd Year	IVth Year	Vth Year	VIth Year	VIIth Year
1883926	1978123	2077029	2180880	2356574	2474403	2598123

VIIIth Year	IXth Year	Xth Year	Total Recurring Cost	Total EMP Cost
2728029	2864430	3007651	24149168	26765180

In order to implement the environmental protection measures, an amount of **Rs. 26,16,012** as capital cost and recurring cost as **Rs. 18,83,926** as recurring cost/annum is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per year, the overall EMP cost for 10 years will be **Rs. 2,67,65,180** as shown in Table 10.2.

10.3 CONCLUSION

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

CHAPTER XI

SUMMARY AND CONCLUSION

11.1 INTRODUCTION

The proposed rough stone mining project (P1) falls within the cluster of 500 m radius with the total extent of 6.55.50ha and it requires submission of EIA report for grant of Environmental Clearance (EC) after conducting public hearing. The proposed project falling in S.F.No. 973/1, 973/7B, 975/2, 977& 978/2 over the extent of 1.96.03 ha is situated in the cluster falling in Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District and Tamil Nadu. The quarries involved in the calculation of cluster extent are two proposed and one existing quarry.

11.2 PROJECT DESCRIPTION

- The proposed project area is located between Latitudes from 12°28'33.39"N to 12°28'38.60"N and Longitudes from 79°40'6.30"E to 79°40'12.51"E in Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District and Tamil Nadu.
- The mining plan approved for quarrying 261380m³ & 718795 Ts of rough stone and 47070m³ & 94140 Ts of gravel to the ultimate depth of 30m BGL for ten years.
- The quarrying operation is opencast semi mechanized involving drilling, blasting and formation of benches of the prescribed dimensions.

11.3 DESCRIPTION OF THE ENVIRONMENT

Baseline data were collected for 5km radius from the proposed area during Oct 2025 to Dec 2025 as per CPCB guidelines. The data were collected by both the FAE's and NABL accredited and MoEF notified **Interstellar Testing Centre Pvt. Ltd** for the environmental attributes including soil, water, noise, air and by FAEs for ecology and biodiversity, traffic and socio-economy.

11.3.1 Land Environment

Land use pattern of the area of 5km radius was studied using Sentinel II imagery. LULC types and their extent are given in Table 1.

Table.1 LULC Statistics of the Study Area

S. No.	Classification	Area (ha)	Area (%)
1	Water Bodies	336.61	4.12
2	Vegetation cover	16.38	0.20
3	Bare Land	77.01	0.94
4	Crop Land	6935.86	84.90
5	Built-up area	678.01	8.30
6	Fallow Land	114.20	1.40
7	Mining Area	11.25	0.14
Total		8169.33	100

Source: Sentinel II Satellite Imagery

11.3.2 Soil Environment

Based on standard soil rating charts the samples fall into the very low category across the board.

Sample	TOC (%)	TOM (%)	Rating
S1	0.18	0.31	Very Low
S2	0.11	0.19	Very Low
S3	0.21	0.36	Very Low
S4	0.08	0.14	Very Low
S5	0.15	0.26	Very Low

Productive agricultural topsoil typically contains **1% to 6%** organic matter. Sample S3 at 0.36% is still well below the minimum threshold for healthy soil function. The data follows the standard **Van Bemmelen factor** $TOM \approx TOC \times 1.724$ assuming organic matter is roughly 58% carbon. The soil is **well-suited for many horticultural crops**, especially fruit trees and specific vegetables than for traditional wet-paddy cultivation, primarily due to its sandy texture and drainage characteristics.

Feature	Paddy Suitability	Horticulture Suitability
Texture (Sandy Loam)	Low (Poor water retention)	High (Good drainage/aeration)
pH (7.2 - 8.7)	Moderate (Prefers acidic 5.5-6.5)	High (Suits citrus, pomegranate, guava)
Organic Matter	Critically Low (Needs massive input)	Low (Requires regular composting)
Nutrients (NPK)	Deficient (Needs heavy fertilization)	Deficient (Needs balanced application)

Stress Relaxation:

Based on the sandy loam texture and physical properties such as low organic matter (<0.36%) and moderate CEC the expected stress relaxation is likely to exhibit rapid initial relaxation with a relatively high residual stress compared to organic-rich soils which would continue to relax over much longer periods.

The cumulative stress from vehicle movement on soil sample **S1** (Sandy Loam) significantly degrades soil quality by increasing the silt fraction and decreasing particulate organic matter which directly impairs plant growth.

Increasing Silt and Particulate Matter

Vehicle induced stress physically alters soil texture through a process known as particle crushing and aggregate fragmentation.

- The high dynamic stress from tires (concentrated in the top 0–20 cm) acts like a mechanical mill on sandy loam.
- Larger sand grains (62.4% in S1) and coarse particles collide and fracture under pressure shifting the grain size distribution toward finer silt-sized particles.
- Silt accumulated on the surface from this physical breakdown is easily suspended by tires increasing PM10 emissions and reducing the available topsoil nutrients.

Impact on Plant Growth

The shift toward a denser siltier structure creates a hostile environment for vegetation

- As the silt fraction increases the soil fills its remaining macropores rapidly raising its Bulk Density (currently 1.092 g/cc). This increased mechanical strength restricts root elongation leading to stunted shallower root systems named root impedance.
- Poor aeration in silt-rich soils have a fine pore structure that results in poor drainage and low oxygen (hypoxia). In S1 this lack of aeration can cause a drop in root respiration and a 12% to 41% reduction in grain yield.

To prevent this siltation effect, it is essential to keep surface pressure below 150 kPa and avoid traffic when soil moisture is high (near 7-12%) as wetness acts as a lubricant that accelerates silt formation and deep-seated compaction.

Summary of vehicle stress effects on soil S1 are

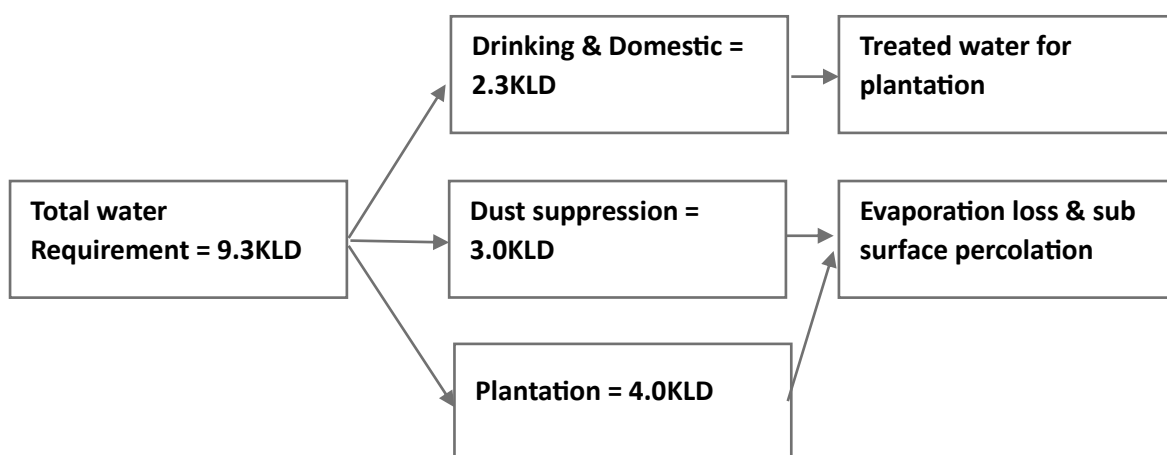
Soil Component	Change Due to Stress	Effect on Plant Growth
Silt Content	Increases via grain crushing	Increases soil strength blocks root penetration.
Bulk Density	Increases rapidly	Reduces air/water movement leads to waterlogging.
Organic Matter	Fractures and decomposes	Loss of nutrient-holding capacity and structural resilience.
Pore Structure	Loss of macropores	Causes oxygen deficiency (hypoxia) in roots.

11.3.3 Water Environment

Mangalam lake is the prominent surface water resources present in the study area. This lake was ephemeral in nature which convey water only after rainfall events. The surface water

sample known as SW1 were collected from the Mangalam lake (0.15km E) to assess the baseline water quality as shown in Table 3.6 and Figure 3.6.

Inference: The surface water quality is compared with the CPCB Water Quality Criteria against A, B, C, D & E class of water. From the test result it is found that both the water does not fit Class A (Drinking Water Source without conventional treatment but after disinfection). But they can be used for outdoor bathing as it meets the requirements shown for class B water. 9.3KLD (9,300 liters per day) water requirement for drinking, domestic, dust suppression and plantation.



11.3.4 Air Environment

Particulate Matter ($\mu\text{g}/\text{m}^3$)

Station ID	PM2.5 (Mean)	PM2.5 (98th %)	PM10 (Mean)	PM10 (98th %)
AAQ1	16.92	18.07	43.58	45.03
AAQ2	16.08	17.51	41.44	45.53
AAQ3	17.44	18.11	44.93	48.14
AAQ4	17.40	19.00	44.83	49.39
AAQ5	17.93	19.73	46.20	51.02

Gaseous Pollutants ($\mu\text{g}/\text{m}^3$)

Station ID	SO ₂ (Mean)	SO ₂ (98th %)	NO _x (Mean)	NO _x (98th %)
AAQ1	5.17	5.47	10.35	10.94
AAQ2	4.97	5.42	9.94	10.84
AAQ3	5.36	5.74	10.78	11.59
AAQ4	5.51	5.75	11.06	11.76
AAQ5	5.55	5.89	11.12	12.15

The station AAQ5 has the highest mean and 98th percentile for all four pollutants suggesting it may be located near a higher-intensity emission source like a major traffic intersection or

industrial area. The **98th percentile** values represent the levels that 98% of the data falls below. Since these values (e.g., PM_{2.5} max of 19.73 µg/m³ at AAQ5) are close to the mean it suggests a stable environment without extreme daily pollution spikes.

Pollutant correlation:

- The PM₁₀ levels (41.44–46.20 µg/m³) are roughly 2.5 times higher than PM_{2.5} levels, which is typical in areas where coarse dust (construction, road dust) contributes more than fine combustion particles.
- SO₂ and NO_x levels are closely linked likely originating from common vehicular or industrial sources.

11.3.5 Noise Environment

Noise level in core zone was 46.2dB(A) Leq during day time and 40.8dB(A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 40.1 to 44.5dB (A) Leq and during night time from 36.6 to 41.8dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

11.3.6 Biological Environment

The lease area as well as buffer zone area reveals no endangered and endemic species of flora and fauna in the area.

11.3.7 Socio Economic Environment

The proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area, thus leading to the improvement of people's standard of living.

11.4 ENVIRONMENT MANAGEMENT PLAN

In order to implement the environmental protection measures, an amount of **Rs. 26,16,012** as capital cost and recurring cost as **Rs. 18,83,926** as recurring cost/annum is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per year, the overall EMP cost for 10 years will be **Rs. 2,67,65,180/-**.

11.5 CONCLUSION:

The environmental impact assessment (EIA) study for a proposed mining operation exposed the potential negative impacts such as

- **Dust emission impact:**

The project is expected to have a negligible impact on overall dust emissions, with levels remaining less than 0.5% of the existing levels.

- **Blasting restriction:**

Blasting with slurry mixtures should be minimized to avoid causing shockwaves and damage to nearby properties and populations.

- **Erosion control measures:**

Terracing, planting vegetation and soil stabilization techniques should be implemented to manage erosion.

- **Dust suppression equipment:**

Dust suppression machines should be readily available on site to minimize dust generation during material handling.

- **Green belt development**

Creating a vegetative barrier that absorbs gaseous and particulate pollutants reduces noise levels and mitigates soil erosion. By planting native tree species with their vast leaf surfaces, green belts effectively reduce pollutant concentrations in the ambient air and improve the aesthetic environment making them crucial for controlling the impacts of activities like proposed mining operations.

- **Comprehensive environmental management:**

All recommended environmental management practices should be implemented throughout the project lifecycle.

CHAPTER XII

DISCLOSURES OF CONSULTANT

The Project Proponent, **M.Karthikeyan** has engaged **Geo Technical Mining Solutions**, a NABET accredited consultancy for carrying out the EIA study as per the ToR issued.

Address of the consultancy:

No: 1/213B Natesan Complex,
Oddapatti, Dharmapuri – 636705,
Tamil Nadu, India.
Email: info.gtmsdpi@gmail.com
Web: www.gtmsind.com
Phone: 04342 232777.

The accredited experts and associated members who were engaged in this EIA study are given below:

S.No.	Name of the expert	In house/ Empanelled	Sector	Functional Area	Category
Approved Functional Area Experts & EC					
1.	Dr. R. Arunbalaji	EIA Coordinator (EC) In-house	1(a)(i)	AQ	B
2.	G. Umamaheswaran	In-house, FAE	1(a)(i)	GEO	B
3.	G. Prithiviraj	In-house, FAE	1(a)(i)	LU	B
4.	G. Umamaheswaran	In-house, FAE	1(a)(i)	HG	B
5.	Dr.R.Arunbalaji	In-house, FAE	1(a)(i)	AP	B
6.	R.Revathy	In-house, FAE	1(a)(i)	WP	B
7.	Dr.R.Arunbalaji	In-house, FAE	1(a)(i)	NV	B
8.	J.Rajarajeshwari	In-house, FAE	1(a)(i)	SC, EB	B
9.	Dr. G. Prabakaran	In-house, FAE	1(a)(i)	SE	B
10.	J.N. Manikandan	Empanelled FAE	1(a)(i)	RH, SHW	B
Approved Functional Area Associates					
11.	R.Srikrishna	FAA	1(a)(i)	LU	B
12.	K.Prithivi	FAA	1(a)(i)	HG	B
13.	R.Srikrishna	FAA	1(a)(i)	Geo	B
Team Members					
14.	G. Umamaheswaran	TM	1(a)(i)	TM for EC	-

15.	M.Muralidharan	TM	1(a)(i)	TM for FAE NV, HW	-
16.	A.Jothibas	TM	1(a)(i)	AP & AQ	-

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA & EMP

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

Signature

:



Date

:

Name

: **Dr.R. Arun Balaji**

Designation

: EIA Coordinator

Name of the EIA Consultant Organization

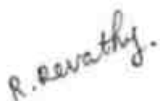
: Geo Technical Mining Solutions

Period of Involvement

: Till date

We, the FAEs, FAAs and TM hereby declare that information furnished in this EIA/EMP report for **M.Karthikeyan**, rough stone and gravel quarry project with the extent of 1.93.03ha situated in the cluster with the extent of 6.55.50ha in Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, and Tamil Nadu is true and correct to the best of our knowledge.

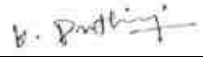
List of Functional Area Experts Engaged in this Project

S. No.	Functional Area	Involvement	Name of the Experts	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	Dr.R.Arunbalaji	
2	WP	- Suggesting water treatment systems, drainage facilities - Evaluating probable impacts of effluent/waste water discharges into the receiving	R.Revathy	

		environment/water bodies and suggesting control measures.		
3	HG	○ Interpretation of ground water table and predict impact and propose mitigation measures. ○ Analysis and description of aquifer Characteristics	G. Umamaheswaran	
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.	G. Umamaheswaran	
5	SE	○ Revision in secondary data as per Census of India, 2011. ○ Impact Assessment & Preventive Management Plan ○ Corporate Environment Responsibility.	Dr. G. Prabakaran	
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.	J.Rajarajeshwari	
7	RH	○ Identification of hazards and hazardous substances	J.N. Manikandan	

		○ Risks and consequences analysis ○ Vulnerability assessment ○ Preparation of Emergency Preparedness Plan ○ Management plan for safety.		
8	LU	○ Construction of Land use Map ○ Impact of project on surrounding land use ○ Suggesting post closure sustainable land use and mitigative measures.	G. Prithiviraj	
9	NV	○ Identify impacts due to noise and vibrations ○ Suggesting appropriate mitigation measures for EMP.	Dr.R. Arun Balaji	
10	AQ	○ Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. ○ Recommending mitigations measures for EMP	Dr.R. Arun Balaji	
11	SC	○ Assessing the impact on soil environment and proposed mitigation measures for soil conservation	J.Rajarajeshwari	
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.	J.N. Manikandan	

List of Functional Area Associate Engaged in this Project

S.No.	Name	Functional Area	Involvement	Signature
1	R.Srikrishna	LU	○ Site visit with FAE ○ Provide inputs & Assisting FAE for LU	
2	R.Srikrishna	GEO	○ Field visits along with FAE ○ Assistance to FAE in both primary and secondary data collection	
3	K.Prithivi	HG	○ Site visit with FAE ○ Provide inputs & Assisting FAE for HG	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, **Dr. S. KARUPPANNAN**, Managing Partner, **Geo Technical Mining Solutions**, hereby, confirm that the above-mentioned functional area experts and team members prepared the EIA/EMP report for **M.Karthikeyan**, rough stone and gravel quarry project with the extent of 1.96.03ha situated in the cluster with the extent of 6.55.50ha in Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, and Tamil Nadu is true and correct to the best of our knowledge.

Signature

:



Date

:

Name

: **Dr. S. Karuppannan**

Designation

: Managing Partner

Name of the EIA Consultant Organization

: Geo Technical Mining Solutions

NABET Certificate No & Issue Date

: NABET/EIA/23-26/RA 0319

Validity

: Till 31.12.2026



File No: 12667
Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Environment Impact Assessment Authority(SEIAA),
TAMIL NADU)



Dated: 29/12/2025



To,

Thiru. KARTHIKEYAN MANOHARAN
 S/o. Manoharan, No.2/21, West Street, Vadamalaipatti, Musiri Taluk, Thathiengarpet, Tiruchirappalli -
 621214. TAMIL NADU.
 infokarthi16@gmail.com

Subject: Grant of Terms of Reference along with Public Hearing under the provision of the EIA Notification 2006-regarding.

Sir/Madam,

Sub: SEIAA, Tamil Nadu – Proposed Rough stone and Gravel quarry over a total extent of 1.96.03Ha in S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2, Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu by Thiru. M.Karthikeyan- under project category – “B1” and Schedule S.No. 1(a) – **ToR issued along with Public Hearing-** preparation of EIA report – Regarding.

Ref: 1. Online proposal No. SIA/TN/MIN/550052/2025, Dated: 01/09/2025.

2. Your application submitted for Terms of Reference dated: 02.09.2025

3. Minutes of the 623rd SEAC -I Meeting held on 23.09.2025.

4. Minutes of the 906th Authority meeting held on 17.10.2025

5. PP replied on 25.10.2025

6. Minutes of the 912th Authority Meeting held on 05.11.2025

7. PP replied on 22.11.2025

8. Minutes of the 929th Authority Meeting held on 11.12.2025

9. PP replied on 15.12.2025

10. Minutes of the 934th Authority Meeting held on 18.12.2025

2. The particulars of the proposal are as below:

(i) TOR Identification No.	TO25B0108TN5682706N
(ii) File No.	12667
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals
(vii) Name of Project	MARUTHADU VILLAGE ROUGH STONE AND GRAVEL MINING LEASE

(viii) Name of Company/Organization	KARTHIKEYAN MANOHARAN
(ix) Location of Project (District, State)	TIRUVANNAMALAI, TAMIL NADU
(x) Issuing Authority	SEIAA
(xi) Applicability of General Conditions	no
(xii) Applicability of Specific Conditions	no

1. In view of the particulars given in the Para 1 above, the project proposal interalia including Form-1 (Part A and B) were submitted to the SEIAA for an appraisal by the SEAC under the provision of EIA notification 2006 and its subsequent amendments.

2. The above-mentioned proposal has been considered by SEIAA in the meeting held on 18.12.2025. The minutes of the meeting and all the Application and documents submitted [viz. Form-1 Part A, Part B] are available on PARIVESH portal which can be accessed by scanning the QR Code above.

3. The State Expert Appraisal Committee (SEAC), based on the information & clarifications provided by the project proponent and after detailed deliberations on all technical aspects recommended the proposal for grant of Terms of Reference with public hearing under the provision of EIA Notification, 2006 and as amended thereof subject to the stipulation of specific and general conditions as detailed in Annexure (2).

4. The SEIAA has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the SEAC hereby decided to issue the following Terms of Reference with public hearing for instant proposal of **Thiru. M. Karthikeyan** under the provisions of EIA Notification, 2006 and as amended thereof.

5. The Ministry/SEIAA-TN reserves the right to stipulate additional conditions, if found necessary.

6. The Terms of Reference with public hearing to the aforementioned project is under provisions of EIA Notification, 2006. It does not tantamount to approvals/consent/permissions etc. required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/Regulations or Statutes, as applicable, to the project.

7. This issues with the approval of the Competent Authority.

8. The TORs with public hearing prescribed shall be valid for a period of three years from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.

Copy To

1. The Secretary, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi.
2. The Additional Chief Secretary to Government, Environment and Forests Department, Tamil Nadu.
3. The Additional Chief Secretary to Government, Natural Resources Department, Tamil Nadu.
4. The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-Cum-Office Complex, East Arjun Nagar, New Delhi-110 032.
5. The Chairperson, TNPC Board, 76, Mount Salai, Guindy, Chennai-32
6. The District Collector, Tiruvannamalai District
7. The Commissioner of Geology and Mines, Guindy, Chennai-32
8. The Assistant Director, Department of Geology & Mining, Tiruvannamalai District
9. EI Division, Ministry of Environment & Forests, Paryavaran Bhawan, New Delhi.
10. Integrated Regional office of MoEF&CC, Sastri Bhawan, Nungambakkam, Chennai
11. File Copy

Annexure 1

Specific Terms of Reference s for (Mining Of Minerals)

1. Seac Conditions - Site Specific

S. No	Terms of Reference
1.1	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. 2. The PP shall ensure the installation of CCTV at the proposed quarry site and ensure its inclusion during the EIA presentation.

2. Seac Standard Conditions

S. No	Terms of Reference
2.1	1. In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of 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. 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. 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. 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. 5. The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report. 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. 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

S. No	Terms of Reference
	the EC. 8. However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level. 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. 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. 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. 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, 13. What was the period of the operation and stoppage of the earlier mines with last work permit 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. 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). 16. The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc., 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. 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. 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. 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. 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. 22. The Proponent shall carry out the Cumulative impact study due to mining operations carried out

S. No	Terms of Reference
	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. 23. Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted. 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. 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. 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. 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. 28. Impact on local transport infrastructure due to the Project should be indicated. 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. 30. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific. 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. 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. 33. Taller/one year old Saplings raised in appropriate size of bags, preferably ecofriendly 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 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. 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. 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. 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.

S. No	Terms of Reference
	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. 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. 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. 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. 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. 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.

3. Seiaa Specific Conditions :

S. No	Terms of Reference
3.1	After detailed discussions, the Authority accepts the recommendation of SEAC-I and decided to grant Terms of Reference (ToR) along with Public Hearing for the quantity of 2,61,380 m³ of Rough Stone & 47,070 m³ of Gravel up to the depth of 30m BGL as per the approved mining plan, under cluster for undertaking the combined Environment Impact Assessment Study and preparation of separate Environment Management Plan subject to the conditions as recommended by SEAC-I & normal conditions & the SEIAA Standard conditions.

4. Seiaa Standard Conditions :

S. No	Terms of Reference
4.1	<u>Cluster Management Committee</u> - 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. - The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc., - 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. - 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. - 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. - 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

S. No	Terms of Reference
	Report. 7. The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner. 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. <u>Agriculture & Agro-Biodiversity</u> 9. Impact on surrounding agricultural fields around the proposed mining Area. 10. Impact on soil flora & vegetation around the project site. 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. 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. 13. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services. 14. The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock. <u>Forests</u> 15. The project proponent shall detailed study on impact of mining on Reserve forests and free ranging wildlife. 16. The Environmental Impact Assessment should study impact on forest, vegetation, 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. 18. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site. <u>Water Environment</u> 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. 20. Erosion Control measures. 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. 22. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. 23. The project proponent shall study and furnish the details on potential fragmentation impact on natural Environment, by the activities. 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. 25. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components. 26. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites. 27. The EIA shall include the impact of mining activity on the following: - Hydrothermal/Geothermal effect due to destruction in the Environment. - Bio-geochemical processes and its foot prints including Environmental stress. - Sediment geochemistry in the surface streams.

S. No	Terms of Reference
	<u>Energy</u> 28. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished. <u>Climate Change</u> 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. 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. 31. Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood. <u>Mine Closure Plan</u> 32. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued. <u>EMP</u> 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. 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. <u>Risk Assessment</u> 35. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining. <u>Disaster Management Plan</u> 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/unfavorable accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued. <u>Others</u> 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. 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. 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.

Standard Terms of Reference for (Mining of minerals)

1.

S. No	Terms of Reference
1.1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994

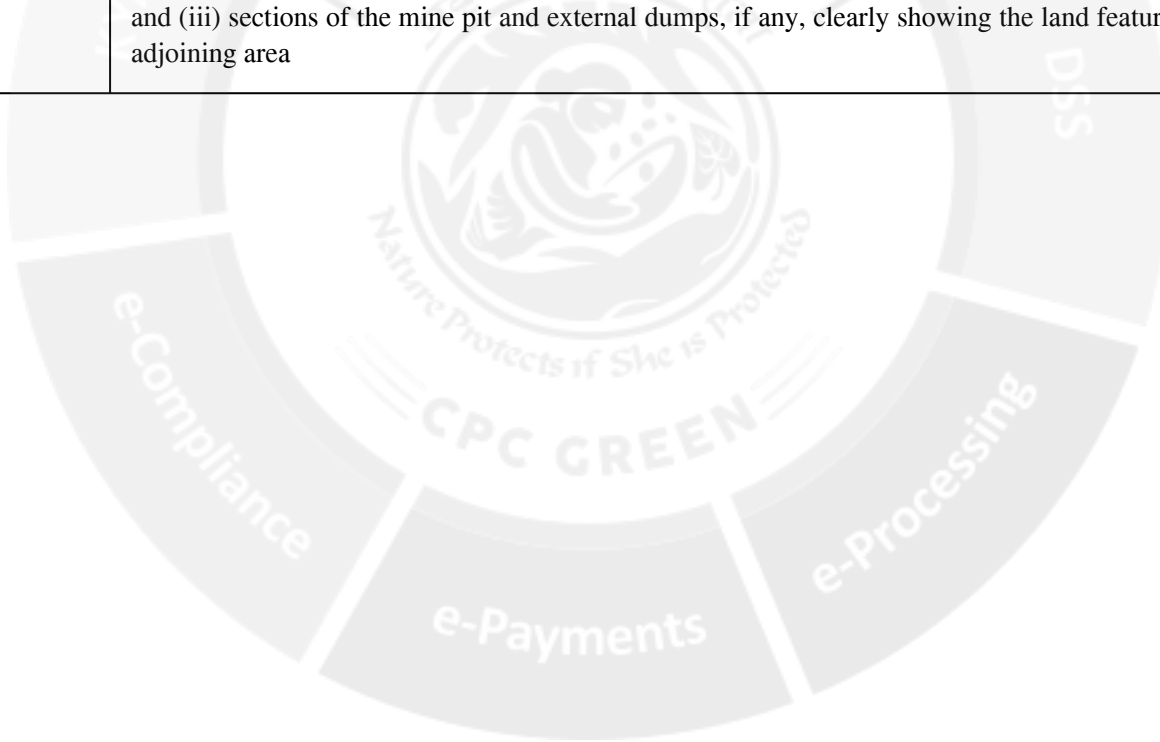
S. No	Terms of Reference
1.2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given
1.3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee
1.4	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)
1.5	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
1.6	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
1.7	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
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
1.9	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
1.10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given
1.11	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
1.12	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

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	would be desirable for representative of the State Forest Department to assist the State Expert Appraisal Committees
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
1.14	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
1.15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given
1.16	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
1.17	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
1.18	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 alongwith 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
1.19	Proximity to Areas declared as Critically Polluted or the Project areas likely to come under the Aravali 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 Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered
1.20	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)
1.21	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

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	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
1.22	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
1.23	Air quality modeling 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 modeling 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
1.24	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
1.25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided
1.26	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
1.27	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
1.28	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 State Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished
1.29	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
1.30	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
1.31	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

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	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
1.32	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
1.33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report
1.34	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
1.35	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
1.36	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
1.37	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
1.38	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
1.39	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
1.40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given
1.41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out
1.42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report
1.43	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

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1.44	Besides the above, the below mentioned general points are also to be followed:- a) All documents to be properly referenced with index and continuous page numbering. b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated. c) 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. d) Where the documents provided are in a language other than English, an English translation should be provided. e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF 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. g) 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. h) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable. i) 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



STANDARD TERMS OF REFERENCE

- 1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
- 2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
- 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.
- 4) All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
- 5) Information should be provided in Survey of India Topo sheet 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.
- 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.
- 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.
- 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.

- 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.
- 10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
- 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.
- 12) 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.
- 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.
- 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.
- 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
- 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.
- 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.

- 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.
- 19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.
- 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 with respect to 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).
- 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.
- 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.

- 23) Air quality modeling 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 modeling 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.
- 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.
- 25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
- 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.
- 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.
- 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.
- 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.

- 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.
- 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.
- 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.
- 33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.
- 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.
- 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.
- 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.
- 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.
- 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.
 - 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.
 - 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.
 - 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.
 - 42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.
 - 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.
 - 44) Besides the above, the below mentioned general points are also to be followed: -
 - a) Executive Summary of the EIA/EMP Report
 - b) All documents to be 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.
 - 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.
 - e) Where the documents provided are in a language other than English, an English translation should be provided.
 - f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
 - 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.

- 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.
- i) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the Environment Clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.
- 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.

In addition to the above, the following shall be furnished:-

The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:

1. Project name and location (Village, District, State, Industrial Estate (if applicable).
2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
3. Measures for mitigating the impact on the environment and mode of discharge or disposal.
4. Capital cost of the project, estimated time of completion.
5. The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.
6. A detailed study of the lithology of the mining lease area shall be furnished.
7. Details of village map, "A" register and FMB sketch shall be furnished.
8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be submitted along with EIA report.
9. Obtain a letter /certificate from the Assistant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report.

10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010.
11. Detail plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.
12. The EIA study report shall include the surrounding mining activity, if any.
13. Modeling study for Air, Water and noise shall be carried out in this field and incremental increase in the above study shall be substantiated with mitigation measures.
14. A study on the geological resources available shall be carried out and reported.
15. A specific study on agriculture & livelihood shall be carried out and reported.
16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.
17. Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./ private land, status of its acquisition, nearby (in 2-3 km.) water body, population, within 10km other industries, forest, eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
18. Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
19. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
20. Likely impact of the project on air, water, land, flora-fauna and nearby population
21. Emergency preparedness plan in case of natural or in plant emergencies
22. Issues raised during public hearing (if applicable) and response given
23. CER plan with proposed expenditure.
24. Occupational Health Measures
25. Post project monitoring plan
26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited agencies.
27. A detailed report on the green belt development already undertaken is to be furnished and also submit the proposal for green belt activities.
28. The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines.
29. A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals.
30. Reserve funds should be earmarked for proper closure plan.

31. A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and forests (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. In this connection, the project proponent has to furnish the action plan.

Besides the above, the below mentioned general points should also be followed:-

- a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.
- b. All documents may be properly referenced with index, page numbers 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.
- d. 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 also be followed.
- e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website <http://www.moef.nic.in/> may be referred.
 - After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above-mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
 - The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.

- The TORs with public hearing prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.



From
Dr.S.Vediappan, M.Sc., Ph.D.,
Deputy Director,
Geology and Mining,
Tiruvannamalai - 4.

To
Thiru.M.Karthickeyan,
S/o.Manokaran,
No.2/21. West Street,
Vadamalaipatti,
Musiri Taluk,
Thathiyengarpet,
Trichy District.

Rc.No.452/Kanimam/2025, dated 17.07.2025.

Sir,

Sub: Mines and Minerals – Minor Mineral - Rough stone and Gravel - Tiruvannamalai District – Vandavasi Taluk - Maruthadu Village Patta land SF.Nos. 973/1, 973/7B, 975/2, 977 & 978/2 over an extent of 1.96.03 hecets., – Application preferred by **Thiru.M.Karthickeyan** S/o.Manokaran - Precise area communicated – Submission of three copies of draft Mining Plan for approval - Approval accorded - regarding.

Ref: 1. Thiru.M.Karthickeyan S/o.Manokaran Online Application No. 25TVM0403450 dated 16.06.2025.
2. Precise Area Communication Notice Rc.No.452/Kanimam/2025, dated 14.07.2025.
3. Mining Plan submitted Thiru.M.Karthickeyan S/o.Manokaran dated 15.07.2025.

Thiru.M.Karthickeyan S/o.Manokaran has preferred an application for the grant of Rough Stone and Gravel quarry lease over an extent of 1.96.03 hecets., of Patta land in SF.Nos. 973/1 (0.47.0), 973/7B (0.03.23), 975/2 (0.07.30), 977 (0.02.50) & 978/2 (1.36.00) of Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District for a period of 10 (Ten years) vide in the reference 1st cited and the precise area has been communicated to the applicant vide in the reference 2nd cited with a direction to submit the approved mining plan and Environmental Clearance.

2. As directed, the applicant has submitted three copies of mining plan for approval vide in the reference 3rd cited. The Mining Plan has been verified in detail and found that it has been prepared in accordance with the guidelines / instructions issued by the Commissioner of Geology and Mining in letter RC. No. 3868 / LC / 2012 dated 19.11.2012.

i) The reserves estimated in the mining plan is

Depth in Mts.	Geological Resources			Mineable Reserves		
	Mineral	in Cbm	in Tons	Mineral	in Cbm	in Tons
30m (BGL)	Rough Stone	528687	1453889	Rough Stone	261380	718795
	Gravel	58743	117486	Gravel	47070	94140

ii) Year wise production proposed for the **first five year period** are as follows:-

Year	Rough Stone Quantity		Gravel Quantity	
	CBM	Tons	CBM	Tons
I	26854	73848	9486	18972
II	26740	73535	18660	37320
III	25526	70196	18924	37848
IV	24540	67485	-	-
V	25560	70290	-	-
Total	129220	355354	47070	94140

iii) Year wise production proposed for the **2nd five year period** are as follows:-

Year	Mineral	Quantity	
		CBM	Tons
I	Rough Stone	26800	73700
II		24090	66248
III		29240	80410
IV		27090	74498
V		24940	68585
Total		132160	363441

3. Therefore in exercise of the powers conferred under Rule 41(2) of Tamil Nadu Minor Mineral Concession Rules, 1959, the mining plan is hereby approved, subject to the following conditions:-

- i. The mining plan is approved without prejudice to any other Law applicable to the quarry lease from time to time whether such laws are made by the Central Government, State Government or any other authority.
- ii. This approval of the mining plan does not in any way convey the approval of the Government in terms or any other provisions of the Mines and Minerals (Development and Regulation) Act, 1957, or any other connected laws including Forest (Conservation) Act, 1980, Forest Conservation Rules, 1981, Environment Protection Act, 1980, Explosives Act, 1884 (Central Act IV of 1884) Minor Mineral Concession and Development Rules, 2010 and the Rules made there under and the Tamil Nadu Minor Mineral Concession Rules, 1959.
- iii. The mining plan is approved without prejudice to any other order or direction from any court of competent jurisdiction.
- iv. Scheme of Mining shall be submitted for the 2nd five year 180 Days prior to expiry of 1st five year period as stipulated in rule 41 (a) of TNMMCR.
- v. Quarrying shall be done in accordance with the approved Mining Plan.
- vi. If anything is found to be concealed in the contents of the mining plan which are required by the mines act or if any proposed for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.
- vii. All the conditions stipulated in the precise area communication dated 14.07.2025 should be duly complied with.
- viii. Environmental Clearance should be obtained for the grant of lease.

4. Further, other quarries situated within 500m radial distance are as follows.

i) Existing Quarries

Name of the Owner	Village & S.F. Nos.	Extent in Hects.	Lease Period	Remarks
Tvl.Dwarakha Mines	Maruthadu 942/4A, 973/2, 973/7A, 973/9(Part), 973/10A, 973/10B and 975/1	2.30.97	10.02.2025 to 09.02.2030	Existing Quarry

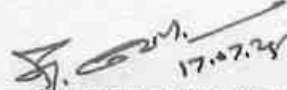
ii) Abandoned quarries

Name of the Owner	Village & S.F. Nos.	Extent in Hects.	Lease Period	Remarks
NIL				

iii) Present Proposed Quarries

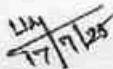
Sl. No	Name of the Owner	Village & S.F. Nos.	Extent in Hects.
1	Thiru.M.Karthickeyan, S/o.Manokaran, No.2/21. West Street, Vadamalaipatti, Musiri Taluk, Thathiyengarpeta, Trichy District	Maruthadu 973/1, 973/7B, 975/2, 977 & 978/2	1.96.03 (Proposed Area)
	R.Arul, S/o.Rajagopal, No.18, NSK Street, Meenakshi Amman Nagar, Alwarthirunagar, Tiruvallur	Maruthadu 965/1A, 965/1B, 965/1C, 965/1D, 965/2A1 & 965/2B1	2.28.5 (Newly applied area)

Encl: 2 Copies of Approved Mining Plan.


Deputy Director,
Geology and Mining,
Tiruvannamalai.

Copy submitted to:

1. The Chairman, SEIAA,
Tamil Nadu, 3rd Floor, Panagal Maaligai,
No.1, Jeenis Road, Saidapet, Chennai-15.
2. The Commissioner of Geology and Mining, Chennai-32.
3. The District Collector, Tiruvannamalai.


17/7/25

MINING PLAN

FOR

MARUTHADU VILLAGE ROUGH STONE AND GRAVEL MINING LEASE WITH
PROGRESSIVE QUARRY CLOSURE PLAN

Patta land /Open Cast-Semi-Mechanized mining/Non- Forest/Non-Captive Use

Lease period 10 Years from the date of lease execution

(Prepared under rule 41 of Tamil Nadu Minor Mineral Concession Rules, 1959)

LOCATION OF THE LEASE AREA

STATE : TAMILNADU
DISTRICT : TIRUVANNAMALAI
TALUK : VANDAVASI
VILLAGE : MARUTHADU
S.F. No's : 973/1, 973/7B, 975/2, 977& 978/2
EXTENT : 1.96.03 Hectares

ADDRESS OF THE APPLICANT

Mr. M. KARTHIKEYAN,

S/o. Manoharan,

No. 2/21, West Street, Vadamalaipatti,

Musiri Taluk, Thathiengarpet,

Tiruchirappalli – 621 214.

PREPARED BY

P.VELLAIYAN, M.Sc., M.Phil.,

Qualified Person

D.No.6-106-B, Athirampatti Village,

Amaragundhi Panchayat & Post,

Omalur Taluk,

Salem District-636 503.

Mob: +91 7010076626, 9751256465



Mr. Karthikeyan

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3.	Copy of "A" register	III
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6.	Copy of ID Proof of the authorized signatory	VI
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LIST OF PLATES

Sl. No.	Description	Plate No.	Scale
1	Key Map	I	Not to scale
2	Location Plan	I-A	Not to scale
3	Toposheet Map	I-B	1:1,00,000
4	Satellite Imagery Map	I-C	1: 5,000
5	Environmental Plan	I-D	1: 5,000
6	Mine Lease Plan	II	1:1000
7	Surface and Geological Plan	III	Plan 1:1000
8	Geological Sections	IIIA	Sections Hor 1:1000 Ver 1:500
9	Conceptual Plan	IV	Plan 1:1000
10	Conceptual Sections	IVA	Sections Hor 1:1000 Ver 1:500
11	Mine Layout Plan and Land Use Pattern	V	Plan 1:1000
12	Year wise Development and Production Plan	VI	Plan 1:1000
13	Year wise Development, Production Sections	VIA	Sections Hor 1:1000 Ver 1:500

M. Kalyan

Mr.M.KARTHIKEYAN,
S/o. Manoharan,
No. 2/21, West Street, Vadamalaipatti,
Musiri Taluk, Thathiengarpet,
Tiruchirappalli – 621 214.



CONSENT LETTER FROM THE APPLICANT

The Mining Plan in respect of rough stone and gravel quarry lease in patta land at S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2 over an extent of 1.96.03hectares of Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu State has been prepared by

P.VELLAIYAN, M.Sc., M.Phil., (Qualified Person)

I request **Deputy Director**, Department of Geology and Mining, Tiruvannamalai District to make further correspondence regarding modifications of the Mining Plan with the said Qualified Person on this following address,

P.VELLAIYAN, M.Sc., M.Phil.,
Qualified Person

D.No.6-106-B, Athirampatti Village,
Amaragundhi Panchayat & Post,
Omalur Taluk,
Salem District-636 503.

Mob: +91 7010076626, 9751256465

I hereby undertake that all modifications so made in the Mining Plan by the Qualified Person may be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respects.

Place: Tiruchirappalli, TN.

Date:


Signature of the applicant
(M. Karthikeyan)



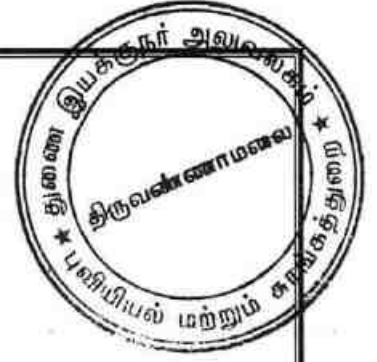
Mr.M.KARTHIKEYAN,

S/o. Manoharan,

No. 2/21, West Street, Vadamalaipatti,

Musiri Taluk, Thathiengarpet,

Tiruchirappalli – 621 214.



DECLARATION

The Mining Plan in respect of rough stone and gravel quarry lease in Patta land at S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2, over an extent of 1.96.03 hectares of Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu State have been prepared with my consultation and I have understood the contents and agree to implement the same in accordance with the Mining Laws.

Place: Tiruchirapalli, TN.

Date:

M. Karthikeyan

Signature of the applicant
(M. Karthikeyan)

M. Karthikeyan

P.VELLAIYAN, M.Sc., M.Phil.,

Qualified Person

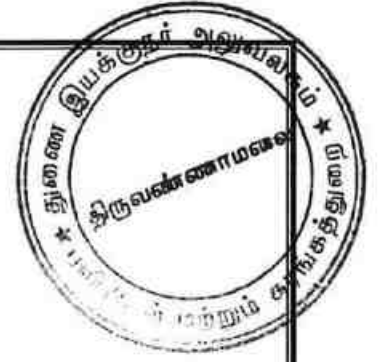
D.No.6-106-B, Athirampatti Village,

Amaragundhi Panchayat & Post,

Omalur Taluk,

Salem District-636 503.

Mob: +91 7010076626, 9751256465



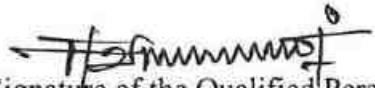
CERTIFICATE

This is to certify that, the provisions of 19 Tamil Nadu Minor Minerals Concession Rules, 1959 have been observed in the Mining Plan for the grant of rough stone and gravel quarry lease in S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2, over an extent of 1.96.03 hectares of Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu State granted to **Mr.M.Karthikeyan**, Tiruvannamalai District.

Wherever specific permission / exemptions / relaxations or approvals are required, the applicant will approach the concerned authorities of State and Central governments for granting such permissions etc.

Place: Salem, TN

Date:


Signature of the Qualified Person

P. VELLAIYAN, M.Sc., M.Phil.,
Qualified Person

D.No. 6-106-B, Athirampatti (Vill),
Amaragundhi Panchayat & Post,
Omalur Taluk, Salem District - 636503.



P.VELLAIYAN, M.Sc., M.Phil.,

Qualified Person

D.No.6-106-B, Athirampatti Village,

Amaragundhi Panchayat & Post,

Omalur Taluk,

Salem District-636 503.

Mob: +91 7010076626, 9751256465



CERTIFICATE

I certify that, in preparation of Mining Plan for rough stone and gravel quarry lease in S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2, over an extent of 1.96.03 hectares of Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu State prepared to **Mr.M.Karthikeyan**, Tiruchirappalli District, covers all the provisions of Mines Act, Rules, and Regulations etc., made there under and whenever specific permission are required, the applicant will approach the Director General of Mines Safety, Chennai. The standards prescribed by DGMS in respect of Mines Health will be strictly implemented.

Place: Salem, TN

Date:

Signature of the Qualified Person

P. VELLAIYAN, M.Sc., M.Phil.,
Qualified Person

D.No. 6-106-B, Athirampatti (Vill),

Amaragundhi Panchayat & Post,

Omalur Taluk, Salem District - 636503.

M. Karthikeyan

MINING PLAN

FOR MARUTHADU VILLAGE ROUGH STONE AND GRAVEL MINING LEASE WITH

PROGRESSIVE QUARRY CLOSURE PLAN

Patta land / Open cast-Semi-Mechanized mining/Non-forest/Non-Captive Use

Lease period 10 Years from the date of lease execution

(Prepared under rule 41 of Tamil Nadu Minor Mineral Concession Rules, 1959)

INTRODUCTORY NOTES:

- a) **Introduction:** The Mining plan with progressive quarry closure plan is prepared for Mr.M.Karthikeyan, S/o.Manoharan, No.2/21, West Street, Vadamalaipatti, Musiri Taluk, Thathiangarpet, Tiruchirappalli – 621 214, Tamilnadu State and filed with application for new proposals has submitted to the Department of Geology and Mining, Tiruvannamalai dated 16.06.2025 had requested to grant the quarry lease for rough stone and gravel in S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2 over an extent of 1.96.03 hectares of Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu State.
- b) **The Precise area communication letter:** The Deputy Director, Department of Geology and mining, Tiruvannamalai has directed to the applicant Mr.M.Karthikeyan, S/o.Manoharan, through his precise area communication letter vide Roc.No.452/Mines/2025 Dated 14.07.2025, for quarrying lease rough stone and gravel at Tamil Nadu State, Tiruvannamalai District, Vandavasi Taluk, Maruthadu Village in S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2 over an extent of 1.96.03 hectares has recommended as following conditions for a period of Ten (10) years under Rule 19 Tamil Nadu Minor Mineral concession rules, 1959.
 - a) The minerals to be quarried shall be transported on payment of seniority amount from time to time as per Schedule II of the Tamil Nadu Minor Mineral Concession Rules, 1959.
 - b) A safety distance of 7.5m should be provided for adjacent patta lands and 10m for government lands.
 - c) Quarrying shall be carried out by experienced explosive users using low-energy explosives without any disturbance to the adjoining Pattadhars / without any encroachment on the adjoining Patta and Government lands.
 - d) The mining plan shall be submitted within the time limit as per the rules.



e) The quarry license shall be granted only if the Environmental Impact Assessment Commission has obtained and submitted a no-objection certificate for the area to be granted the quarry license.

c) **Preparation and Submission of Mining Plan:** The Mining Plan with progressive quarry closure plan has been prepared under rule 41 and submitted under rule 42 of Tamil Nadu Minor Mineral Concession Rules, 1959 for mining lease as per conditions mentioned in the precise area communication letter Roc.No.452/Mines/2025 Dated 14.07.2025.

d) **Geological resources and Mineable reserves:** Geological resource of estimated as 587430m^3 / 1571375MT including the resources of safety zone, gravel etc. Of which, rough stone resources of about 528687m^3 / 1453889MT and gravel is 58743m^3 / 117486MT. The total mineable reserve is estimated to be 308450m^3 / 812935MT by deducting the reserve safety zone, block in benches from the total Geological resources. of which, rough stone is about 261380m^3 / 718795MT and gravel is 47070m^3 / 94140MT up to a depth of 30m below ground level (Refer Plate No. IIIA & IVA).

e) **Proposed Production Schedule:** Total proposed production of rough stone is 261380m^3 / 718795MT and gravel is 47070m^3 / 94140MT up to a depth of 30m below ground level for ten years lease period. (Refer Plate No.VIA).

- Proposed production for first five years of rough rough stone is 129220m^3 or 355354MT and gravel is 47070m^3 or 94140MT up to a depth of 30m below ground level (R.L 88m-58m).

f) **Environmental Sensitivity of the proposed lease area: -**

i). **Interstate boundary:** There is no interstate boundary around 10Km radius periphery of proposed lease area.

ii). **Wildlife Sanctuaries any:** There are no notified wildlife sanctuaries within the radius of 10km from the project site under the wildlife (Protection) Act, 1972.

iii). **Forest (conservation) Act, 1980:** No forest land granted for quarrying and there is no reserve forest around 60m radius.

iv). **CRZ Notification, 2019:** There is no Sea coastal zone found within radius of 10km and this project site doesn't attract CRZ Notification, 2019.

h) **Environmental measures to be adopted during the ongoing activity period,**

- a. Usage of sharp drill bits while drilling which will help in reducing noise.



- b. Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders.
- c. Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained.
- d. Green Belt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise.
- e. Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation.
- f. Transportation of material will be carried out during day time and material will be covered with tarpaulin.
- g. The speed of tippers plying on the haul road will be limited below 20 km/hr to avoid generation of dust.
- h. And any other conditions as stipulated by the concerned authorities should be followed to protect the environment.

1.0 GENERAL:

a.	Name of the Applicant	:	Mr. M.Karthikeyan
	Applicant address	:	S/o. Manoharan, No. 2/21, West Street, Vadamalaipatti, Musiri Taluk, Thathiengarpet,
	District	:	Tiruchirappalli
	State	:	Tamilnadu
	Pin code	:	621 214
	Phone	:	+91 9629873572
	Fax	:	Nil
	Gram	:	Nil
	Telex	:	Nil
	E-mail	:	.....
b.	Status of the Applicant		
	Private individual	:	Private individual
	Cooperative Association	:	---
	Private company	:	---
	Public Company	:	---
	Public Sector Undertaking	:	---
	Joint Sector Undertaking	:	---
	Other (pl. specify)	:	---
c.	Mineral(s) Which are occurring in the area and which the applicant intends to mine	:	Rough Stone and Gravel Quarry Lease

M. Karthikeyan

d.	Period for which the mining lease granted /renewed/ proposed to be applied	:	The precise area has been communicated to the applicant for quarrying period of Ten (10) years.
	Name of the QP preparing the Mining Plan	:	P.VELLAIYAN, M.Sc., M.Phil.,
	Address	:	D.No.6-106-B, Athirampatti Village, Amaragundhi Panchayat & Post, Omalur Taluk, Salem District-636 503. Mob: +91 7010076626, 9751256465
	Phone	:	+91 7010076626, 9751256465
	Fax	:	Nil
	e-mail	:	pvellaiyangp@gmail.com
g.	Reference No. and date of consent letter from the state government	:	The precise area communication letter issued by the Deputy Director, Department Geology and Mining, Tiruvannamalai vide Roc.No.452/Mines/2025 Dated 14.07.2025.

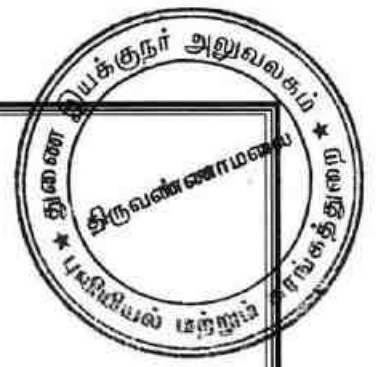
2.0 LOCATION AND ACCESSIBILITY:

a.	Details of the Area:	:	Refer plate no: IA & IB				
	District & State	:	Tiruvannamalai, Tamil Nadu				
	Taluk	:	Vandavasi				
	Village	:	Maruthadu				
	Khasra No./ Plot No./ Block Range/ Felling Series etc.:						
	Survey No	Sub Division	Total Extent in Hect	Patta No.	Village and Name of the Land Owner	Mine lease Applied S.F.No.	Mine lease Applied area out of total area in hect.
	973	1	0.47.00	5309	Mr.A.Rakesh (@) Logeshwaran S/o.Arumugam	973/1	0.47.00
	973	7B	0.03.23			973/7B	0.03.23
	975	2	0.07.30			975/2	0.07.30
	977	--	0.02.50			977	0.02.50
	978	2	1.36.00			978/2	1.36.00
	Total Extent		1.96.03	Applied lease area extent			1.96.03
	Lease area (hectares)		: 1.96.06 Hectares				
	Whether the area is recorded to be in forest (please specify whether protected, reserved, etc)		: The proposed lease area is recorded as patta land. (Ref.Anne.No's:IV)				
	Ownership / Occupancy		: This is a patta land S.F.No's: 973/1, 973/7B, 975/2, 977 & 978/2 is registered on the name				



	:	of Mr.A.Rakesh (or) Logeshwaran o.Arumugam as patta no.5309. Hence Patta has been given consent to the applicant.																																																
Existence of Public Road / Railway line if any nearby and approximate distance	:	✓ Exploited quarry materials will be transported through the approach road is situated on the southern side. ✓ There is no NH road situated around 5km radius from the lease area. ✓ There is an SH-115 is situated on the northern side about 1.7km which is connecting Cheyur-Vandavasi Road. ✓ There is no railway line is situated around 5km radius from the lease area.																																																
Toposheet No. with latitude and longitude	:	Toposheet No. 57 P/11 Latitude: From 12°28'33.39"N to 12°28'38.60"N Longitude: From 79°40'6.30"E to 79°40'12.51"E																																																
Geo-Coordinates of the lease boundary: <table border="1" style="width: 100%; margin-top: 10px; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Pillar No</th> <th style="width: 35%;">Latitude</th> <th style="width: 50%;">Longitude</th> </tr> </thead> <tbody> <tr><td>1</td><td>12°28'38.28"N</td><td>79°40'12.51"E</td></tr> <tr><td>2</td><td>12°28'35.84"N</td><td>79°40'12.30"E</td></tr> <tr><td>3</td><td>12°28'35.96"N</td><td>79°40'10.43"E</td></tr> <tr><td>4</td><td>12°28'33.65"N</td><td>79°40'10.29"E</td></tr> <tr><td>5</td><td>12°28'33.39"N</td><td>79°40'10.31"E</td></tr> <tr><td>6</td><td>12°28'33.60"N</td><td>79°40'8.75"E</td></tr> <tr><td>7</td><td>12°28'33.55"N</td><td>79°40'8.73"E</td></tr> <tr><td>8</td><td>12°28'33.64"N</td><td>79°40'7.72"E</td></tr> <tr><td>9</td><td>12°28'34.36"N</td><td>79°40'7.79"E</td></tr> <tr><td>10</td><td>12°28'36.13"N</td><td>79°40'7.87"E</td></tr> <tr><td>11</td><td>12°28'36.16"N</td><td>79°40'6.88"E</td></tr> <tr><td>12</td><td>12°28'35.31"N</td><td>79°40'6.94"E</td></tr> <tr><td>13</td><td>12°28'35.21"N</td><td>79°40'6.65"E</td></tr> <tr><td>14</td><td>12°28'36.17"N</td><td>79°40'6.64"E</td></tr> <tr><td>15</td><td>12°28'38.60"N</td><td>79°40'6.30"E</td></tr> </tbody> </table>			Pillar No	Latitude	Longitude	1	12°28'38.28"N	79°40'12.51"E	2	12°28'35.84"N	79°40'12.30"E	3	12°28'35.96"N	79°40'10.43"E	4	12°28'33.65"N	79°40'10.29"E	5	12°28'33.39"N	79°40'10.31"E	6	12°28'33.60"N	79°40'8.75"E	7	12°28'33.55"N	79°40'8.73"E	8	12°28'33.64"N	79°40'7.72"E	9	12°28'34.36"N	79°40'7.79"E	10	12°28'36.13"N	79°40'7.87"E	11	12°28'36.16"N	79°40'6.88"E	12	12°28'35.31"N	79°40'6.94"E	13	12°28'35.21"N	79°40'6.65"E	14	12°28'36.17"N	79°40'6.64"E	15	12°28'38.60"N	79°40'6.30"E
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Land use pattern (Forest, Agricultural, Grazing, Barren etc.)	:	It is an barren Land.																																																
b. <i>Attach a general location and vicinity map showing area</i>	:	Refer plate no-IA & IB																																																

M. K. Raju



boundaries and existing and proposed access routs. It is preferred that the area to be marked on a survey of India topographical map or a cadastral map or forest map as the case may be. However if none of these are available, the area should be shown on an accurate sketch map on scale of 1 : 5000.

i) INFRASTRUCTURE AND COMMUNICATION:

S.No	Description	Place	Distance	Direction
a.	Nearest post office	Maruthadu	1.7Km	North
b.	Nearest police station	Kilkodungalore	3.8km	Northeast
c.	Nearest fire station	Vandavasi	6.8km	Northwest
d.	Nearest medical facility	Kilkodungalore	4.4km	Northeast
e.	Nearest school	Kallankuthu	1.6km	North
f.	Nearest railway station	Tozhuppedu	17.2km	Southeast
g.	Nearest port facility	Chennai	95.4km	Northeast
h.	Nearest airport	Chennai	78.7km	Northeast
i.	Nearest DSP office	Vandavasi	8.5km	Northwest
j.	Nearest villages	Maruthadu	1.4km	North
		Kottai	2.8km	East
		Punnai	1.6km	South
		Kodanallur	2.5km	West



PART – A

3.0 GEOLOGY AND MINERAL RESERVES:

(a) Briefly describe the topography and general geology and local/mine geology of the mineral deposit including drainage pattern:

(i)	Topography	:	The proposed lease area is flat topography. The maximum elevation (88m) was observed west side of the site. The slope is towards eastern side and falls in Toposheet no. 57 P/11
(ii)	General Geology of the District: The Entire district is underlain by the rocks belonging to hard crystalline rock masses of Archaean age. The Archaean rocks in this area are represented by rocks of eastern Ghat complex comprising charnockites, Migmatite complex of composite gneiss. The district is covered by metamorphic crystalline rocks of charnockite, composite gneiss of Archaean age. These rocks are highly metamorphosed and have been subjected to sever folding, crushing and faulting. Charnockites group is occupied by North and Southern part of the basin. The other rock type is encountered by composite granitic gneiss of Epidote hornblende biotite gneiss and hornblende biotite gneiss are occupy in the middle portion of the basin. Charnockite group occupies the high ground as well as plain and it is poorly weathered and jointed. They are generally black grey to dark grey in colour medium to coarse grained texture, and generally massive and un-foliated. A gneissic rock occurs as linear bands in the middle portion of the area and is highly migmatized. Mostly, micaceous with bands of granites, pegmatites, quartz veins the rock is well foliated. The Hornblende biotite gneiss forms the country rock of the area and epidote hornblende gneiss (Proterozoic age) occurs as small isolated outcrops. The crystalline formations are charnockite, granitic gneiss of Archean age have been intrude by dolerite dykes and pegmatite veins. These rocks are highly metamorphosed and have been subjected to very severe folding, crushing and faulting. The crystalline rocks are subjected to tectonic activities under various orogenic cycles resulting in the development of secondary structures such as joints, fissures and cleavages. The intensity of weathering varies from place to place. Highly weathered zones and granitic rock occurs in masses are around some of the villages like Ariyanallur, Mukkunam, Kaarunkuli Tondur, vedal,) Melokkur, Pennagar,		

Chinngam(57p/7). The general geological requence of formation given in the Table

Age	Stage	Lithology
Recent	Migmatite	Biotite Gneiss, Hornblende gneiss
Archean	Charnockite Group	Magnetite

(iii) Local / Mine Geology of The Mineral Deposit:

Topography of the proposed lease area:

The applied lease area exhibits an flat topography and the maximum elevation 88m was observed west side of the site. The rocks exhibits layered, medium to coarse grained hornblende biotite, orthopyroxene charnockite gneiss.

The Gravel is obtained the average of 0-3.0m and a rough stone starts from 3.0m to 30m (R.L.88-58m) from the surface level. The Surface plan showing elevation, contour, accessibility road and Geological map was prepared the proposed lease area.

Mode of origin:

The Charnockite series originally was assumed to have developed by the fractional crystallization of silicate magma. Subsequent studies have shown, however, that many, if not all, of the rocks are metamorphic, formed by recrystallization at high pressures and moderately high temperatures.

Physiography of the rocks:

General characteristics of the rocks of this series has recorded that the rocks are in general bluish gray or darkish in colour and extremely fresh in appearance with an even grained granular structure.

Chemical composition of rocks:

Charnockite, any member of a series of metamorphic rocks with variable chemical composition, the term is often limited to the characteristic ortho pyroxene granite of the series. The alkali feldspar may be intermediate between microcline and orthoclase, the fine micro perthitic texture being common.

Order of superposition of the proposed lease area,

Age	Group	Rock Formation
Recent to Sub recent	---	Gravel
Archaean	Charnockite Group	Charnockites.

(iv)	Drainage Pattern	:	There is no major river found within 50m radius. The drainage in the area is sub-dendritic in nature.
(b)	<i>The topographic plan of the lease area prepared on a scale of 1:1000 or 1:2000 with contour interval of 3 to 10m depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan:</i>		
	a. Present status:	:	The QP examined the surface features during survey. It is a fresh quarry lease.
	b. Surface Plan	:	Surface plan showing elevation contour and accessibility road was prepared at the scale of 1:1000, as shown in Plate No. III.
(c)	Geological sections should be prepared at suitable intervals on a scale of 1: 1000 / 1: 2000:	:	Longitudinal and transverse geological cross sections were prepared at the horizontal scale of 1: 1000 and at the vertical scale of 1:500, as shown in Plate No. III
(d)	<i>Broadly indicate the Yearwise future programme of exploration, taking into consideration the future production programme planned in next five years as in table below:-</i> No future programmed proposed in this area. Its massive homogeneous parent rock. Hence exploration proposal is not required to this mining project.		
(e) Indicate geological and recoverable reserves and grade, duly supported by standard method of estimation and calculations along with required sections (giving split up of various categories i.e. proved, probable, possible). Indicate cut-off grade. Availability of resources should also be indicated for the entire leasehold. The geological resources were computed by cross section method with respect to the boundaries of the lease area. In this method, the lease area was divided into one longitudinal and two transverse section to calculate the volume of material up to the depth of 30m below ground level for ten years plan period. (Refer Plate No. IIIA). The one longitudinal and two transverse cross section were assigned XY-AB & XY-CD, as respectively. Using the cross-sectional method, total reserve is estimated to be 587430m³ / 1571375MT including the resources of safety zone, and gravel, etc. Of which, rough stone resources of about 528687m³ / 1453889MT and gravel is 58743m³ / 117486MT.			



GEOLOGICAL RESOURCES										
Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume In M ³	Rough Stone in M ³	Gravel in M ³	Bulk Density	Rough Stone in (MT)	Gravel in (MT)
XY-AB	I	75	181	3	40725	.....	40725	2	.....	81450
	I	75	181	2	27150	27150	.....	2.75	74662.5	.....
	II	75	181	5	67875	67875	.....	2.75	186656.3	.....
	III	75	181	5	67875	67875	.....	2.75	186656.3	.....
	IV	75	181	5	67875	67875	.....	2.75	186656.3	.....
	V	75	181	5	67875	67875	.....	2.75	186656.3	.....
	VI	75	181	5	67875	67875	.....	2.75	186656.3	.....
TOTAL					407250	366525	40725	.....	1007944	81450
XY-CD	I	78	77	3	18018	.....	18018	2	.....	36036
	I	78	77	2	12012	12012	.....	2.75	33033.0	.....
	II	78	77	5	30030	30030	.....	2.75	82582.5	.....
	III	78	77	5	30030	30030	.....	2.75	82582.5	.....
	IV	78	77	5	30030	30030	.....	2.75	82582.5	.....
	V	78	77	5	30030	30030	.....	2.75	82582.5	.....
	VI	78	77	5	30030	30030	.....	2.75	82582.5	.....
TOTAL					180180	162162	18018	.....	445945	36036
GRAND TOTAL					587430	528687	58743	.....	1453889	117486

(f) Indicate mineable reserves by slice plan / level plan method, as applicable, as per the proposed mining parameters: -

The total mineable reserve is estimated to be **308450m³ / 812935MT** by deducting the reserve safety zone, block in benches from the total Geological resources up to a depth of 30m below ground level. Of which, rough stone is about **261380m³ / 718795MT** and gravel is **47070m³ / 94140MT**. The commercially viable rough stone has been prepared on 1:1000 scale and sections are prepared in a scale of 1:1000 in horizontal axis and 1:500 as vertical axis (Refer plate no's IVA)

MINEABLE RESERVES										
Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume In M ³	Rough Stone in M ³	Gravel in M ³	Bulk Density	Rough Stone in (MT)	Gravel in (MT)
XY-AB	I	68	166	3	33864	.....	33864	2	.....	67728
	I	68	166	2	22576	22576	.....	2.75	62084	.....
	II	63	156	5	49140	49140	.....	2.75	135135	.....
	III	58	146	5	42340	42340	.....	2.75	116435	.....
	IV	53	136	5	36040	36040	.....	2.75	99110	.....
	V	48	126	5	30240	30240	.....	2.75	83160	.....
	VI	43	116	5	24940	24940	.....	2.75	68585	.....
TOTAL					239140	205276	33864	.....	564509	67728

M. Kozhikoya

XY-CD	I	71	62	3	13206	.....	13206	2	26412	
	I	71	62	2	8804	8804	.....	2.75	24211	
	II	66	52	5	17160	17160	.....	2.75	47190	
	III	61	42	5	12810	12810	.....	2.75	35229	
	IV	56	32	5	8960	8960	.....	2.75	24640	
	V	51	22	5	5610	5610	.....	2.75	15428	
	VI	46	12	5	2760	2760	.....	2.75	7590	
TOTAL					69310	56104	13206		154286	26412
GRAND TOTAL					308450	261380	47070		718795	94140

4.0 MINING:

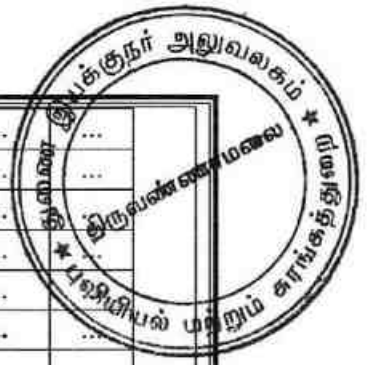
- a) Briefly describe the existing / proposed method for developing / working the deposit with all design parameters.
(Note: In case of pocket deposits, sequence of development/working may be indicated on the same plan)
- : The mining operation is open-cast, semi-mechanized method are adopted and on single shift basis only. Under the regulation 106 of the Metalliferous Mines Regulations, 1961, in all open cast workings in hard rock, the benches and sides should be properly benched and sloped. The bench height should not exceed 6m and the bench width should not less than the bench height. The slope of the benches should not exceed 45° from horizontal.

- b) *Indicate quantum of development and tonnage and grade of production expected pit wise as in table below.*

Total proposed production of rough stone is **261380m³ / 718795MT** and gravel is **47070m³ / 94140MT** up to a depth of 30m below ground level for ten years lease period. (Refer Plate No.VIA).

- Proposed production for first five years of rough rough stone is **129220m³** or **355354MT** and gravel is **47070m³** or **94140MT** up to a depth of 30m below ground level (R.L 88m-58m)

Year	Pit No.(s)	Topsoil/Overburden (m ³)	ROM (m ³)	Saleable rough stone (m ³) @ 100%	Rough stone (MT)	Saleable Gravel (m ³)	Saleable Gravel (MT)	Rough stone to waste
I	I	...	36340	26854	73848	9486	18972	...
II	I	...	45400	26740	73535	18660	37320	...
III	I	...	44450	25526	70196	18924	37848	...
IV	I	...	24540	24540	67485	...	...	...
V	I	...	25560	25560	70290	...	...	...
Total	---	...	176290	129220	355354	47070	94140	...



	VI	I	...	26800	26800	73700	...	...	...
	VII	I	...	24090	24090	66248	...	...	...
	VIII	I	...	29240	29240	80410	...	...	...
	IX	I	...	27090	27090	74498	...	...	...
	X	I	...	24940	24940	68585	...	...	...
	Total	—	...	132160	132160	363441	...	...	...
	Grand Total	—	...	308450	261380	718795	47070	94140	...
c)	Composite plans and Year wise sections (In case of 'A' class mines):				:	Not applicable. It is a "B" class quarry lease			

YEARWISE PRODUCTIONS (First Five Years)											
Year	Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume In M ³	Rough Stone in M ³	Gravel in M ³	Bulk Density	Rough Stone in (MT)	Gravel in (MT)
I-YEAR	XY-CD	I	51	62	3	9486	.....	9486	2	.....	18972
		I	51	62	2	6324	6324	.....	2.75	17391	.....
		II	41	52	5	10660	10660	.....	2.75	29315	.....
		III	31	42	5	6510	6510	.....	2.75	17902	.....
		IV	21	32	5	3360	3360	.....	2.75	9240	.....
TOTAL						36340	26854	9486	.....	73848	18972
II-YEAR	XY-CD	I	20	62	3	3720	.....	3720	2	.....	7440
	XY-AB	I	30	166	3	14940	.....	14940	2	.....	29880
		I	30	166	2	9960	9960	.....	2.75	27390	.....
	XY-CD	I	20	62	2	2480	2480	.....	2.75	6820	.....
	XY-AB	II	10	156	5	7800	7800	.....	2.75	21450	.....
	XY-CD	II	25	52	5	6500	6500	.....	2.75	17875	.....
TOTAL						45400	26740	18660	.....	73535	37320
III-YEAR	XY-AB	I	38	166	3	18924	.....	18924	2	.....	37848
		I	38	166	2	12616	12616	.....	2.75	34694	.....
		II	10	156	5	7800	7800	.....	2.75	21450	.....
		III	7	146	5	5110	5110	.....	2.75	14052	.....
TOTAL						44450	25526	18924	.....	70196	37848
IV-YEAR	XY-AB	III	8	146	5	5840	5840	.....	2.75	16060	.....
	XY-CD	III	30	42	5	6300	6300	.....	2.75	17325	.....
	XY-AB	IV	10	136	5	6800	6800	.....	2.75	18700	.....
	XY-CD	IV	35	32	5	5600	5600	.....	2.75	15400	.....
TOTAL						24540	24540	0	.....	67485	0
V-YEAR	XY-AB	V	5	126	5	3150	3150	.....	2.75	8662	.....
	XY-CD	V	51	22	5	5610	5610	.....	2.75	15428	.....
		VI	46	12	5	2760	2760	.....	2.75	7590	.....
	XY-AB	II	18	156	5	14040	14040	.....	2.75	38610	.....
TOTAL						25560	25560	0	.....	70290	0
GRAND TOTAL (A)						176290	129220	47070	.....	355354	94140

14. K. K. K.



YEARWISE PRODUCTIONS (Next Five Years)											
VI-YEAR	XY-AB	II	25	156	5	19500	19500	.....	2.75	56625	
		III	10	146	5	7300	7300	.....	2.75	20075	.....
TOTAL						26800	26800	0	.....	76700	0
VII-YEAR	XY-AB	III	33	146	5	24090	24090	.....	2.75	66248	.....
TOTAL						24090	24090	0	.....	66248	0
VIII-YEAR	XY-AB	IV	43	136	5	29240	29240	.....	2.75	80410	.....
TOTAL						29240	29240	0	.....	80410	0
IX - YEAR	XY-AB	II	43	126	5	27090	27090	.....	2.75	74498	.....
TOTAL						27090	27090	0	.....	74498	0
X-YEAR	XY-AB	II	43	116	5	24940	24940	.....	2.75	68585	.....
TOTAL						24940	24940	0	.....	68585	0
GRAND TOTAL (B)						132160	132160	0	.....	363441	0
GRAND TOTAL (A+B)						308450	261380	47070	.....	718795	94140

d)	Attach supporting composite plan and section showing pit layouts, dumps, stacks of sub-grade mineral, if any, etc.	:	Composite plan not prepared in this proposed lease area
e)	Indicate proposed rate of production when the mine is fully developed and the expected life of the mine and the year from which effected: At this rate of production, the expected life of quarry is calculated as given below: <u>Rough stone:</u> Mineable reserves of rough stone (10 Years) = 261380m³ / 718795MT Annual Peak production = 29240m³ / 80410MT <u>Gravel:</u> Mineable reserves of gravel = 47070m³ / 94140MT		
f)	Attach a note furnishing a conceptual mining plan for the entire lease period (for "B" category mines) and upto the life of the mine (for "A" category mines) based on the geological, mining and environments considerations:		
i)	Time frame of completion of mineral exploration program in leasehold area: Give broad description identified potential areas to be covered in the given time frame:	:	Considering the indefinite depth persistence of the rough stone deposit is proved beyond the workable limits about up to a depth of 35m below ground level (R.L.88m to 58m) from the petrogenetic character of the charnockite rock as well as from the actual mining practice in the area and with the

M. Karthikeya

		current trend of rough stone production the quarry may sustain for 10 years																																																																																																		
ii)	Whether ultimate pit limit has been determined and demarcated on surface and geological plan :- The ultimate pit limit has been determined and demarcated in the conceptual plan	<table border="1"> <thead> <tr> <th colspan="6">SECTION XY-AB</th> </tr> <tr> <th>Bench</th><th>Period</th><th>Overburden/ Mineral</th><th>L (m)</th><th>W (m)</th><th>D (m)</th></tr> </thead> <tbody> <tr> <td>I</td><td rowspan="7">Ten years Plan period</td><td>Gravel</td><td>68</td><td>166</td><td>3</td></tr> <tr> <td>I</td><td rowspan="6">Rough stone</td><td>68</td><td>166</td><td>2</td></tr> <tr> <td>II</td><td>63</td><td>156</td><td>5</td></tr> <tr> <td>III</td><td>58</td><td>146</td><td>5</td></tr> <tr> <td>IV</td><td>53</td><td>136</td><td>5</td></tr> <tr> <td>V</td><td>48</td><td>126</td><td>5</td></tr> <tr> <td>VI</td><td>43</td><td>116</td><td>5</td></tr> <tr> <td colspan="5">Total Depth</td><td>30</td></tr> <tr> <th colspan="6">SECTION XY-CD</th> </tr> <tr> <th>Bench</th><th>Period</th><th>Overburden/ Mineral</th><th>L (m)</th><th>W (m)</th><th>D (m)</th></tr> <tr> <td>I</td><td rowspan="7">Ten years Plan period</td><td>Gravel</td><td>71</td><td>62</td><td>3</td></tr> <tr> <td>I</td><td rowspan="6">Rough stone</td><td>71</td><td>62</td><td>2</td></tr> <tr> <td>II</td><td>66</td><td>52</td><td>5</td></tr> <tr> <td>III</td><td>61</td><td>42</td><td>5</td></tr> <tr> <td>IV</td><td>56</td><td>32</td><td>5</td></tr> <tr> <td>V</td><td>51</td><td>22</td><td>5</td></tr> <tr> <td>VI</td><td>46</td><td>12</td><td>5</td></tr> <tr> <td colspan="5">Total Depth</td><td>30</td></tr> </tbody> </table>	SECTION XY-AB						Bench	Period	Overburden/ Mineral	L (m)	W (m)	D (m)	I	Ten years Plan period	Gravel	68	166	3	I	Rough stone	68	166	2	II	63	156	5	III	58	146	5	IV	53	136	5	V	48	126	5	VI	43	116	5	Total Depth					30	SECTION XY-CD						Bench	Period	Overburden/ Mineral	L (m)	W (m)	D (m)	I	Ten years Plan period	Gravel	71	62	3	I	Rough stone	71	62	2	II	66	52	5	III	61	42	5	IV	56	32	5	V	51	22	5	VI	46	12	5	Total Depth					30
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iii)	Whether the site for disposal of waste rock or an un-saleable material have/ has been examined for adequacy of land and suitability of long term use in the event of continuation of mining activity: -	: The recovery of rough stone and gravel in this quarry is 100%. There is no waste rock will be proposed in this lease area.																																																																																																		
iv)	Whether back filling of pits after recovery of mineral up to techno -economically feasible depth envisaged. If so, describe the broad features of the proposal: -	: As the depth of persistence of the deposit may likely to continue for further depth, it is proposed not to backfilled the quarry pit.																																																																																																		
v)	Whether post mining land use envisaged: -	: At the end of mining activities over the quarry pit may be utilized for storage of rain water and may be converted in to dumping																																																																																																		

M. G. K. K. K.

		yards for solid waste by adopting suitable technologies.
g)	Open cast mining	
i)	Describe briefly giving salient features of the mode of working (Mechanized, Semi-Mechanized, manual)	: It is a fresh quarry lease. The operation is opencast, semi-mechanized methods are adopted and on single shift basis only. Under the regulation 106 of the Metalliferous Mines Regulations, 1961 in all opencast workings in hard rock, the benches and sides should be properly benched and sloped. The bench height should not exceed 6m and the bench width should not less than the bench height. The slope of the benches should not exceed 45° from horizontal.
ii)	Describe briefly the layout of mine workings, the layout of faces and sites for disposal of overburden/waste. A reference to the plans enclosed under 4(b) and 4(d) will suffice	The rough stone is proposed to quarry at 5m bench height & width conventional opencast semi mechanized quarrying operation using shot hole drilling with the help of tractor mounted compressor attached with jack hammers, smooth blasting and waste and are removal using Hydraulic excavator and loaded directly to the tippers and transported to the needy customer. Bench height = 5mts. Bench width = 5mts.
	a. Details of Topsoil/Overburden	No separate of topsoil will be removed.
	b. Rough Stone waste and side burden waste:-	The recovery of rough stone in this quarry is 100%. There is no rough stone waste or side burden will be removed.
H	Underground Mining	Not applicable
i)	Extent of mechanization: Describe briefly including the calculation for adequacy and type of machinery and equipment proposed to be used in different mining operations.	
	(I) Drilling Machines: Drilling of shot holes will be carried out using tractor mounted compressor and jack hammer. Details of drilling equipment's are given below.	

M. K. K. K.

Type	Nos	Dia of hole (mm)	Size / Capacity	Make	Motive power	H.P.
Jack Hammer	2	32 mm	Hand held	--	Diesel	--
Compressor	1	---	Air	--	Diesel	--

(2) Loading Equipment:

Type	Nos	Size / Capacity	Make	Motive power	H.P.
Hydraulic Excavator	1	2.9-4.5m ³	--	Diesel	--

(3) Haulage and Transport Equipment
 (a) Haulage within the mining leasehold:

Type	Nos	Size / Capacity	Make	Motive power	H.P.
Tipper	8	--	--	Diesel	--

Whether the dumpers are fitted with exhaust conditioner should be indicated:
 The dumpers not used in this quarry area, hence it's a small "B" category mine.

b) Transport from mine head to the destination
 Tipper will be used for transport rough stone from the mine head to needy customer.

c) Describe briefly the transport system (please specify)
 Hydraulic excavator and tippers utilized for internal transport sizeable rough stone lumps and deliver to the customer's area.

i) Ore transported by: own trucks / hired trucks
 Hired trucks for initially production purposes.

ii) Main destination to which ore is transported (giving to and from distance)
 The excavated stone materials road metal will be supplied to the consumers like road laying, earth filling, building construction, etc

a) Details of hauling / transport equipment:

Type	Nos	Size / Capacity	Make	Motive power	H.P.
--	--	--	--	--	--

4) (4). Miscellaneous:
 Describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

(A) Operations
 The mining operation is open-cast, semi-mechanized methods are adopted and on single shift basis only.

(B) Machineries deployed
 Machineries like Tractor mounted compressor attached with Jack hammers is proposed to drilling and blasting. Hydraulic Excavators and tipper combination are adapted.

5.

BLASTING:

a) Broad blasting parameters like charge per hole, blasting pattern, delay, maximum number of holes blasted in a round, manner and sequence of firing, etc.

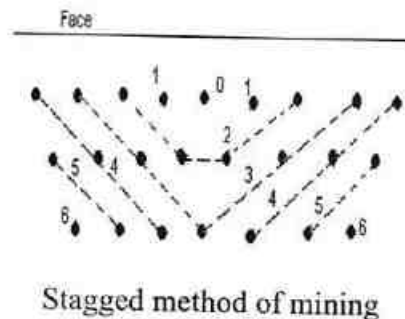
Blasting pattern:

The quarrying operation is proposed to be carried by open cast mining in conjunction with conventional method using jack hammer drilling and blasting for shattering effect and loosen the rough stone.

Rough stone production for 10 years = $261380\text{m}^3 / 718795\text{MT}$

BLAST DESIGN	
Blasthole Diameter (D) in mm	32
Burden (B) in m	1.2
Spacing (S) in m	1.38
Subdrill in m	0.5
Charge length (C) in m	0.70
Stemming	0.5
Hole Length (L) in m	1.2
Bench Height (BH) in m	2.5
Mass of explosive/hole in g	437.5
Stemming material size in mm	3.2
Burden stiffness ratio	2.08
Blast volume/hole in m^3	4.14
Production of rough stone/day in m^3	93
Number of blast holes/day	23
Number of blast round/day	1
Blasthole pattern	Staggered
Mass of explosive /day in kg	9.86
Powder factor in kg/m^3	0.11
Loading density	0.63
Type of explosives	Slurry
Diameter of packaging in mm	25
Initiation system	NONEL

Note: If >2kg of explosives per day use for blasting if proponent get the permission from the DGMS



b) Type of explosives used / to be used:

Following explosives are recommended for efficient blasting with safe practice.

Small dia. 25mm slurry explosives are proposed to be used for shattering and heaving effect for removal and winning of rough stone. No deep hole drilling. primary blasting is proposed.

c) Measures proposed to minimize ground vibration due to blasting:
The control blasting measures is being adopted for minimizing ground vibration and fly rock.

Shallow depths jack hammer drilling and blasting is proposed to be carried out with minimum use of explosive mainly to give hearing effect in rough stone for easy excavation and to control fly rock.

Delay detonators:

Delay blasting permits to divide the shot to smaller charges, which are detonated in a predetermined millisecond sequence at specific time intervals. The major advantages of delay blasting are:

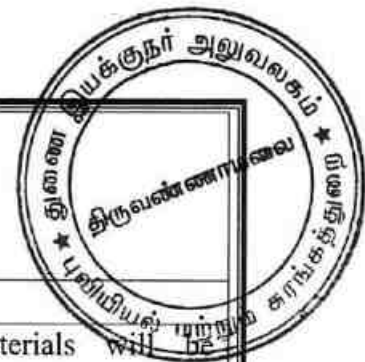
- ❖ Reduction of ground vibration
- ❖ Reduction in air blast
- ❖ Reduction in over break
- ❖ Improved fragmentation
- ❖ Better control of fly rock

Blasting program for the production per day

No of holes	: 23 holes
Yield	: 93m ³
Total explosive required	: 9.86kg-Slurry explosives
Charge per hole	: 0.5kg
Blasting at day time only	: 12.0p.m-1.0p.m

c)	Powder factor in ore and overburden / waste / development heading / stope	: Powder factor is proposed as 0.11kg per hole of explosives
d)	Whether secondary blasting is needed, if so describe it briefly	There is no secondary blasting involved.
e)	Storage of explosives (like capacity and type of explosive magazine)	1. The applicant is advised to engage an authorized explosive agency to carry out blasting. 2. First Aid Box will be keeping ready at all the time.

		3. Necessary precautionary announcement will be carried out before the blasting operation.
6.	MINE DRAINAGE:	
a)	Likely depth of water table based on observations from nearby wells and water bodies	: The ground water table is reported as of 65m in summer and 60m in rainy season from the general ground level observed in the adjacent bore well.
b)	Workings expected to be _____ m. above / reach below water table by the year _____.	: Proposed mining depth is 30m below ground level. Now, the present Mining lease shall be proposed above the water table and hence, quarrying may not affect the ground water.
c)	Quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged	: The ground water may not rise immediately in this type of mining. However, the rain water percolation and collection of water from the seepage shall be less than 300 L pm and it shall be pumped out periodically by a stand by diesel powered Centrifugal pump motivated with 7.5 H.P. Motor. The quality of water is potable and it is not contaminated with any hazardous things.
7.	STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE:	
a).	Indicate briefly the nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the years: No other wastes are removed during years.	
b).	Land chosen for disposal of waste with proposed justification	: There is no waste are proposed.
c).	Attach a note indicating the manner of disposal and configuration, sequence of buildup of dumps along with	: The recovery of rough stone in this quarry is 100%. If rough stone may be unsold will be keep within the lease boundary.



	the proposals for the stacking of sub-grade ore, to be indicated Year wise.	
8.	USE OF MINERAL:	
a).	Describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)	: The excavated stone materials will be supplied to the consumers like stone pillar, sized stone, etc. For instance, aggregates are mostly used for building, roads and footpaths., etc
b).	Indicate physical and chemical specifications stipulated by buyers	: Basically, the materials produced at this quarry are rough stone (charnockite) and gravel the same are used for building materials and road metal. So, there is no chemical specifications are specified. Only physical specifications are involved.
c).	Give details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers.	: Not blending process is involved, after blasting the rough stone and gravel will be directly loaded to the needy customer.
9.	OTHERS	
	Describe briefly the following a) Site services	: Infrastructure required for such mines like office, stores, canteen, first aid station, shelter latrine and bath rooms have been provided as per the Metalliferous Mines Regulations, 1961 as a welfare amenity for our quarry laborers.
	b) Employment potential: As per Mines safety under the provisions of Metalliferous Mines Rules, 1961 under the Mines Act, 1952, whenever the workers are employed more than 10, it is preferred to have a qualified Mining Mate to keep all the production workers directly under his control and supervision. The following man power is proposed for quarrying stone material during the five years period the same manpower will be utilize for this mining plan period to achieve the proposed production and to comply the provisions of as per	

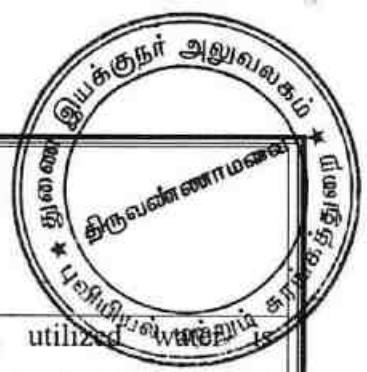


the MMR, 1961 norms.

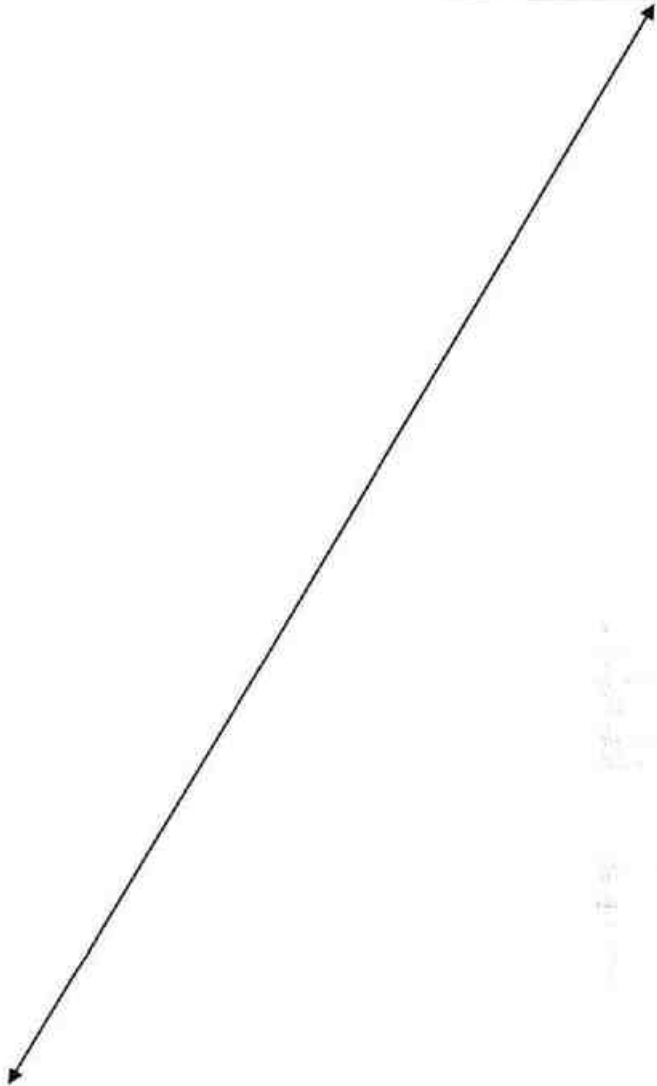
1.	Highly Skilled	Mines Manager	1 No
		Mine Engineer	1 No
		Mine Geologist	1 No
		Blaster	1 No
2.	Unskilled	Musdoor / Labours	16 No's
Total =			20 No's

10 MINERAL PROCESSING/BENEFICIATIONS:

(a)	If processing / beneficiations of the ore or minerals mined is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the processing /beneficiation. This should indicate size and grade of feed material and concentrate (finished marketable product), recovery rate.	:	Excavated rough stone minerals directly will be used by the applicant for required size ½, ¾ and 1½ inches Jelly which are mainly used in road and building construction purpose. The recovery of rough stone in this quarry is 100%.
(b)	Explain the disposal method for tailings or waste from the processing plant (quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailing dam).	:	No water shall be used for quarrying or any other processing except drinking water to be drawn from public sources. Some stagnation of rain water in the pit shall be used for drilling and spraying haul roads. Therefore, need for tailing dam doesn't arise. But tailing control of rain water flow during rainy season has to be done by decanting the SPM in a pit before passing the water in to natural system.
(c)	A flow sheet or schematic diagram of the processing procedure should be attached.	:	Not applicable.
(d)	Specify quantity and type of chemicals to be used in the processing plant.	:	Not applicable



(e)	Specify quantity and type of chemicals to be stored on site / plant.	: Not applicable
(f)	Indicate quantity (cu.m. per day) of water required for mining and processing and sources of supply of water. Disposal of water and of recycling.	: Drinking is 0.2KLD, utilized water is 0.8KLD, Dust suppression is 1.2KLD and Green Belt is 1.3KLD. Minimum quantity of water 3.5KLD per day. It is proposed to make an authorized water vendors for drinking water, dust suppression. The workers utilized water will be used for green belt development. The sewage water to a tune of 0.9KLD generated from the mine office toilet and mine labour toilet will be diverted to the septic tank followed by soak pit.

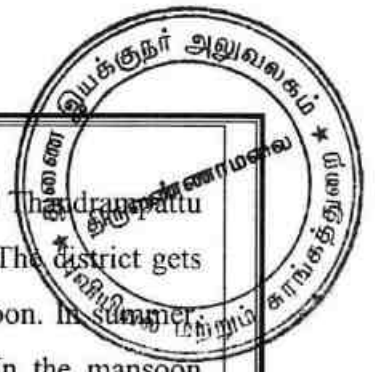


PART – B

11.0 ENVIRONMENTAL MANAGEMENT PLAN:

a) Attach a note on the status of Baseline information with regard to the Following:

11.1	Fresh lease land use pattern indicating the area already degraded due to quarrying /pitting, dumping, roads, processing plant, workshop, township etc in a tabular form. The present land use pattern is given as below.																									
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11.2	Water Regime	: Water table in this area is noticed at a depth of 65m in summer and 60m in rainy season from the general ground level and presently the quarrying of rough stone is ultimate up to a depth of 30m below ground level. Hence, it will not affect the ground water depletion of this area. It is proposed to make an authorized water vendors for drinking water, dust suppression. The workers utilized water will be used for green belt development.																								
11.3	Flora and Fauna	: There is no major flora observed in this area and except bushes, shrubs, no other valuable trees are noticed in the lease area. Further, neither flora of botanical interest nor fauna of zoological interest is noticed in this area.																								
11.4	Quality of air, ambient noise level and water	: Air or dust expected to be generated from drilling process, hauling roads, places of excavation etc., will be suppressed by periodical wetting of land by water spraying. Quarrying of rough stone will be carried out by drilling and blasting by using low power explosives, and hence, noise will be very minimum. However, periodical noise level monitoring will be carried out every six months around the quarry site.																								



11.5	Climatic conditions: This district has moderate climate. In Tiruvannamalai and Thandrapattu taluks, the climate is cool in winter and hot during summer. The district gets rainfall during both north-east monsoon and southwest monsoon. In summer, from march to June, the wind is hot and uncomfortable. In the monsoon season, from July to November, the wind is mild and from December to February, the wind is cold. The hottest month in this district was April (36.3°C) and coldest month in this district was January (21.2°C). The general climate is tropical. The district receives rainfall from Northeast and Southwest monsoons. The total rainfall during 2016-17 districts is 635.8mm.																										
11.6	Human Settlement: The nearest villages are found in the buffer zone with population as per 2011 census. <table><tr><th>S.No</th><th>Village</th><th>Direction</th><th>Distance in Kms</th><th>Population</th></tr><tr><td>1</td><td>Maruthadu</td><td>North</td><td>1.4km</td><td>8103</td></tr><tr><td>2</td><td>Kottai</td><td>East</td><td>2.8km</td><td>2343</td></tr><tr><td>3</td><td>Punnai</td><td>South</td><td>1.6km</td><td>1909</td></tr><tr><td>4</td><td>Kodanallur</td><td>West</td><td>2.5km</td><td>1009</td></tr></table>		S.No	Village	Direction	Distance in Kms	Population	1	Maruthadu	North	1.4km	8103	2	Kottai	East	2.8km	2343	3	Punnai	South	1.6km	1909	4	Kodanallur	West	2.5km	1009
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3	Punnai	South	1.6km	1909																							
4	Kodanallur	West	2.5km	1009																							
11.7	Public buildings, places of worship and monuments	: No infrastructure like residential building, are found within radius of 300m. The places of special interest like archeological monuments, Sanctuaries, etc., are found around 10km radius.																									
11.8	Attach plans showing the locations of sampling stations	: The proposed Ambient air quality, Water quality Ambient noise level and vibration are periodically tested for every season (6 months once) around 5km radius as per the guidance of MoEF and EIA Notification 2006 and also covering DGMS norms.																									
11.9	Does area (partly or fully) fall under notified area under Water (Prevention & Control of Pollution), Act, 1974	: The proposed area not fall under notified area under Water (Prevention & Control of Pollution), Act, 1974																									

M. Karthikeya

b) Attach an Environmental Impact Assessment Statement describing the impact of Mining and beneficiation on environment on the following over the next five years (and upto conceptual plan period for 'A' category mines)

i) Land area indicating the area likely to be degraded due to quarrying, pitting, dumping, roads, workshop, processing plant, township etc.

Due to quarrying and exploitation of the rough stone, there will impact in the form i.e. change in the ground profile, pits, and dumps. The details of the land use pattern, during the ensuing plan period and till lease period is shown in the tabular form:

Sl. No.	Land Use	Area in use during the quarrying period (Hect.)
1	Area under Mining	1.44.85
2	Infrastructure	0.02.0
3	Roads	0.03.0
4	Green Belt	0.39.73
5	Un-Utilized Area	Nil
6	Drainage & Settling Tank	0.06.45
Grand Total		1.96.03

ii).	Air Quality	Air or dust expected to be generated from drilling process, hauling roads, places of excavation etc., will be suppressed by periodical wetting of land by water spraying.
iii).	Water quality	A water sample from the open/bore wells was tested to NABL approved lab to assess hardness, Salinity, colour, Specific gravity, etc.
iv).	Noise levels	Quarrying of rough stone will be carried out by drilling and blasting by using low power explosives, and hence, noise will be very minimum. However, periodical noise level monitoring will be carried out every six months around the quarry site.
v).	Vibration levels (due to blasting)	No deep hole blasting envisaged. Small dia shot holes are used for breaking boulders. The maximum peak particles velocity shall be recoded using mini seismograph devises as per the guidance of MoEF and EIA Notification 2006 and also covering DGMS norms.
vi).	Water regime	No major river or any odai track are found around 50m radius.

vii).	Socio-economics	1. To provide Employment opportunities of the nearby villagers. 2. For the cultural development of the nearby villagers.
viii).	Historical monuments etc.	There are no historical monuments, etc found around 300m radius.

c) Attach an Environmental Management Plan (supported by appropriate plans and sections) defining the time bound action proposed to be taken with sequence & timing in the following areas (or diagrams should be used):

i).	temporary storage and utilization of topsoil	:	No separate of topsoil will be removed.
ii).	Yearwise proposal for reclamation of land affected by abandoned quarries and other mining activities during five years (and upto conceptual plan period for 'A' category mines) clarifying the extent of back filling and re-contouring and / or alternative use of unfilled / partially filled excavations / road sides / slopes and mine. In case abandoned quarries/ pits are proposed to be used as reservoir, their size, water holding capacity and proposal for utilization of such water be given.	:	The present mining is proposed depth of 30m from below the ground level has been envisaged as workable depth for safe & economic mining during the lease period. The mined-out area will be fenced on top of working bench with S1 fencing. No immediate proposals for closure of pit as the rough stone persist still at deeper level.

iii). *Programme of afforestation, Yearwise for the initial five years (and upto conceptual plan period for 'A' category mines) indicating the number of plants with name of species to be afforested under different areas in hectares.*

Green Belt Development:

Safety barrier, nearby school area and Nearest Panchayat approach Roads has been identified to be utilized for Greenbelt appropriate native species of Neem, Pungan and other regional trees will be planted in a phased manner as described below

Year	Place	Area in Sq.m	No.of Plants	Rate of survival	Rate	Amount in Rs
First	Lease Boundary	3973	500	80%	@100 Rs Per sapling	50,000/-
Second	Approach	—	300	80%		30,000/-

		road and Nearby Village Road					
	Third	Schools	--	300	80%		
	Total						30,000/-
iv).	Stabilization and vegetation of dumps along with waste dump management Year wise for the five years (and upto conceptual plan period for 'A' category mines).			:	No waste or rejects shall be proposed.		
v).	Measures to control erosion / sedimentation of water courses.			:	Not applicable. There is no major dumps are stabilize in this quarry area.		
vi).	Treatment and disposal of water from mine.			:	It will not be harmful and it does not require any treatment before discharging into the natural courses.		
vii).	Measures for minimizing adverse effects on water regime.			:	There is no water to be pumped out will be very pure and portable and therefore, it will not affect any water regime surrounding the quarry.		
viii).	Protective measures for ground vibrations / air blast caused by blasting,			:	It is a small "B" category open cast, semi mechanized mining and no heavy machinery shall be used. The only smooth blasting is proposed, therefore no change for ground vibration or noise from the quarry.		
ix).	Measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity.			:	No historical monuments and for rehabilitation of human settlements doesn't to be disturbed during mining activity.		
x).	Socioeconomic benefits arising out of mining.			:	The nearest villages are will get employment benefits.		

d). *Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only)*

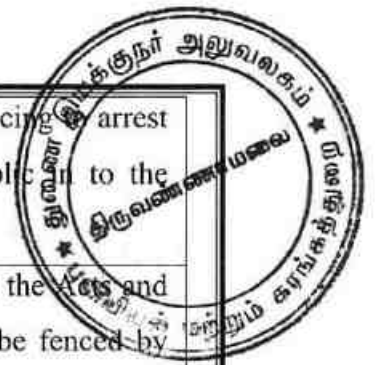
Not applicable. It is B category quarry

12.0 PROGRESSIVE QUARRY CLOSURE PLAN:

12.1	Steps proposed for phased restoration, reclamation of already mined out area.	:	The Ultimate mining is proposed to an average depth of 30m below ground level. The mined-out area will be fenced on top

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		of working bench with S1 fencing to arrest the entry of cattle's and public to the quarry site.
12.2	Measures to be under taken on mine closure as per Act & Rules	: Measures will be taken as per the Acts and Rules. The quarried pit will be fenced by Barbed wire fencing. Green belt development at the rate of 500 trees will be proposed in the quarry area. No immediate proposals for closure of pit as the rough stone persist still at deeper level.
12.3	Mitigation measures to be undertaken for safety and restoration/ reclamation of the already mined out area	: The quarry lease is a fresh mining lease, no mitigation measures observed.
12.4	Mine closure activity	: The present mining plan is proposed to depth of 30m below ground level has been envisaged as workable depth for safe & economic mining during the lease period. The mined-out area will be fenced on top of open cast working with S1 fencing. No immediate proposals for closure of pit as the rough stone persist still at deeper level.
12.5	Safety and security	: Safety measures implement to the prevent access to surface opening excavations will be taken as Metalliferous mine regulations, 1961, it is a small open cast mining method adopted. Safety provisions like helmet, goggles, safety shoes, Dust mask, Ear muffs etc have to be provided as per the circulars and amendments made for Mine labours under the guidance of DGMS being a mechanized operation.
12.6	Disaster management and Risk Assessment	: Open cast mining method is adopted in this quarry. If the benches are made with





			proposed height and with no risk will be there. Even then if any minor or major accident happens the quarry staffs having First aid facilities with first aid box, necessary medicine and stretches etc., to give first aid treatment at the site and will arrange immediately the vehicle to reach nearest hospital, if any disaster happens the lessee is capable to meet such eventualities. At the time of any accident during mining activity, proposal of first aid facility at quarry and one vehicle always ready at quarry site.
12.7	Care and maintenance during temporary discontinuance	:	A board of discontinuance will be changed on the main entrance of the working place. One watch man will be kept on the quarry area for security purposes also look after the survival of the plants.
12.8	Economic repercussions of closure of quarry and man power entrenchments	:	During the five years mining period the employment potential will be generated, general financial status and socio-economic conditions of approx. 20 labors will be improved.

12.9 Proposed Financial Estimate / Budget for (EMP) Environment Management:

A	Fixed Asset Cost:		
	1. Land Cost (Consent Land)	:	Rs. 24,00,000/-
	2. Labour Shed	:	Rs. 1,00,000/-
	3. Sanitary Facility	:	Rs. 1,00,000/-
	4. Fencing	:	Rs. 3,00,000/-
	5. Other expenses (Security guard, dust bin, etc)	:	Rs. 4,00,000/-
	Total	:	Rs. 33,00,000/-

B	B. Machinery cost	: Rs. 25,00,000/- (Hire Rs. 25,00,000/-)
C	Total Expenditure of EMP cost (for Ten years)	
	1. Drinking Water Facility	: Rs. 1,00,000/-
	2. Sanitary facility & Maintenance	: Rs. 2,00,000/-
	3. Permanent water sprinkler	: Rs. 1,50,000/-
	4. Afforestation and its maintenance	: Rs. 1,10,000
	5. Safety Kits	: Rs. 1,00,000/-
	6. Provision of tyre washing facility	: Rs. 1,50,000/-
	7. Blasting materials with blast mat cost	: Rs. 10,00,000/-
	8. Drainage & Settling Tank (0.06.45Hect or 645 Sq.m x 400)	Rs. 2,58,000/-
	9. Environment monitoring	: Rs. 5,00,000/-
	Total	: Rs. 25,68,000/-
D	Total Project Cost (A+B+C)	: Rs. 83,68,000/-

13.0 FINANCIAL ASSURANCE:

Not applicable, it is a small "B" rough stone and gravel quarry.

14.0 CERTIFICATES:

All required certificates are enclosed.

15.0 PLAN AND SECTIONS, ETC:

Plan and Sections are submitted along with mining plan.

16.0 ANY OTHER DETAILS INTEND TO FURNISH BY THE APPLICANT

- Care and precautionary measures will be taken for the safety of workers as per Rules and Acts.
- The applicant will endeavor every attempt to quarry the rough stone economically without any wastage and to improve the environment and ecology.
- The Mining Plan is prepared by incorporating the conditions stipulated in the precise area communication issued by Deputy Director, Department of Geology and Mining, Tiruvannamalai vide letter **Roc.No.452/Mines/2025 Dated 14.07.2025.**
- Total proposed production of rough stone is **261380m³ / 718795MT** and gravel is **47070m³ / 94140MT** up to a depth of 30m below ground level for ten years lease period. (Refer Plate No.VIA).

17.0 CSR Expenditure:

CSR (Corporate Social responsibility) shall provide by the applicant 2.0% of average net profit of the company for the last three financial years to the nearby village on the Ministry has notified the amendments in section 135 of the Act as well in the CSR Rules on 22nd January 2021 as circular no. CSR-05/01/2021-CSR-MCA dated 25th August 2021.

Place: Salem, TN

Date:

Signature of the Qualified Person

P. VELLAIYAN, M.Sc, M.Phil.,
Qualified Person
D.No. 6-106-B, Athirampatti (Vill),
Amaragundhi Panchayat & Post,
Omair Taluk, Salem District - 636503.

This Mining Plan is Approved
Subject to the Conditions/Stipulation
Indicated In The Mining Plan Approval
Letter No. 452/mines/2025 Dt: 17-7-2025
Office Of The Deputy Director Of
Geology And Mining, Tiruvannamalai.

Deputy Director,
Geology and Mining,
Tiruvannamalai.

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17/7/25

M. K. K. K.

ந.க.எண்.452/கனிமம்/2025

துணை இயக்குநர் அலுவலகம்,

மாவட்ட ஆட்சியர் அலுவலகம்

வளாகம், திருவண்ணாமலை

நாள். 14.07.2025

குறிப்பாணை

பொருள்: கனிமங்களும் குவாரிகளும் - கல்குவாரிகள் - திருவண்ணாமலை மாவட்டம் வந்தவாசி வட்டம் மருதாடு கிராம புல எண்கள். 973/1, 973/7B, 975/2, 977 & 978/2 ஆகியவற்றின் மொத்தப்பரப்பு 1.96.03 ஹெக்டேர் பரப்பில் - சாதாரண கற்கள் மற்றும் கிராவல் மண் வெட்டியெடுக்க குவாரி குத்தகை உரிமம் வழங்கக்கோரி திரு.எம்.கார்த்திகேயன் த/பெ.மனோகரன் என்பவர் இணையதளத்தில் விண்ணப்பம் செய்தது - அறிக்கைகள் வரப்பெற்றது - புலத்தணிக்கை செய்யப்பட்டது - தகுதியான நிலப்பரப்பாக கருதி ஏற்பளிக்கப்பட்ட சுரங்கதிட்டம் மற்றும் சுற்றுச்சூழல் தாக்க மதிப்பீட்டு ஆணைய தடையின்மை சான்று பெற்று சமர்ப்பிக்க கோருதல் தொடர்பாக.

- பார்வை: 1. திரு.எம்.கார்த்திகேயன் த/பெ.மனோகரன் என்பவரின் இணையதள விண்ணப்பம் எண். 25TVM0403450 நாள். 16.06.2025.
2. இவ்வலுவலக கடிதம் இதே எண். நாள். 18.06.2025.
3. வட்டாட்சியர், வந்தவாசி அவர்களின் ந.க.ஆ1/4333/2025, நாள்.25.06.2025.
4. வருவாய் கோட்ட அலுவலர் (மு.க.பொ.) செய்யார் அவர்களின் ந.க.அ5/3646/2025, நாள். 02.07.2025.
5. உதவி புவியியலாளர், புவியியல் மற்றும் சுரங்கத்துறை அவர்களின் புலத்தணிக்கை நாள். 12.07.2025.
6. மற்றும் உரிய ஆவணங்கள்

பார்வையில் காணும் கடிதங்களின் மீது கனிவான கவனம் வேண்டப்படுகிறது.

2) திருவண்ணாமலை மாவட்டம், வந்தவாசி வட்டம், மருதநாடு கிராம புல எண்கள். 973/1 (0.47.0), 973/7B (0.03.23), 975/2 (0.07.30), 977 (0.02.50) & 978/2 (1.36.00)ல் மொத்தப்பரப்பு 1.96.03 ஹெக்டேர் பரப்பில் சாதாரண கற்கள் / கிராவல் மண் குவாரி செய்ய 10 ஆண்டுகளுக்கு குத்தகை உரிமம் வழங்கக்கோரி திரு.எம்.கார்த்திகேயன் த/பெ.மனோகரன் என்பவர்

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இணையதளத்தின் மூலம் உரிய ஆவணங்களுடன் 16.06.2022 அன்று விண்ணப்பம் அளித்துள்ளார்.



3. மேற்கண்ட விண்ணப்பம் தொடர்பாக வட்டாட்சியர், வருவாய் திட்ட அலுவலர் (மு.கூ.பொ), செய்யார் மற்றும் உதவி புவிமியலாளர் (கனிமம்) திருவண்ணாமலை ஆகியோர் புலத்தணிக்கை மேற்கொண்டு திருவண்ணாமலை மாவட்டம், வந்தவாசி வட்டம், மருதாடு கிராம புல எண்கள். 973/1 (0.47.0), 973/7B (0.03.23), 975/2 (0.07.30), 977 (0.02.50) & 978/2 (1.36.00)ல் மொத்தப்பரப்பு 1.96.03 ஹெக்டேரில் மட்டும் திரு.எம்.கார்த்திகேயன் த/பெமனோகரன் என்பவருக்கு கிராவல் மண் மற்றும் சாதாரண கற்குவாரி உரிமம் வழங்க ஏற்கனவே குவாரி பணி செய்யாத புலம் என்பதால் 10 ஆண்டு காலத்திற்கு கீழ்க்கண்ட நிபந்தனைகளுக்கு உட்பட்டு அனுமதி வழங்கலாம் என பரிந்துரை செய்துள்ளனர்.

நிபந்தனைகள்

- 1959-ம் வருடத்திய தமிழ்நாடு சிறு கனிம சலுகை விதிகள், அட்டவணை II-ல் கண்டுள்ளபடி குவாரி செய்யப்படும் கனிமங்களுக்கு சீனியரேஜ் தொகை அவ்வப்போது செலுத்தி கனிமம் கொண்டு செல்லப்பட வேண்டும்.
- அருகில் உள்ள பட்டா நிலங்களுக்கு 7.5மீ. மற்றும் அரசு நிலங்களுக்கு 10 மீ. பாதுகாப்பு இடைவெளியும் விட வேண்டும்.
- அனுபவம் வாய்ந்த வெடிபொருள் பயன்படுத்துவோர் மூலம் குறைந்த அளவு சக்தி கொண்ட வெடிபொருட்களை பயன்படுத்தி அருகிலுள்ள பட்டாதாரர்களுக்கு எவ்வித இடையூறுமின்றி / அருகிலுள்ள பட்டா மற்றும் அரசு புலங்களில் எவ்வித ஆக்கிரமிப்பும் இன்றி குவாரிப் பணி மேற்கொள்ள வேண்டும்.
- விதிகளின்படி ஏற்பளிக்கப்பட்ட சுரங்கத்திட்டத்தினை உரிய காலத்திற்குள் சமர்ப்பிக்க வேண்டும்.
- குவாரி உரிமம் வழங்க உள்ள பகுதிக்கு சுற்றுச்சூழல் தாக்க மதிப்பீட்டு ஆணையத்தின் தடையின்மை சான்று பெற்று சமர்ப்பிக்கும் பட்சத்தில் மட்டுமே குவாரி உரிமம் வழங்கப்படும்.

5. இயக்குநர், புவிமியல் மற்றும் சுரங்கத்துறை, சென்னை அவர்களின் 10.08.2020 நாளிட்ட கடிதத்துடன் இணைத்து வரப்பெற்ற அரசாணை எண்.169, தொழில் துறை (எம்.எம்.சி-1) நாள் 04.08.2020-ன்படி பட்டா

M. Karthikeyan



புலங்களில் கிராவல், சாதாரண வகை கற்கள் ஆகிய சிறுகளில் உரிமம் வழங்கும் நேர்வுகளில் நடவடிக்கை எடுக்க விதி 19 மற்றும் 33-ல் திருவண்ணாமலை மாவட்டம் ஆட்சியருக்கு வழங்கப்பட்ட அதிகாரம் தற்போது சம்மந்தப்பட்ட உதவித் துணை இயக்குநர் அவர்களுக்கு மாற்றி வழங்க உத்தரவிடப்பட்டுள்ளது.

6. எனவே, வட்டாட்சியர், வருவாய் கோட்ட அலுவலர் (மு.க.பொ), செய்யார் மற்றும் உதவி புவியியலாளர் (கனிமம்) திருவண்ணாமலை ஆகியோரின் பரிந்துரைகள், நிபந்தனைகள் மற்றும் மனுதாரரின் கோரிக்கையின் அடிப்படையில், திருவண்ணாமலை மாவட்டம், வந்தவாசி வட்டம், மருதநாடு கிராம புல எண்கள். 973/1 (0.47.0), 973/7B (0.03.23), 975/2 (0.07.30), 977 (0.02.50) & 978/2 (1.36.00)ல் மொத்தப்பரப்பு 1.96.03 ஹெக்டேரில் 1959-ம் வருட தமிழ்நாடு சிறுகனிம விதிகள், விதி எண்.19-ன்படி மேற்கண்ட நிபந்தனைகளுக்குட்பட்டு 10 (பத்து) வருட காலத்திற்கு திரு.எம்.கார்த்திகேயன் த/பெ.மனோகரன் கிராவல் / சாதாரண கற்கள் குவாரி உரிமம் வழங்குவதற்குரிய தகுதியான நிலப்பரப்பாக கருதப்படுகிறது.

7. மேலும், தமிழ்நாடு சிறுகனிம சலுகை விதிகள் 1959, விதி 41-ன்படி குவாரிப் பணி மேற்கொள்வது தொடர்பாக, வரைவு சுரங்க திட்டத்தினை 90 தினங்களுக்குள் சமர்ப்பிக்குமாறு மனுதாரரைக் கேட்டுக் கொள்ளப்படுகிறது. மேலும் ஏற்பளிக்கப்பட்ட சுரங்கத்திட்டத்தின் தொடர்ச்சியாக 1959-ம் வருடத்திய தமிழ்நாடு சிறு கனிம சலுகை விதிகள், விதி எண்.42-ன்படி சுற்றுச் சூழல் தாக்க மதிப்பீட்டு ஆணையத்தின் தடையின்மை சான்று பெற்று சமர்ப்பிக்கும் பட்சத்தில் மட்டுமே குவாரி உரிமம் வழங்கப்படும் என இதன் மூலம் தெரிவிக்கப்படுகிறது.

14.07.74

துணை இயக்குநர்,
புவியியல் மற்றும் சுரங்கத்துறை,
திருவண்ணாமலை.

பெறுநர்
திரு.ம.கார்த்திகேயன்,
த/பெ.மனோகரன்,
எண்.2/21, மேற்கு தெரு,
வடமலைப்பேட்டை,
முசிறி வட்டம், தத்தியெங்கர்பேட்டை,
திருச்சி.
நகல்.

1. தலைவர், மாநில சுற்றுச்சூழல் தாக்க மதிப்பீட்டு ஆணையம், சென்னை
2. ஆணையர், புவியியல் மற்றும் சுரங்கத்துறை, சென்னை-32.

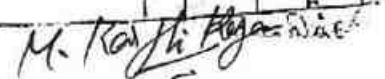
M. K. K. K.

திராமம்

பெயர்.

பரப்ப: ஷெக்லேடா

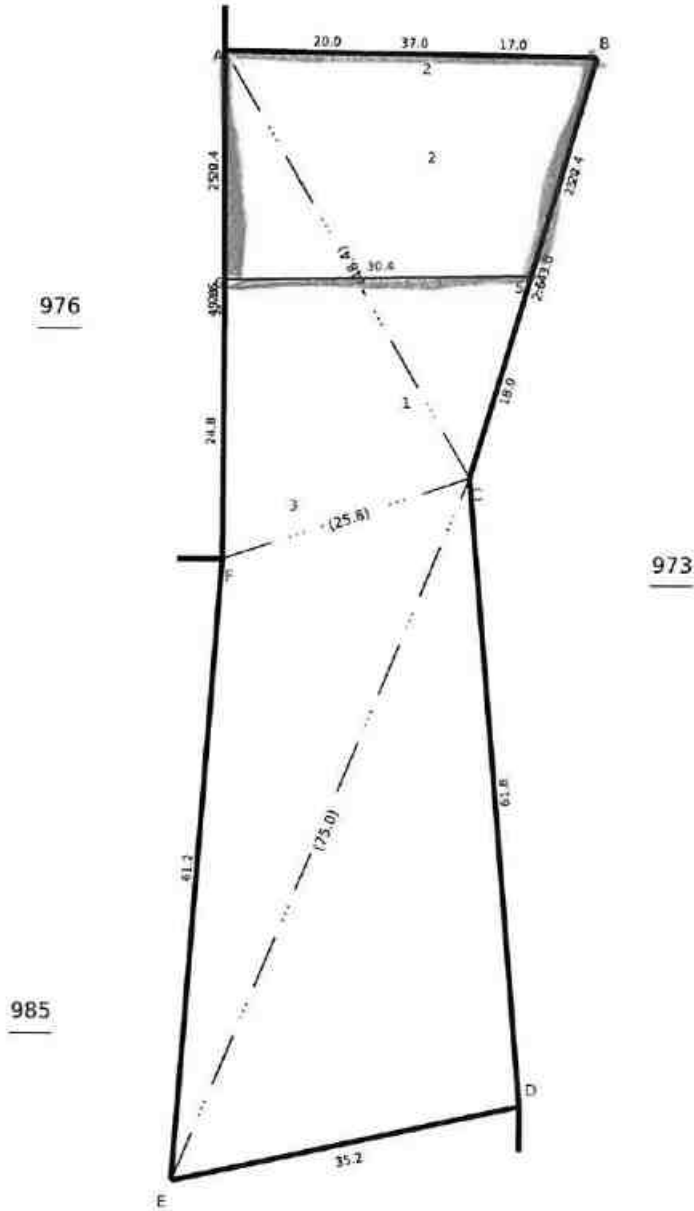
4



District : Tiruvannamalai
Taluk : Vandavasi
Village : Maruthadu [176]



Survey No : 975
Area : Hect 00 Ares 31.50
Scale : 1 : 500



LEASE APPLIED AREA



M. Rajagopalnususamy

Data Digitally Signed By
RAJAGOPALPONNUSAMY

Date of Issue: 14-07-2025 21:21:59

Survey and Settlement Department, Government of TamilNadu

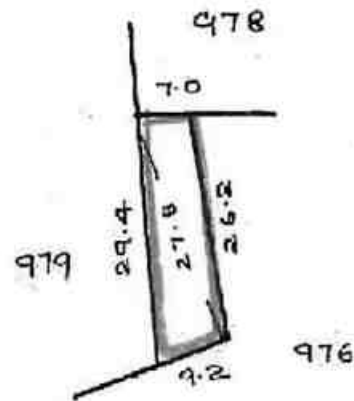
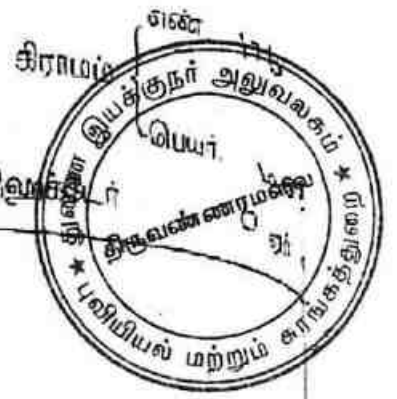


மாவட்டம். வடாற்காடு

வட்டம். சாந்திவாதி.

புலஎண். 977

பரப்பு: ஹெக்டேர்



12 கி.மீ. க்குள்

சு. இராசசுந்தரன்
12-06-2008
திராம நிர்வாக அலுவலர்
33, மந்தாடி திராமம்
வந்தவாசி வட்டம், தி.மலை மாவட்டம்.

LEASE APPLIED AREA



M. K. S. / S. S.

		2	3	4	5	6	7	8	9	10
									கு. பை.	கு. பை.
972	SB	972	ர	பு	...	8-4	6	2 00	0 17.0	0 34
		-3பா								
	4A	-4A	ர	பு	...	8-4	6	2 00	0 63.0	1 20
	4B	-4B	ர	பு	...	8-4	6	2 00	0 51.5	1 02
	5A	-5பா	ர	பு	...	8-4	6	2 00	0 42.0	0 84
	5B	-5பா	ர	பு	...	8-4	6	2 00	0 62.0	1 24
									4 39.5	8 78
973	1	973-1	ர	பு	...	8-5	7	1 24	0 47.0	0 58
	2	-2	ர	பு	...	8-5	7	1 24	0 62.0	0 76
	3	-3	ர	பு	...	8-5	7	1 24	0 26.5	0 32
	4	-4	ர	பு	...	8-5	7	1 24	0 27.5	0 34
	5	-5	ர	பு	...	8-5	7	1 24	0 39.5	0 47
	6	-6	ர	பு	...	8-5	7	1 24	0 14.0	0 17
	7	-7	ர	பு	...	8-5	7	1 24	0 53.5	0 66
	8	-8	ர	பு	...	8-5	7	1 24	0 88.0	1 09
	9	-9	ர	பு	...	8-5	7	1 24	0 26.5	0 32
	10A	-10A	ர	பு	...	8-5	7	1 24	0 15.0	0 19
	10B	-10B	ர	பு	...	8-5	7	1 24	0 13.5	0 16
	11A	-11A	ர	பு	...	8-5	7	1 24	0 26.5	0 32
	11B	-11B	ர	பு	...	8-5	7	1 24	0 14.5	0 17



1373

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1004

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381

1824

1456

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1376

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87

கு. பை. ஹெ. எர்ஸ். கு. பை.

1373 ஜெனரல் கவுண்டர்.

376 ஜெனரல் கவுண்டர்.

91 ப. அ. கவுண்டர்.

88 ப. அ. கவுண்டர்.

264 ந. காசி கவுண்டர்.

101 வி. ஆறுமுக கவுண்டர்.

1004 அ. பாண்டி கவுண்டர்.

462 பெ. சாலை கவுண்டர்.

462 பெ. சாலை கவுண்டர்.

462 பெ. சாலை கவுண்டர்.

462 பெ. சாலை கவுண்டர்.

462 பெ. சாலை கவுண்டர்.

381 வி. கோபால் கவுண்டர்.

1824 பெ. ஜெனரல் கவுண்டர் மற்றும் ப. அ. கவுண்டர்.

1456 அ. ஆனந்தன் கவுண்டர் (1) பெ. ஜெனரல் கவுண்டர் (2)

1376 பெ. ஜெனரல் கவுண்டர்.

1379 அ. ஜெனரல் கவுண்டர்.

1376 பெ. ஜெனரல் கவுண்டர்.

87 ப. அ. கவுண்டர்.

87 ப. அ. கவுண்டர்.

87 ப. அ. கவுண்டர்.

விவரப்படியானவை பார்க்கவும்.



11

1	2	3	4	5	6	7	8	9	10
								கு. பை. ஹெ. ஏர்ஸ். கு. பை.	
73	11C 973 -11பா	ர	பு	...	8-5	7	1 24	0 11.0	0 14
								4 64.0	5 69
74	974	ர	பு	...	8-5	7	1 24	0 48.0	0 59
75	975	ர	பு	...	8-5	7	1 24	0 31.5	0 63
76	976	ர	பு	...	8-5	7	1 24	0 62.5	0 77
77	977	ர	பு	...	8-5	7	1 24	0 02.5	0 06
78	1A 978 -1பா	ர	பு	...	8-5	7	1 24	1 37.5	1 70
	1B -1பா	ர	பு	...	8-5	7	1 24	0 01.5	0 06
	2 -2	ர	பு	...	8-5	7	1 24	1 36.0	1 61
								2 75.0	3 37
79	1 979-1	ர	பு	...	8-4	6	2 00	0 76.0	1 52
	2A -2பா	ர	பு	...	8-4	6	2 00	0 31.0	0 62
	2B -2பா	ர	பு	...	8-4	6	2 00	0 36.0	0 72
	3A -3பா	ர	பு	...	8-4	6	2 00	0 33.0	0 66
	3B -3பா	ர	பு	...	8-4	6	2 00	0 36.5	0 73
	4A -4பா	ர	பு	...	8-4	6	2 00	0 11.0	0 22
	4B -4பா	ர	பு	...	8-4	6	2 00	0 55.5	1 10
								2 79.0	5 57

134 கு. இருச
கவுண்டர்.

1377 பெ. ஜெயபால்
கவுண்டர்.

381 வீ. கோபால்
சாமி கவுண்டர்.

1029 மா. முருகேச
கவுண்டர்.

101 சி. ஆறுமுக
கவுண்டர்.

1453 மு. ஜெனார்த
தன கவுண்டர் (1),
சி. ஆறுமுக
கவுண்டர் (2).

1373 மு. ஜெனார்த
தன கவுண்டர்.

101 சி. ஆறுமுக
கவுண்டர்.

546 ப. சீனிவாச
கவுண்டர்.

951 கு. பொன்னம்,
மாள்.

1381 பெ. ஜெயம்
மாள்.

639 மு. தனசேகரட்டி
யம்மாள்.

639 மு. தனசேகரட்டி
யம்மாள்.

639 மு. தனசேகரட்டி
யம்மாள்.

1025 மா. முருகேச
கவுண்டர்.

12-06-2021
D. Saravanan
(13-06-2021)
கிராம நிர்வாக அலுவலர்
33, மருதாடு கிராமம்
வந்தவாசி வீட்டம், தி.மலை மாவட்டம்.

M. Kalyan Kumar

[illegible]

அ-பதிவேடு

District : Tiruvannamalai

Taluk : Vandavasi

Village : Maruthadu



Total For Survey Number- 973													
14	974	P	புதுவை	8-5	7	1	24	0	48.00	0	59	1253-தினேஸ்	WELL
15	975	P	புதுவை	8-5	7	1	24	0	31.50	0	63	2108-கோபால்சுவாமிநாதர் மற்றும் 1 நபர்(கள்)	DC LAND ADAMANAM
16	976	P	புதுவை	8-5	7	1	24	0	62.50	0	77	2169-முனியம்மாள் மற்றும் 1 நபர்(கள்)	DC LAND ADAMANAM
17	977	P	புதுவை	8-5	7	1	24	0	2.50	0	06	101-ஜெயமணி மற்றும் 3 நபர்(கள்)	JOINT WELL
18	978-1	P	புதுவை	8-5	7	1	24	1	37.50	1	70	1453-ஜெனார்த்தசுவாமி மற்றும் 1 நபர்(கள்)	JOINT WELL
19	978-1	P	புதுவை	8-5	7	1	24	0	1.50	0	08	1373-ஜெனார்த்தசுவாமிநாதர்	
20	978-2	P	புதுவை	8-5	7	1	24	1	36.00	1	61	101-ஜெயமணி மற்றும் 3 நபர்(கள்)	
Total For Survey Number- 978													
21	979-1	P	புதுவை	8-4	6	2	0	0	76.00	1	52	3612-ஆனந்தசுந்தரம்	WELL
22	979-2	P	புதுவை	8-4	6	2	0	0	31.00	0	62	4059-மூர்த்தி	
23	979-2	P	புதுவை	8-4	6	2	0	0	36.00	0	72	4416-ர.நர்மதா	
24	979-3A	P	புதுவை	8-4	6	2	0	0	33.00	0	66	4416-ர.நர்மதா	
25	979-3B	P	புதுவை	8-4	6	2	0	0	36.50	0	73	4416-ர.நர்மதா	
26	979-4	P	புதுவை	8-4	6	2	0	0	11.00	0	22	4416-ர.நர்மதா	DC LAND CONDITION ADAMANAM
27	979-4	P	புதுவை	8-4	6	2	0	0	55.50	1	10	4281-கோசுநாதன்	DC LAND ADAMANAM
Total For Survey Number- 979													
28	980-1	P	புதுவை	8-4	6	2	0	0	1.50	0	06	2016-தனம்மாள் மற்றும் 3 நபர்(கள்)	சுட்டு மேடு
29	980-1	P	புதுவை	8-4	6	2	0	0	51.50	1	02	4775-கனலச்செல்வன்	WASTE
30	980-1	P	புதுவை	8-4	6	2	0	0	24.00	0	48	4775-கனலச்செல்வன்	
31	980-1	P	புதுவை	8-4	6	2	0	0	40.00	0	80	4775-கனலச்செல்வன்	
32	980-1	P	புதுவை	8-4	6	2	0	0	63.50	1	30	4740-ஆறுமுகம் மற்றும் 1 நபர்(கள்)	WASTE
33	980-3	P	புதுவை	0-0	0	0	0	0	30.00	0	00	0	குட்டை
34	980-4	P	புதுவை	0-0	0	0	0	0	25.00	0	00	0	குட்டை
35	980-5	P	புதுவை	8-4	6	2	0	1	25.00	2	53	1373-ஜெனார்த்தசுவாமிநாதர்	DC LAND CONDITION ADAMANAM
Total For Survey Number- 980													
36	981-1	P	புதுவை	8-4	6	2	0	0	7.50	0	15	4072-K.S.சுவாமிநாதன்	
37	981-2	P	புதுவை	8-4	6	2	0	0	12.00	0	24	4072-K.S.சுவாமிநாதன்	
38	981-3	P	புதுவை	8-4	6	2	0	0	97.00	1	94	4756-ராஜகுமார்	WASTE
Total For Survey Number- 981													
39	982	P	புதுவை	8-4	6	2	0	0	42.00	0	84	4072-K.S.சுவாமிநாதன்	
40	983	P	புதுவை	0-0	0	0	0	0	41.00	0	00	0	குட்டை
41	984-1A	P	புதுவை	8-4	6	2	0	0	20.25	0	40	4443-வேங்கடேசன்	
42	984-1A	P	புதுவை	8-4	6	2	0	0	4.03	0	10	1452-ரங்கநாதசுவாமிநாதர் மற்றும் 1 நபர்(கள்)	
43	984-1A	P	புதுவை	8-4	6	2	0	0	36.72	0	70	1452-ரங்கநாதசுவாமிநாதர் மற்றும் 1 நபர்(கள்)	
44	984-1	P	புதுவை	8-4	6	2	0	0	21.00	0	40	3400-இளமதி	
45	984-2	P	புதுவை	8-4	6	2	0	0	17.00	0	34	4072-K.S.சுவாமிநாதன்	
46	984-2	P	புதுவை	8-4	6	2	0	0	27.00	0	54	4072-K.S.சுவாமிநாதன்	
47	984-2	P	புதுவை	8-4	6	2	0	0	34.50	0	69	4072-K.S.சுவாமிநாதன்	

சீராம நிரவர அலுவலர்
M. Keythi
மருதாடு சீராமம்
வந்தவாசி வட்டம், தி.மலை மாவட்டம்.



தமிழ்நாடு அரசு

வருவாய் மற்றும் பேரிடர் மேலாண்மைத் துறை

நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு

மாவட்டம் : திருவண்ணாமலை

வட்டம் : வந்தவாசி

வருவாய் கிராமம் : மருதாடு

பட்டா எண் : 5309

உரிமையாளர்கள் பெயர்

ராகேஷ்(எ)லோகேஸ்வரன்



ஆறுமுகம்		மகன்		ராகேஷ்(எ)லோகேஸ்வரன்		மற்றவை		குறிப்புகள்	
புல எண்	உட்பிரிவு	புன்செய்		தன்செய்		மற்றவை		குறிப்புகள்	
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை		
		ஹெக்ட - ஏர்	ரூ - பை	ஹெக்ட - ஏர்	ரூ - பை	ஹெக்ட - ஏர்	ரூ - பை		
973	1	0 - 47.00	0.58	--	--	--	--	2025/0103/06/459232- ----- Digitally signed:MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM	
973	7B	0 - 3.23	0.04	--	--	--	--	2025/0103/06/459232- -2024/06/06/000772SD ----- Digitally signed:MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM	
975	2	0 - 7.30	0.09	--	--	--	--	2025/0103/06/459232- -2024/06/06/000772SD ----- Digitally signed:MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM	
977	-	0 - 2.50	0.06	--	--	--	--	2025/0103/06/459232- ----- Digitally signed:MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM	
978	2	1 - 36.00	1.61	--	--	--	--	2025/0103/06/459232- ----- Digitally signed:MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM	
		1 - 96.03	2.38						

குறிப்பு :



- மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் <https://eservices.tn.gov.in> என்ற இணைய தளத்தில் P/06/06/176/05309/50657 என்ற குறிப்பு எண்ணை உள்ளிட்டு செய்து உறுதி செய்துகொள்ளவும்.
- இத் தகவல்கள் 13-06-2025 அன்று 02:36:07 PM நேரத்தில் அச்சடிக்கப்பட்டது.
- கைப்பேசி கேமராவின் 2D barcode படிப்பான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்

LEASE AGREEMENT

THIS LEASE AGREEMENT entered at Kilkdungalur on the 26th day of March 2025.

Between

Mr. **A.Rakesh @ A. Logeshwaran** (Aadhaar No. 9410 8502 1569 & PAN Card No. ADIPL9612L, Cell.9715642197.), son of late Mr. M.K.Arumugam, Hindu, aged about 54 years, residing at No.1, Palla Street, Marudhadu Village, Vandavasi Taluk, Tiruvannamalai District - 604 405, hereinafter called the '**LESSOR**' of the **FIRST PART**.

And

Mr. **Karthikeyan. M.** (Aadhaar No.6949 7463 3037, PAN : KCRP0198K, Cell. 9629873572), son of Mr. Manoharan, Hindu, aged about 32 Years, residing at No.2/21, West Street, Vadamalaipatti, Musiri Taluk, Thathiengarpeth, Trichy - 621 214, hereinafter called the '**LESSEE**' of the **OTHER PART**.

(The expressions '**LESSOR**' and '**LESSEE**' wherever they occur in these presents, shall unless the context otherwise admits, also mean and include their respective heirs, executors, legal representatives and assigns)

Whereas the LESSOR acquired the property mentioned schedule hereunder by a **Settlement Deed** executed by his mother 1).Mrs.A.Jeyamani, his sisters namely 2).Mrs.M.Surekha @ Thatchayini and 3).Mrs.A.Sumathi @ Ranjanikumari to and infavour of him vide **Doc. No. 17/2025**, dated 06.01.2025 registered at SRO, Kilkodungaloor.

M. Karthikeyan

1	பத்திரம்	2025	ம் வருத்திய	596
ஆவணம்	13	தாள்களைக் கொண்டது		
1	வது தாளில்	பதிவு அனுவரம்		

A. Logeshwaran

M. Karthikeyan



Whereas, ever since the LESSOR has been in continuous, uninterrupted, peaceful possession and enjoyment thereof with full powers in all respects without any let of hindrances, paying all taxes and outgoing payable to the Government and Local Authorities down this date, having got valid and marketable title to the schedule property.

Whereas the LESSEE is engaged in quarrying business and he is interested to take possession of the lands in Survey Nos. 973/1, 973/7B, 975/2, 977 and 978/2 of **Marudhadu Village**, Vandavasi Taluk, Tiruvannamalai District which belong to the LESSOR. The LESSOR is also willing to handover possession of the lands which is morefully described in schedule hereunder to the LESSEE to do the quarrying in his land.

NOW THIS DEED WITNESSETH that pursuant to the this agreement and in consideration of the rent agreed to be paid by the Lessee as hereinafter provided and subject to the covenants terms, and conditions hereinafter mentioned, the Lessor doth demise unto Lessee the said piece of land more particularly described in the Schedule hereunder written for a term of 10 years from the date hereof.

1. The LESSOR agrees to receive the rent amount every month. The LESSOR undertakes not to involve himself in the administration of quarrying in his land by the LESSEE. The LESSEE undertakes to transfer the money to the bank account of LESSOR.
2. The LESSEE agrees to pay Rs. 20,000/- every month as rent to the Lessor's SB Account Number 30788975091, in State Bank of India, Vandavasi Branch and LESSOR agrees to receive it.
3. The LESSOR undertakes to cooperate by giving power to LESSEE to apply licenses and no objection certificate before revenue department, electricity board, mines and minerals department and other line department including SEIAA.

M. Koyli Kyan

1	பத்திரம்	2025	ம் வருத்திய	596
ஆவணம்	13	தாள்களைக் கொண்டது		
2	பதிவு	பதிவு	பதிவு	

M. Koyli Kyan

M. Koyli Kyan



4. The LESSOR undertakes not to revoke this agreement for a minimum 10 years and if any difference of opinion arises between the two parts it may be referred to Arbitration.
5. The LESSEE has to bear all expenses and fees to the Government.
6. The LESSEE has take charge of operation of quarry on and from this date and he is responsible for day to day work done at the Schedule mentioned properties. The LESSEE agrees to run the quarry operation by following all legal guidelines issued by Geology & Mining Department, Pollution Control Board, Revenue Department etc., The LESSEE agree to bear all expenses for operation, labour and incidental expenses from this date of Agreement.
7. The LESSEE undertake to pay all taxes, assessments, dues payable to the Government or any local authority in respect of the said land and the quarrying operations therein.
8. The LESSEE agree to observe and perform the terms and conditions hereinafter mentioned.
9. The LESSOR doth hereby grant permission to the LESSEE to enter upon the said land to carry on quarry operations subject to what is hereinafter provided.
10. The LESSEE hereby agrees to relieve the LESSOR from all quarry operations and all responsibilities in the Schedule mentioned properties during 10 year period.
11. The LESSEE agreed to use Government approved method of blasting i.e., Low pressure blasting materials. The leaseholder is not allowed to use bore blasting in the leased quarry site.

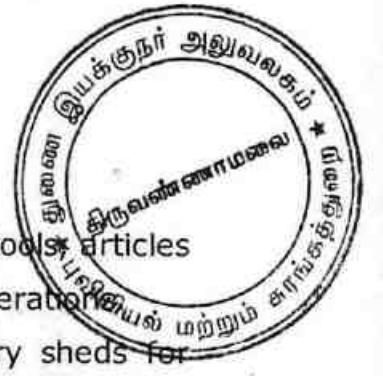
M. Kalyan

1	பித்தம் 2025	596
ஆவணம்	13	தாளகலவைக் கொண்டு
3	வது தரம்	
பதிவு அலுவலர்		



1. 2/5/25

M. Kalyan



12. The LESSEE will be entitled to bring in all equipment, tools, articles and things which are required to carry on quarrying operations.
13. The LESSEE will be allowed to put up any temporary sheds for keeping and fixing the equipment, articles and things as may be required and at convenient places on the said land but the LESSEE shall not construct any buildings or structures of a permanent nature.
14. The LESSEE shall take prior permission for use of explosives and shall use them according to the rules and regulations under the Explosives Substances Act and directions issued by the Inspectors and experts from time to time.
15. The LESSEE shall be entitled to excavate and remove only stones and gravel from the said land but shall not remove any other material of substance or other minerals found while excavating or digging the said land.
16. The LESSEE shall not assign this agreement or any right given hereunder to any other person without the LESSOR's prior permission but the LESSEE will be entitled to engage contractors for carrying or transporting the stones from the said land.
17. That on the LESSEE paying the said rent and royalty in lumpsum in the manner aforesaid and observing and performing the covenants conditions and stipulations herein contained and on the part of the LESSEE to be observed and performed shall peacefully and quietly hold, possess and enjoy the demised land during the term hereby created without eviction interruption, disturbance, claim and demand whatsoever by the LESSOR any person or persons lawfully or equitably claiming by, from, under or in trust for them.

H. Kalyan

1	முத்தம் 2025	ம வர்த்த 596
ஆவணம் 13	தாள்களைக் கொண்டது	
4	வது தள்.	
பதிவு அலுவலர்		

1. L. Kalyan

H. Kalyan



18. The LESSOR undertakes to get the name transfer the quarry license in the name of LESSEE, which would be named at the appropriate time, within 90 days time or any period as mutually extended thereupon. Expenses have to be meted out by LESSEE.
19. This Agreement will get terminated upon the expiry of the lease period; or when due to non performance of any of the conditions stipulated above by the LESSEE or when the Government cancels the quarrying license.
20. The LESSOR shall not unilaterally cancel the agreement document and shall not hinder the process of quarrying by the LESSEE.
21. The LESSOR shall not interfere in the quarry operations done by the LESSEE.
22. The LESSOR shall take all necessary taxes and charges to pay to Government authorities in respect of schedule mentioned properties and the LESSEE undertakes to pay the charges/ fees pertaining to the quarry operation done in the property.
23. The LESSEE and LESSOR undertake to give 3 months prior notice to either of the parties in case if they decide to terminate the lease prior to completion of Agreement.
24. The address for the communication for sending notice for the LESSOR is Mr.A.Rakesh @ A.Logeshwaran, son of late Mr.M.K.Arumugam, Hindu, aged about 54 years, residing at No.1, Palla Street, Marudhadu Village, Vandavasi Taluk, Tiruvannamalai District - 604 405. The contact phone number is 9715642197 and the email id of the LESSOR is alogeswaranmkarumgam814@gmail.com.

H. Karthikeyan

1	புத்தகம் 2025	பக்க எண் 596
சுவணம் 13	தாள்களைக் கொண்டு	
5	வசூலான	
பதிவு செய்யப்பட்டது		



A. Logeshwaran

M. Karthikeyan



25. The address for the communication for sending notices to the LESSEE is Mr.Karthikeyan, son of Mr.Manoharan, Hindu, aged about 32 Years, residing at No.2/21, West Street, Vadamalaipatti, Musiri Taluk, Thathiengarpet, Trichy - 621 214. The contact phone number is 9629873572 and the email id of the LESSEE is karthickmanogaran87@gmail.com
26. The normal sending communication via Speed Post/ Registered Post with ack card/courier service and correspondence over Email and Whatsapp are allowed to be done by both parties against each other and it is for the opposite party to appropriately reply for the contentions.
27. Any dispute arising out of the interpretation of terms and conditions of this agreement shall be done by both parties by invoking the jurisdiction of appropriate court.

SCHEDULE OF PROPERTY

All that piece and parcel of lands situated in, **Marudhadu Village**, Vandavasi Taluk, Tiruvannamalai District, Registration district of Cheyyar and **Sub-Registrar office of Kilkodungalur**, are As per **Patta No. 5309**,

1. Punjai Survey No. **973/1** (0.47.00 Ares) **1.16 Acre**,
2. Punjai Survey No. **973/7B** (0.03.23 Ares) **0.08 Cent**,
3. Punjai Survey No. **975/2** (0.07.30 Ares) **0.18 Cent**,
4. Punjai Survey No. **977** (0.02.50 Ares) **0.06 Cent**, and
5. Punjai Survey No. **978/2** (1.36.00 Hectare) **3.36 Acre**,

All together a total extent of **4.84 Acre** of land situated in **Marudhadu Village**, Vandavasi Taluk, Tiruvannamalai District.

M. Karthikeyan

1	பத்திரம் 2025	மேலுத்திய 596
சு.வணம் 13	தாளகவளக் கொண்டது	
6	வது தாள	
பதிவு அலுவலர்		



M. Karthikeyan

M. Karthikeyan



IN WITNESS WHERE OF the LESSEE and the LESSOR have put their hands the day and the year first hereinabove written, in the presence of the following witnesses:

LESSEE

M. Kashi Kumar

LESSOR

J. S. Sathivel

Witnesses :

1. *A. Kasi*

(Aadhaar : 289860837666, Cell. 7708565177.)

A. Kasi, S/o. Angu,

No. 475, Mettu Colony, Vazhur-604405.

2.

S. Rajasekaran

(Aadhaar : 734616544825, Cell. 9952598046)

S. Rajasekaran, S/o. Sundaramoorthi,

No. 10, Nathamuni Street, Vandavasi-604408.

சான்று செய்தவர்:



S. SAKTHIVEL, M.A., L.L.B.,

Advocate, (Enrol. No. MS. 723/2021),

3/900. Mootha Kovil Street, Ponnur, Vandavasi Taluk, T.Malai Dist.

Cell. 7871638246, 9345552246.

J. S. Sathivel

Typeset By : G. கார்த்திகேயன் ரியல்-டெக் கம்ப்யூட்டர்ஸ், வந்தவாசி, CITIZEN LOGIN ID : REALTEK, Cell. 868292266!

1	புத்தகம்	2025	வருடத்திய	596
ஆவணம்	13	தாள்களைக் கொண்டது		
7	வது தாள்	பதிவு செய்தவர்		



M. Kashi Kumar



தமிழ்நாடு அரசு

வருவாய் மற்றும் பேரிடர் மேலாண்மைத் துறை
நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு



மாவட்டம் : திருவண்ணாமலை

வட்டம் : வந்தவாசி

வருவாய் கிராமம் : மருதாடு

பட்டா எண் : 5309

உரிமையாளர்கள் பெயர்

1. ஆறுமுகம் மகன் ராகேஷ்(எ)லோகேஸ்வரன்

புல எண்	உட்பிரிவு	புன்செய்		நன்செய்		மற்றவை		குறிப்புகள்
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை	
		ஹெக்டர் - ஏர்	ரூ - பை	ஹெக்டர் - ஏர்	ரூ - பை	ஹெக்டர் - ஏர்	ரூ - பை	
973	1	0 - 47.00	0.58	--	--	--	--	2025/0103/06/459232- Digitally signed: MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM
973	7B	0 - 3.23	0.04	--	--	--	--	2025/0103/06/459232- -2024/06/06/000772SD Digitally signed: MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM
975	2	0 - 7.30	0.09	--	--	--	--	2025/0103/06/459232- -2024/06/06/000772SD Digitally signed: MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM
977	-	0 - 2.50	0.06	--	--	--	--	2025/0103/06/459232- Digitally signed: MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM
978	2	1 - 36.00	1.61	--	--	--	--	2025/0103/06/459232- Digitally signed: MALARVIZHI G Head Quarters Deputy Tahsildar 25/01/2025 11:19:16:PM
		1 - 96.03	2.38					

குறிப்பு :

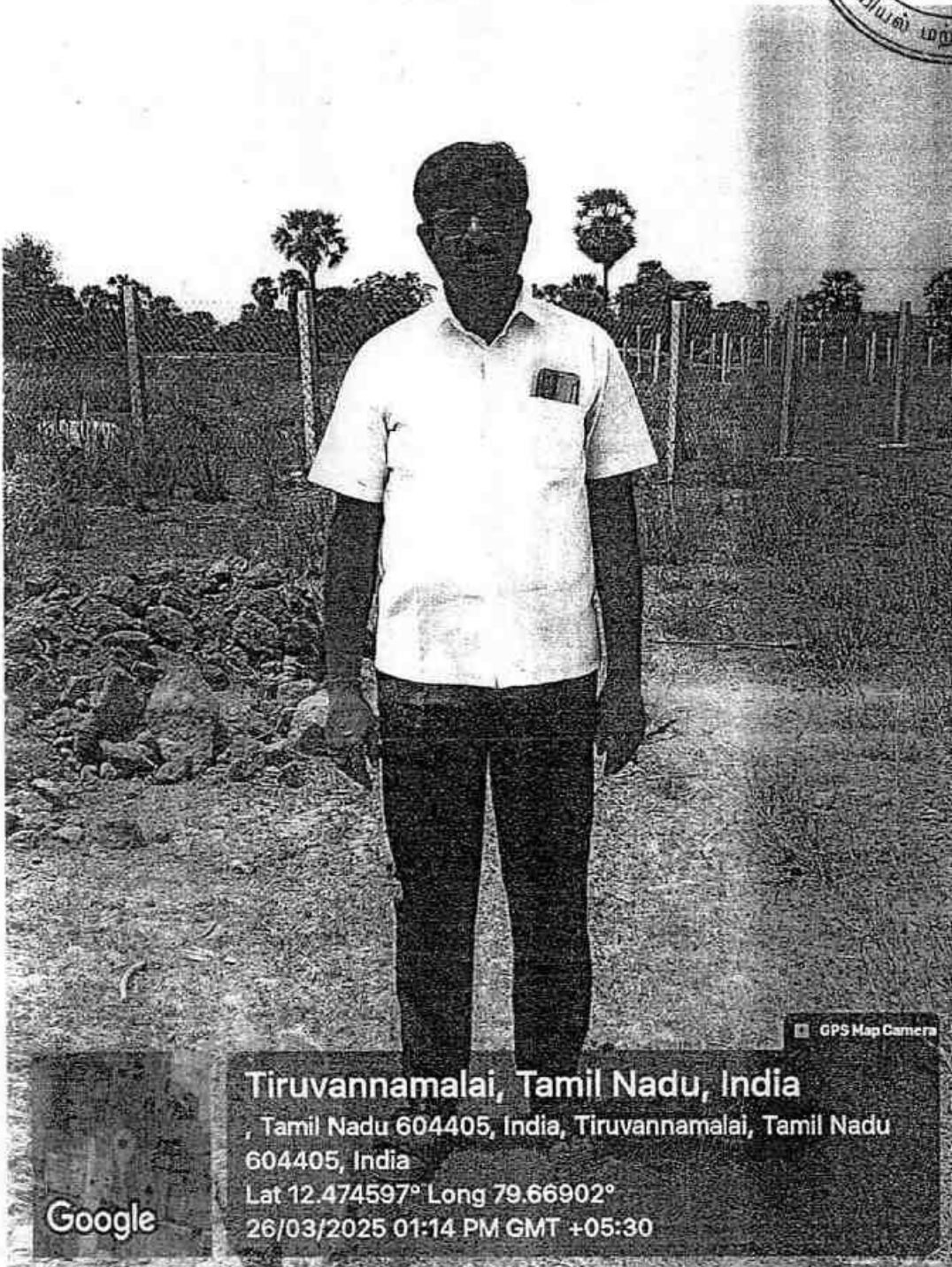


- மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் <https://eservices.tn.gov.in> என்ற இணைய தளத்தில் 06/06/176/05309/50657 என்ற குறிப்பு எண்ணை உள்ளிட்டு செய்து உறுதி செய்துகொள்ளவும்.
- இத் தகவல்கள் 26-03-2025 அன்று 08:22:57 AM நேரத்தில் அச்சிடப்பட்டது.
- எஃப்.பி.சி கோராவின் 2D barcode டிடிபான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்.

H. Keshava

புத்தம் 2025 ம் வருத்திய 596
ஆவணம் 13
8 வது தளம்
பதிவு செய்யப்பட்டது

H. Keshava



M. Karthi Kyan

1	2025	596
சூலம்	13	தூலகளைக் கொண்டது
9		



M. Karthi Kyan

Unique Identification Authority of India

முக்தர் S/O Manoharan, 201
சுற்றுச்சூழல், வடமலையாபட்டி
முக்தர் குடியேற்றம், தாமிரவருணியம், திருச்சிராப்பள்ளி
தமிழ்நாடு 621214

Address: S/O: Manoharan,
201, WEST STREET,
VADAMALAIPATTI, MUSIRI
TALUK, Thathengarpet,
Tiruchirappalli, Tamil Nadu,
621214

6949 7463 3037

www.uidai.gov.in

இந்திய அரசு
Government of India

கருத்தியன் மனோகரன்
Karthikeyan Manoharan
தந்தை மனோகரன்
Father Manoharan

பிறப்பு: 30/03/1993
பாலினம்: Male

6949 7463 3037

ஆதார - சாதாரண மனிதனின் அதிகாரம்

यह कार्ड के होने/होने पर कृपया सूचित करें/बिना
आपका पैन कार्ड खोया, पर एन सी यू
पीसी यूनिट, नवी दिल्ली
प्लॉट नं. 341, सर्वे नं. 997/8
मॉडल कोलोनी, नैर डीप बंगला चौक,
पिन - 411 016

If this card is lost / someone's lost card is found,
please inform / return to :-
Income Tax PAN Services Unit, NSDL
4th Floor, Mantri Sterling
Plot No. 341, Survey No. 997/8,
Model Colony, Near Deep Bungalow Chowk,
Pune - 411 016.
Tel: 91-20-2721 8080, Fax: 91-20-2721 8081
e-mail: tininfo@nsdl.co.in

आयकर विभाग
INCOME TAX DEPARTMENT

भारत सरकार
GOVT. OF INDIA

स्थायी लेखा संख्या कार्ड
Permanent Account Number Card
KCRPK0198E

नाम / Name
KARTHIKEYAN MANOHARAN

पिता का नाम / Father's Name
MANOHARAN

जन्म की तिथि /
Date of Birth
30/03/1993

हस्ताक्षर / Signature

भारत सरकार
Government of India

लोगेश्वरन
Logeshwaran
30/03/1971
पुल्ल / MALE

9410 8502 1569
VID : 9152 3510 2128 7812

எனது அடைபாள்ம்

இந்திய அங்கீகரிக்கப்பட்ட அமைதி
Unique Identification Authority of India

முக்தர்
S/O: Manoharan, 201, WEST STREET,
VADAMALAIPATTI, MUSIRI
TALUK, Thathengarpet,
Tiruchirappalli, Tamil Nadu - 621214

2 Address:
S/O: Arumugam, 1, PALLA STREET,
Maruthadu, Tiruvannamalai,
Tamil Nadu - 604405

9410 8502 1569
VID : 9152 3510 2128 7812

1 புத்தகம் 2025 ம் வருத்திய 596
ஆவணம் 13 தாள்களைக் கொண்டது
10 வரு தான்
பதிவு அலுவலர்

Income Tax PAN Services Unit, UTISI,
Plot No. 3, Section - 11, CBD Belapur,
New Mumbai - 400 614.

यह कार्ड के होने/होने पर कृपया सूचित करें/बिना
आपका पैन कार्ड खोया, पर एन सी यू
पीसी यूनिट, नवी दिल्ली
प्लॉट नं. 3, सेक्टर 11, सीडी बेलापुर,
नवी मुंबई - 400 614

आयकर विभाग
INCOME TAX DEPARTMENT

भारत सरकार
GOVT. OF INDIA

A LOGEESHWARAN

ARUMUGAM

30/03/1971

ADIPL9612L

Signature

H. Karthikeyan

249 M. Karthikeyan

A. S. Karthikeyan

 ஆதார் Unique Identification Authority of India முகவரி: S/O. அங்கு, 475, METTU COLONY, Vazhur, Tiruvannamalai, Tamil Nadu, 604405 2898 6083 7666 1547 1900 300 1947 help@uidai.gov.in www.uidai.gov.in	 இந்திய அரசாங்கம் Government of India காதி அங்கு Kadi Angu தந்தை: அங்கு Father: ANGU பிறப்பு தேதி DOB: 06/07/1970 பாலினம்: Male 2898 6083 7666 ஆதார் - சாதாரண மனிதனின் அதிகாரம்

Aikun



 இந்திய அரசாங்கம் Government of India  ராஜேகரன் சுந்தரமூர்த்தி Rajasekaran Sundaramoorthy பிறப்பு தேதி DOB: 16/09/1961 பாலினம் MALE 7346 1654 4825	 இந்திய அரசாங்கம் Unique Identification Authority of India Address: S/O: Sundaramoorthy, 10, NATHAMUNI STREET VANDAVASI VANDAVASI, Vandavasi, Tiruvannamalai, Tamil Nadu - 604408 முகவரி: S/O: சுந்தரமூர்த்தி, 10, நாமுனி தெரு வந்தவாசி, வந்தவாசி, வந்தவாசி, திருவண்ணாமலை, தமிழ் நாடு - 604408 7346 1654 4825

1 பத்தகம் 2025 ம் வருடத்திய 596
ஆவணம் 13 தாள்களைக் கொண்டது
11 பகுதி

SR

M. K. Kishiyar



CERTIFICATE UNDER SECTION 42 OF THE INDIAN STAMP ACT

S.No 372 of 2025

I hereby certify that a sum of ₹ 24,000/- (Rupees Twenty Four Thousand only) on account of deficit stamp duty has been levied under section 41 of the Stamp Act in respect of this instrument from Mr. கார்த்திகேயன் residing at எண் 2/21, மேற்கு தெரு, வடமலைபட்டி கிராமம்., VADAMALAIPATTY, Musiri, Thiruchirappalli, Tamil Nadu, India, 621214.

Sub Registrar: Kilkodungalur
Date: 26/03/2025

Signature of Sub Registrar and Collector under Section
41 of the Indian Stamp Act

SUB-REGISTRAR
KILKODUNGALORE

Presented in the office of the Sub Registrar of Kilkodungalur and fee of ₹ 24,410/- paid at 03:33 PM on the 26/03/2025 by

Left Thumb



M. Karthikeyan

1	பத்தகம் 2025	ம வருடத்திய 596
ஆவணம் 13	தாள்களைக் கொண்டது	
12	வது தாள்கள்	
		பதிவு அலுவலர்

Additions as per recitals of document

Execution admitted by
Left Thumb



A. Logeshwaran

Identity of the person verified through Consent based AADHAAR Authentication using Thumb Impression with UIDAI reference No. :
UKC:6367394e632d5b826ee4bb6a8d7b8b56d4498dc
(Details from UIDAI : Logeshwaran S/O: Arumugam, 22-04-1971, xxxxxxxx1569)



Claim admitted by
Left Thumb



M. Karthikeyan

Identity of the person verified through Consent based AADHAAR Authentication using Thumb Impression with UIDAI reference No. :
UKC:81009154ddf52200c864ea0b4cd055369c7ba0b
(Details from UIDAI : Karthikeyan Manoharan S/O:



M. Karthikeyan

R/Kilkodungalur/Book-1/596/2025



Manoharan, 30-03-1993, xxxxxxxx3037)

26th day of March 2025

SUGANYA R
Sub Registrar
Kilkodungalur

SUB-REGISTRAR
KILKODUNGALORE

Registered as Number R/Kilkodungalur/Book-1/596/2025.

Date: 26/03/2025
Kilkodungalur

SUGANYA R
Sub Registrar

SUB-REGISTRAR
KILKODUNGALORE

1	புத்தகம்	2025	ம் வருடத்திய	596
	சுருவணம்	13	தாள்களைக் கொண்டது	
i3	வது தாள்தான்.			
	பதிவு அலுவலர்			



H. Rajhikyan

இந்திய அரசாங்கம்
Government of India

கார்த்திகேயன் மனோகரன்
Karthikeyan Manoharan

தந்தை மனோகரன்
Father Manoharan

பிறந்த நாள் DOB: 30/03/1993
 ஆண்/பெண்: Male

6949 7463 3037

ஆதார் - சாதாரண மனிதனின் அதிகாரம்



இந்திய தனிப்பட்ட அடையாள ஆணைய அமைப்பு
Unique Identification Authority of India

ஆதார்

முகவரி S/O மனோகரன் 2/21
 மேற்கு தெரு, வடமலைப்பட்டி
 முசிரி தாலுக்கா, தாத்நையங்கார்பேட்டை
 தாத்நையங்கார்பேட்டை
 திருச்சிராப்பள்ளி, தமிழ் நாடு
 621214

Address: S/O: Manoharan,
 2/21, WEST STREET,
 VADAMALAIPATTI, MUSIRI
 TALUK, Thathiangarpet,
 Thathiangarpet,
 Tiruchirappalli, Tamil Nadu,
 621214

6949 7463 3037

1947
 help@uidai.gov.in
 www.uidai.gov.in

M. Karthikeyan



आयकर विभाग
INCOME TAX DEPARTMENT

भारत सरकार
GOVT. OF INDIA

स्थायी लेखा संख्या कार्ड
Permanent Account Number Card

KCRPK0198E

नाम / Name
KARTHIKEYAN MANOHARAN

पिता का नाम / Father's Name
MANOHARAN

जन्म की तारीख /
Date of Birth
30/03/1993

हस्ताक्षर / Signature

13112000

M. Karthikeyan



பெரியார் பல்கலைக்கழகம்
PERIYAR UNIVERSITY

ANNEXURE - VII

அறிவியல் புலம்
FACULTY OF SCIENCE



பெரியார் பல்கலைக்கழகம்

ஜூலை 2018

ஆம் ஆண்டு நடத்திய

பயன்பாட்டுப் புவியமைப்பியல்

தேர்வில்

P வெள்ளையன்

முதல் வகுப்பில் உயர் தகமையுடன் O தரத்தில்

தேர்ச்சி பெற்றுத் தகுதியடைந்திருப்பதாக

உரிய தேர்வாளர்கள் சான்றளித்ததை ஏற்று

ஆய்வியல் நிறைஞர்

என்னும்

நடத்தியவை அவருக்குப் பல்கலைக்கழக இலட்சியை உடன்
வழங்குகின்றது.

பெரியார் பல்கலைக்கழக ஆட்சிக்குழு

The Syndicate of the PERIYAR UNIVERSITY hereby makes known that
VELLAIYAN P has been
admitted to the Degree of MASTER OF PHILOSOPHY
having been certified by duly appointed Examiners to be qualified to receive the same in
APPLIED GEOLOGY
and was placed in FIRST CLASS EXEMPLARY WITH O GRADE
at the Examination held in JULY 2017 by Periyar University.



Given under the Seal of the University

Dated: 20-03-2018
Salem - 636011
Tamil Nadu, India.

Controller of Examinations

Registrar

Vice-Chancellor

Cell: 98857845
E-mail -ellammangranites@gmail.com



M/s ELLAMMAN GRANITES

PLOT NO 1, ROOM NO 10, BANKERS COLONY, SRIKAKULAM ANDHRA PRADESH-532001

Ref. No.- EG/EC/2022/02

Date - 02.11.2022

EXPERIENCE CERTIFICATE

This is to certify that Mr.P.Vellaiyan Geologist worked in M/s Ellamman Granites as Mines Manager in Sy.No.71, Mukhalingapuram Village, Tekkali Mandal, Srikakulam District, Andhra Pradesh State from 20.07.2017 to 31.10.2022. During his working period he carried out Boundary demarcation survey using DGPS, Reserve Estimation, direct and co-ordinate the production activities, Ensure Mine Safety and Surface plan prepared. We found him a sincere, honest, hardworking, dedicated employee with a professional attitude and very good job knowledge. He is amiable in nature and character is well.

We wish him every success in life.

For ELLAMMAN GRANITES

R. Polu Sai

Proprietor

(Signature with date and official Seal)

[Handwritten Signature]
(Signature of Employee)

M. Keshiyan

Cell: 988579345
E-mail -ellammangranites@gmail.com



M/s ELLAMMAN GRANITES

PLOT NO 1, ROOM NO 10, BANKERS COLONY, SRIKAKULAM ANDHRA PRADESH-532001

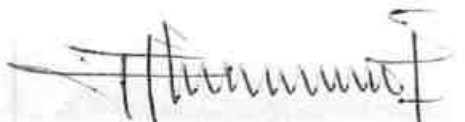
S.No	Nature of Practical Experience	Place of Work	Period of Experience		Total Working Experience		
			From	To	Year	Month	Days
1	Worked as Geologist and it Boundary demarcation survey using DGPS, Reserve Estimation, direct and co-ordinate the production activities, Ensure Mine Safety and Surface plan prepared.	Open Cast Mines and Office	20.07.2017	31.10.2022	5	3	11

For ELLAMMAN GRANITES

R. Polu R.

Proprietor

(Signature with date and official Seal)


(Signature of Employee)

M. Kalyan Kumar

TOWARDS
VANDAVASI

7.3Km



MARUTHADU

SH-115

20.2Km

TOWARDS
MELMARUVATHUR

LEASE
APPLIED AREA

1.9Km

1.12Km

2.8Km

TOWARDS
ADIYANKUPPAM

1.7Km

TOWARDS
MAZHAVANKARUNAI



PLATE No-1

APPLICANT:
Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATTENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No : 973/1, 973/7B, 975/2, 977 & 978/
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI.

INDEX

MINE LEASE AREA



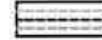
APPROACH ROAD



VILLAGE ROAD



SH-115 ROAD



HABITATION



KEY MAP

Not to Scale

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE
HAS BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

[Signature]

P.VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON

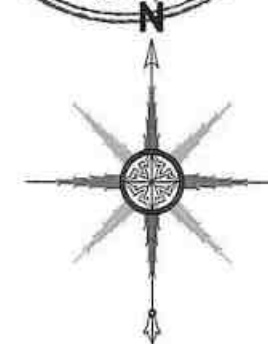
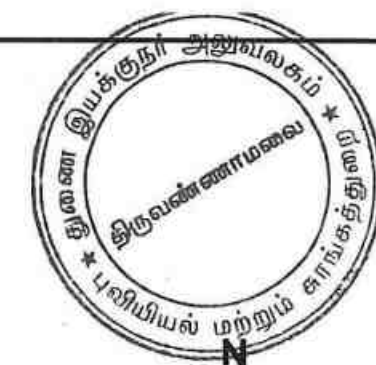
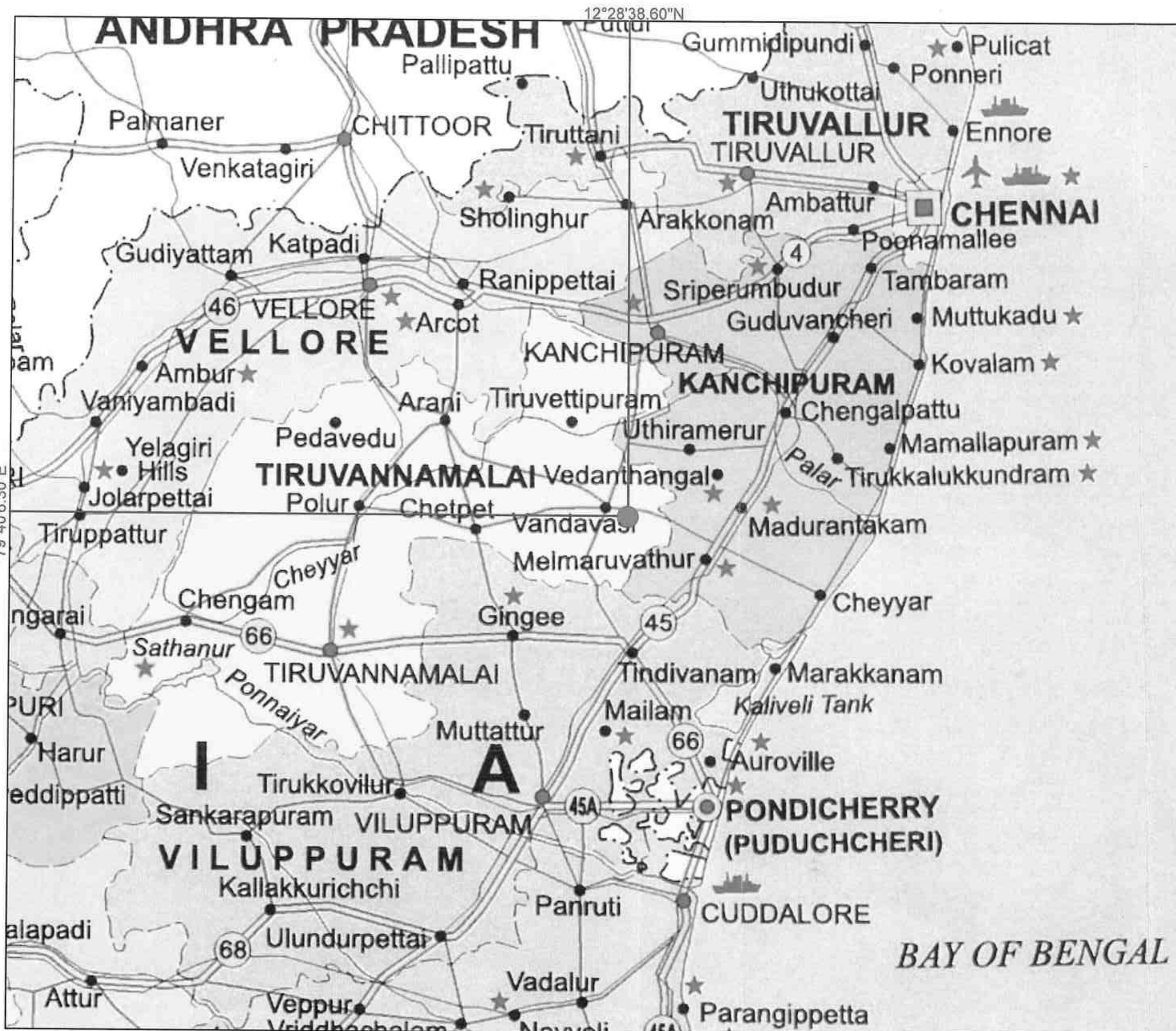


PLATE No-IA

APPLICANT:
Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:
S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI,

INDEX

MINE LEASE AREA : ●
TOPO SHEET NO : 57-P/11
LATITUDE : 12°28'33.39"N to 12°28'38.60"N
LONGITUDE : 79°40'6.30"E to 79°40'12.51"E

LOCATION PLAN NOT TO SCALE

Prepared By:
I DO HEREBY CERTIFY THAT THE PLATE
HAS BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

P. Vellaiyan
P.VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON

12°28'38.60"N

79°40'6.30"E

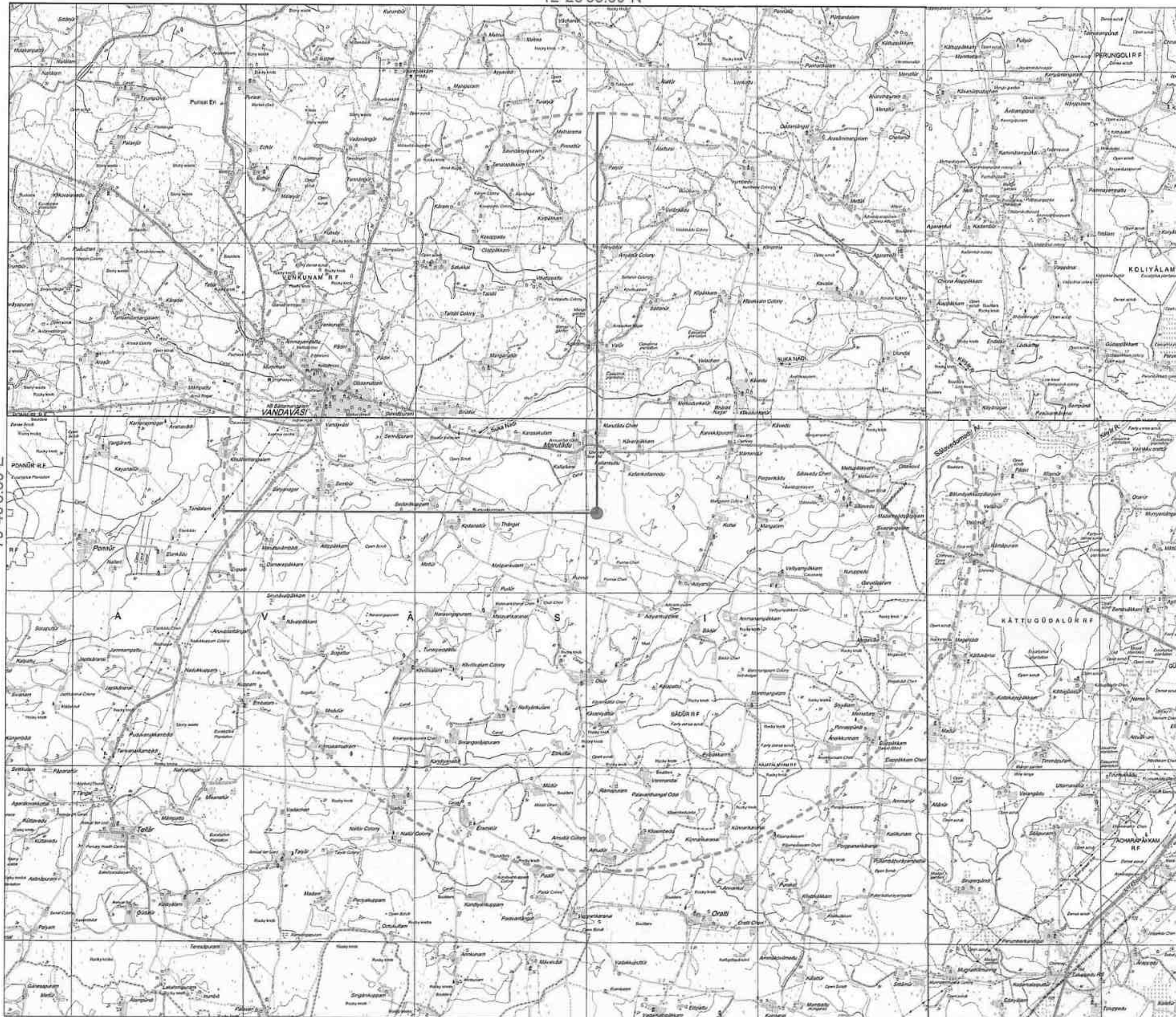


PLATE No-IB

APPLICANT:

Mr. M. KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTY,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI,

TOPO SHEET NO : 57-P/11

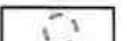
LATITUDE : 12°28'33.39"N to 12°28'38.60"N

LONGITUDE : 79°40'6.30"E to 79°40'12.51"E

MINE LEASE AREA



10KM RADIUS



CONVENTIONAL SYMBOLS

Express highway with 4 or 6 lanes, with distance stone		29
Roads, metalled, according to importance		
Highways, double carriageway, according to importance		
Unmetalled road, cart track, pack track with axis, pack path		
Stream, with bank to left, undefined, canal		
Dam, temporary, creek, sluice, water, well		
River dry with water channel, with island & rocks, tidal river		
Waterlogged rocks, Shrub, Swamp, Marsh		
Water, level, unmetalled, T-shaped, Spring, Tanka, pond, dry		
Contour line, road or rail line, broken ground		
Railways, broad gauge, double, single with station, under construction		
Railways, other gauges, double, single with distance stone, 30		
Mixed line of railway, Rail, Cutting with tunnel		
Contours with rock features, Rocky slopes, Cuts		
Sand, boulder (1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th, 101st, 102nd, 103rd, 104th, 105th, 106th, 107th, 108th, 109th, 110th, 111st, 112nd, 113th, 114th, 115th, 116th, 117th, 118th, 119th, 120th, 121st, 122nd, 123rd, 124th, 125th, 126th, 127th, 128th, 129th, 130th, 131st, 132nd, 133rd, 134th, 135th, 136th, 137th, 138th, 139th, 140th, 141st, 142nd, 143rd, 144th, 145th, 146th, 147th, 148th, 149th, 150th, 151st, 152nd, 153rd, 154th, 155th, 156th, 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12°28'38.60"N



TOWARDS
MARUTHADU 79°40'6.30"E

TOWARDS
ADIVANUR

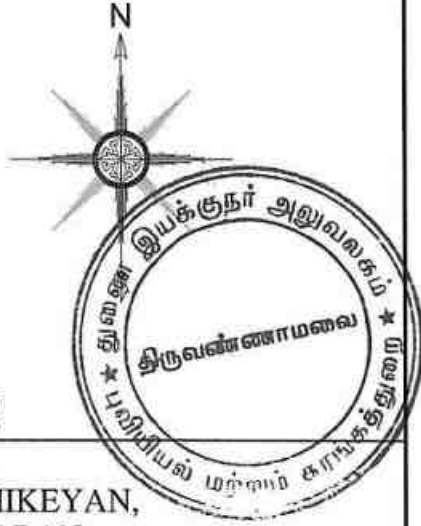


PLATE No-IC

APPLICANT:

Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI,

INDEX

MINE LEASE AREA	
APPROACH ROAD	
VILLAGE ROAD	
100m RADIUS	
200m RADIUS	
300m RADIUS	
400m RADIUS	
500m RADIUS	

TOPO SHEET NO : 57-P/11

LATITUDE : 12°28'33.39"N to 12°28'38.60"N

LONGITUDE : 79°40'6.30"E to 79°40'12.51"E

SATELITE IMAGERY MAP

SCALE- 1:5000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE
HAS BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

P.VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON

OCTOBER TO DECEMBER

12°28'38.60"N

79°40'6.30"E

TOWARDS
MARUDHADU

TOWARDS
ADIYANUR

JULY TO SEPTEMBER

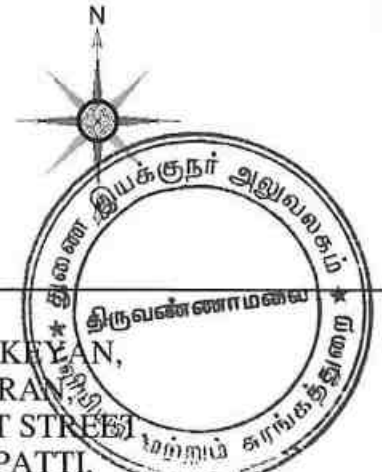


PLATE No-ID

APPLICANT:
Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:
S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI,

INDEX

MINE LEASE AREA	
APPROACH ROAD	
VILLAGE ROAD	
100m RADIUS	
200m RADIUS	
300m RADIUS	
400m RADIUS	
500m RADIUS	
HABITATIONS	
SHRUBS & TREES	
WIND DIRECTION	

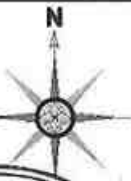
TOPO SHEET NO : 57-P/11
LATITUDE : 12°28'33.39"N to 12°28'38.60"N
LONGITUDE : 79°40'6.30"E to 79°40'12.51"E

ENVIRONMENTAL PLAN
SCALE- 1:5000

Prepared By:
I DO HEREBY CERTIFY THAT THE PLATE
HAS BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

P.VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON

PLATE No- II



APPLICANT:

Mr.M.KARTHIKEYAN
S/o. MANOHARAN,
No. 2/21, WEST STREET
VADAMALAIPATTI
MUSIRI TALUK, THAMARASEMPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2,
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI.

S.No	Latitude	Longitude
1	12°28'38.28"N	79°40'12.51"E
2	12°28'35.84"N	79°40'12.30"E
3	12°28'35.96"N	79°40'10.43"E
4	12°28'33.65"N	79°40'10.29"E
5	12°28'33.39"N	79°40'10.31"E
6	12°28'33.60"N	79°40'8.75"E
7	12°28'33.55"N	79°40'8.73"E
8	12°28'33.64"N	79°40'7.72"E
9	12°28'34.36"N	79°40'7.79"E
10	12°28'36.13"N	79°40'7.87"E
11	12°28'36.16"N	79°40'6.88"E
12	12°28'35.31"N	79°40'6.94"E
13	12°28'35.21"N	79°40'6.65"E
14	12°28'36.17"N	79°40'6.64"E
15	12°28'38.60"N	79°40'6.30"E

INDEX

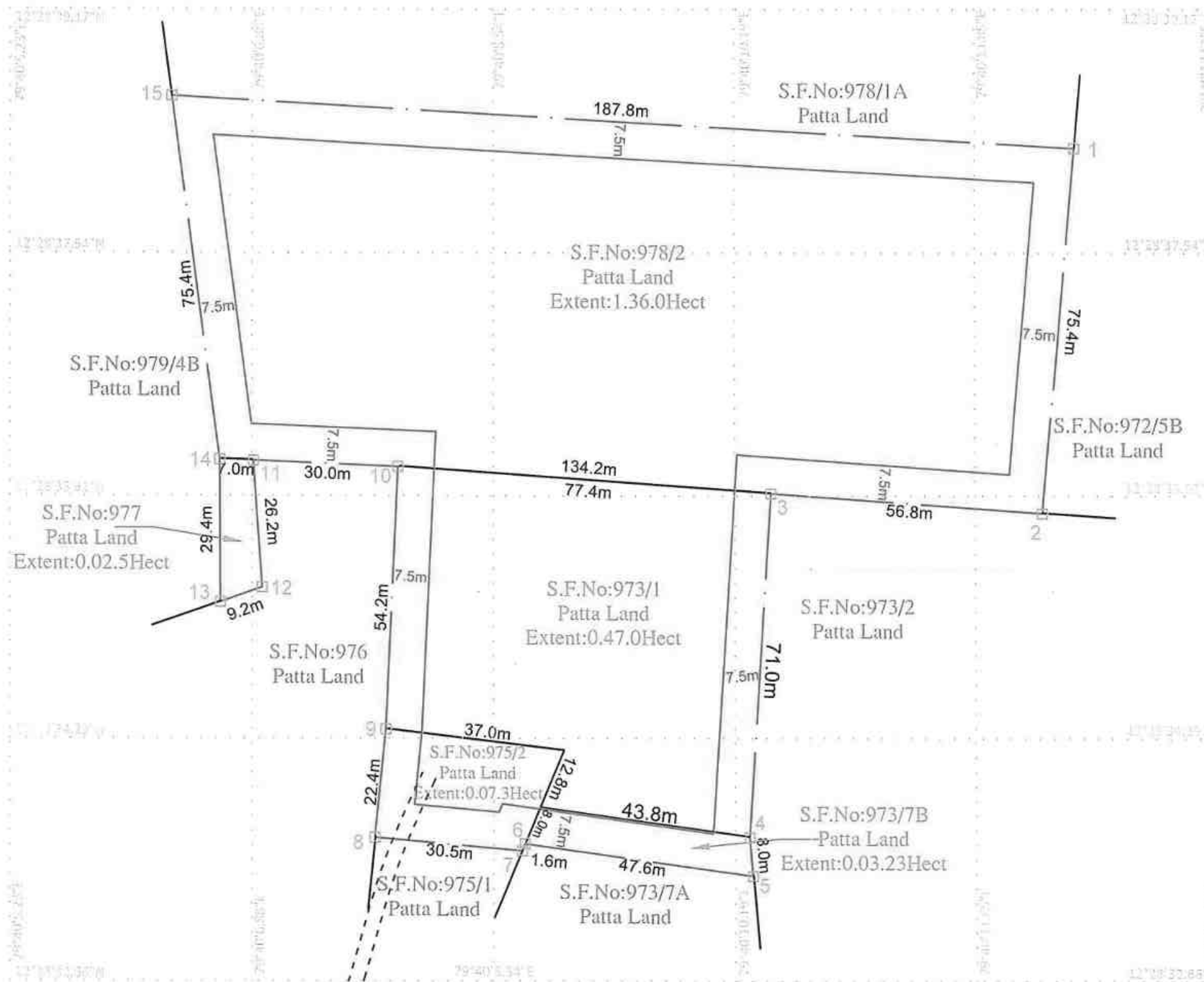
MINE LEASE BOUNDARY	
SAFETY BOUNDARY	
APPROACH ROAD	
BOUNDARY PILLAR STONES	

MINE LEASE PLAN SCALE 1 : 1000

Prepared By:

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BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

**P. VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON**



S.F.No	Sub-Division	Extent in Hect
973	1	0.47.0
	7B	0.03.23
975	2	0.07.30
977	-	0.02.50
978	2	1.36.0
Total		1.96.03Hect

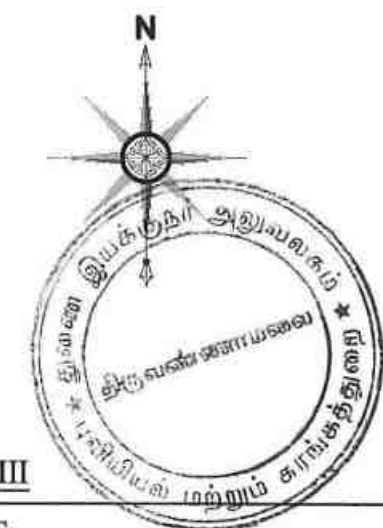
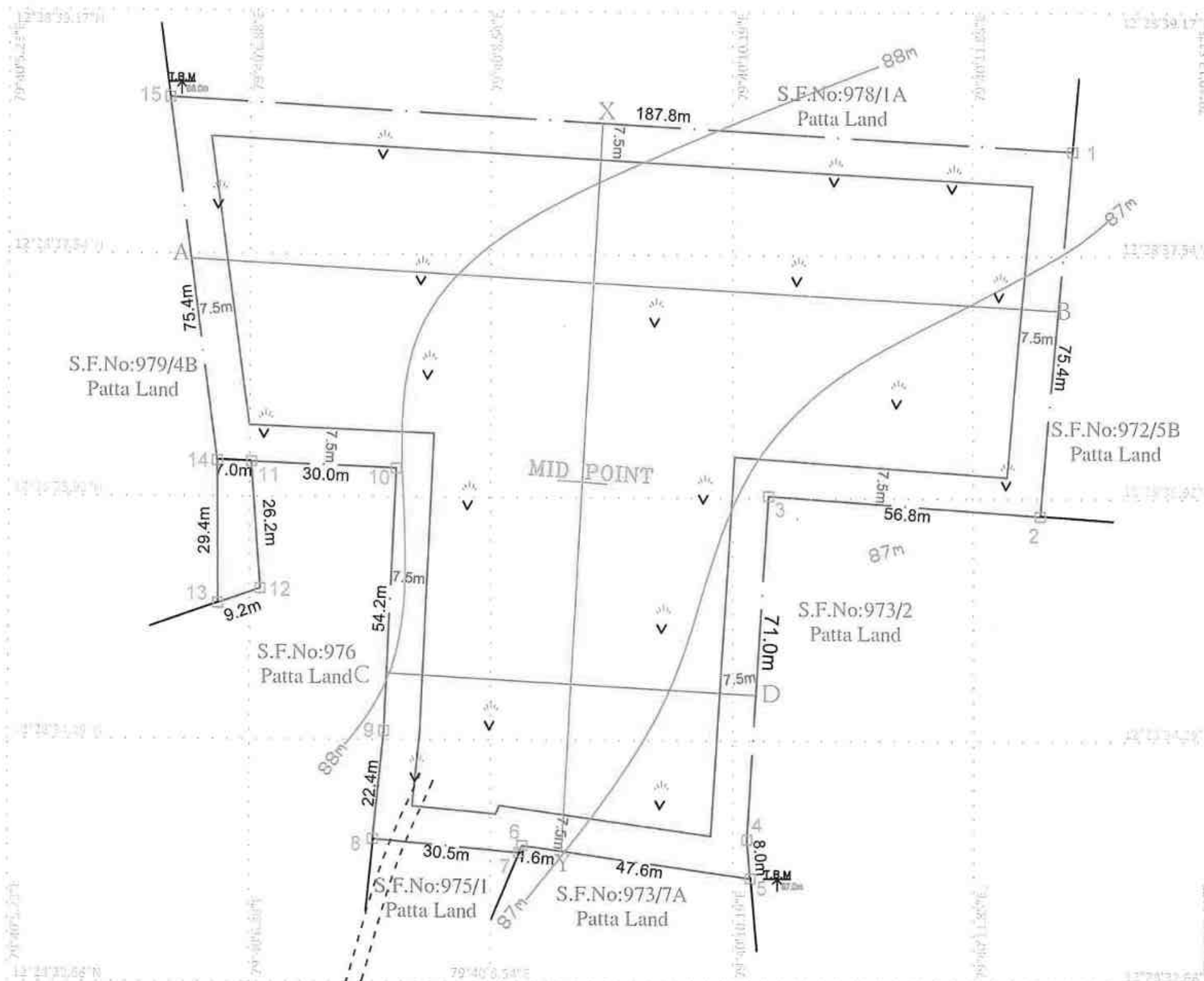


PLATE No- III

APPLICANT:
 Mr.M.KARTHIKEYAN,
 S/o. MANOHARAN,
 No. 2/21, WEST STREET,
 VADAMALAIPATTI,
 MUSIRI TALUK, THATHIENGARPET,
 TIRUCHIRAPPALLI - 621214.

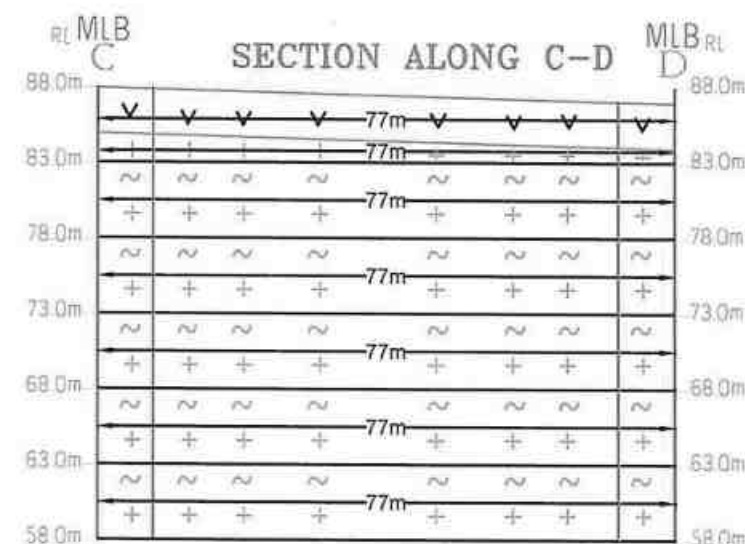
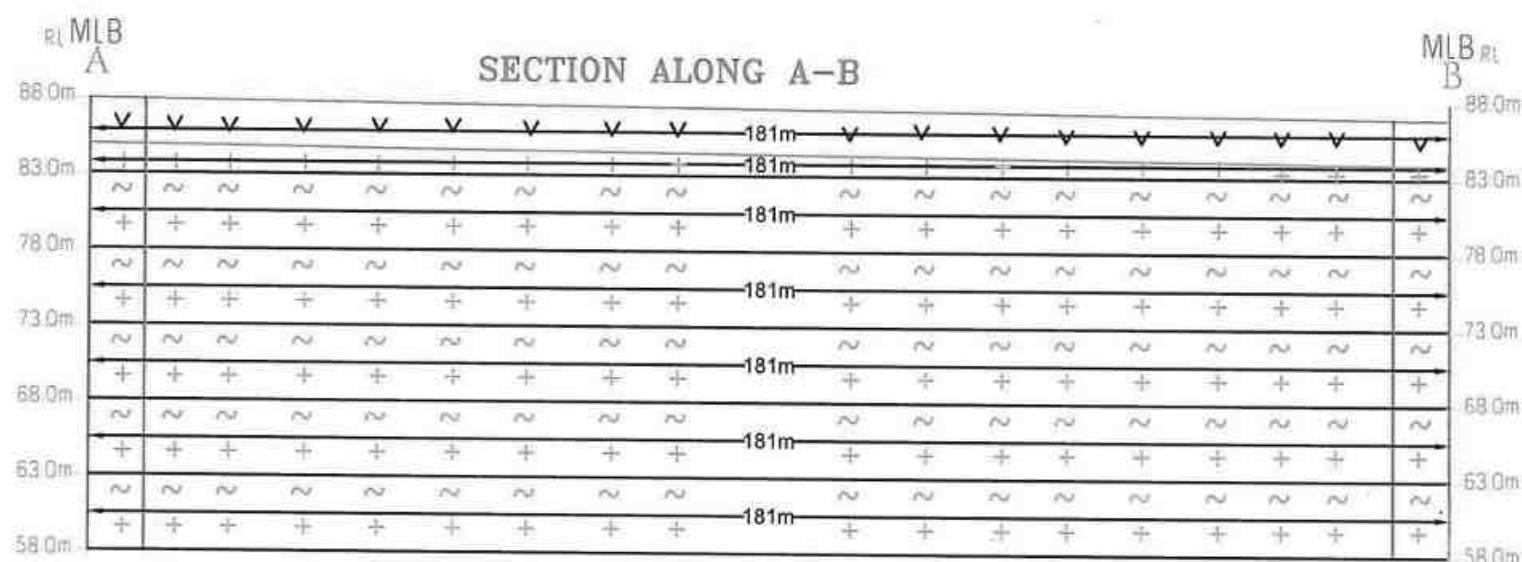
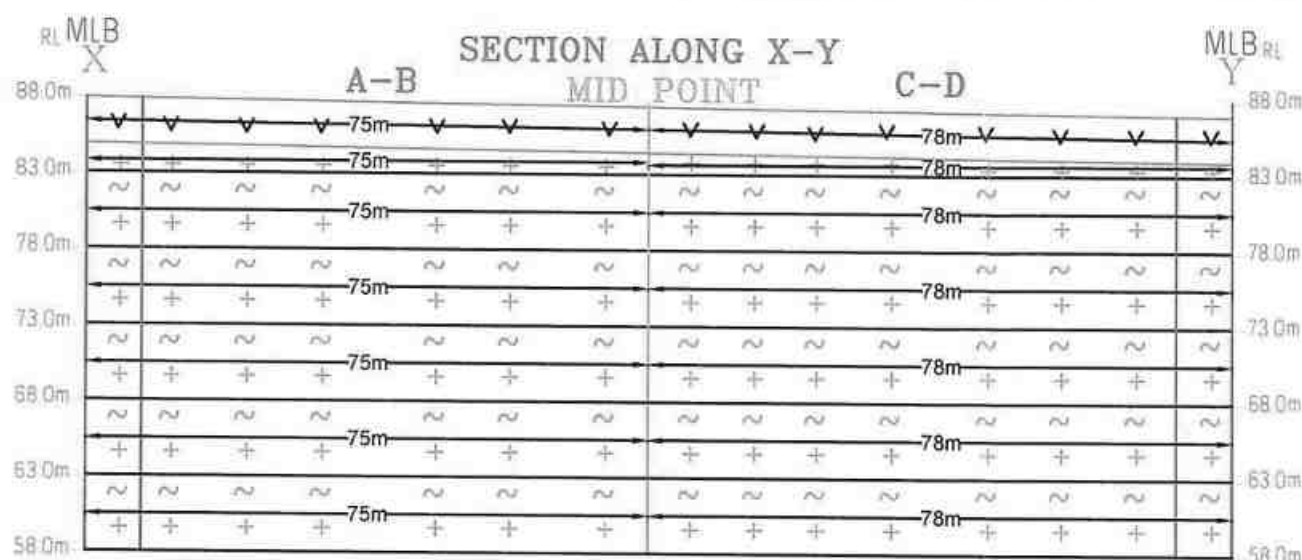
LEASE APPLIED AREA:
 S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2,
 EXTENT : 1.96.03 Hect,
 VILLAGE : MARUTHADU,
 TALUK : VANDAVASI,
 DISTRICT : TIRUVANNAMALAI,

INDEX	
MINE LEASE BOUNDARY	
SAFETY BOUNDARY	
APPROACH	
BOUNDARY PILLAR STONES	
CONTOUR LINES	
TEMPORARY BENCH MARK	
SHRUBS	
GRAVEL	

SURFACE, GEOLOGICAL PLAN
 PLAN SCALE 1: 1000

Prepared By:
 I DO HEREBY CERTIFY THAT THE PLATE HAS
 BEEN CHECKED BY ME AND IS CORRECT
 TO THE BEST OF MY KNOWLEDGE

(Signature)
 P.VELLAIYAN, M.Sc., M.Phil.,
 QUALIFIED PERSON



GEOLOGICAL RESOURCES										
Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume In M ³	Rough Stone in M ³	Gravel in M ³	Bulk Density	Rough Stone in (MT)	Gravel in (MT)
XY-AB	I	75	181	3	40725	.....	40725	2	.....	81450
	I	75	181	2	27150	27150	.....	2.75	74662.5	.....
	II	75	181	5	67875	67875	.....	2.75	186656.3	.....
	III	75	181	5	67875	67875	.....	2.75	186656.3	.....
	IV	75	181	5	67875	67875	.....	2.75	186656.3	.....
	V	75	181	5	67875	67875	.....	2.75	186656.3	.....
	VI	75	181	5	67875	67875	.....	2.75	186656.3	.....
TOTAL					407250	366525	40725	.....	1007944	81450
XY-CD	I	78	77	3	18018	.....	18018	2	.....	36036
	I	78	77	2	12012	12012	.....	2.75	33033.0	.....
	II	78	77	5	30030	30030	.....	2.75	82582.5	.....
	III	78	77	5	30030	30030	.....	2.75	82582.5	.....
	IV	78	77	5	30030	30030	.....	2.75	82582.5	.....
	V	78	77	5	30030	30030	.....	2.75	82582.5	.....
	VI	78	77	5	30030	30030	.....	2.75	82582.5	.....
TOTAL					180180	162162	18018	.....	445945	36036
GRAND TOTAL					587430	528687	58743	.....	1453889	117486

APPLICANT:
Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

S.F.No	: 973/1, 973/7B, 975/2, 977 & 978/2,
EXTENT	: 1.96.03 Hect,
VILLAGE	: MARUTHADU,
TALUK	: VANDAVASI,
DISTRICT	: TIRUVANNAMALAI.

MINE LEASE BOUNDARY	
SAFETY BOUNDARY	
GRAVEL	
ROUGH STONE	

GEOLOGICAL SECTIONS
SECTION HOR 1 : 1000 & VER 1 : 500

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BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE


 P. VELLAIYAN, M.Sc., M.Phil.,
 QUALIFIED PERSON

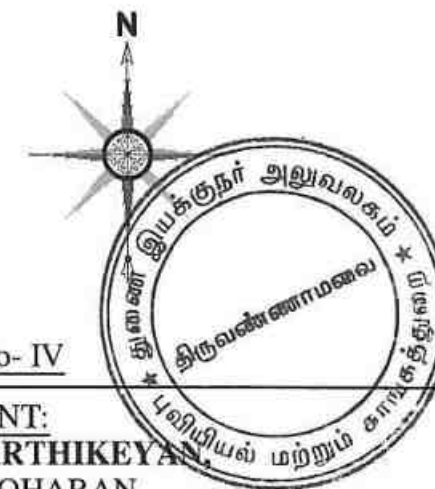
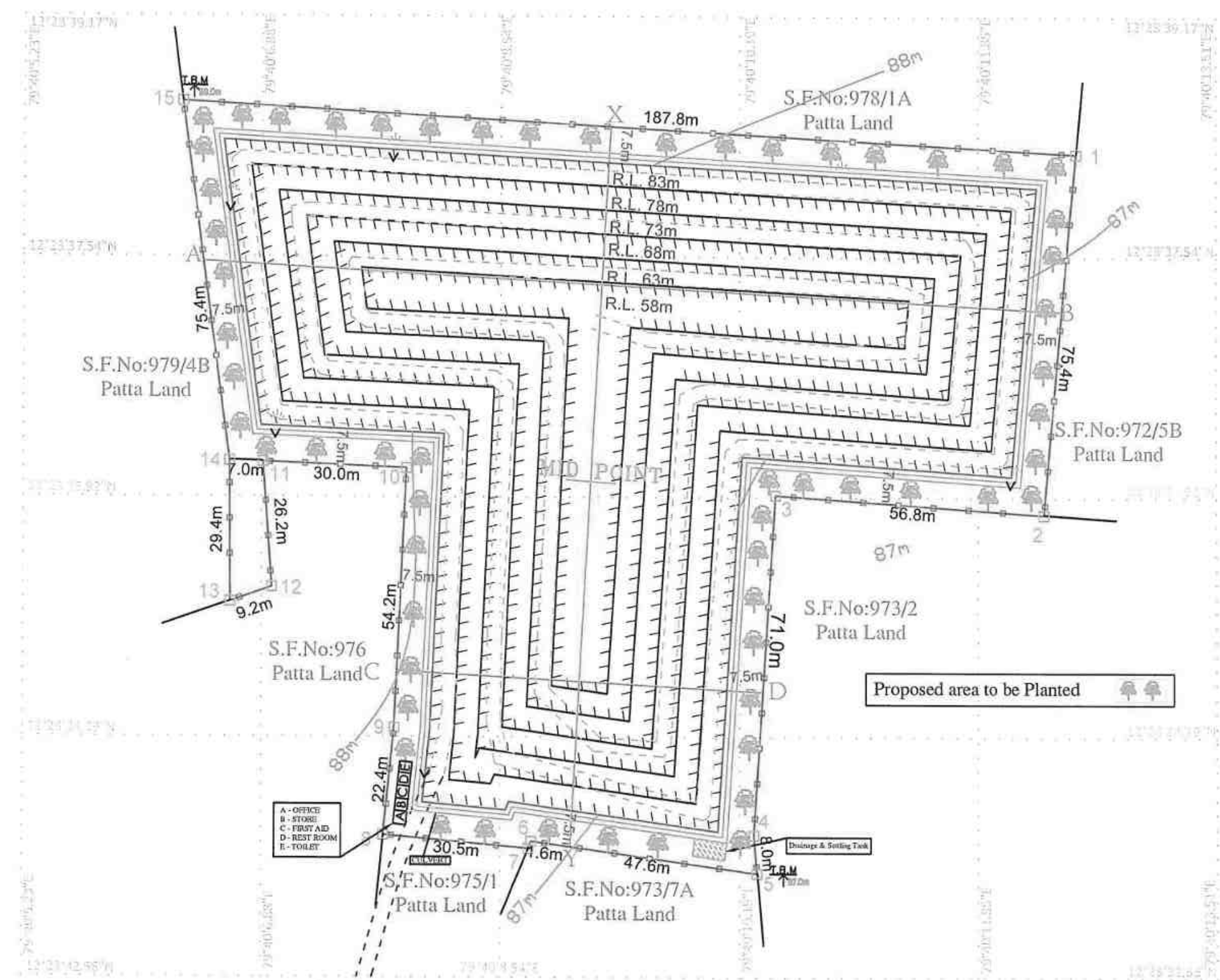


PLATE No- IV

APPLICANT:

Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2,
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI,

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GRAVEL	
FENCING	
ULTIMATE BENCH	
DRAINAGE & SETTLING TANK	

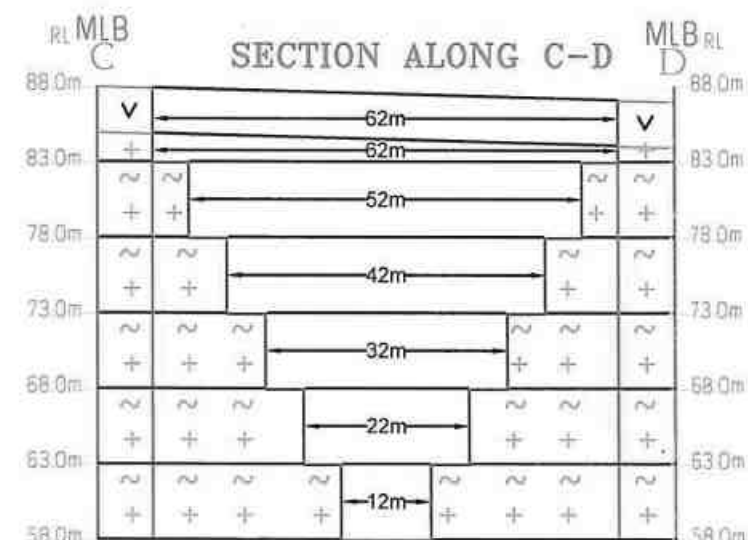
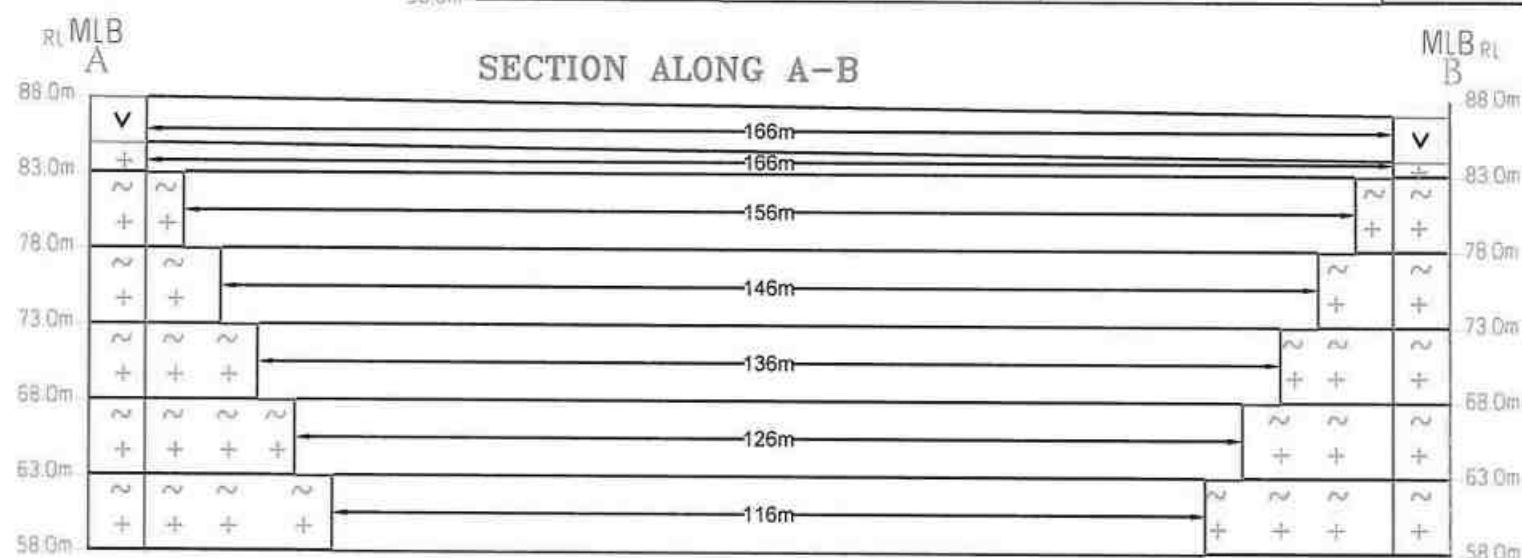
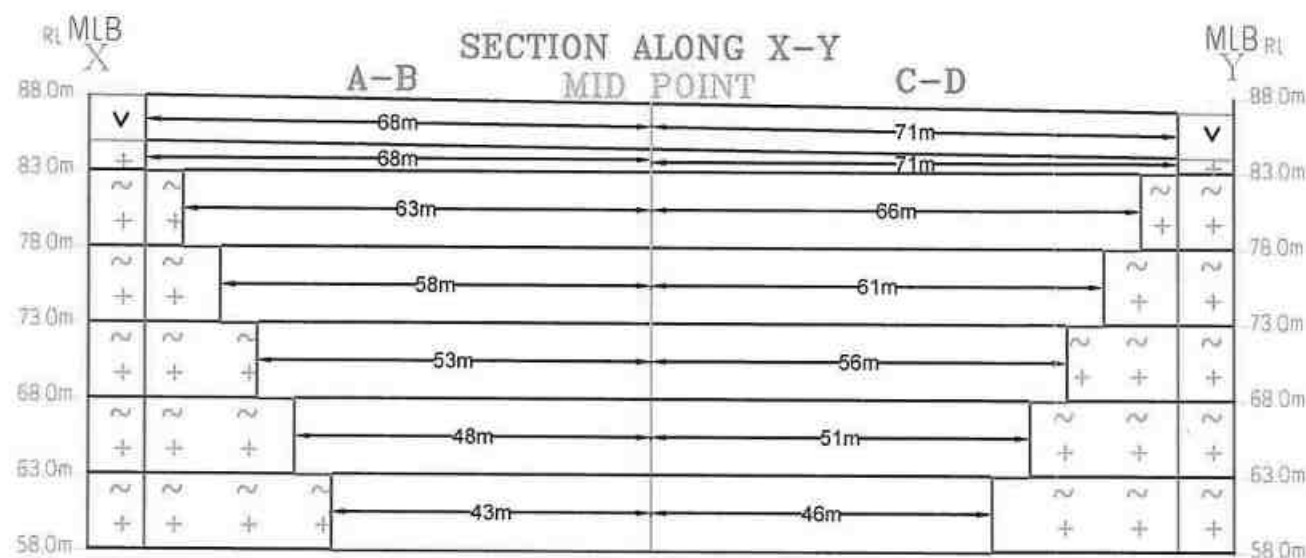
CONCEPTUAL PLAN

PLAN SCALE 1: 1000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS
BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

P. VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON



MINEABLE RESERVES										
Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume In M ³	Rough Stone in M ³	Gravel in M ³	Bulk Density	Rough Stone in (MT)	Gravel in (MT)
XY-AB	I	68	166	3	33864	.....	33864	2	.....	67728
	I	68	166	2	22576	22576	.....	2.75	62084	.....
	II	63	156	5	49140	49140	.....	2.75	135135	.....
	III	58	146	5	42340	42340	.....	2.75	116435	.....
	IV	53	136	5	36040	36040	.....	2.75	99110	.....
	V	48	126	5	30240	30240	.....	2.75	83160	.....
	VI	43	116	5	24940	24940	.....	2.75	68585	.....
TOTAL					239140	205276	33864	.....	564509	67728
XY-CD	I	71	62	3	13206	.....	13206	2	.....	26412
	I	71	62	2	8804	8804	.....	2.75	24211	.....
	II	66	52	5	17160	17160	.....	2.75	47190	.....
	III	61	42	5	12810	12810	.....	2.75	35227	.....
	IV	56	32	5	8960	8960	.....	2.75	24640	.....
	V	51	22	5	5610	5610	.....	2.75	15428	.....
	VI	46	12	5	2760	2760	.....	2.75	7590	.....
TOTAL					69310	56104	13206	.....	154286	26412
GRAND TOTAL					308450	261380	47070	.....	718795	94140

PLATE No- IVA

APPLICANT:
Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2,
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI.

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MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

ULTIMATE BENCH

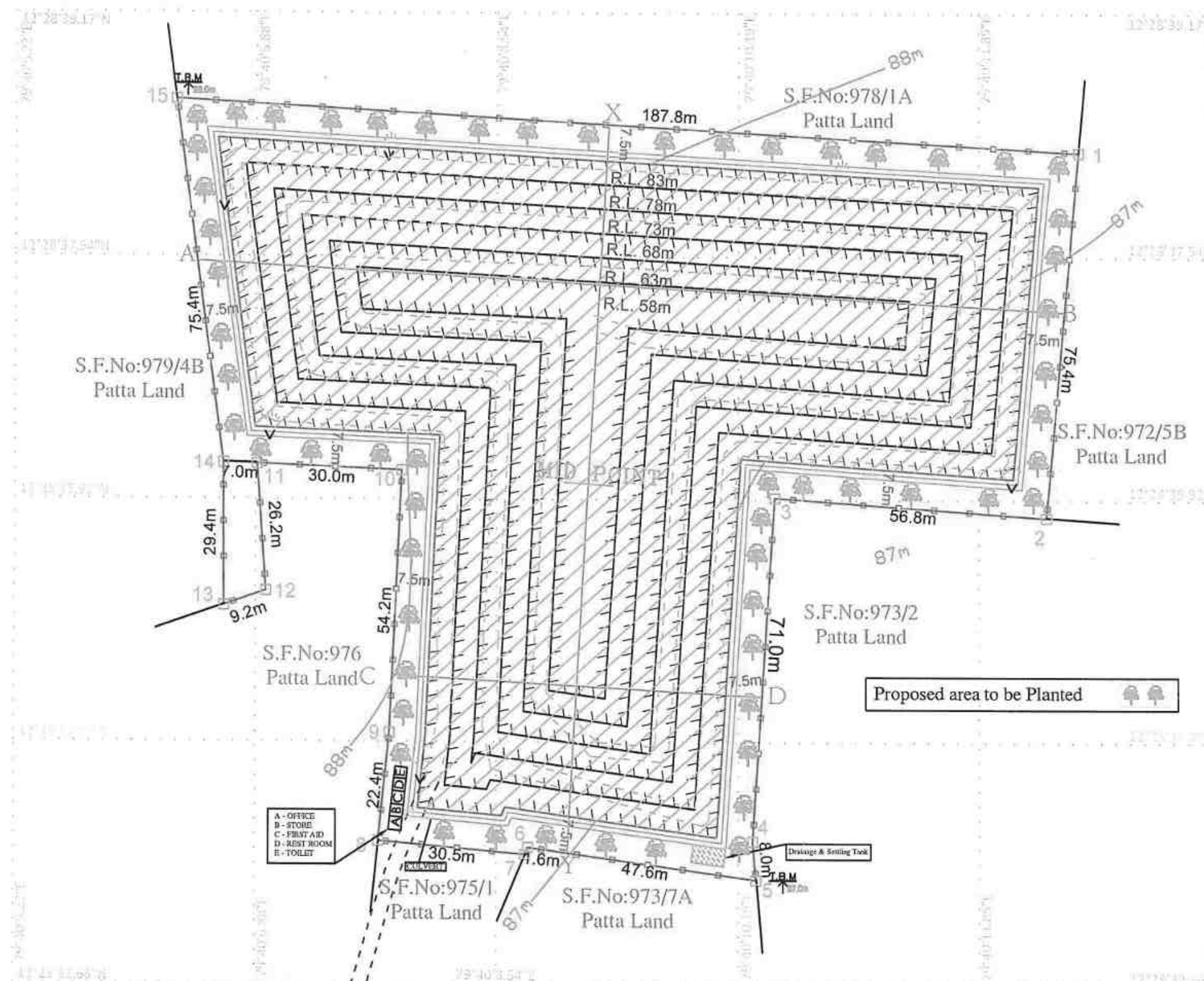
CONCEPTUAL SECTIONS

SECTION HOR 1 : 1000 & VER 1: 500

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS
BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

P.VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON



MINE LAYOUT LAND USE PATTERN

DESCRIPTION	PRESENT AREA (Hect)	AREA IN USE DURING THE QUARRYING PERIOD(Hect)	COLOR CODE
AREA UNDER QUARRYING	NIL	1.44.85	
INFRASTRUCTURE	NIL	0.02.0	
ROADS	NIL	0.03.0	
UN-UTILIZED AREA	1.96.03	NIL	
GREEN BELT	NIL	0.39.73	
DRAINAGE & SETTLING TANK	NIL	0.06.45	
GRAND TOTAL	1.96.03	1.96.03	

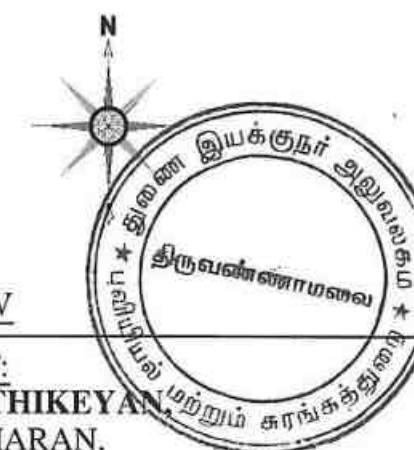


PLATE No- V

APPLICANT:

Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2,
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI,

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GRAVEL	
FENCING	
PROPOSED BENCH	
DRAINAGE & SETTLING TANK	

**MINE LAYOUT PLAN
& LAND USE PATTERN**

PLAN SCALE 1: 1000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS
BEEN CHECKED BY ME AND IS CORRECT
TO THE BEST OF MY KNOWLEDGE

M. Karthikeyan *P. Vellaiyan*

P.VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON

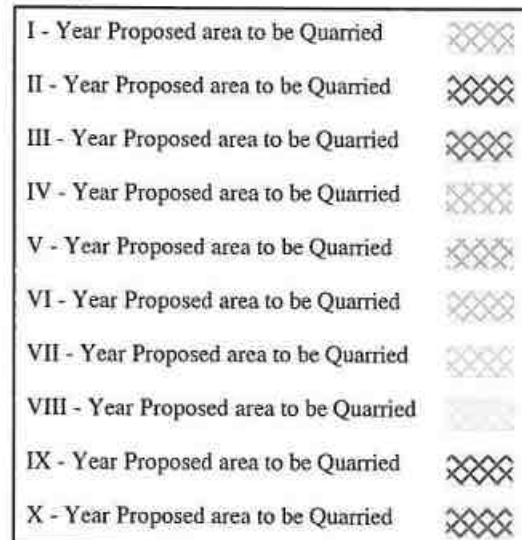


PLATE No- VI

APPLICANT:
Mr.M.KARTHIKEYA
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:

S.F.No	: 973/1, 973/7B, 975/2, 977 & 978/2,
EXTENT	: 1.96.03 Hect,
VILLAGE	: MARUTHADU,
TALUK	: VANDAVASI,
DISTRICT	: TIRUVANNAMALAI,

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YEARWISE DEVELOPMENT & PRODUCTION PLAN

PLAN SCALE 1: 1000

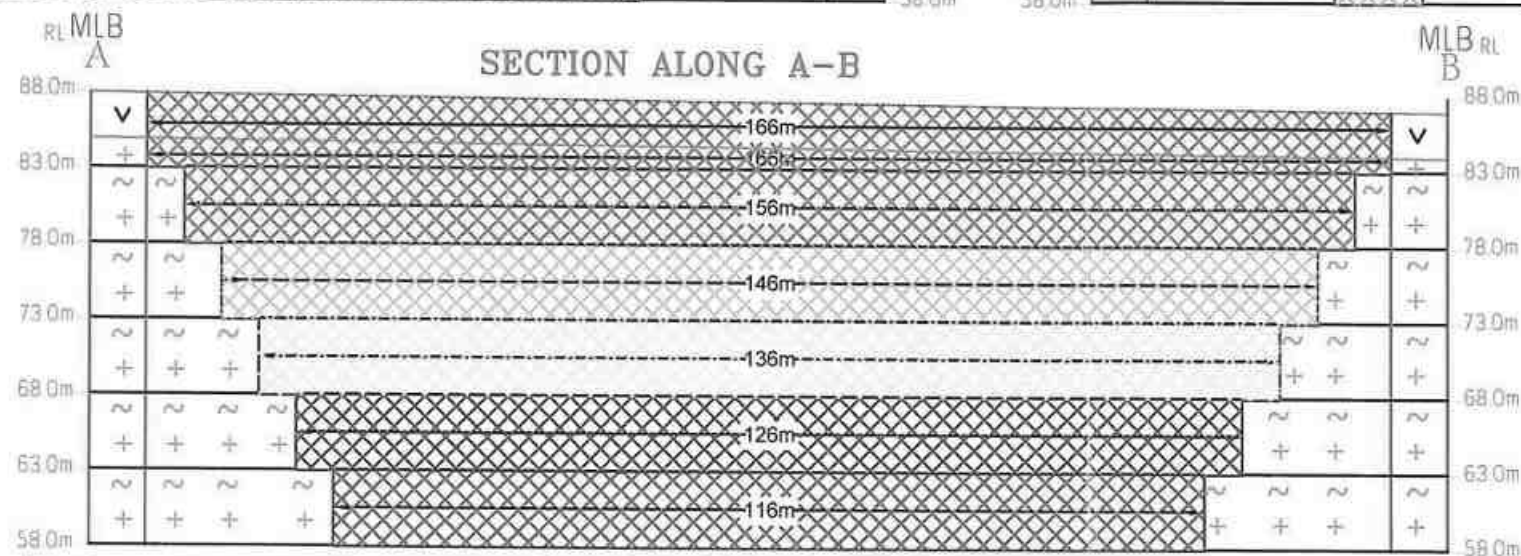
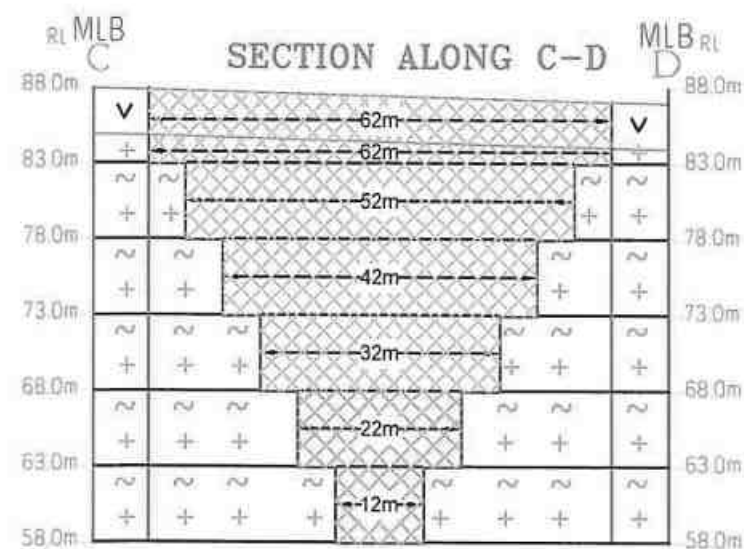
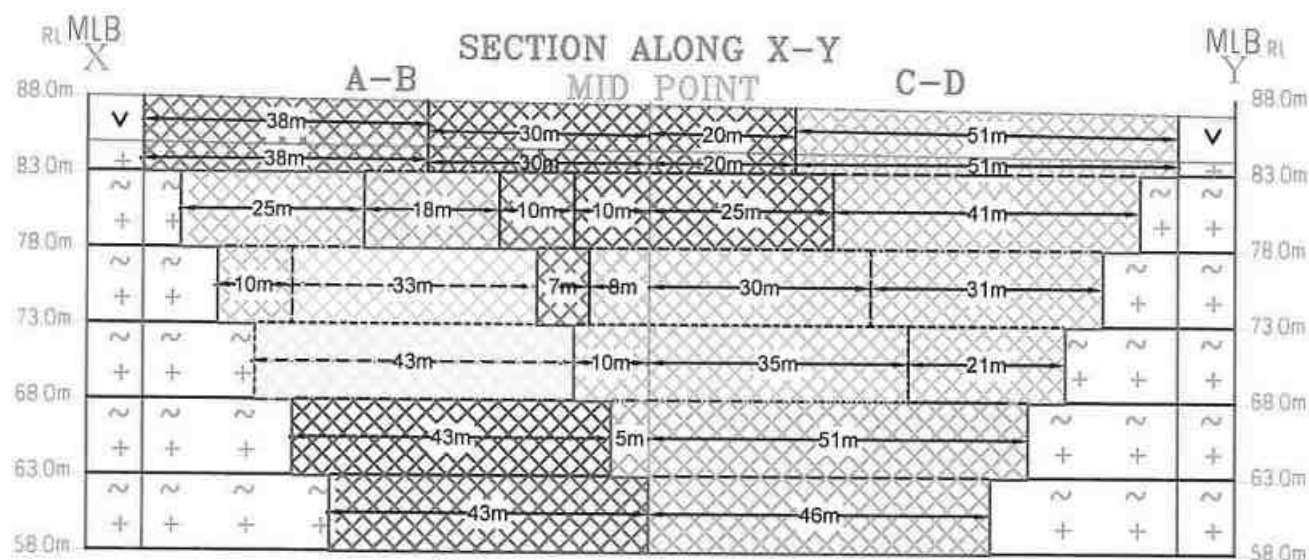
Prepared By:

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TO THE BEST OF MY KNOWLEDGE

M. Kay Shi Ky

[Signature]

P. VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON



YEARWISE PRODUCTIONS (First Five Years)													
Year	Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume In M ³	Rough Stone in M ³	Gravel in M ³	Bulk Density	Rough Stone in (MT)	Gravel in (MT)		
I-YEAR	XY-CD	I	51	62	3	9486	6324	9486	2	17391	18972		
		I	51	62	2	6324	10660	6324	2.75	29315	17391		
		II	41	32	5	10660	6510	10660	2.75	17902	29315		
		III	31	42	5	6510	3360	6510	2.75	9240	17902		
		IV	21	32	5	3360	1660	3360	2.75	4480	9240		
TOTAL						36340	26854	9486	2	73848	18972		
II-YEAR	XY-CD	I	20	62	3	3720	14940	3720	2	7440	29880		
		I	30	166	3	14940	9960	14940	2	27390	14940		
		I	30	166	2	9960	2480	9960	2.75	6820	2480		
		II	20	62	2	2480	7800	2480	2.75	21450	2480		
		II	10	156	5	7800	6500	7800	2.75	17875	7800		
XY-AB	II	10	156	5	7800	6500	7800	2.75	17875	7800			
XY-CD	II	25	52	5	6500	3360	6500	2.75	9240	6500			
TOTAL						45400	26740	18660	2	73535	37320		
III-YEAR	XY-AB	I	38	166	3	18924	12616	18924	2	37848	18924		
		I	38	166	2	12616	7800	12616	2.75	34694	12616		
		II	10	156	5	7800	6800	7800	2.75	21450	7800		
		III	7	146	5	5110	5840	5110	2.75	16060	5110		
		III	7	146	5	5110	6300	5110	2.75	17325	5110		
TOTAL						44450	25526	18924	2	70196	37848		
IV-YEAR	XY-AB	III	8	146	5	5840	5840	5840	2.75	16060	5840		
		III	30	42	5	6300	6800	6300	2.75	18700	6300		
		IV	10	136	5	6800	5600	6800	2.75	15400	6800		
		IV	35	32	5	5600	3150	5600	2.75	8662	3150		
		IV	35	32	5	5600	5610	5600	2.75	15428	5600		
TOTAL						24540	24540	0	2.75	67485	0		
V-YEAR	XY-AB	V	5	126	5	3150	3150	3150	2.75	8662	3150		
		V	51	22	5	5610	2760	5610	2.75	15428	5610		
		VI	46	12	5	2760	14040	2760	2.75	7590	2760		
		II	18	156	5	14040	24940	14040	2.75	38610	14040		
		II	18	156	5	14040	24940	14040	2.75	38610	14040		
TOTAL						25560	25560	0	2.75	70290	0		
GRAND TOTAL (A)						176290	129220	47070	2	355354	94140		
YEARWISE PRODUCTIONS (Next Five Years)													
VI-YEAR	XY-AB	II	25	156	5	19500	19500	19500	2.75	53625	19500		
		III	10	146	5	7300	7300	7300	2.75	20075	7300		
		TOTAL						26800	26800	0	2.75	73700	0
VII-YEAR	XY-AB	III	33	146	5	24090	24090	24090	2.75	66248	24090		
		TOTAL						24090	24090	0	2.75	66248	0
		TOTAL						24090	24090	0	2.75	66248	0
VIII-YEAR	XY-AB	IV	43	136	5	29240	29240	29240	2.75	80410	29240		
		TOTAL						29240	29240	0	2.75	80410	0
		TOTAL						29240	29240	0	2.75	80410	0
IX - YEAR	XY-AB	II	43	126	5	27090	27090	27090	2.75	74498	27090		
		TOTAL						27090	27090	0	2.75	74498	0
		TOTAL						27090	27090	0	2.75	74498	0
X-YEAR	XY-AB	II	43	116	5	24940	24940	24940	2.75	68585	24940		
		TOTAL						24940	24940	0	2.75	68585	0
		TOTAL						24940	24940	0	2.75	68585	0
GRAND TOTAL (B)						132160	132160	0	2.75	363441	0		
GRAND TOTAL (A+B)						308450	261380	47070	2	718795	94140		

- I - Year Proposed area to be Quarried
- II - Year Proposed area to be Quarried
- III - Year Proposed area to be Quarried
- IV - Year Proposed area to be Quarried
- V - Year Proposed area to be Quarried
- VI - Year Proposed area to be Quarried
- VII - Year Proposed area to be Quarried
- VIII - Year Proposed area to be Quarried
- IX - Year Proposed area to be Quarried
- X - Year Proposed area to be Quarried



PLATE No- VIA

APPLICANT:
Mr.M.KARTHIKEYAN,
S/o. MANOHARAN,
No. 2/21, WEST STREET,
VADAMALAIPATTI,
MUSIRI TALUK, THATHIENGARPET,
TIRUCHIRAPPALLI - 621214.

LEASE APPLIED AREA:
S.F.No : 973/1, 973/7B, 975/2, 977 & 978/2,
EXTENT : 1.96.03 Hect,
VILLAGE : MARUTHADU,
TALUK : VANDAVASI,
DISTRICT : TIRUVANNAMALAI,

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SAFETY BOUNDARY	
GRAVEL	
ROUGH STONE	
PROPOSED BENCH	

YEARWISE DEVELOPMENT & PRODUCTION SECTIONS

SECTION HOR 1 : 1000 & VER 1 : 500

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

M. K. K. K.

P. Vellaiyan

P.VELLAIYAN, M.Sc., M.Phil.,
QUALIFIED PERSON

From
Dr.S.Vediappan, M.Sc., Ph.D.,
Deputy Director,
Geology and Mining,
Tiruvannamalai - 4.

To
Thiru.M.Karthickeyan,
S/o.Manokaran,
No.2/21. West Street,
Vadamalaipatti,
Musiri Taluk,
Thathiyengarpet,
Trichy District.

Rc.No.452/Kanimam/2025, dated 17.07.2025.

Sir,

Sub: Mines and Minerals - Minor Mineral - Rough stone and Gravel - Tiruvannamalai District - Vandavasi Taluk - Maruthadu Village Patta land SF.Nos. 973/1, 973/7B, 975/2, 977 & 978/2 over an extent of 1.96.03 hecets., - Application preferred by **Thiru.M.Karthickeyan** S/o.Manokaran - Precise area communicated - Submission of three copies of draft Mining Plan for approval - Approval accorded - regarding.

Ref: 1. Thiru.M.Karthickeyan S/o.Manokaran
Online Application No. 25TVM0403450 dated 16.06.2025.
2. Precise Area Communication Notice
Rc.No.452/Kanimam/2025, dated 14.07.2025.
3. Mining Plan submitted
Thiru.M.Karthickeyan S/o.Manokaran
dated 15.07.2025.

Thiru.M.Karthickeyan S/o.Manokaran has preferred an application for the grant of Rough Stone and Gravel quarry lease over an extent of 1.96.03 hecets., of Patta land in SF.Nos. 973/1 (0.47.0), 973/7B (0.03.23), 975/2 (0.07.30), 977 (0.02.50) & 978/2 (1.36.00) of Maruthadu Village, Vandavasi Taluk, Tiruvannamalai District for a period of 10 (Ten years) vide in the reference 1st cited and the precise area has been communicated to the applicant vide in the reference 2nd cited with a direction to submit the approved mining plan and Environmental Clearance.

2. As directed, the applicant has submitted three copies of mining plan for approval vide in the reference 3rd cited. The Mining Plan has been verified in detail and found that it has been prepared in accordance with the guidelines / instructions issued by the Commissioner of Geology and Mining in letter RC. No. 3868 / LC / 2012 dated 19.11.2012.

i) The reserves estimated in the mining plan is

Depth in Mts.	Geological Resources			Mineable Reserves		
	Mineral	in Cbm	in Tons	Mineral	in Cbm	in Tons
30m (BGL)	Rough Stone	528687	1453889	Rough Stone	261380	718795
	Gravel	58743	117486	Gravel	47070	94140

ii) Year wise production proposed for the **first five year period** are as follows:-

Year	Rough Stone Quantity		Gravel Quantity	
	CBM	Tons	CBM	Tons
I	26854	73848	9486	18972
II	26740	73535	18660	37320
III	25526	70196	18924	37848
IV	24540	67485	-	-
V	25560	70290	-	-
Total	129220	355354	47070	94140

iii) Year wise production proposed for the **2nd five year period** are as follows:-

Year	Mineral	Quantity	
		CBM	Tons
I	Rough Stone	26800	73700
II		24090	66248
III		29240	80410
IV		27090	74498
V		24940	68585
Total		132160	363441

3. Therefore in exercise of the powers conferred under Rule 41(2) of Tamil Nadu Minor Mineral Concession Rules, 1959, the mining plan is hereby approved, subject to the following conditions:-

- i. The mining plan is approved without prejudice to any other Law applicable to the quarry lease from time to time whether such laws are made by the Central Government, State Government or any other authority.
- ii. This approval of the mining plan does not in any way convey the approval of the Government in terms or any other provisions of the Mines and Minerals (Development and Regulation) Act, 1957, or any other connected laws including Forest (Conservation) Act, 1980, Forest Conservation Rules, 1981, Environment Protection Act, 1980, Explosives Act, 1884 (Central Act IV of 1884) Minor Mineral Concession and Development Rules, 2010 and the Rules made there under and the Tamil Nadu Minor Mineral Concession Rules, 1959.
- iii. The mining plan is approved without prejudice to any other order or direction from any court of competent jurisdiction.
- iv. Scheme of Mining shall be submitted for the 2nd five year 180 Days prior to expiry of 1st five year period as stipulated in rule 41 (a) of TNMMCR.
- v. Quarrying shall be done in accordance with the approved Mining Plan.
- vi. If anything is found to be concealed in the contents of the mining plan which are required by the mines act or if any proposed for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.
- vii. All the conditions stipulated in the precise area communication dated 14.07.2025 should be duly complied with.
- viii. Environmental Clearance should be obtained for the grant of lease.

4. Further, other quarries situated within 500m radial distance are as follows.

i) Existing Quarries

Name of the Owner	Village & S.F. Nos.	Extent in Hects.	Lease Period	Remarks
Tvl.Dwarakha Mines	Maruthadu 942/4A, 973/2, 973/7A, 973/9(Part), 973/10A, 973/10B and 975/1 273	2.30.97	10.02.2025 to 09.02.2030	Existing Quarry

ii) Abandoned quarries

Name of the Owner	Village & S.F. Nos.	Extent in Hects.	Lease Period	Remarks
NIL				

iii) Present Proposed Quarries

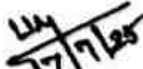
Sl. No	Name of the Owner	Village & S.F. Nos.	Extent in Hects.
1	Thiru.M.Karthickeyan, S/o.Manokaran, No.2/21. West Street, Vadamalaipatti, Musiri Taluk, Thathiyengarpet, Trichy District	Maruthadu 973/1, 973/7B, 975/2, 977 & 978/2	1.96.03 (Proposed Area)
	R.Arul, S/o.Rajagopal, No.18, NSK Street, Meenakshi Amman Nagar, Alwarthirunagar, Tiruvallur	Maruthadu 965/1A, 965/1B, 965/1C, 965/1D, 965/2A1 & 965/2B1	2.28.5 (Newly applied area)

Encl: 2 Copies of Approved Mining Plan.


17.07.24
Deputy Director,
Geology and Mining,
Tiruvannamalai.

Copy submitted to:

1. The Chairman, SEIAA,
Tamil Nadu, 3rd Floor, Panagal Maaligai,
No.1, Jeenis Road, Saidapet, Chennai-15.
2. The Commissioner of Geology and Mining, Chennai-32.
3. The District Collector, Tiruvannamalai.


17/7/25

சுருதி



National Accreditation Board for Education and Training

Certificate of Accreditation

Geo Technical Mining Solutions, Dharmapuri

5/1485-3, Salem Main Road, Elakkiyampatty, Dharmapuri, Tamil Nadu

The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA/EMP reports in the following Sectors.

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals - including opencast and underground mining	1	1 (a) (i)	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated January 24, 2024, posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/24/3142 dated Feb 19, 2024. The accreditation needs to be renewed before the expiry date by Geo Technical Mining Solutions, Dharmapuri following due process of assessment.

Issue Date
Feb 19, 2024

Valid up to
Dec 31, 2026



Mr. Ajay Kumar Jha
Sr. Director, NABET

Certificate No.
NABET/EIA/23-26/RA 0319

Prof (Dr) Varinder S Kanwar
(CEO NABET)

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