DRAFT ENVIRONMENTAL IMPACT ASSESSMENT

&

ENVIRONMENT MANAGEMENT PLAN

FOR OBTAINING

Environmental Clearance under EIA Notification – 2006
Schedule Sl. No. 1 (a) (i): Mining Project

"B1" CATEGORY – MINOR MINERAL – CLUSTER – NON-FOREST LAND

THIRU. P. ARULDOSS ROUGH STONE & GRAVEL QUARRY

Proponent Name & Address	Project Location	Extent
Thiru. P. Aruldoss, S/o. Ponnusamy, No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai– 600 048	S.F.No. 41/2, 66/1A (P), 66/1B and 66/8, T.C. Kandikai Village, Thiruttani Taluk, Tiruvallur District	2.94.5 ha

Obtained ToR

Lr.No. SEIAA-TN/F.No. 8730/ToR- 1085/2021 Dated: 17.03.2022.

CLUSTER EXTENT = 6.94.5 ha

Environmental Consultant
GEO EXPLORATION AND MINING SOLUTIONS
Old No. 260-B, New No. 17,
Advaitha Ashram Road, Alagapuram,
Salem – 636 004, Tamil Nadu, India
Accredited for sector 1 Cat 'A' & 38 Cat 'B'
Certificate No : NABET/EIA/2225/RA 0276
Phone: 0427-2431989,
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Laboratory
CHENNAI METTEX LAB PRIVATE LIMITED
(Approved by AAI, AGMARK, APEDA, BIS, EIC FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)
Jothi Complex, 83,
M.K.N Road, Guindy,
Chennai – 600 032

Baseline Monitoring Period: October 2022 to December 2022

MARCH 2023

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

PROPOSED QUARRIES				
CODE	**Name of the Owner**	**S.F. Nos**	**Extent**	**Status**
P1	**Thiru.P. Aruldoss,** S/o. Ponnusamy, No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai, Tamil Nadu State – 600 048	41/2, 66/1A (P), 66/1B and 66/8	2.94.5 ha	TOR Obtained: Lr. No. SEIAA-TN/F.No.8730/ToR-1085/2021 Dated: 17.03.2022
TOTAL			**2.94.5 ha**	
EXISTING QUARRIES				
CODE	**Name of the Owner**	**S.F. No**	**Extent**	**Status**
E1	**Thiru. S.Sriram** S/o.C.Shanmuganathan, No2, Lakshmipuram Extension-II, Mudichur Road, West Tambaram, Chennai -6000045	58/2 (P)	2.00.0 ha	Operation
	TOTAL		**2.00.0 ha**	
	EXPIRED QUARRIES			
CODE	**Name of the Owner**	**S.F. No**	**Extent**	**Status**
Ex-1	**Thiru. R.Subramani,** S/o. Rangasamy, No.126,Periyar Nagar, Thiruttani Village & Taluk, Thiruvallur District.	41/1 (P)	2.00.0 ha	Lease Period Expired on 17.05.2021
	TOTAL		2.00.0 ha	
TOTAL CLUSTER EXTENT			**6.94.5 ha**	

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

TERMS OF REFERENCE (ToR) COMPLIANCE

P1 -P. ARULDOSS

Lr. No. SEIAA-TN/F.No.8730/ToR-1085/2021 Dated: 17.03.2022

SPECIFIC CONDITIONS		
1	The Proponent shall carry out the cumulative & comprehensive environmental impact assessment study due to mining operations carried out in the quarry cluster specifically with reference to the environment in terms of air pollution, water Pollution & health impacts, and accordingly the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	Cumulative Impact Study is carried out and detailed under Chapter 7 and accordingly EMP is framed and discussed under Chapter 10.
2	The Proponent shall carry out the Socio-Economic impact Assessment study in the vicinity of the villages located in the proposed quarry.	Noted & agreed.
3	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, a) What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? b) Quantity of minerals mined out. c) Highest production achieved in any one year d) Detail of approved depth of mining. e) Actual depth of the mining achieved earlier. f) Name of the person already mined in that leases area. c) If EC and CTO already obtained, the copy of the same shall be submitted. h) Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	It is a fresh lease.
4	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).	Discussed under Chapter 2 & Chapter 3
5	The proponent shalt fumish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Noted and agreed. Fencing will be carried out before execution of lease deed and greenbelt development will be carried out from the 1st Year of Mining Plan Period and periodical compliance with photographs will be submitted to SEIAA every 6 months.
6	The Project Proponent shall provide the details of geological 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 proposed mitigation measures for the same.	Noted and agreed. Discussed under Chapter 2 and Chapter 4.
7	The Project Proponent shall provide the	Noted and agreed.

	Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Detailed under Chapter 6.
8	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within I km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3.
9	A detailed study shall be carried out in order to ascertain the status of existing trees (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	It is a fresh lease.
10	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific A detailed mine closure plan for the proposed project shall be included in EIA, EMP report which should be site-specific, along with the exclusive photographs/images/plans showing the proposed closure activities conceptually.	Noted & agreed. Detailed under Chapter 2.
11	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	Noted & agreed.
12	The recommendation for the issue of "Terms of Reference" is subjected to the outcome of the Hon'ble NGT, Principal Bench, New Delhi in O.A No. 186 of 2016 (M.A.No.350/2016) and O.A. No.200/2016 and O.A.No.58012016 (M.A.No.1182/2016) and O.A.No.102/2017 and O.A.No.404/2016 (M.A.No.758/2016, M.A.No.920/2016, M.A.No. 1122/2016, M.A.No.12l2017 & M.A. No. 843/2017) and O.A.No.40512016 and O.A.No.520 of 2016 (M.A.No.981/201 6, M.A.No.982/2016 & M.A.No.384/2017).	Noted & agreed.
13	The purpose of green belt around the project is to capture the fugitive dust emissions, carbon sequestration and to attenuate the noise generated, in addition to reduce the visual impacts. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University and local school college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	Noted & agreed.
14	Taller/one year old Saplings raised in appropriate size of bags. preferably eco-friendly	Noted & agreed.

	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.	
15	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Detailed under Chapter 7.
16	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	Detailed under Chapter 7.
17	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.	Detailed under Chapter 3.
18	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought. fie Project Proponent shall fumish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	Noted & agreed. It is a fresh lease.
19	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (protection) Act. 1986.	Noted & agreed.
ADDITIONAL CONDITIONS		
1	As per the MoEF&CC office memorandum F.No.22-6512017-lA.lll dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	Noted & agreed.
2	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	Noted & agreed. Detailed under Chapter 3.
3	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem,the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Noted & agreed. Detailed under Chapter 3.
4	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted & agreed. Detailed under Chapter 4.
5	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	Noted & agreed. Detailed under Chapter 3.
6	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial	Noted & agreed. Detailed under Chapter 3.

	components.	
7	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	Noted & agreed. Detailed under Chapter 3.
8	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	Noted & agreed. Detailed under Chapter 3.
9	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Noted & agreed. Detailed under Chapter 3.
10	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	Noted & agreed. Detailed under Chapter 10.
11	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Noted & agreed. Detailed under Chapter 3.
12	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	Noted & agreed. Detailed under Chapter 3.
13	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.	Noted & agreed. Detailed under Chapter 3.
14	The project proponent shall study and furnish the details on potential fragmentation impact of natural environment, by the activities.	Noted & agreed. Detailed under Chapter 3.
15	The project proponent shall study and fumish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	Noted & agreed. Detailed under Chapter 3.
16	The project proponent shall study and fumish 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.	Noted & agreed. Detailed under Chapter 3.
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.** This is Not a violation category project. This proposal falls under B1 Category
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The applied land for quarrying is a Patta Land. Document is enclosed along with Approved Mining Plan as Annexure Volume 1.
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	**Noted & agreed.**
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/	Map showing – Project area is with adjacent quarries details is

	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).	enclosed in Figure No1.1 page No. 2 Project area boundary coordinates superimposed on Toposheet – Figure No. 1.1A, Page No. 7 Toposheet of the project area covering 10km radius – Figure No. 1.2, Page No. 8 Geology map of the project area covering 10km radius - Figure No. 2.11
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	**Map showing –** Geology map of the project area covering 10km radius - Figure No. 2.11, Page No. 28 Geomorphological features are incorporated in the Toposheet map covering 10km radius around the project area Figure No. 2.12.
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The applied area was inspected by the officers of Department of Geology along with revenue officials and found that the land is fit for quarrying under the policy of State Government.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent has framed their Environmental Policy and the same is discussed in the Chapter No 10.1.
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90^0 bench angles. Quarrying activities will be carried out under the supervision of Competent Persons like Mines Manager, Mines Foreman and Mining Mate. Necessary permissions will be obtained from DGMS after obtaining Environmental Clearance.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	Noted & Agreed**.** The study area considered for this study is 10 km radius and all data contained in the EIA report such as waste generation etc., is for the Life of the Mine / lease period.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3.

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

	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 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	**Not Applicable.** Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	**Not Applicable.** The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	**Not Applicable.** There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season); December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for One Season October to December 2022 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.
23	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for	Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD view 9.6.1 Model. Details in Chapter No. 4.

	modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Total Water Requirement for this project is given in the chapter No 2, Table No 2.13.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water for dust suppression, greenbelt development and domestic use will be obtained from accumulated rainwater/seepage water in mine pits. Drinking water will be sourced from the approved water vendors, No 2, Table No 2.13.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	The rain water collected in the pits after spell of rain will be used for greenbelt development and dust suppression.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Quality discussed in Chapter No. 4.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The ground water table is at 55-59m below ground level. The ultimate depth of this project is 54m from the general ground profile. Maximum depth is proposed in this cumulative EIA project is 19m. It is inferred the quarrying activities in the Cumulative EIA project (Quarries) will not intersect the Ground water table.
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Highest elevation of the project area is 154m AMSL Ultimate depth of the mine is 54m AMSL Water level in the area is 55m BGL to 59m BGL
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	Progressive greenbelt development plan has been prepared and discussed along with Recommended Species details are given in the Chapter 4, Table No.4.9 .
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no much significant impact due to the proposed transportation from the project area. Details in Chapter 2.

	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.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Discussed in chapter No 2.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Details in Chapter 10.
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Details in Chapter 10.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Details in Chapter 4.
37	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Environment Management Plan Chapter 10.
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	The outcome of public hearing will be updated in the final EIA/EMP report
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	No litigation is pending in any court against this project.
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	The proposed capital cost for Environmental Monitoring Programme is Rs 3,80,000/- and the recurring cost is Rs 76,000/- per annum. Details in Chapter 7
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Details in Chapter 7
42	A Disaster management Plan shall be prepared	Details in Chapter 7

	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.	Details in Chapter.8
44	**Besides the above, the below mentioned general points are also to be followed:-**	
A	Executive Summary of the EIA/EMP Report	Encloses as separate volume
B	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
C	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are given properly.
D	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC / NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Baseline monitoring reports are enclosed with mining plan
E	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
F	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	-
G	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF & CC vide O.M. No. J-11013/41/2006-IA.II(I) Dated: 4th August, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA.II (I) Dated: 4th August, 2009 are followed.
H	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF & CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	It is a fresh proposal.
I	As per the circular no. J-11011/618/2010-IA.II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable.
J	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Surface Plan – Page No Figure No 2.3

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1. INTRODUCTION

1.0 PREAMBLE

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

Rough Stone & Gravel is the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing quarries of Thiru. P. Aruldoss Rough Stone & Gravel Quarries Cluster consisting of one Proposed, one Existing & one Expired Quarries with total extent of Cluster of 6.94.5ha in T.C. Kandikai Village, Thiruttani Taluk, Thiruvallur District and Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

This EIA Report is prepared in compliance with ToR obtained vide –

- Lr. No. SEIAA-TN/F.No.8730/ToR-1085/2021 Dated: 17.03.2022 for Proposed Lease area;

The Baseline Monitoring study has been carried out during the period of **October-December 2022** and this EIA /EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) individually to minimize those adverse impacts.

1.1 PURPOSE OF THE REPORT

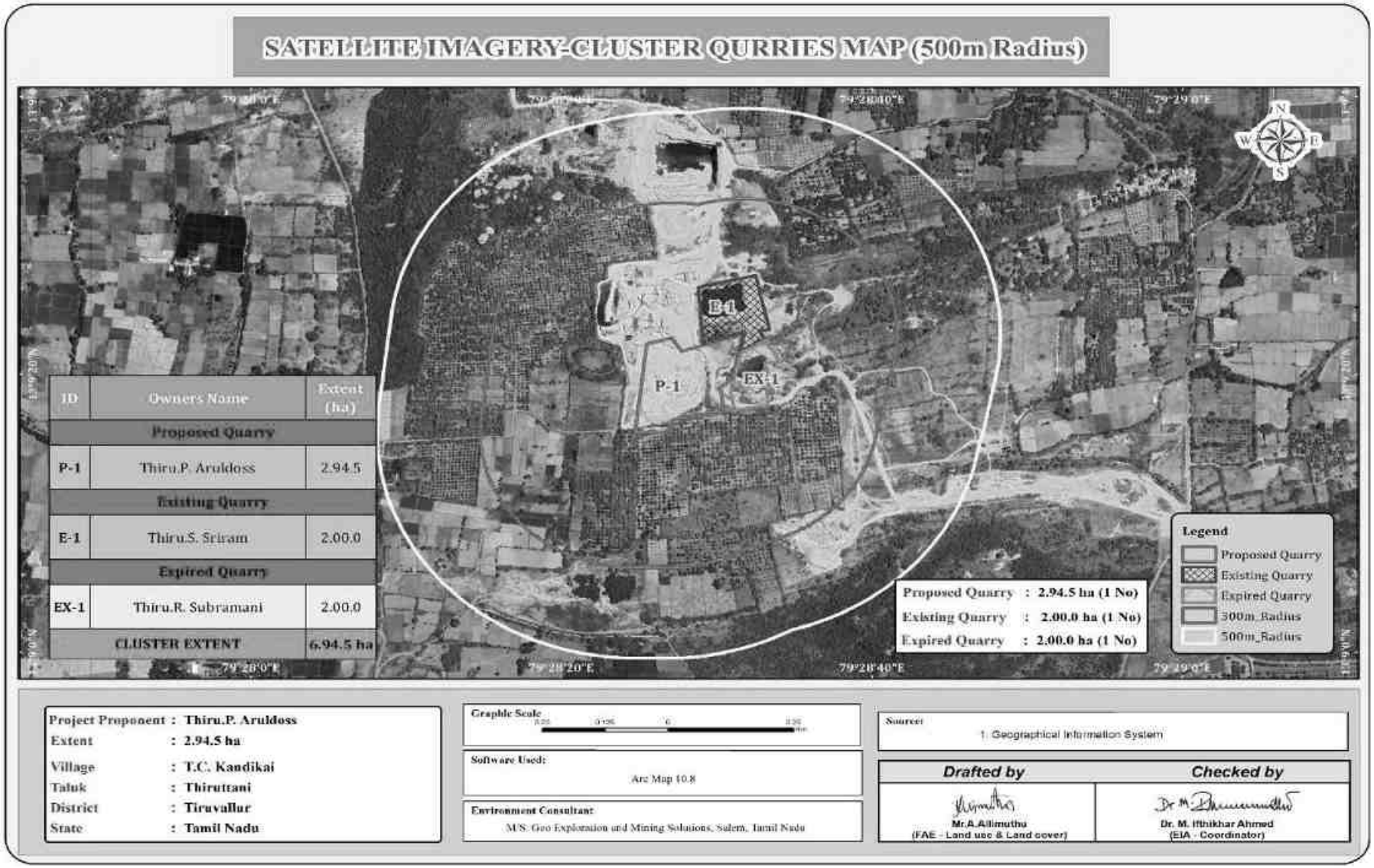
The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14thSeptember 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14thAugust 2018, Mining Projects are classified under two categories i.e., A (> 100 Ha) and B (≤ 100 Ha),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

Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B- 1 and appraised by SEAC/ SEIAA as well as for cluster situation.

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

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

FIGURE1.1: SATELLITE IMAGERY CLUSTER QUARRIES



1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 Identification of Project

TABLE 1.1: SALIENT FEATURES OF THE PROPOSED PROJECTS

PROPOSAL	
Name of the Project	Thiru. P. Aruldoss, Rough Stone & Gravel Quarry Project
S.F. No.	42/1, 66/1A(P), 66/1B and 66/8
Extent	2.94.5 ha
Land Type	Patta Land
Village Taluk and District	T.C.Kandikai Village, Thiruttani Taluk, Thiruvallur District

Source: Approved Mining Plan of proposal.

1.2.2 Identification of Project Proponent

TABLE 1.2: DETAILS OF PROJECT PROPONENT

PROPOSAL	
Name of the Company	Thiru. P. Aruldoss, Rough Stone & Gravel Quarry Project
Address	S/o. Ponnusamy, residing at No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai, Tamil Nadu State – 600 048.
Mobile	+91 99403 52888
Status	Proprietor

Source: Approved Mining Plan of proposal.

1.3 BRIEF DESCRIPTION OF THE PROJECT

1.3.1 Nature and Size of the Project

Common Mining Methodology is proposed for all the mines. The quarrying operation is proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Jack Hammer Drilling & Slurry Explosive during blasting. Hydraulic Excavator and tippers are used for Loading and transportation. Rock Breakers are deployed to avoid secondary blasting.

TABLE 1.3: BRIEF DESCRIPTION OF THE PROJECT

Name of the Quarry	P. Aruldoss Rough Stone & Gravel Quarry Project	
Toposheet No	57-O/08	
Latitude between	13°09'15.82"N to 13°09'22.89"N	
Longitude between	79°28'24.73"E to 79°28'31.68"E	
Highest Elevation	154m AMSL	
Proposed Depth of Mining	54m (4m gravel + 50m Roughstone)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	14,70,840	1,19,920
Mineable Reserves	Rough Stone in m^3	Gravel m^3
	3,40,887	63,856
Production as per ToR	Rough Stone in m^3	Gravel m^3
	1,65,677	63,856
Proposed Depth As per ToR	17m (4m gravel + 15m Rough Stone) (2m AGL + 17 BGL)	
Ultimate Pit Dimension	154 m (L) * 119 m (W) * 54 m (D)	
Water Level in the surrounds area	59m - 55m	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is elevated terrain. The gradient is gentle towards Southwestern side and altitude of the area is 154m above from Mean Sea level. The area is covered by 4m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the nearby existing pits.	
Machinery proposed	Jack Hammer	6 Nos
	Compressor	2Nos
	Excavator with Bucket and Rock Breaker	1No

	Tippers	3Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	27 Nos	
Project Cost	Rs.96,10,000/-	
CER Cost	Rs.5,00,000/-	
Nearby Water Bodies	Tank -900m-Sw	
Greenbelt Development Plan	Proposed to plant 1800 trees in the 7.5 m Safety Zone, Village road and panchayat road	
Proposed Water Requirement	3.0KLD	
Nearest Habitation	670m -SW	

Source: Approved Mining Plan

1.3.2 Location of the Project

- Proposed quarry projects fall in T.C. Kandikai Village, Thiruttani Taluk, Thiruvallur District, Tamilnadu.
- The proposed projects are located about 14 km East side of Thiruttani Town and 7 km South West side of Sholinghur Town.

Thiruvallur —32km→ Thiruttani —14km→ T.C. Kandikai —1km→ Leaseapplied area

- The area is marked in the Survey of India, Toposheet No. 57 O/08.

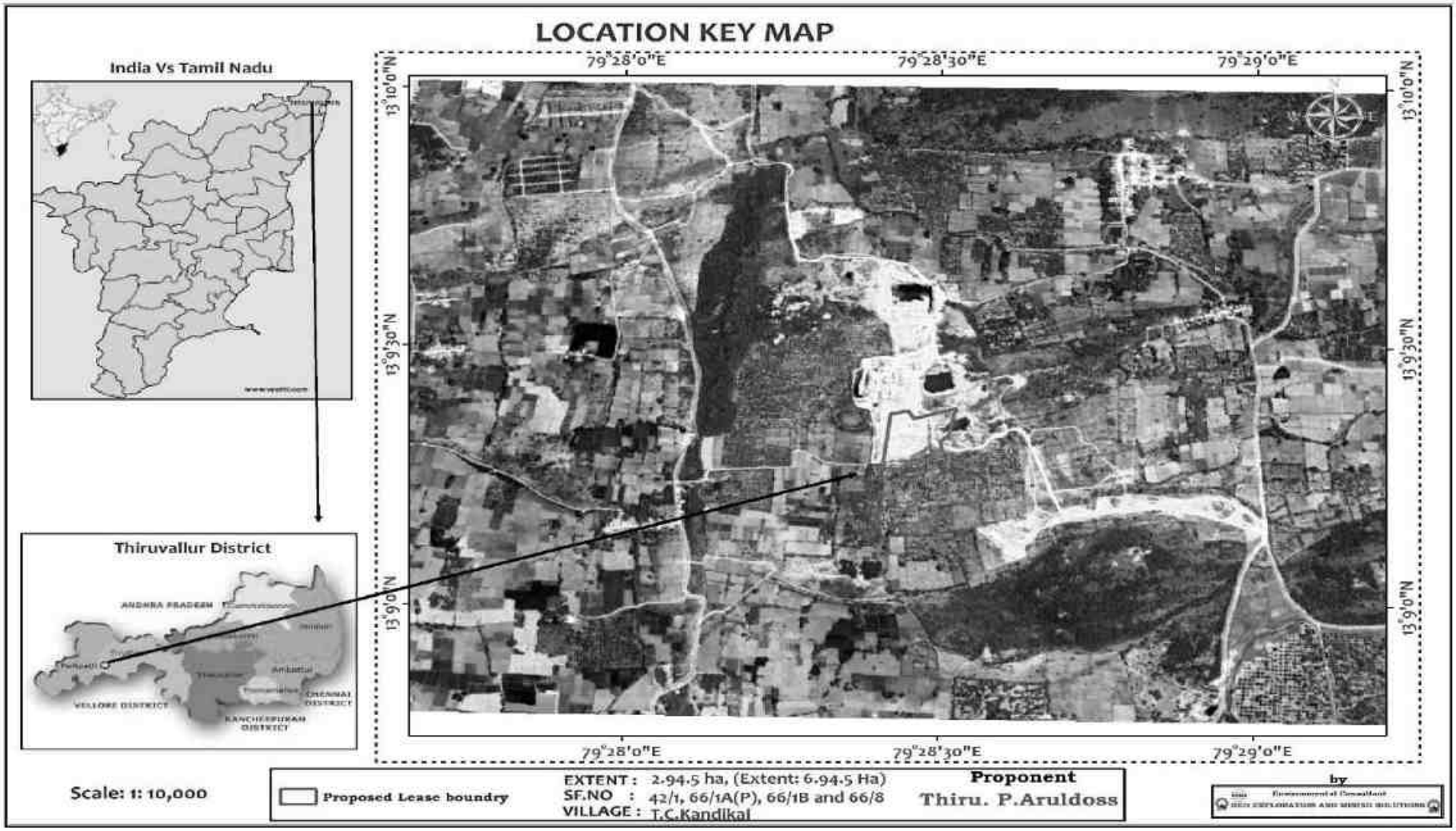


FIGURE1.2: KEY MAP SHOWING THE LOCATION KEY MAP

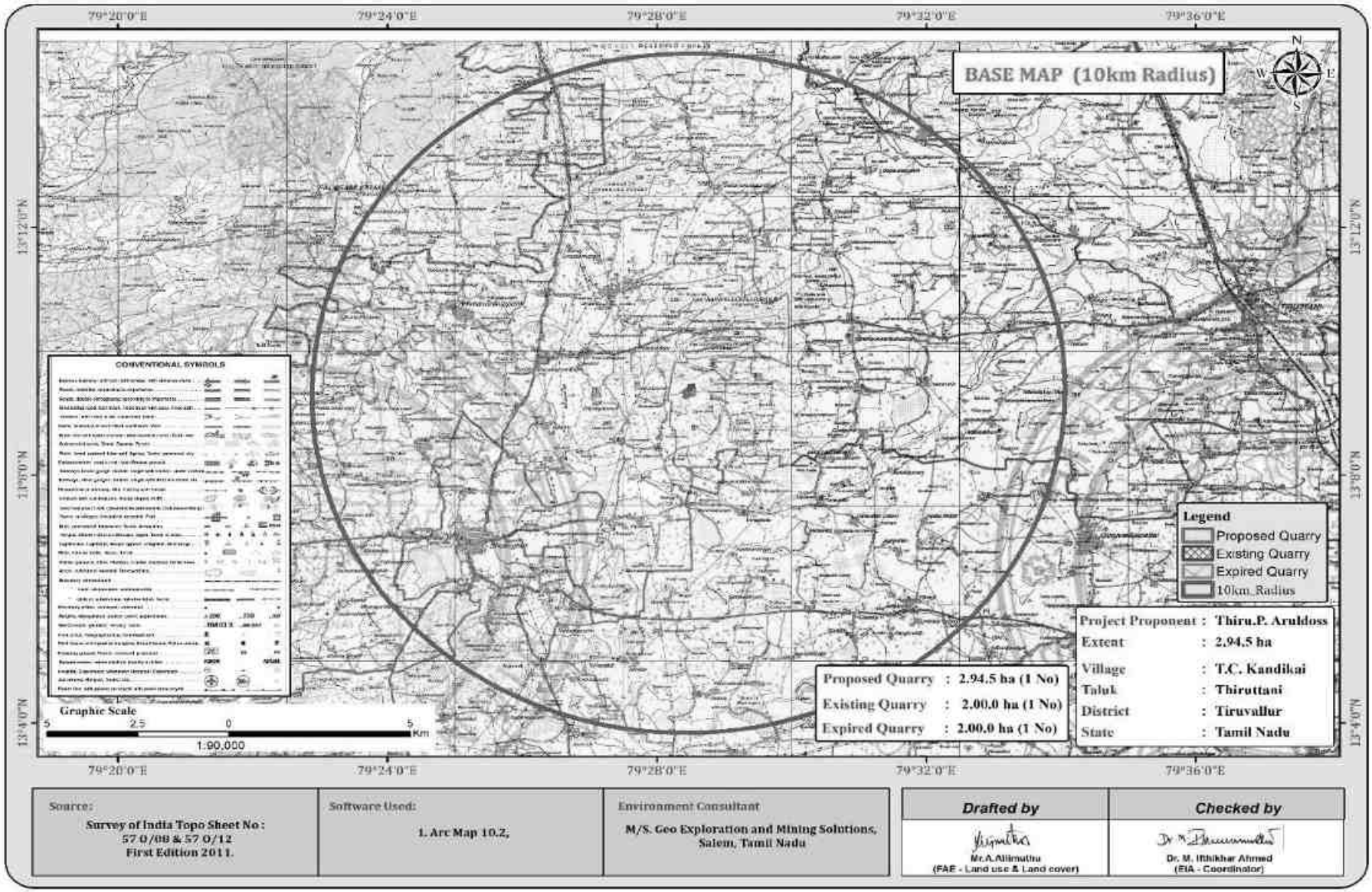


FIGURE 1.3: TOPOSHEET MAP OF THE STUDY AREA 10 KM RADIUS

1.4 ENVIRONMENTAL CLEARANCE

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

1. Screening,
2. Scoping
3. Public consultation &
4. Appraisal

SCREENING –

PROPOSAL

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 20.11.2019
- Precise Area Communication Letter was issued by the District Collector, Thiruvallur R.C.301/2019/G&M-2, Dated:17.12.2020.
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director, Geology and Mining, Thiruvallur District, vide R.C. No301/2019/G&M-2, Dated:01.4.2021
- The proposed project falls under "B1" Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- Proponent applied for ToR for Environmental Clearance vides online Proposal No. SIA/TN/MIN/66597/2021, Dated: 13.08.2021

SCOPING

- The proposal was placed in 248th SEAC meeting held on 24.02.2022 and the committee recommended for issue of ToR.
- The proposal was considered in 492th SEIAA meeting held on 16.03.2022 and issued ToR vide Letter No SEIAA-TN/F.No. 8730/ToR-1085/2021 Dated: 17.03.2022.

PUBLIC CONSULTATION –

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

APPRAISAL

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

The report has been prepared using the following references:

- Guidance Manual of Environmental Impact Assessment for Mining of Minerals, Ministry of Environment and Forests, February, 2010
- EIA Notification, 14thSeptember, 2006
- Letter No SEIAA-TN/F.No. 8730/ToR-1085/2021 Dated: 17.03.2022.for Proposal.
- Approved Mining Plan of Proposed Project.

1.5 TERMS OF REFERENCE (ToR)

Compliance to ToR issued vide –

- Lr. No. SEIAA-TN/F.No.8730/ToR-1085/2021 Dated: 17.03.2022 for Proposal.

Are detailed in above.

1.6 POST ENVIRONMENT CLEARANCE MONITORING

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

1.7 GENERIC STRUCTURE OF EIA DOCUMENT

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

1.8 THE SCOPE OF THE STUDY

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries and formulate the effective mitigation measures for each individual leases. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during the Post monsoon season (Oct-Dec 2022) for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

TABLE 1.11: ENVIRONMENT ATTRIBUTES

Sl.No.	Attributes	Parameters	Source and Frequency
1	Ambient Air Quality	PM_{10}, PM $_{2.5}$, SO_2, NO_2	Continuous 24-hourly samples twice a week for three months at 8 locations (2 Core & 6 Buffer)
2	Meteorology	Wind speed and direction, temperature, relative humidity and rainfall	Near project site continuous for three months with hourly recording and from secondary sources of IMD station
3	Water quality	Physical, Chemical and Bacteriological parameters	Grab samples were collected at 7 locations – 5 Ground water and 2 Surface water samples; once during study period.
4	Ecology	Existing terrestrial and aquatic flora and fauna within 10 km radius circle.	Limited primary survey and secondary data was collected from the Forest department.
5	Noise levels	Noise levels in dB(A)	8 locations (2 Core & 6 Buffer) – data

			monitored once for 24 hours during EIA study
6	Soil Characteristics	Physical and Chemical Parameters	Once at 6 locations during study period
7	Land use	Existing land use for different categories	Based on Survey of India topographical sheet and satellite imagery and primary survey.
8	Socio-Economic Aspects	Socio-economic and demographic characteristics, worker characteristics	Based on primary survey and secondary sources data like census of India 2011.
9	Hydrology	Drainage pattern of the area, nature of streams, aquifer characteristics, recharge and discharge areas	Based on data collected from secondary sources as well as hydro-geology study report prepared.
10	Risk assessment and Disaster Management Plan	Identify areas where disaster can occur by fires and explosions and release of toxic substances	Based on the findings of Risk analysis done for the risk associated with mining.

Source: Onsite Monitoring Data/Sampling by Laboratories, the data has been collected as per the requirement of the ToR issued by SEIAA – TN.

1.8.1 Regulatory Compliance & Applicable Laws/Regulations for Proposed Quarries

- Application for Quarrying Lease as per Tamil Nadu Minor Mineral Concession Rules, 1959
- Obtained Precise Area Communication Letter as per Tamil Nadu Minor Mineral Concession Rules, 1959 for Preparation of Mining Plan and obtaining Environmental Clearance
- The Mining Plan has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959
- Lr. No. SEIAA-TN/F.No.8730/ToR-1085/2021 Dated: 17.03.2022 for Proposal.

2. PROJECT DESCRIPTION

2.0 GENERAL

The Proposed Rough Stone and Gravel Quarry require Environmental Clearance. There are One proposed, one expired and one existing quarry forming a cluster; calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 6.94.5 ha.

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

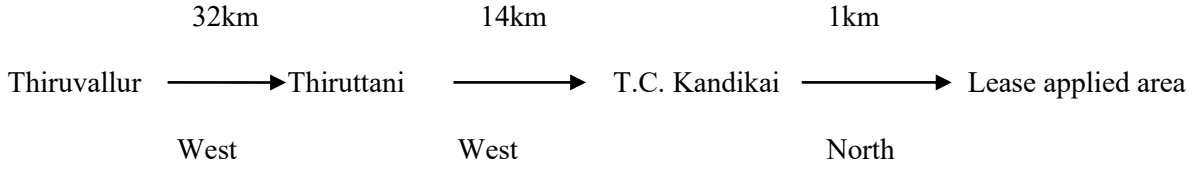
2.1 DESCRIPTION OF THE PROJECT

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

2.2 LOCATION OF THE PROJECT

- Proposed Roughstone and Gravel quarry projects T.C. Kandikai Village, Thiruttani Taluk, Thiruvallur District, Tamil Nadu.
- The proposed projects are located about 14 km East side of Thiruttani Town and 7 km South West side of Sholinghur Town.

The lease applied area is located about 47km Western side of Thiruvallur town, 14km Western side of Thiruttani town and 1km Southwest of T.C. Kandikai Village.



- The area is marked in the Survey of India, Toposheet No. 57 O/08.
- The project does not fall within 10 km radius of any Eco – sensitive zone, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves.

TABLE 2.1: SITE CONNECTIVITY

Nearest Roadway	The National Highway (NH - 716) Tirupati – Chennai -15.0km-North eastern side The State Highway (SH-58) Thiruttani – Ramakrishnaraja – 2.0km - North western side.
Nearest Village	T.C. Kandigai – 1.0km South.
Nearest Town	Thiruttani – 15.0km – East
Nearest Railway	Chennai-Tirupati Railway station – 15.0Km -East
Nearest Airport	Chennai International Airport – 78.0Km – South East
Seaport	Ennore Port – 93.0km – East
Interstate Boundary	Tamilnadu-Andhra Pradesh -6.0 km-North West

Source: Survey of India Toposheet

TABLE 2.2: BOUNDARY CO-ORDINATES OF PROPOSED PROJECT

Geocoordinates of Boundary Pillar		
Boundary Pillar No.	**Latitude**	**Longitude**
1	13° 09' 15.84"N	79° 28' 24.73"E
2	13° 09' 22.21"N	79° 28' 25.51"E
3	13° 09' 22.60"N	79° 28' 27.12"E
4	13° 09' 21.67"N	79° 28' 27.73"E
5	13° 09' 22.89"N	79° 28' 31.68"E
6	13° 09' 19.70"N	79° 28' 31.02"E
7	13° 09' 19.10"N	79° 28' 30.25"E
8	13° 09' 17.29"N	79° 28' 30.46"E
9	13° 09' 16.72"N	79° 28' 27.21"E
10	13° 09' 15.82"N	79° 28' 26.78"E

Source:ApprovedMiningPlans

FIGURE 2.1: GOOGLE IMAGE OF THE PROJECT AREA

FIGURE 2.2: QUARRY LEASE PLAN / SURFACE PLAN – PROPOSAL

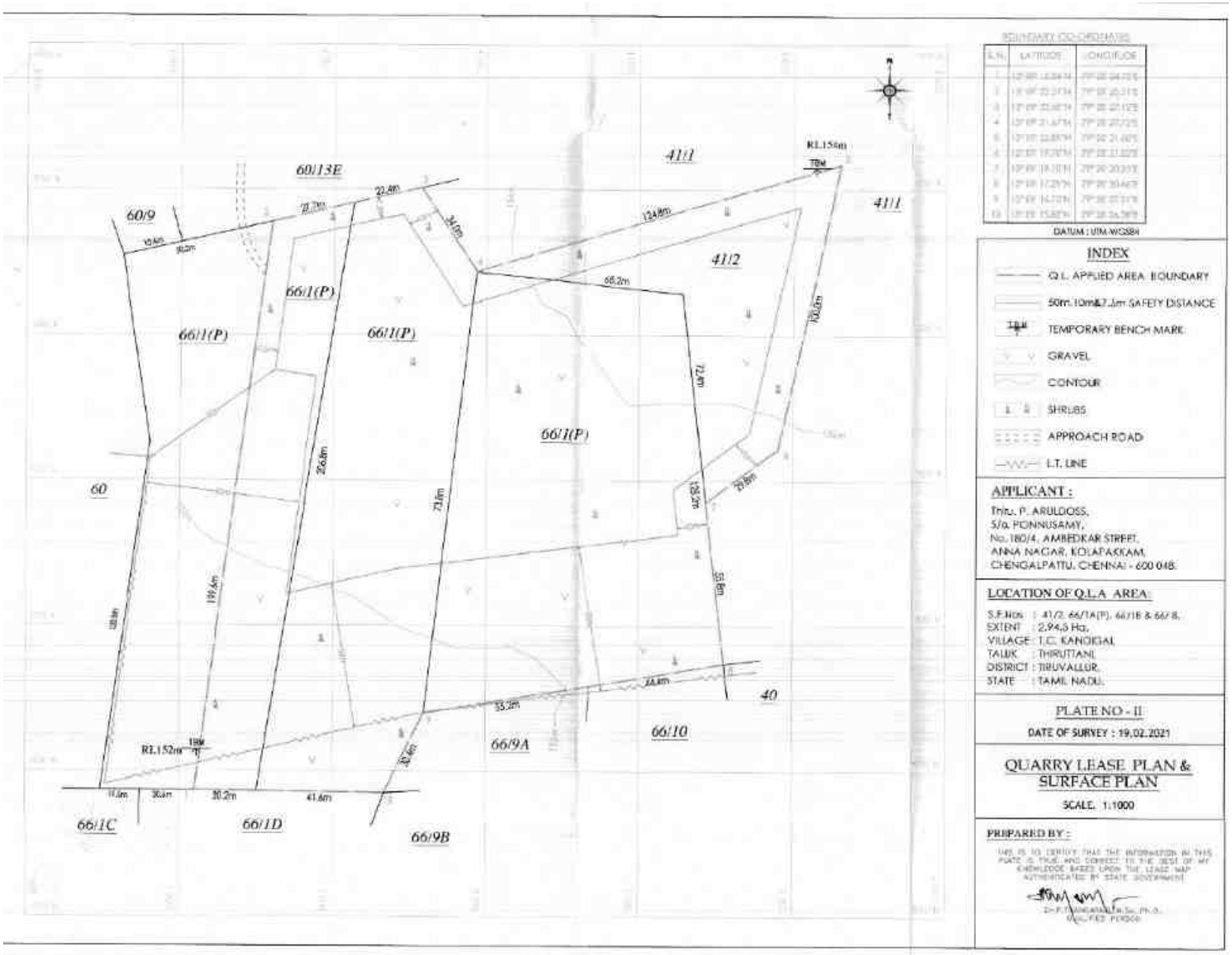
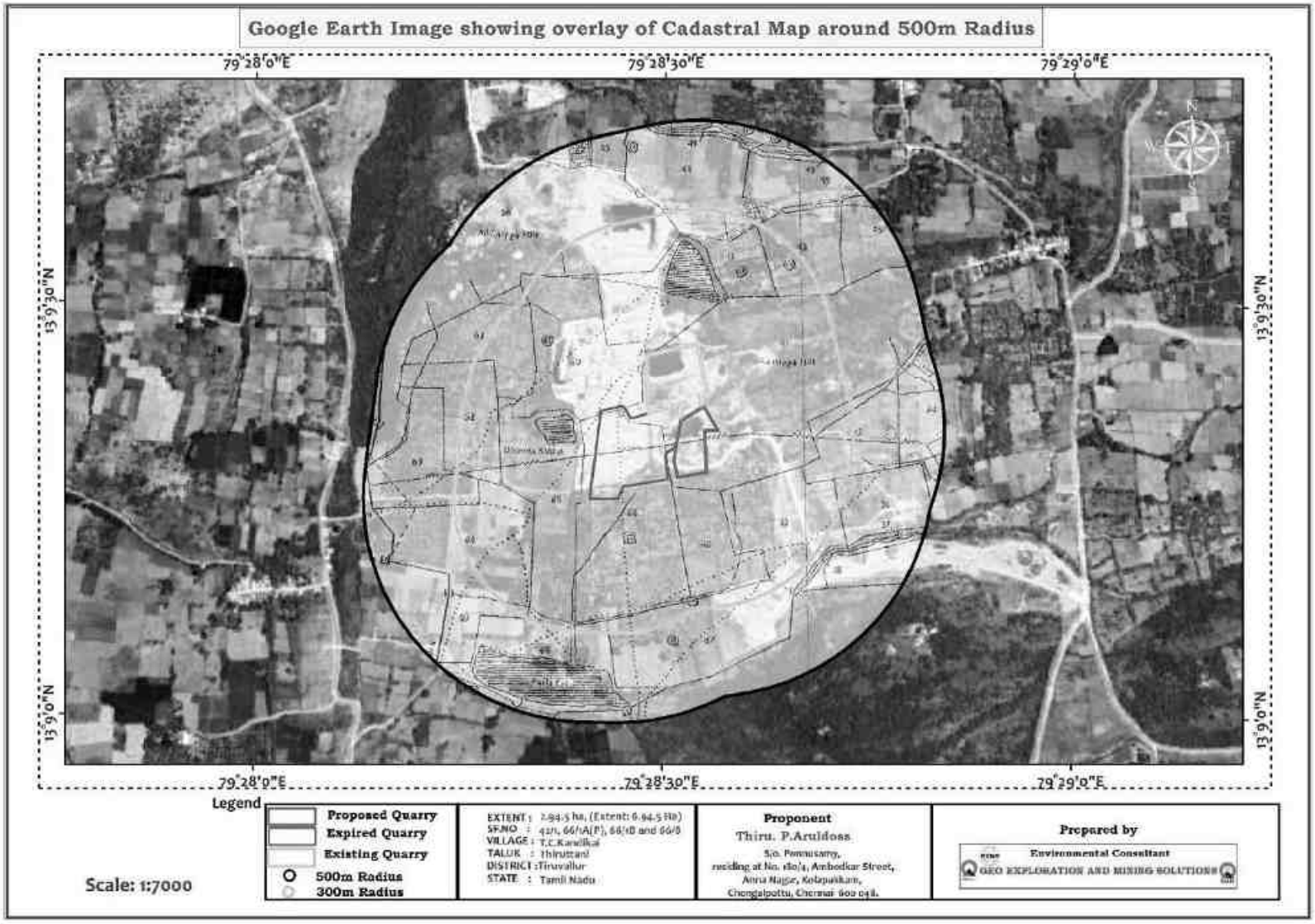


FIGURE 2.3: GOOGLE EARTH IMAGE SHOWING OVERLAY OF CADASTRAL MAP AROUND 500M RADIUS



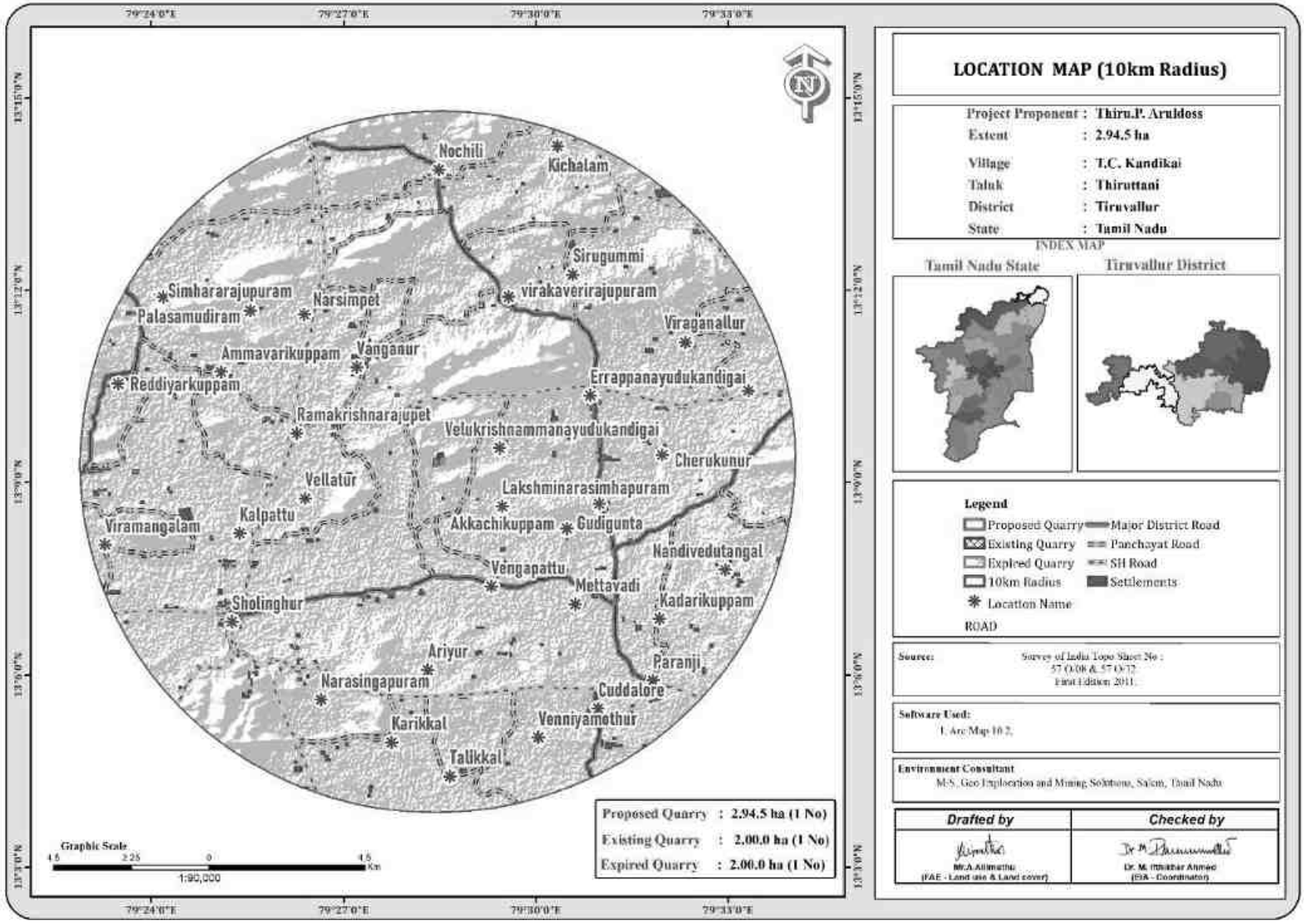


FIGURE 2.4: IMAGE SHOWING SURFACE FEATURES AROUND 10 KM RADIUS

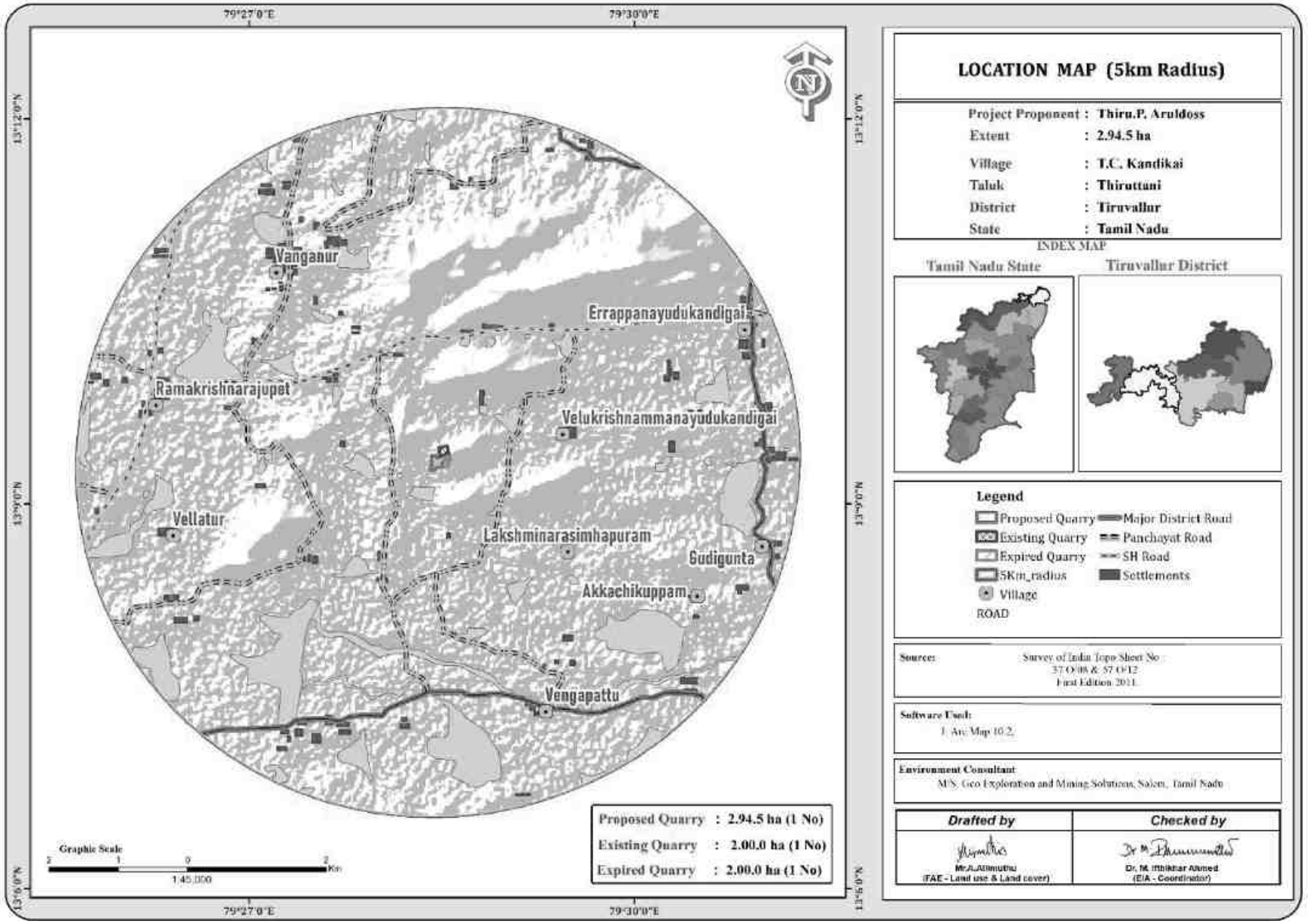


FIGURE 2.5: IMAGE SHOWING SURFACE FEATURES AROUND 5KM RADIUS

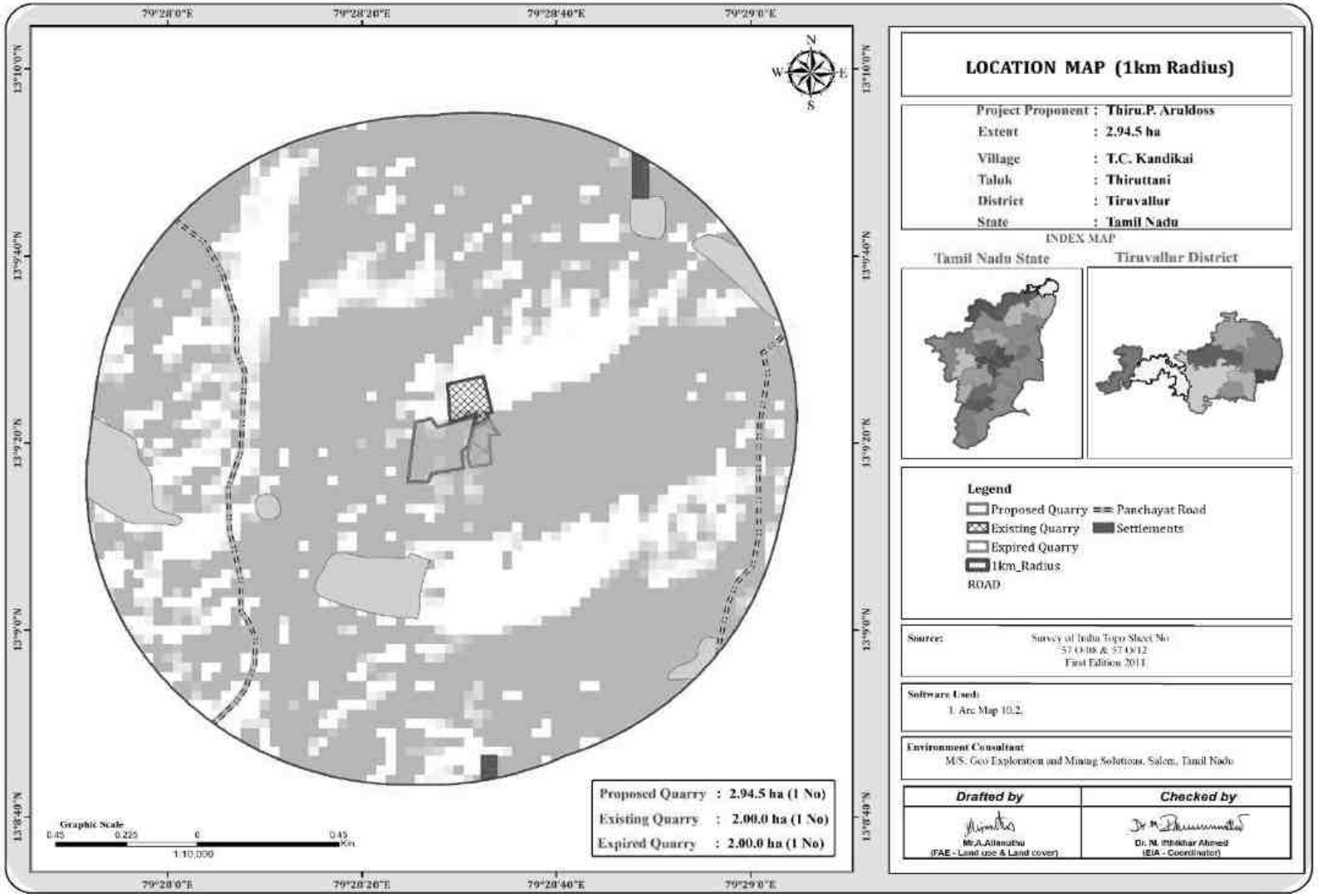


FIGURE 2.6: IMAGE SHOWING SURFACE FEATURES AROUND 1 KM RADIUS

2.2.1 Project Area

- Proposed Project is site specific
- There is No beneficiation or processing proposed inside the project area.
- There is no forest land involved in the proposed projects and is devoid of major vegetation and trees.

TABLE 2.3: LAND USE PATTERN OF THE PROPOSED PROJECT

DESCRIPTION	PRESENT AREA IN (HA)	AREA AT THE END OF LIFE OF QUARRY (HA)
Area under quarry	Nil	1.53.0
Infrastructure	Nil	1.01.0
Roads	Nil	0.02.0
Green Belt	Nil	0.30.0
Un – utilized area	2.94.5	0.12.6
TOTAL	**2.94.5**	**2.94.5**

Source: Approved Mining Plans of Proposal

2.2.2 Size or Magnitude of Operation

TABLE 2.4: OPERATIONAL DETAILS FOR PROPOSED PROJECTS

PARTICULARS	DETAILS	
	Rough Stone (5Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources in m^3	14,70,840	1,19,920
Mineable Reserves in m^3	3,40,887	63,856
Mining Plan Period	5 Years	
Number of Working Days	300 Days	
Production per day in m^3	**227**	**71**
No of Lorry loads ($6m^3$ per load)	**38**	**12**
Total Depth of Mining	54m (4m Gravel + 50m Rough Stone)	

Source: ApprovedMiningPlans

2.3 GEOLOGY

2.3.1 Peninsular gneiss forms the oldest rock formations, in which the massive formation of Charnockite lies over with rich accumulation of recent quaternary formation. On regional scale the Charnockite body N30°W – S30°E with dipping towards SW60º.

Regional stratigraphic sequence:

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

Geomorphology the prominent geomorphic units identified in the districtthrough interpretation of Satellite imagery are 1) Alluvial Plain, 2) Old River Courses 3) Coastal plains 4) Shallow & deep buried Pediments, 5) Pediments and 6) Structuralhills. The elevation of the area ranges from 183 m amsl in the west to sea level in the east. Four cycles of erosion gave raise to a complex assemblage of fluvial, estuarine and marine deposits. The major part of the area is characterised by an undulating topography with innumerable depressions which are used as irrigation tanks. The coastal tract is marked by three beach terraces with broad inter-terrace depressions.

https://Thiruvallur.nic.in/document/district-survey-record-2019-report-of-minor-mineral-gravel/

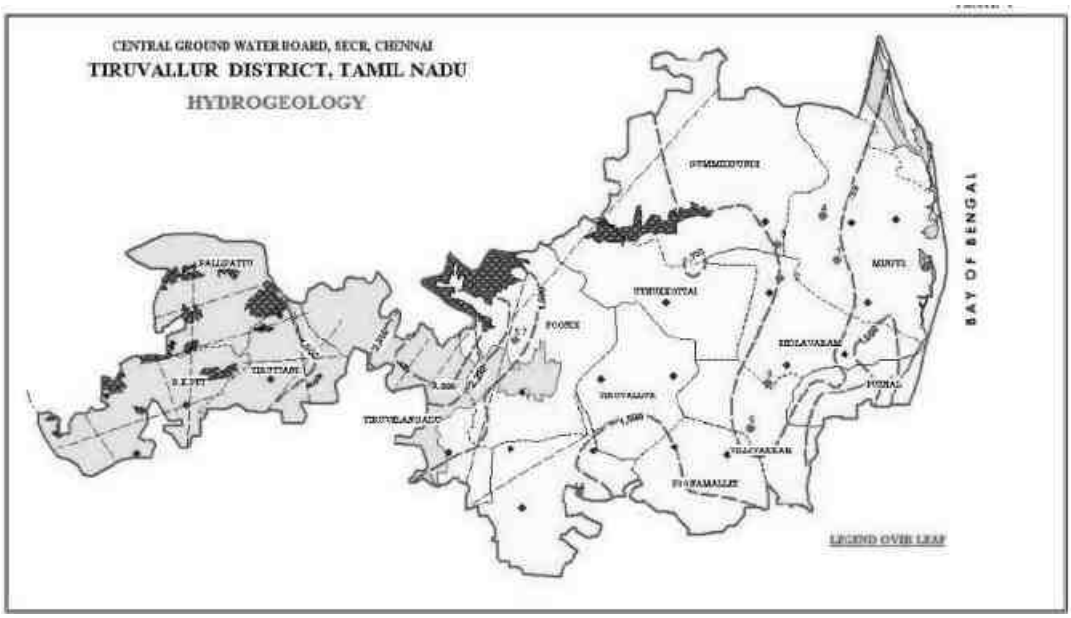
2.3.2 Local Geology: -

The Thiruvallur district can be geologically classified into hard rock and sedimentary (alluvial) formation. This district is principally made up of Archaean, upper Gondwana and the tertiary formations. These are over laid by laterites and alluvium. The oldest of the crystalline rocks of Archaean age are of Biotite and Hornblende Gneiss, Charnockite and granite. These are intruded by Amphibole dykes, and occasionally with veins of quartz and pegmatites. Granites and gneisses of Archaean 4 age are mainly seen in Tiruthani taluk.

2.3.3 Hydrogeology

The district is underlain by both porous and fissured formations. The important aquifer systems in the district are constituted by i) unconsolidated & semi-consolidated formations and ii) weathered, fissured and fractured crystalline rocks. The porous formations in the district include sandstones and clays of Jurassic age (Upper Gondwana), marine sediments of Cretaceous age, Sandstones of Tertiary age and Recent alluvial formations. As the Gondwana formations are well-compacted and poorly jointed, the

movement of ground water in these formations is mostly restricted to shallow levels.:The maximumthickness of alluvium is 30.0 m. whereas the average thickness is about 15.0m.



Aquifer Systems:

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

In Sedimentary formations, the presence of primary inter granular porosity enhances the transmitting capacity of groundwater where the yield will be appreciable. The sedimentary area which occupies the eastern part of the district along the coastal tract is more favourable for groundwater recharge. Ground Water occurs both in semi confined and confined conditions. A brief description of occurrence of groundwater in each formation is furnished below.

Alluvial Formations

In the river alluvium groundwater occurs under water table condition. The maximum thickness is 32m and the average thickness of the aquifer is approximately 12m. These formations are porous and permeable which have good water bearing zones.

Tertiary Cuddalore sandstone

Tertiary formations are represented by Cuddalore Sandstone and characterised as fluvial to brakish marine deposits. Predominantly this formation is divided into Lower and Upper Cuddalore formations. In

the Upper Cuddalore formations the groundwater occurs in semi confined conditions, whereas in the Lower Cuddalore the groundwater occurs in confined condition with good groundwater potential.

Cretaceous Formations

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

Hard Rock Formations

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

Granitic Gneiss

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

Charnockite

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

Aquifer Parameters

The specific capacity in the fissured formation ranges from 27.73 to 979 lpm/m/dd. Transmissivity values in weathered, partly weathered and jointed rocks vary from 14 to 750 m^2/day and specific yield in these formations is less than 2%. In the porous formation the specific capacity values vary from 23.5 to 509.9 lpm/m.dd and the Transmissivity values ranged from 40to 625 m^2/day. The specific yield varied from less than 1 to 12%. High specific yields are noticed in the river alluvium.

TABLE 2.5: RANGE OF AQUIFER PARAMETERS

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

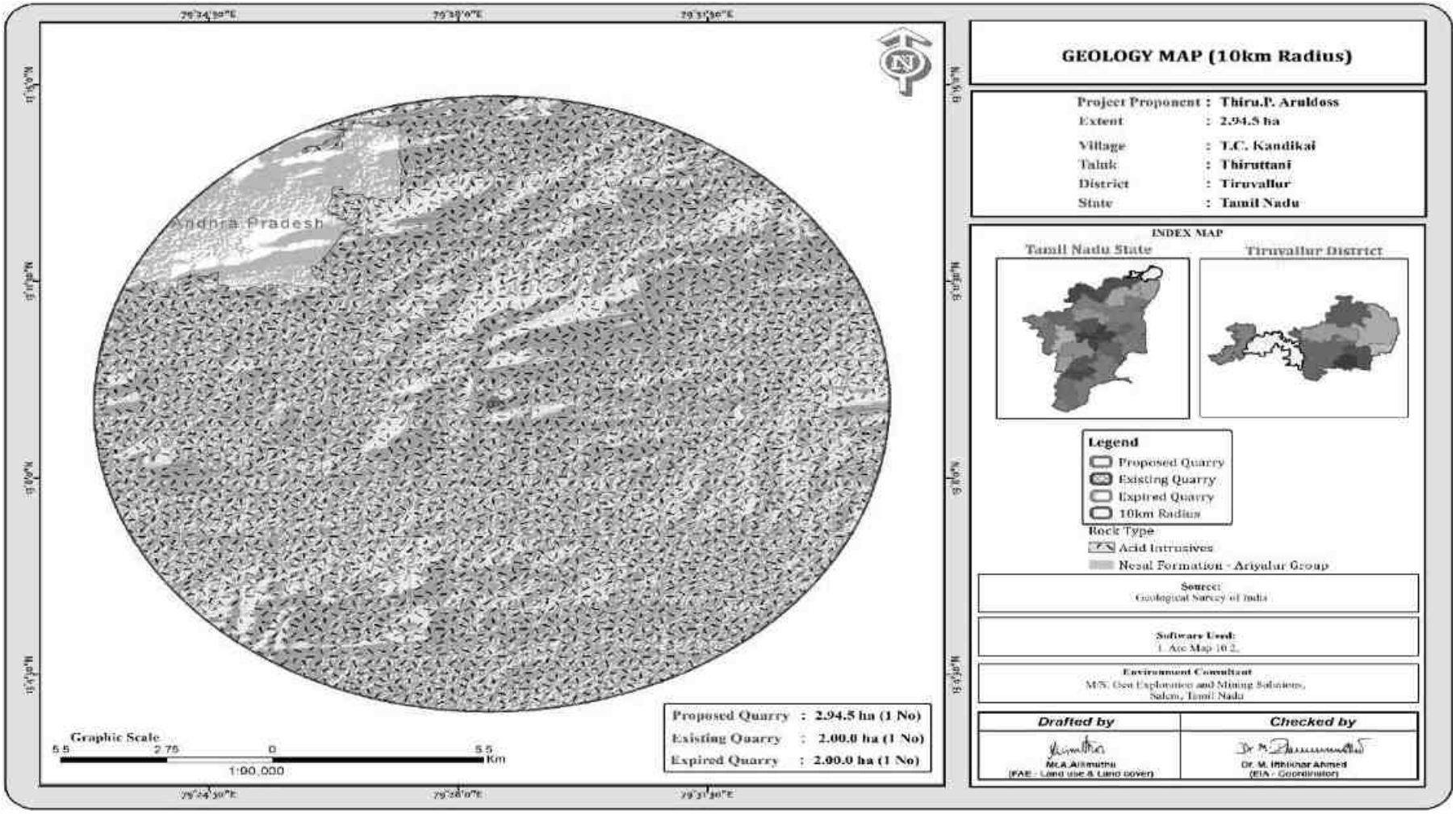


FIGURE 2.7: REGIONAL GEOLOGY MAP

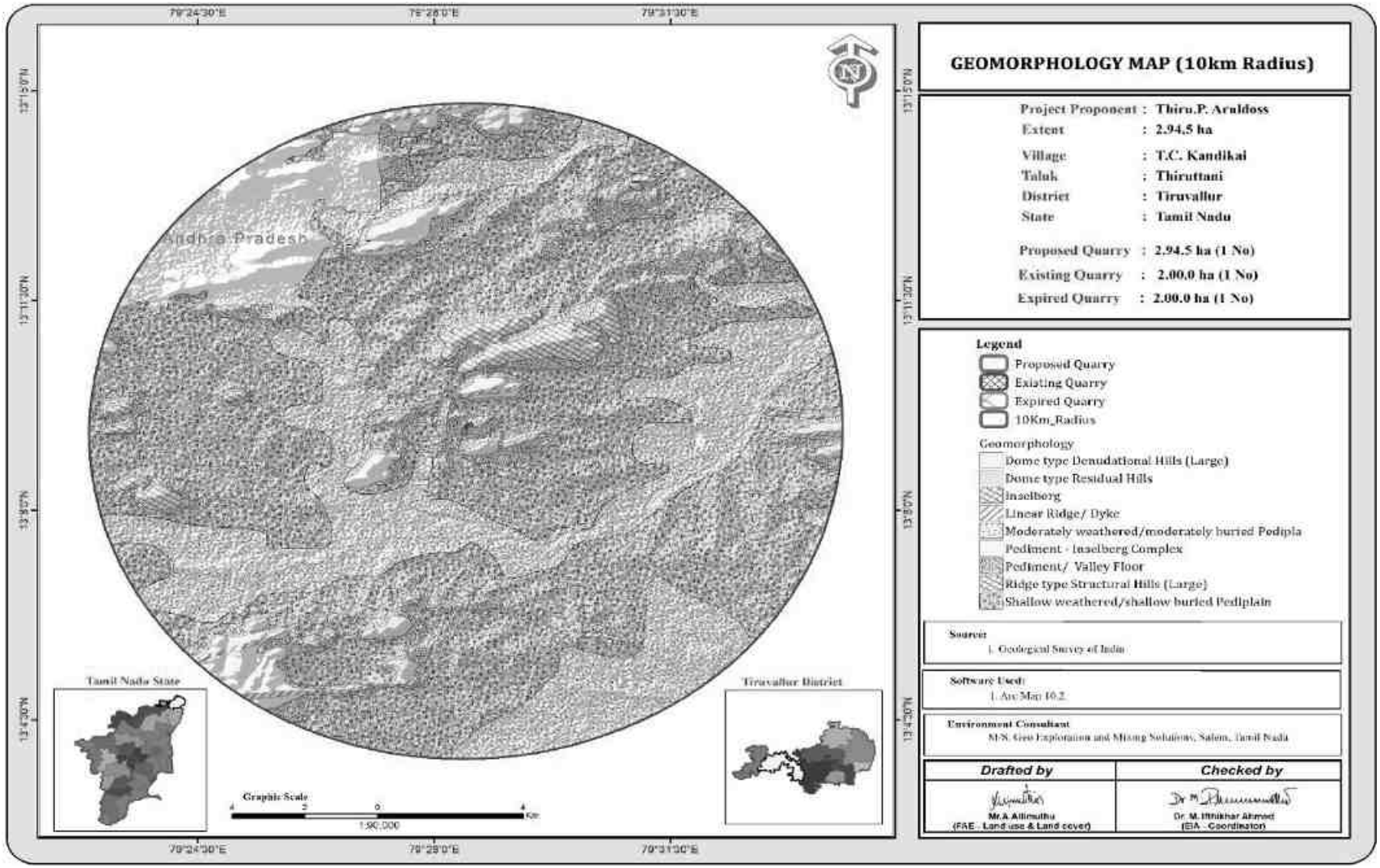


FIGURE 2.8: GEOMORPHOLOGY MAP

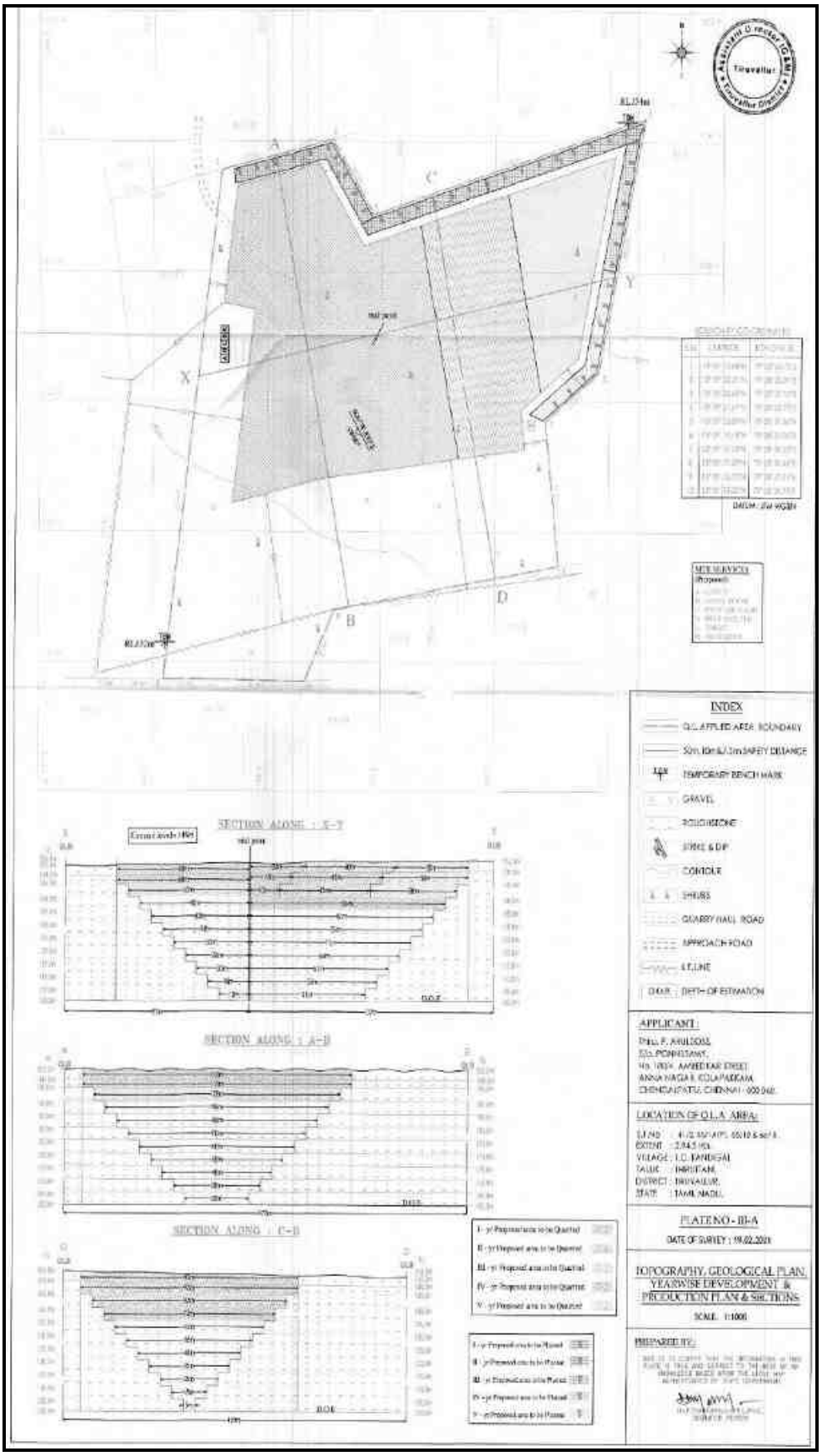


FIGURE 2.9: TOPOGRAPHY, GEOLOGICAL, YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS – PROPOSAL

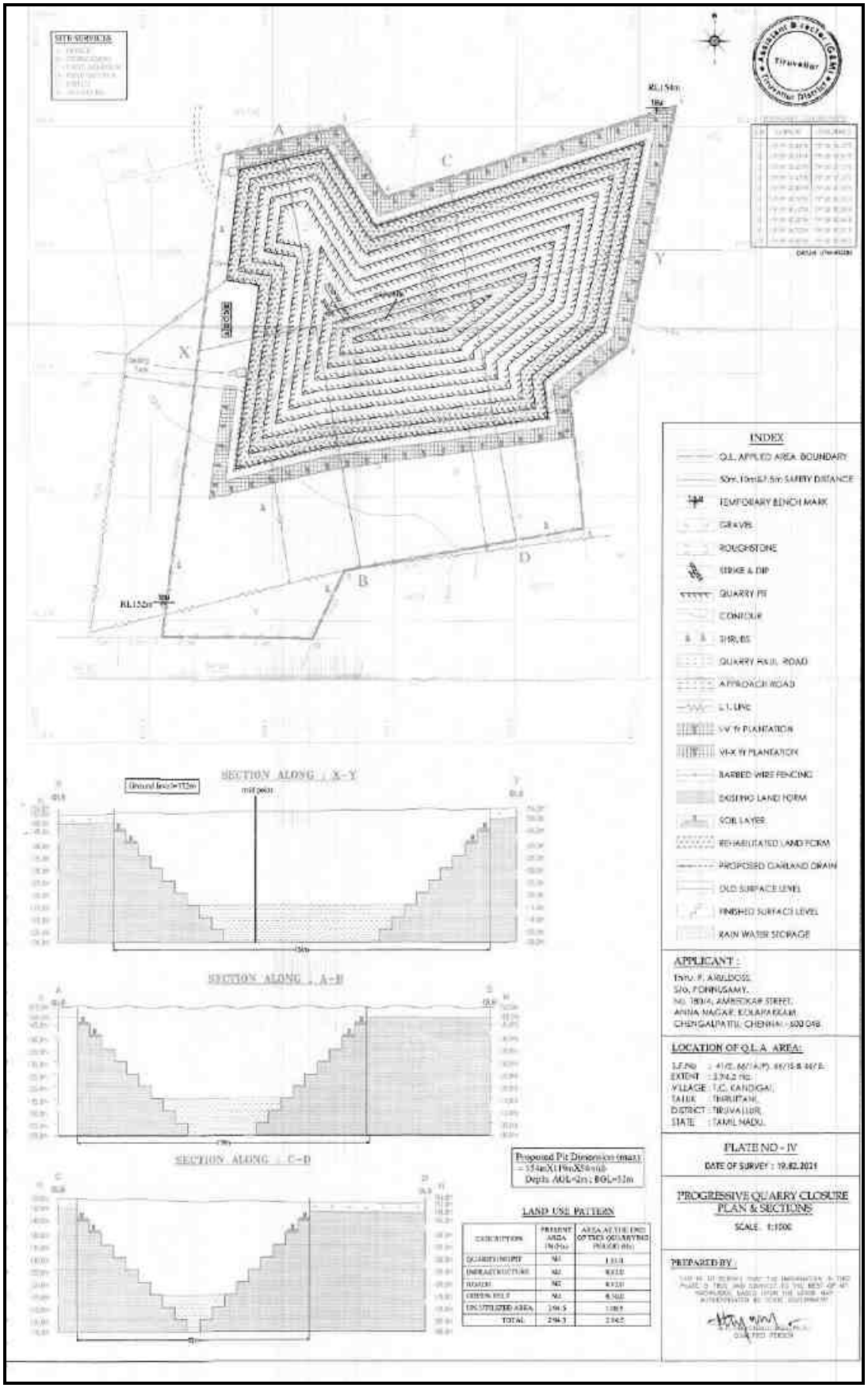


FIGURE 2.10 : CLOSURE PLAN AND SECTIONS – PROPOSAL

2.4 RESOURCES AND RESERVES

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

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

TABLE 2.6: AVAILABLE GEOLOGICAL RESOURCES OF PROPOSED PROJECT

PROPOSAL		
	Rough Stone	**Gravel**
Geological Resource in m^3	14,70,840	1,19,920
Mineable Resource in m^3	3,40,887	63,856

Source: Approved Mining Plan

TABLE 2.7: YEAR-WISE PRODUCTION PLAN

PROPOSAL		
YEAR	**ROUGH STONE (m^3)**	**GRAVEL (m^3)**
I	34,607	36,496
II	36,000	15,200
III	34,200	12,160
IV	32,250	-
V	28,620	-
TOTAL	**1,65,677**	**63,856**

Source: Approved Mining Plan

Disposal of Waste

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

Conceptual Mining Plan/ Final Mine Closure Plan

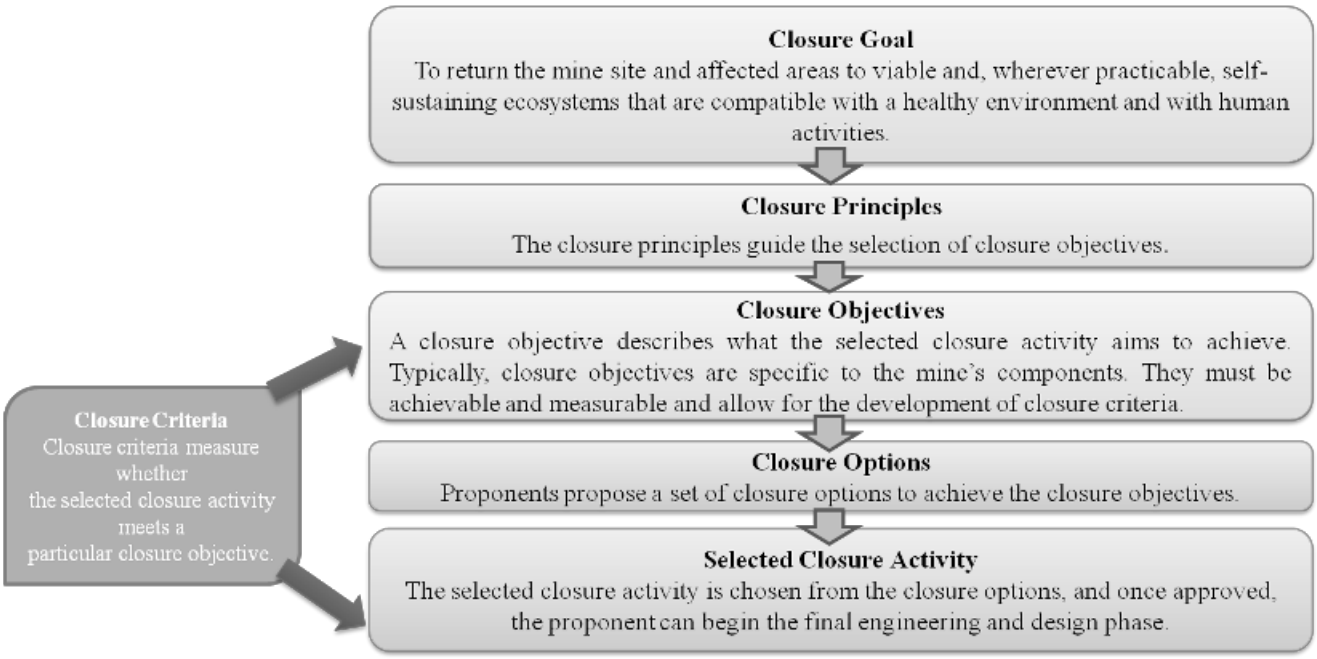
The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc.

TABLE 2.8: ULTIMATE PIT DIMENSION

PROPOSAL			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max)**
I	154	119	54m (2m Agl+52m Bgl)

Source: Approved Mining Plan

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



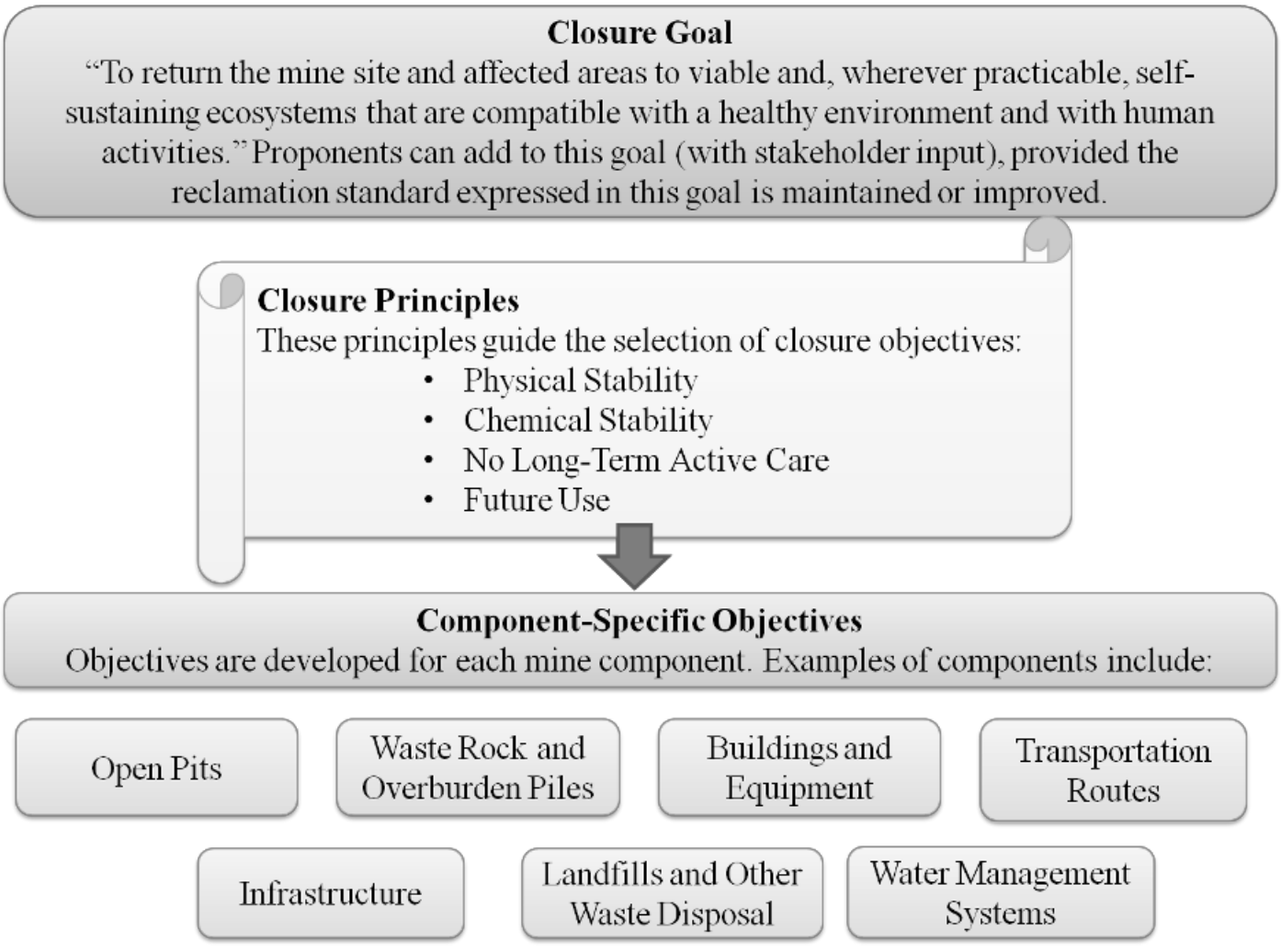
Closure Objectives –

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

Closure Planning & Options Considerations in Mine Design –

- The closure of mine is well planned at the initial stage of planning & design consideration by the internal and external stake holders
- Construction of 2m height bund all along the mine pit boundary and ensure its stability all time & construction of garland drain along the natural slope to avoid sliding and collection of soil to the pit & surface runoff during rainfall

- After complete exploitation of mineral, the lowest bench foot wall side will be maintained as plain surface without any sump pits to avoid any accidents
- All the sharp edges will be dressed to smoother face before the closure of mine and ensure no loose debris on hanging wall side
- The project proponent as a part of social responsibilities assures to supply the stored mine pit water to the nearby villages after effective treatment process as per the standards of TNPCB & TWAD
- Native species will be planted in 3 row patterns on the boundary barriers and 1st bench, a full-time sentry will be appointed at the gate to prevent inherent entry of public & cattle.
- The access road to the quarry will be cut-off immediately after the closure
- The layout design shall be prepared and get approved from Department of Geology and Mining.
- The proponent is instructed to construct as per the layout approved
- Physical and chemical stability of structures left in place at the site, the natural rehabilitation of a biologically diverse, stable environment, the ultimate land use is optimized and is compatible with the surrounding area and the requirements of the local community, and taking the needs of the local community into account and minimizing the socio-economic impact of closure
- There will be a positive change in the environmental and ecology due to the mine closure



Post-Closure Monitoring –

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

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

TABLE 2.9: MINE CLOSURE BUDGET

ACTIVITY	YEAR		RATE	COST (Rs.)
Plantation (In Nos.)	1800		@100 Rs Per sapling Including Maintenance	1,80,000
Plantation Cost	17500	17500		
Plantation in quarried out benches and approach road (In Nos.)	200	200		40,000
Plantation Cost	20000	20000		
Wire Fencing for 760 Mtrs length	228000		@300 Rs Per Meter	2,28,000
Garland Drain with settling traps for 490 Mtrs length	147000		@300 Rs Per Meter	1,47,000
Total				**5,95,000**

Source: Proposed by FAE's and EC

2.5 METHOD OF MINING

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

necessary provision is available with the Regulation 106 (2) (b) of MMR-1961, under Mine Act – 1952.

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

2.5.1 Drilling & Blasting Parameters

Diameter of hole – 32 mm Drilling & Blasting will be carried out as per parameters given below: -

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

Type of Explosives to be used –

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

Storage of Explosives –

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

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

2.5.2 Extent of Mechanization

TABLE 2.10 PROPOSED MACHINERY DEPLOYMENT

PROPOSAL				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	6	1.2m to 2.0m	Compressed air
2	Compressor	2	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit 4	1	300 HP	Diesel Drive
4	Tippers / Dumpers	3	20 Tonnes	Diesel Drive

Source: Approved Mining Plan

2.6 GENERAL FEATURES

2.6.1 Existing Infrastructures

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

2.6.2 Drainage Pattern

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

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

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

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

2.6.3 Traffic Density

The traffic survey conducted based on the transportation route of material, the Rough Stone is proposed to be transported mainly through National Highway Road – Tirupati to Chennai on Eastern Side of the Cluster and State Highway Connecting to Thiruthani- Ramakrishnaraja on North Western Side.

Traffic density measurements were performed at two locations

TS1 - Madurapuram-Kondapuram-N

TS2- Madurapuram- Beerakuppam-NE

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

TABLE.2.11: TRAFFIC SURVEY LOCATIONS

Station Code	Road Name	Distance and Direction	Type of Road
TS1	Madurapuram-Kondapuram	15.km North	Village Road
TS2	Madurapuram- Beerakuppam	2.0 km NE	District road

Source: On-site monitoring by GEMS FAE & TM

TABLE 2.12: EXISTING TRAFFIC VOLUME

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	120	360	90	90	420	210	660
TS2	135	405	100	100	340	170	675

Source: On-site monitoring by GEMS FAE & TM

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

TABLE 2.13: ROUGH STONE & GRAVEL HOURLY TRANSPORTATION REQUIREMENT

Transportation of Rough Stone & Gravel per day		
Capacity of trucks	No. of Trips per day Cumulatively	Volume in PCU
10 tonnes	30	90

Source: Data analysed from Approved Mining Plan

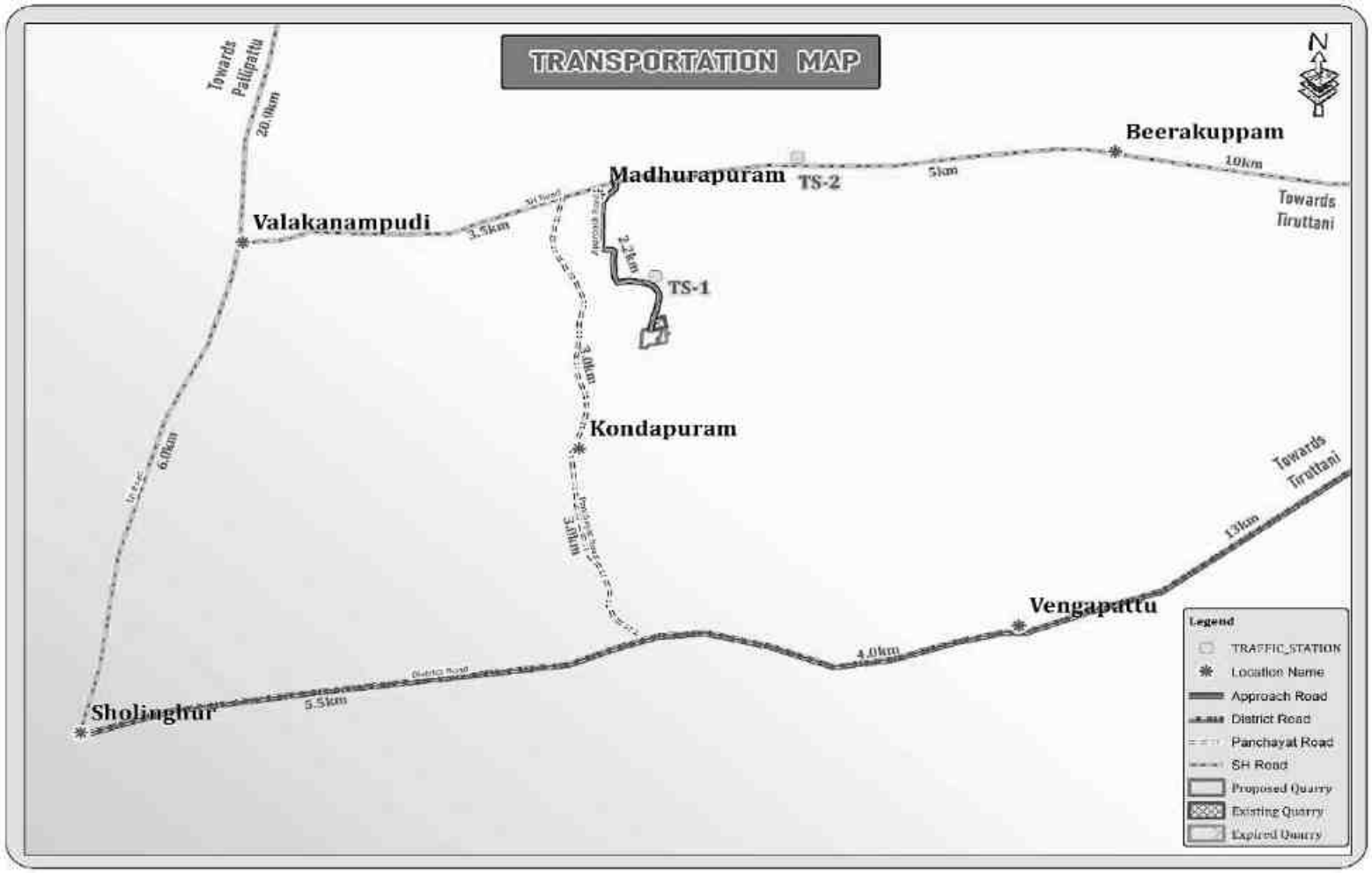
TABLE 2.14: SUMMARY OF TRAFFIC VOLUME

Route	Existing Traffic volume in PCU	Incremental traffic due to the project	Total traffic volume	Hourly Capacity in PCU as per (IRC – 1960 Guidelines)
Madurapuram-Kondapuram	660	90	750	1500
Madurapuram- Beerakuppam	675	90	765	1200

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

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

FIGURE.2.11: MINERAL TRANSPORTATION ROUTE MAP



2.6.4 Mineral Beneficiation and Processing

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

2.7 PROJECT REQUIREMENT

2.7.1 Water Source & Requirement

Detail of water requirements in KLD as given below:

TABLE 2.15: WATER REQUIREMENT FOR THE PROJECT

PROPOSAL		
***Purpose**	**Quantity**	**Source**
Dust Suppression	1.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.0 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	**3.0 KLD**	

Source: Prefeasibility report

* Drinking water will be sourced from Approved Water Vendors

2.7.2 Power and Other Infrastructure Requirement

No proposed projects require power supply for the mining operations. The quarrying activity is proposed during day time only (General Shift 8 AM – 5 PM, Lunch Break 1 PM – 2 PM). Electricity for use in office and other internal infrastructure will be obtained from SEB by project proponent.

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

2.7.3 Fuel Requirement

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

1.For Gravel:

Per hour Excavator will consume = 10 liters / hour

Per hour Excavator will excavate = 60$m^3$of Gravel

Gravel Quantity = 63,856/60 = 1064 hours

Diesel consume = 1064 hours x 10 liters

Total diesel consumption = 10640 Liters of HSD will be utilized for Gravel

2. For Rough Stone:

Per hour Excavator will consume = 16 liters / hour

Per hour Excavator will excavate = 20$m^3$of Rough Stone

Rough Stone quantity = 3,40,887/20 = 17,044 hours

Diesel consume = 17,044 hours x 16 liters

Total diesel consumption = 2,72,709 Liters of HSD will be Utilized for Rough Stone

Total diesel consumption is around = **2, 83,349 Liters** of HSD for the entire period of life.

Average diesel consumption is around = **189 Liters of HSD / day per proposed project.**

2.7.4 Project Cost

TABLE 2.16: PROJECT COST OF PROPOSED PROJECT

PROPOSAL	
Project Cost	**Rs.96,10,000/-**

Source: Approved Mining Plan &Prefeasibility Report

2.8 EMPLOYMENT REQUIREMENT:

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

TABLE 2.17: PROPOSED MANPOWER DEPLOYMENT

Sno	Employment	No. of persons (Proposal)
1	Mines Manager/Mines Foreman	1
2	Mate/Blaster	1
3	Jack hammer operator	12
4	Excavator Operator	2
5	Tipper Driver	2
6	Labour & Helper	4
7	Cleaner & Co-operator	4
8	Security	1
	Total	**27**

Source: Approved Mining Plans of Project

2.9 PROJECT IMPLEMENTATION SCHEDULE

The commercial operation will commence after the grant of Environmental Clearance. CTO will be obtained from the Tamil Nadu State Pollution Control Board. The conditions imposed during the Environmental Clearance will be compiled before the start of mining operation.

TABLE 2.18: EXPECTED TIME SCHEDULE

Sl.No.	Particulars	Time Schedule (In Month)					Remarks if any
		1st	2nd	3rd	4th	5th	
1	Environmental Clearance						
2	Consent to Operate						Production Start Period
Time line may vary; subjected to rules and regulations /& other unforeseen circumstances							

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

3. DESCRIPTION OF ENVIRONMENT

3.0 GENERAL

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering **October, November and December 2022** with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by CHENNAI METTEX LAB PRIVATE LIMITED Approved by AAI, AGMARK, APEDA, BIS, EIC FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD Certified & MoEF Notified Laboratory, for the below attributes –

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

Study Area

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

Study Period

The baseline study was conducted during the Post-monsoon season i.e., Oct to Dec 2022

Study Methodology

- The project area was surveyed in detail with the help of Total Station and the boundary pillars were picked up with the help of GPS. The boundary coordinates were superimposed on the satellite imagery to understand the relief of the area, besides Land use pattern of the area was studied through the Landsat8-9 OLI/TIRS C2 L2 - USGS-Earth Explorer.
- Soil samples were collected and analysed for relevant physio-chemical characteristics, exchangeable Cations, nutrients & micro nutrients etc., in order to assess the impact due to mining activities and to recommend saplings for Greenbelt development
- Ground water samples were collected during the study period from the existing bore wells, while surface water was collected from ponds in the buffer zone. The samples were analysed for parameters necessary to determine water quality (based on IS: 10500:2012 criteria) and those which are relevant from the point of view of environmental impact of the proposed mines
- A onsite meteorological station was setup in cluster area, to collect data about wind speed, wind direction, temperature, relative humidity, rainfall and general weather conditions were recorded throughout the study period
- In order to assess the Ambient Air Quality (AAQ), samples of ambient air were collected by installation of Respiratory Dust Samplers (RDS) for Fugitive dust, PM_{10} and SO_2, NO_X with gaseous attachments & Fine Dust Samplers (FDS) for $PM_{2.5}$ and other parameters as per NAAQ norms and analysed for primary air pollutants to work out the existing status of air quality.
- The Noise level measurements were also made at various locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.

- Baseline biological studies were carried out to assess the ecology of the study area to study the existing flora and fauna pattern of the area.
- Socio-Economic survey was conducted at village and household level in the study area to understand the present socio-economic conditions and assess the extent of impact due to the proposed mining project.

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

TABLE 3.1: MONITORING ATTRIBUTES AND FREQUENCY OF MONITORING

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land-use Land cover	Land-use Pattern within 10 km radius of the study area	Data's from census handbook 2011 and from the satellite imagery	Study Area	Satellite Imagery Primary Survey
*Soil	Physio-Chemical Characteristics	Once during the study period	6 (2 core & 4 buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	7 (2 surface water & 5 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 Fugitive Dust	24 hourly twice a week (March – May 2021)	8 (2 core & 6 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	8 (2 core & 6 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio–Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

Source: On-site monitoring/sampling by Chennai Mettex in association with GEMS

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

3.1 LAND ENVIRONMENT

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

3.1.1 Land Use/ Land Cover

To study the land use pattern of the core as well as a buffer zone, land use/land cover details have been identified/ maps have been prepared in accordance with the Generic ToR point no. 4 (ix) and ToR Point no. 4 Stating:

Point No. 4(ix)."A list of major industries with name and type within the study area (10 km radius) shall be incorporated. Land use details of the study area".

Point No. 4. "Present land use shall be prepared based on satellite imagery. High-resolution satellite image data having 1m - 5m spatial resolution like a quick bird, Ikonos, IRS P-6 pan-sharpened, etc. for the 10 km radius area from the proposed site. The same should be used for land used / land-cover mapping of the area.

3.1.2 Objective

The objectives of the LULC study are as follow:

- Preparation of land use and land cover map using the extent of the project and study area.
- Identification and marking of important basic features according to primary and secondary data.
- Evaluation of the impact on existing land use of the project area.
- Mitigative measures for conservation and sustainable use of land

Technical specification of Satellite imagery Data Used:

- Satellite Image - Landsat8-Level2-OLI-TIRS sensor- spatial resolution - 30m
- Satellite Data Source - USGS-Earth Explorer
- Satellite Vintage - 19th Nov 2022
- SOI Toposheet No - 57 O/08 & 57 O/12
- Software Used - ArcGIS 10.8

The satellite image (Natural color 4,3,2) of the buffer zone is given in 3.1

The spatial resolution and the spectral bands in which the sensor collects the remotely sensed data are two important parameters for any land use survey. Landsat8 data offers a spatial resolution of 30m and a 185 km wide swath of the earth in 15-30m resolution covering wide areas the data is collected in 7 visible bands namely band number and Resolution.

1. 0.433-0.453 30m
2. 0-450-0.515 30m
3. 0.525-0.600 30m
4. 0.630-0.680 30m
5. 0.845-0.885 30m
6. 1.560-1.660 30m
7. 2.100 – 2.300 30m

3.1.3 Methodology

- Preliminary/primary data collection of the study area
- Satellite data procurement from USGS-Earth Explorer
- Secondary data collection from authorized bodies
- Survey of India Toposheet (SOI)
- Mine Layout
- Cadastral / Khasra map
- GPS Coordinates of Lease Boundary
- Processing of satellite data using ArcGIS 10.8 and preparing the Land Use & Land cover maps (e.g. Plant/Mine area, agriculture, settlements, Non-agriculture land, Barren Land, water bodies, etc.) by Digital Image Processing (DIP) technique.
- Geo-Referencing of the Survey of India Toposheet
- Geo-Referencing of satellite Imagery with the help of Geo-Referenced Toposheets
- Enhancement of the Satellite Imagery
- Base Map layer creation (Roads, Railway, Village Names, and other Secondary data, etc.)
- Data analysis and Classification using Digital interpretation techniques.
- Ground truth studies or field Verification.
- Error fixing / Reclassification
- Final Map Generation.

The land use/Land cover Map of the buffer zone is given in 3.4(b).
Land Use Pattern of the Buffer Zone (Study area)
Details of the same are given in Table - 3.2 and the map is shown in Figure - 3.2

Table - 3.2 :Land Use / Land Cover Details of Study Area

Sno	Landuse/Landcover Class	Area (Hect's)	Area in (%)
1	Water bodies (Pond, Lake River)	2293.50	7.01
2	Open scrub Land	10330.30	31.57
3	Mining area	447.83	1.37
4	Builtup Land	2001.54	6.12
5	Agriculture Land	6859.72	20.97
6	Non-Agriculture Land	3502.18	10.70
7	Rockybushes with RF area	7281.95	22.26
	Total	**32717.02**	**100**

Source: USGS-Earth Explorer, LU/LC Map for Buffer Zone.

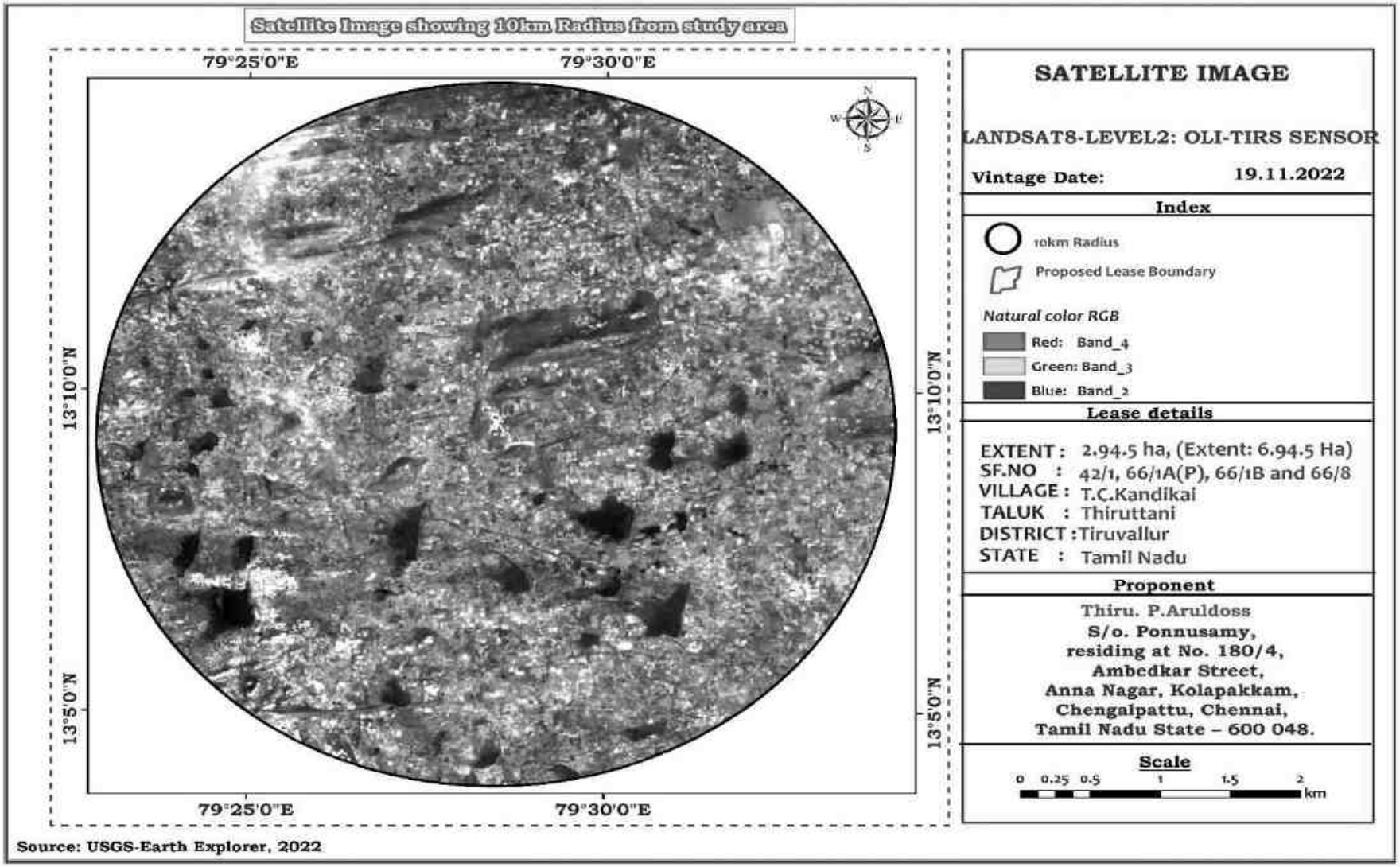


FIGURE 3.1: MAP SHOWING NATURAL COLOUR COMPOSITE (4,3,2) SATELLITE IMAGERY OF THE STUDY AREA

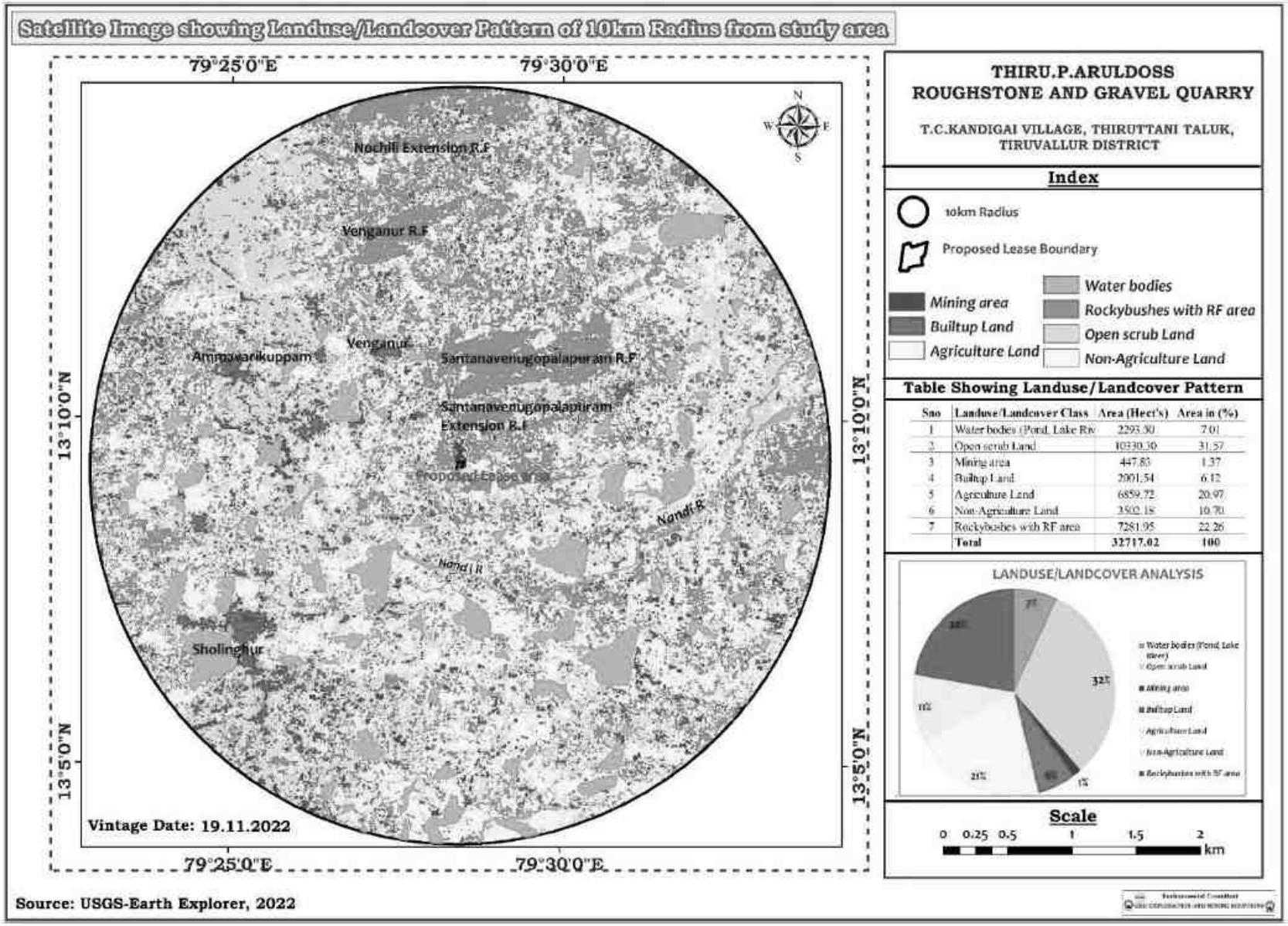


FIGURE 3.2: LAND USE LAND COVER MAP 10KM RADIUS

3.1.4 Interpretation:

- The 10 km radius study area mainly comprises Agricultural land accounting for 20.97% of the total study area.

The cropping pattern of the Buffer Zone:

The entire buffer zone has undulating hill topography. Agriculture is the most dominant occupation of the T.C.Kandigai village, Thiruthani Taluk, Tiruvallur District, Tamil Nadu. Within the 10 km radius of the buffer area, most of the area is occupied by agriculture and Non-Agriculture Land.

In view, Thiruvallur District belongs to North Eastern Agro Climatic zone. Paddy is the major principal crop in Thiruvallur District and Farmers are doing Paddy cultivation in three seasons viz., Sornavari, Samba and Navarai with good ground water potential. Greengram and Black gram is the major pulse crop in this District. Green gram is cultivating mainly in Minjur, Sholavaram, Ponneri, Ellapuram and Tiruvallur blocks and Black gram is growing in Kadambathur, Tiruthani, Pallipat and RKpet blocks during Rabi season. Tiruthani, Tiruvalangadu, RKPet and Pallipat blocks are the main source of Sugarcane cane crop cultivation (Tiruvallur District Handbook, 2011). As observed during the primary survey conducted during the month of Nov. majority of the crops were sown with commercial crops like Mango, watermelon and Jasmine cultivation and other prominent crops under cultivation are Greens, Brinjal , Bhendi, Chillies and other vegetable crops. Source: https://Thiruvallur.nic.in/agriculture-department-of-agriculture/

- Water Bodies such as odai and lakes dry with a water channel locally called comprise 7.01% of the total buffer area SOI Toposheet, there are total 04 major water bodies exist such as S.Agraharam, Cherukkanur, Chinna Paravathur,Veeranathur the agriculture fields of the buffer area are fed by the canal and Ponds/lakes. This is the main source of irrigation. The farmers use water conservation techniques such as canal irrigation technology to water the fields.
- The buffer zone studied has no ecologically sensitive area (National Park, Wildlife Sanctuary, Biosphere Reserve/ Protect Forest/ Reserve Forest, etc.). The 10 km study area consists of Rockbushes with R.F land with a dense of 22.26 % of the total study area.
- The buffer zone area covered by barren or non-Agriculture land is 10.70 %. The area occupied by some industries and mining etc.
- The Builtup area has about 6.12% of the area covered core and buffer zone. The nearest village within the 1km radius of the project site boundary is observed to be villages T.C.Kandigai, Madurapuram, SVG Puram, Venganur etc.,
- The mining area occupies (1.37%) of the area in the Core and buffer zone area.
- The open scrub land area consists of 31.57% of the study area.

3.1.5 Conclusion

Thiru.P. Aruldoss, Roughstone and Gravel Quarry is proposed extent of 2.94.5Ha (Total extent of 6.94.5 ha) at T.C. Kandigai Village, Thiruthani Taluk, thiruvallur district, Tamil nadu. The total project land is barren land/Open scrub land and will be converted for Mining purpose. Currently, it is devoid of any habitation/villages which require replacement/resettlements thus no major impact is envisaged due to the change in the land use property of the core zone. Within the buffer zone, various social, cultural, and economic impacts can be foreseen on the major land use category of the area i.e. agriculture, river, and nearby habitation. Proper mitigative measures will be adopted by Thiru. P. Aruldoss. Detail of the same has been incorporated in chapter 4 of the Draft EIA/EMP report.

From the above table, pie diagram and land use map it is inferred that the majority of the land in the study area is Agriculture land (includes crop land) 20.97%, Builtup Land is about 6.12% Open Scrub land is 31.57% Rockybushes with R.F land is about 22.26% and Mining area is about – 137%.

The total mining area within the study area is 447.87 ha i.e., 1.37 %. The cluster area has 6.64.5 ha within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.1.6 Topography

The lease applied area is elevated terrain. The gradient is gentle towards Southwestern side and altitude of the area is 158m above from Mean Sea level. The area is covered by 4m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the nearby existing pits.

3.1.7 Drainage Pattern of the Area

Drainage pattern are created by stream erosion over time that reveals characteristics of the kind of rocks and geological structures in a landscape region drained by streams. Drainage pattern is the pattern formed by the streams, rivers, and lakes in a particular drainage basin. They are governed by the topography of the land, whether a particular region is dominated by hard or soft rocks, and the gradient of the land. Dendritic patterns, which are by far the most common, develop in areas where the rock (or unconsolidated material) beneath the stream has no particular fabric or structure and can be eroded equally easily in all directions.

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

3.1.8 Seismic Sensitivity

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

3.1.9 Environmental Features in the Study Area

There is no Wildlife Sanctuaries, National Park and Archaeological monuments within project area. Santanavenugopalapuram Reserved Forest area, Venganur R.F, Nochili R.F is involved in the project area. Therefore, there will be no need to acquisition/diversion of forest land. The details related to

the environment sensitivity around the proposed quarry lease area i.e., 10 km radius, are given in the below Table 3.3.

TABLE 3.3: DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE CLUSTER

Sl.No	Sensitive Ecological Features	Name	Arial Distance in km from Cluster
1	National Park / Wild life Sanctuaries	None	Nil within 10km Radius
2	Reserved Forest	Santhavenugopalapuram R.F Venganoor R.F Nochili R.F	3.8km-NE & 4.30km-N 8.5km-N
3	Lakes/Reservoir/ Dams/Stream/Rivers	Ramakrishna Rajapet Lake	3.0km-NW
		Veeranathur Lake	2.5km-SW
		Chinna Paravathur Lake	3.4km-SE
		S.Agraharam Lake	4.0km-E
		Cherukkanur Lake	5.5km-E
		Kallar River (dry)	9.5km-S
		Paranji Lake	6.4km-SE
4	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	None	Nil within 10KM Radius
5	Critically Polluted Areas	Ranipet SIPCOT Industrial Complex	27km-SW
6	Mangroves	None	Nil within 10km Radius
7	Mountains/Hills	None	Nil within 10km Radius
8	Notified Archaeological Sites	None	Nil within 10km Radius
9	Industries/ Thermal Power Plants	None	Nil within 10km Radius
10	Defence Installation	None	Nil within 10km Radius

Source: Survey of India Toposheet

TABLE 3.4: NEARBY WATER BODIES FROM THE PROPOSED PROJECT SITE

PROPOSAL		
Sl.No	**NAME**	**DISTANCE & DIRECTION**
1	Ramakrishna Rajapet Lake	3.0km-NW
2	Veeranathur Lake	2.5km-SW
3	Chinna Paravathur Lake	3.4km-SE
4	S. Agraharam Lake	4.0km-E
5	Cherukkanur Lake	5.5km-E
6	Kallar River (dry)	9.5km-S
7	Paranji Lake	6.4km-SE

Source: Village Cadastral Map and Field Survey

3.1.10 Soil Environment

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

The objective of the soil sampling is -

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

TABLE 3.5: SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Core Zone	Project Area	13° 9'21.74"N 79°28'30.29"E
2	S-2	Kondapuram	1.2km SW	13° 8'45.49"N 79°28'3.13"E
3	S-3	Beerakuppam	4.5km NE	13°10'26.68"N 79°30'45.28"E
4	S-4	Krishnakuppam	2.7km NW	13° 9'56.61"N 79°27'4.61"E
5	S-5	Cherukkanur	4.3km East	13° 9'21.06"N 79°30'53.37"E
6	S-6	Adhivaragapuram	4.3km SW	13° 8'9.05"N 79°26'18.98"E

Source: On-site monitoring/sampling by Laboratories in association with GEMS

Methodology –

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

TABLE 3.6: METHODOLOGY OF SAMPLING COLLECTION

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

Source: On-site monitoring/sampling by Laboratories in association with GEMS

Soil Testing Result –

The samples were analysed as per the standard methods prescribed in "Soil Chemical Analysis (M.L. Jackson, 1967) & Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India". The important properties analysed for soil are bulk density, porosity, infiltration rate, pH and Organic matter, Nitrogen, Phosphorous and Potassium. The standard classifications of soil and physico-chemical characteristics of the soils are presented below in Table 3.6 & Test Results in Table 3.7.

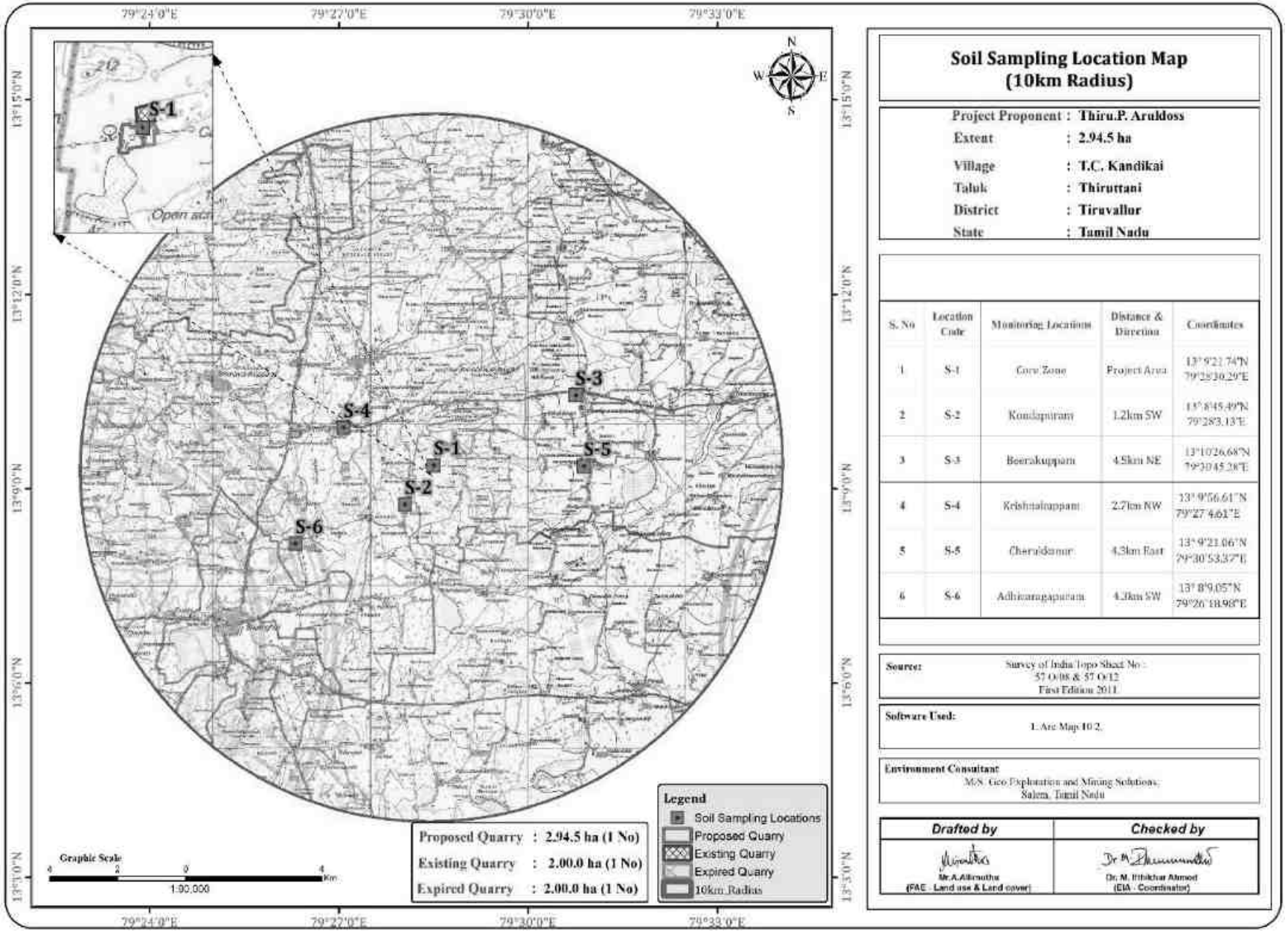


FIGURE 3.3: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS

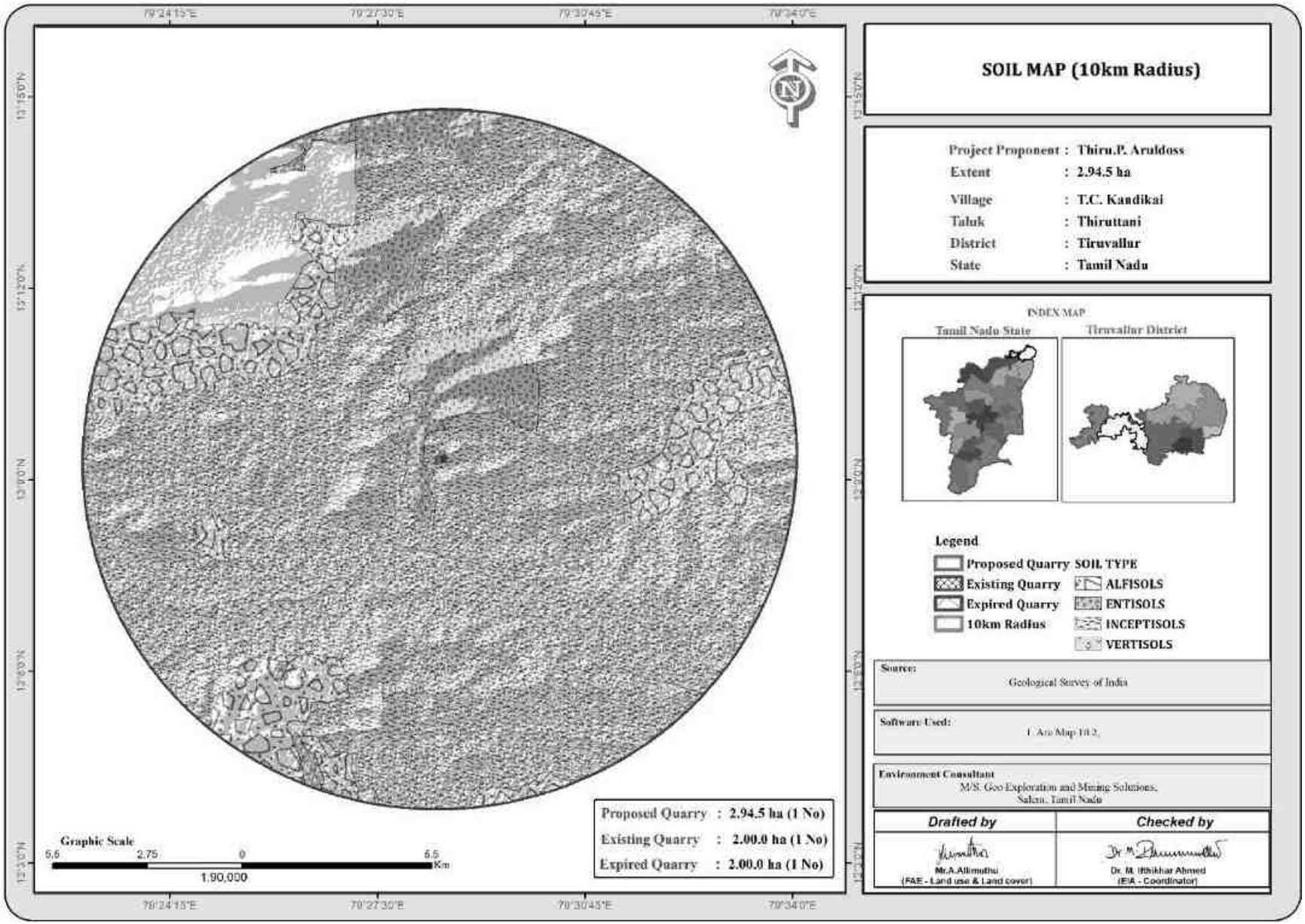


FIGURE 3.4: SOIL MAP

TABLE 3.7: SOIL QUALITY OF THE STUDY AREA

S.no	Test Parameters	Protocols	Soil Core Zone 1	Soil2-Kondapuram	Soil3-Beerakuppam	Soil4-Krishnakuppam	Soil5-Cherukanur	Soil6-Aadhivaragapuram
1	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.73	8.74	8.72	8.06	8.62	8.33
2	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	360 µmhos/cm	362 µmhos/cm	438 µmhos/cm	360 µmhos/cm	464 µmhos/cm	434 µmhos/cm
3	Texture :							
	Clay	Gravimetric Method	35.20%	34.20%	34.80%	31.70%	24.70%	33.60%
	Sand		49.60%	47.60%	42.60%	46.60%	46.40%	47.20%
	Silt		15.20%	18.20%	22.60%	21.70%	28.90%	19.20%
4	Water Holding Capacity	By Gravimetric Method	32.70%	31.60%	34.60%	33.60%	33.60%	32.70%
5	Bulk Density	By Cylindrical Method	1.13 g/cm3	1.16 g/cm3	1.12 g/cm3	1.18 g/cm3	1.27 g/cm3	1.16 g/cm3
6	Porosity	By Gravimetric Method	29.70%	24.20%	27.60%	27.40%	31.20%	27.60%
7	Calcium as Ca	USEPA 3050 B – 1996 &	318 mg/kg	284 mg/kg	382 mg/kg	380 mg/kg	460 mg/kg	370 mg/kg
8	Magnesium as Mg	USEPA 6010 C - 2000	410 mg/kg	202 mg/kg	48 mg/kg	234 mg/kg	280 mg/kg	210 mg/kg
9	Manganese as Mn	USEPA 6010 C - 2000	32 mg/kg	17.2 mg/kg	74 mg/kg	32 mg/kg	41.6 mg/kg	31.6 mg/kg
10	Zinc as Zn		1.6 mg/kg	0.91 mg/kg	3.21 mg/kg	1.62 mg/kg	3.62 mg/kg	0.46 mg/kg
11	Boron as B		0.82 mg/kg	0.41 mg/kg	0.88 mg/kg	1.11 mg/kg	1.71 mg/kg	1.82 mg/kg
12	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	210 mg/kg	208 mg/kg	310 mg/kg	320 mg/kg	360 mg/kg	192 mg/kg
13	Total Soluble Sulphate as SO4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.04%	0.05%	0.03%	0.03%	0.04%	0.04%
14	Potassium as K	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	160 mg/kg	86.4 mg/kg	162 mg/kg	280 mg/kg	282 mg/kg	260 mg/kg
15	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	1.82 mg/kg	1.82 mg/kg	1.80 mg/kg	2.62 mg/kg	3.66 mg/kg	0.96 mg/kg
16	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	372 mg/kg	360 mg/kg	460 mg/kg	310 mg/kg	430 mg/kg	306 mg/kg
17	Cadmium as Cd	USEPA 3050 B – 1996 &	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
18	Total Chromium as Cr	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	1.02 mg/kg	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
19	Copper as Cu		BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
20	Lead as Pb		0.66 mg/kg	0.71 mg/kg	0.82 mg/kg	1.06 mg/kg	1.82 mg/kg	0.94 mg/kg
21	Iron as Fe		3.21 mg/kg	1.46 mg/kg	2.61 mg/kg	1.36 mg/kg	1.38 mg/kg	1.31 mg/kg
22	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.71%	3.01%	3.52%	3.11%	2.94%	2.02%
23	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	0.99%	1.75%	2.05%	1.81%	1.71%	1.17%
24	Cation Exchange Capacity	USEPA 9080 – 1986	24.8 meq/100g of soil	26.2 meq/100g of soil	3.7 meq/100g of soil	26.4 meq/100g of soil	36.2 meq/100g of soil	32.4 meq/100g of soil

Source: Sampling Results by Laboratories

Interpretation & Conclusion

Physical Characteristics –

The physical properties of the soil samples were examined for texture, bulk density, porosity and water holding capacity. The soil texture found in the study area is Clay Loam Soil and Bulk Density of Soils in the study area varied between 1.12 – 1.27 g/cc. The Water Holding Capacity and Porosity of the soil samples is found to be medium i.e. ranging from 31.6 –34.60 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 8.33 to 8.74
- The available Nitrogen content range between 306 to 460 kg/ha
- The available Phosphorus content range between 0.96to 3.66 kg/ha
- The available Potassium range between 86.4 to 282 mg/kg

3.2 WATER ENVIRONMENT

The water resources, both surface and groundwater play a significant role in the development of the area. The purpose of this study is to assess the water quality characteristics for critical parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the norms in pre-treated sampling cans to laboratory for analysis.

3.2.1 Surface Water Resources:

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

3.2.2 Ground Water Resources:

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

Ground water is occurring in pheratic conditions in weathered and fractured gneiss rock formation. The weathering is controlled by the intensity of weathering and fracturing. Dug wells as wells as bore wells are more common ground water abstraction structures in the area. The diameter of the dug well is in the range of 7 to 10 m and depth of dug wells range from 15 to 18 m bgl. The dug wells yield up to 1 lps in summer months and few wells remains dry. The yield is adequate for irrigation for one or two crops in monsoon period.

3.2.3 Methodology

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

- Drainage pattern;
- Location of Residential areas representing different activities/likely impact areas; and

- Likely areas, which can represent baseline conditions

Two (2) surface water and Five (4) ground water samples were collected from the study area and were analysed for physio-chemical, heavy metals and bacteriological parameters in order to assess the effect of mining and other activities on surface and ground water. The samples were analysed as per the procedures specified by CPCB, IS-10500:2012 and 'Standard methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). The water sampling locations are given in Table 3.8 and shown as Figure 3.6.

TABLE 3.8: WATER SAMPLING LOCATIONS

S.NO	CODE	LOCATIONS	DISTANCE & DIRECTION	COORDINATES
SURFACE WATER				
1	SW-1	Tank Near Cherukkanur	4.3km East	13° 9'19.86"N 79°30'56.29"E
2	SW-2	Veeranathur	3.8km SW	13° 7'26.33"N 79°27'21.60"E
GROUND WATER				
3	WW-1	Core Zone	290m NW	13° 9'31.89"N 79°28'24.98"E
4	WW-2	Adhivaragapuram	3.8km SW	13° 8'8.50"N 79°26'38.22"E
5	BW-1	Kondapuram	1.2km SW	13° 8'42.04"N 79°28'2.53"E
6	BW-2	Vengapattu	4.6km SE	13° 7'30.87"N 79°30'11.33"E

Source: On-site monitoring/sampling by Laboratories in association with GEMS

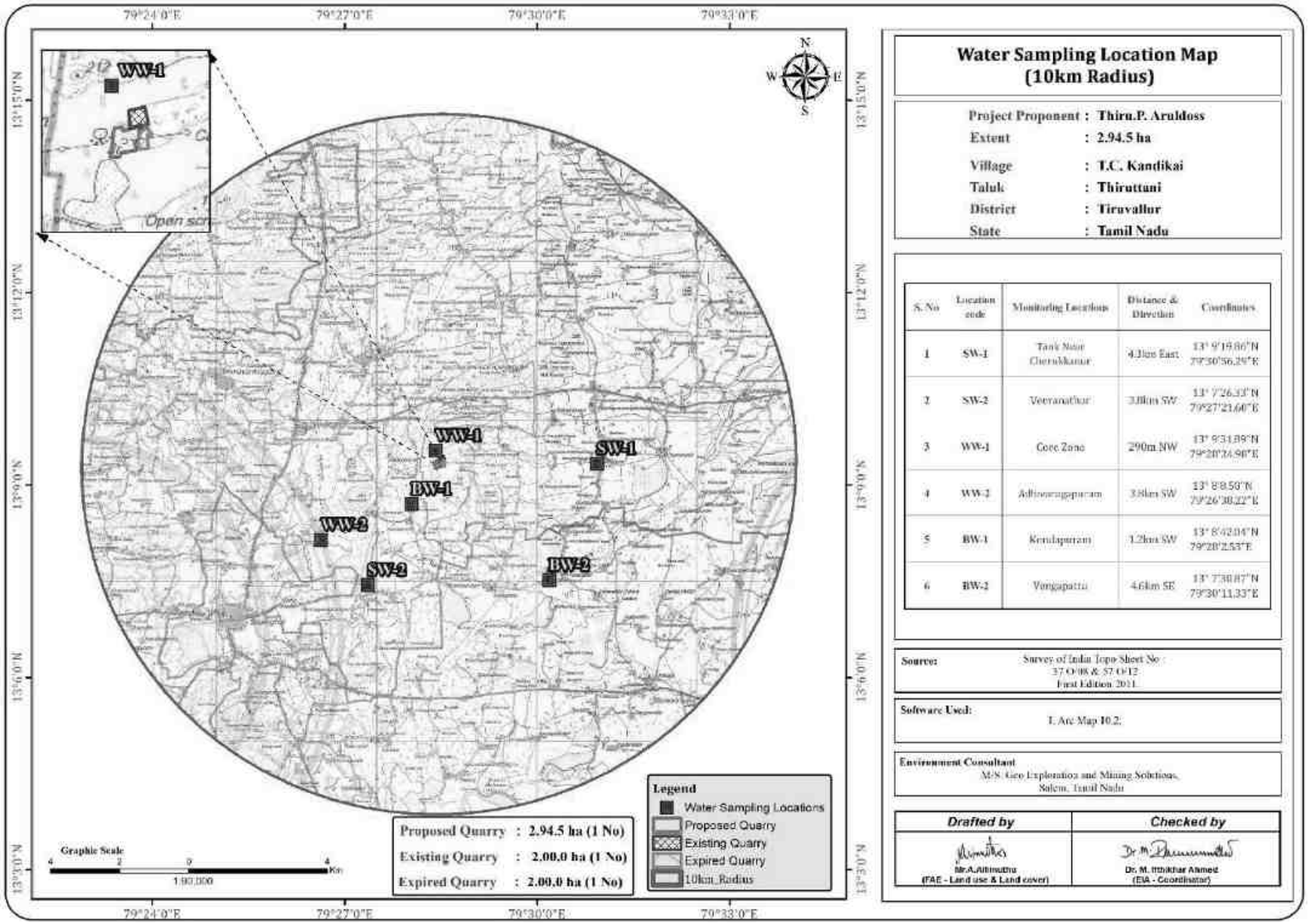


FIGURE 3.5: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS

TABLE 3.9:SURFACE & GROUND WATER SAMPLING RESULTS

Sno	Test	Protocol	Surface Water (SW-1) – Tank Near Cherukkanur	Surface Water (SW-2) – Veeranathur.	Ground water (WW1-Core Zone)	Ground Water (WW-2) – Adhivaragapuram	Ground Water (BW-1) – Kondapuram	Ground Water (BW-2) – Vengapattu
1	Colour	IS 3025 Part 4:1983 (Reaff:2017)	5 Hazen	5 Hazen	10 Hazen	10 Hazen	10 Hazen	10 Hazen
2	Odour	IS 3025 Part 5:2018	Agreeable					
3	pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.91	8.31	7.36	7.62	7.92	7.44
4	Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	830 µmhos/cm	788 µmhos/cm	838 µmhos/cm	910 µmhos/cm	784 µmhos/cm	760 µmhos/cm
5	Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	4.6 NTU	5.9 NTU	2.9 NTU	2.8 NTU	2.3 NTU	3.2 NTU
6	Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	465 mg/l	441 mg/l	470 mg/l	518 mg/l	440 mg/l	426 mg/l
7	Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	168 mg/l	172 mg/l	164 mg/l	194 mg/l	172 mg/l	137 mg/l
8	Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	31.2 mg/l	32.7 mg/l	39.4 mg/l	41 mg/l	38.4 mg/l	21.7 mg/l
9	Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	21.9 mg/l	22 mg/l	16 mg/l	22.3 mg/l	18.5 mg/l	20.1 mg/l
10	Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	168 mg/l	182 mg/l	192 mg/l	192 mg/l	169 mg/l	133 mg/l
11	Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	110 mg/l	106 mg/l	114 mg/l	114 mg/l	98 mg/l	94 mg/l
12	Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	34 mg/l	37 mg/l	31 mg/l	32 mg/l	32 mg/l	26 mg/l
13	Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.26 mg/l	0.22 mg/l	0.23 mg/l	0.24 mg/l	BDL(DL : 0.01 mg/l)	0.31 mg/l
14	Residual Free Chlorine	IS 3025 Part 26:2021	BDL (DL:0.1 mg/l)					
15	Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.46 mg/l	0.42 mg/l	0.36 mg/l	0.40 mg/l	0.25 mg/l	0.52 mg/l
16	Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	11.2 mg/l	9.6 mg/l	9.2 mg/l	9.6 mg/l	8.6 mg/l	13.6 mg/l
17	Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)					
18	Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)					
19	Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)					

20	Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)					
21	Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)					
22	Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)					
23	Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)					
24	Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)					
25	Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)					
26	Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)					
27	Mineral Oil	IS 3025 Part 39-2021	BDL(DL : 0.01 mg/l)					
28	Phenolic compounds as C6H5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)					
29	Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019)	BDL (DL:0.01 mg/l)					
30	Cyanide as CN	IS 3025 Part 27/Sec 1-2021	BDL (DL:0.01 mg/l)					
31	BOD @ 27°C for 3 days	IS 3025 Part 44:1993 (Reaff:2019)	6 mg/l	5 mg/l	NIL			
32	Chemical Oxygen Demand	IS 3025 Part 58:2006 (Reaff:2017)	24 mg/l	27 mg/l				
33	Dissolved Oxygen	IS 3025 Part 38:1989 (Reaff:2019)	5.8 mg/l	5.8 mg/l				
34	Barium as Ba	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL:0.05 mg/l)					
35	Ammonia (as total ammonia-N)	IS 3025 Part 34-1988 (Reaff. 2019)	BDL (DL:0.01 mg/l)					
36	Sulphide as H2S	IS 3025 Part 29-1986 (Reaff: 2019)	BDL (DL:0.01 mg/l)					
37	Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)					
38	Total Arsenic as As	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)					
39	Total Suspended Solids	IS 3025 Part 17 -1984 (Reaff:2017)	11 mg/l	8 mg/l	6.0 mg/l	6.0 mg/l	8 mg/l	6.0 mg/l
40	Discipline: Biological Group: Water							
41	Total Coliform	APHA 23rd Edn. 2017:9221B	1600 MPN/100ml	1600 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml
42	Escherichia coli	APHA 23rd Edn. 2017:9221F	300 MPN/100ml	240 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml

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

3.2.4 Interpretation& Conclusion

Surface Water

Ph:

The pH varied from 7.91to 8.31 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH).

Total Dissolved Solids:

Total Dissolved Solids varied from 441 to 465 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride content is 106 - 110 mg/l. Nitrates varied from 9.6 to 11.2 mg/l, while sulphates varied from 34 to 37 mg/l.

Ground Water

The pH of the water samples collected ranged from 7.36to 7.92 and within the acceptable limit of 6.5 to 8.5. PH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 426 - 518 mg/l in all samples. Total hardness varied between 137 – 194 mg/l for all samples.

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

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by hard rock formation fissured and fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-80 Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth between 55-59m. The maximum depth proposed out of proposed project is 15 m to 54 m BGL. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area. There is no necessity of stream, channel diversion due to these proposed projects.

During the rainy season there is a possibility of collection of seepage water from the subsurface levels which will be collected and stored in the mine sump pits and will be used for dust suppression

and greenbelt development and during the end of the life of the mine this collected water will act as a temporary reservoir.

TABLE 3.11: WATER LEVEL OF OPEN WELLS 1 KM RADIUS

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Oct-22	Nov-22	Dec-22	Average		
OW-1	10.3	10.9	11.5	25.03	79° 28' 17.07E	13° 08' 55.84N
OW-2	11.2	11.8	12.4	27.13	79° 28' 22.04E	13° 08' 52.30N
OW-3	12.4	13	13.6	29.93	79° 28' 22.53E	13° 08' 58.81N
OW-4	10.6	11.2	11.8	25.73	79° 28' 54.10E	13° 09' 22.77N
OW-5	12.3	12.9	13.5	29.70	79° 28' 48.22E	13° 09' 35.61N
OW-6	11.8	12.4	13	28.53	79° 28' 56.71E	13° 09' 41.64N
OW-7	10.4	11	11.6	25.27	79° 28' 37.19E	13° 09' 37.55N
OW-8	11.3	11.9	12.5	27.37	79° 28' 36.98E	13° 09' 40.94N
OW-9	12.6	13.2	13.8	30.40	79° 28' 32.63E	13° 09' 51.12N
OW-10	10.1	10.7	11.3	24.57	79° 28' 22.51E	13° 09' 43.18N
OW-11	11.2	11.8	12.4	27.13	79°27'54.26"E	13° 9'9.19"N
OW-12	11.6	12.2	12.8	28.07	79°27'50.28"E	13° 9'26.21"N

Source: Onsite monitoring data

TABLE 3.12: WATER LEVEL OF BOREWELLS 1 KM RADIUS

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Oct-22	Nov-22	Dec-22	Average		
BW-1	55.2	55.7	56.2	129.63	79° 28' 22.41E	13° 09' 23.43N
BW-2	56.4	56.9	57.4	132.43	79° 28' 47.01E	13° 09' 32.17N
BW-3	55.3	55.8	56.3	129.87	79° 28' 54.60E	13° 09' 32.27N
BW-4	57.1	57.6	58.1	134.07	79° 28' 49.97E	13° 09' 45.64N
BW-5	56.5	57	57.5	132.67	79° 28' 48.39E	13° 09' 49.06N
BW-6	55.7	56.2	56.7	130.80	79° 28' 23.30E	13° 09' 45.22N
BW-7	56.9	57.4	57.9	133.60	79° 27' 55.94E	13° 09' 27.69N
BW-8	57.2	57.7	58.2	134.30	79° 28' 06.19E	13° 09' 10.64N
BW-9	58.2	58.7	59.2	136.63	79° 28' 01.43E	13° 09' 09.34N
BW-10	59.2	59.7	60.2	138.97	79° 27' 56.32E	13° 08' 59.27N
BW-11	56.6	57.1	57.6	132.90	79° 28' 31.38E	13° 08' 48.63N
BW-12	55.3	55.8	56.3	129.87	79° 28' 51.31E	13° 09' 11.07N

Source: Onsite monitoring data

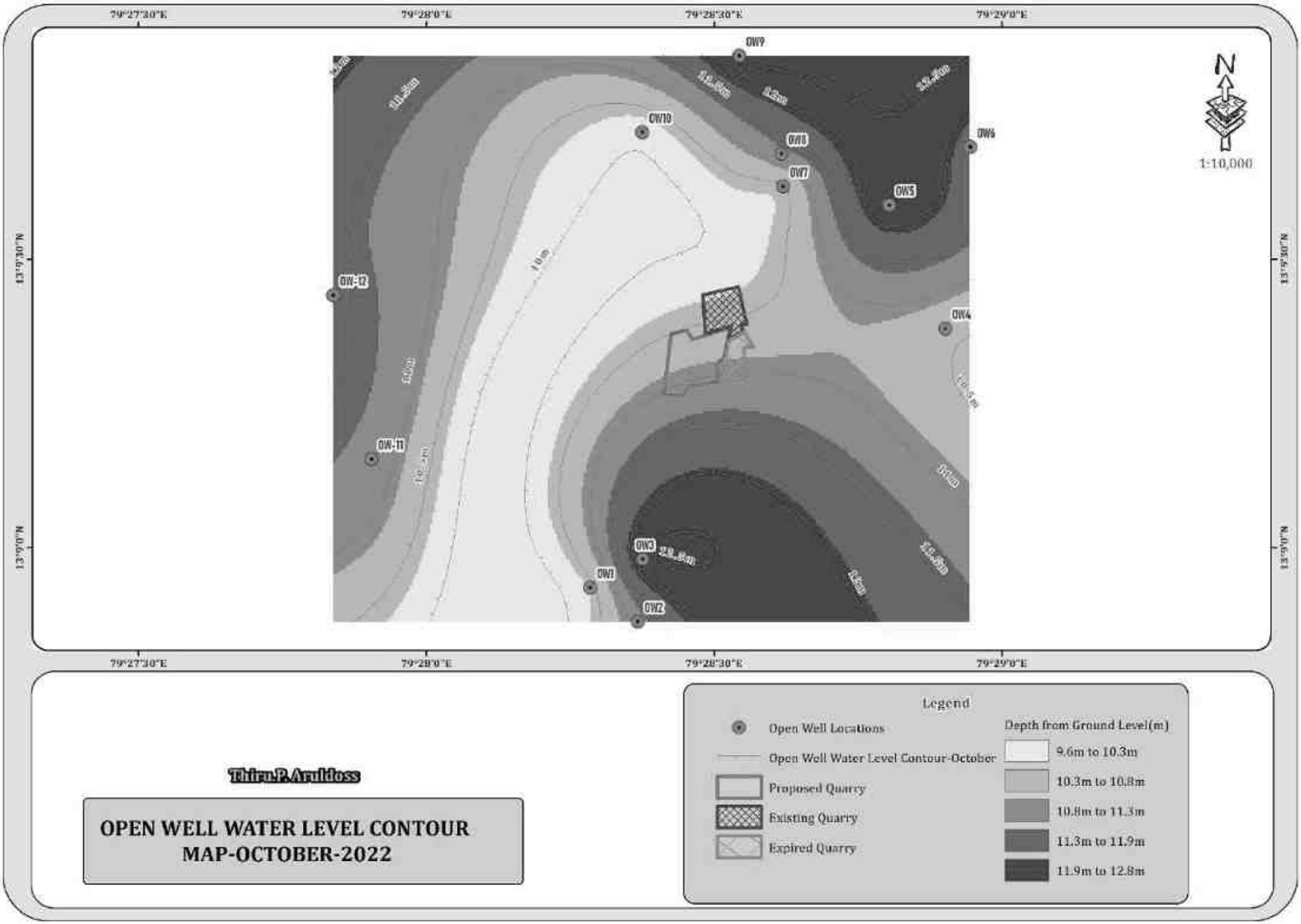


FIGURE 3.6: WATER LEVEL CONTOUR MAP OF OPEN WELLS 1 KM RADIUS – OCTOBER 2022

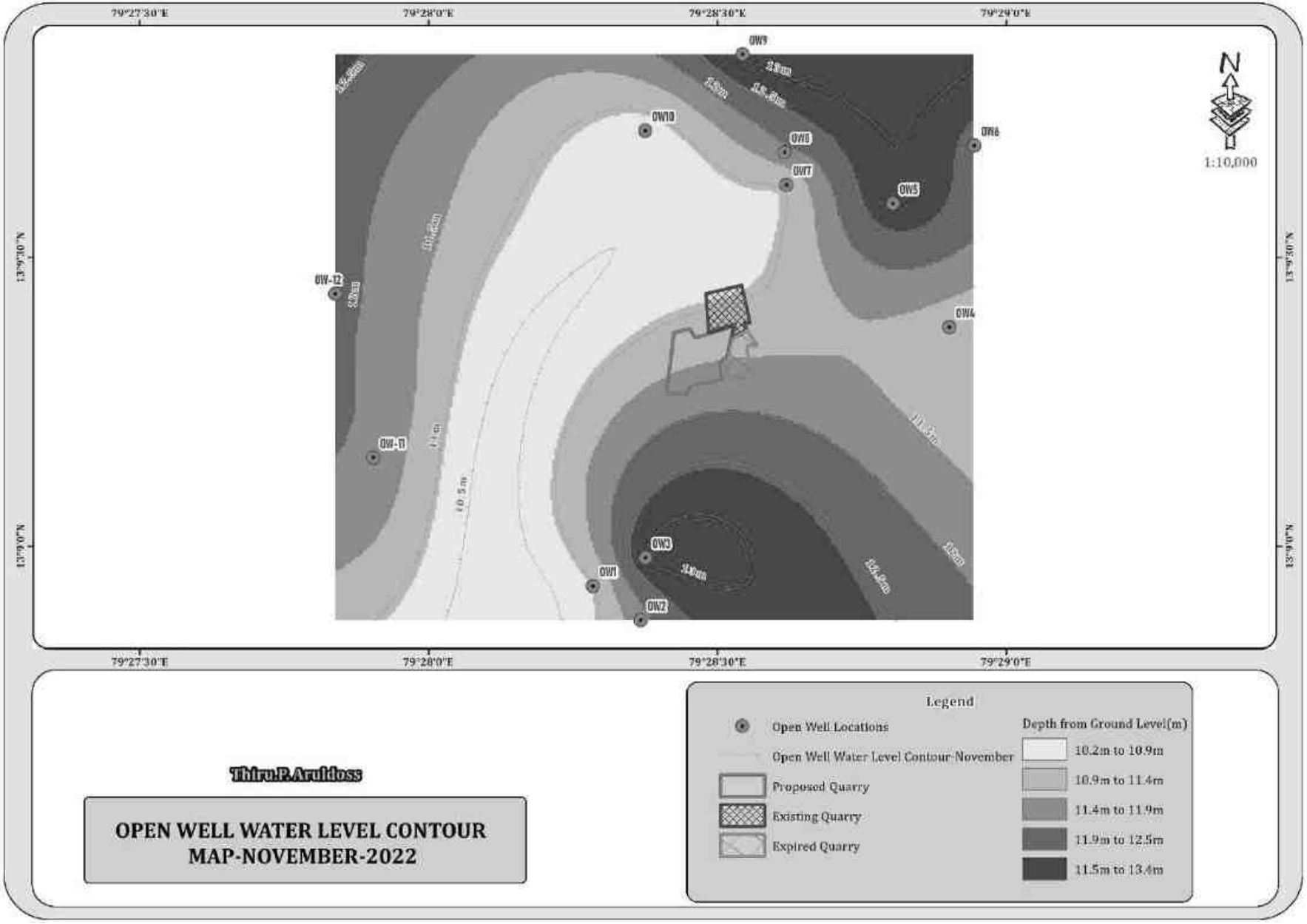


FIGURE 3.7: WATER LEVEL CONTOUR MAP OF OPEN WELLS 1 KM RADIUS – NOVEMBER 2022

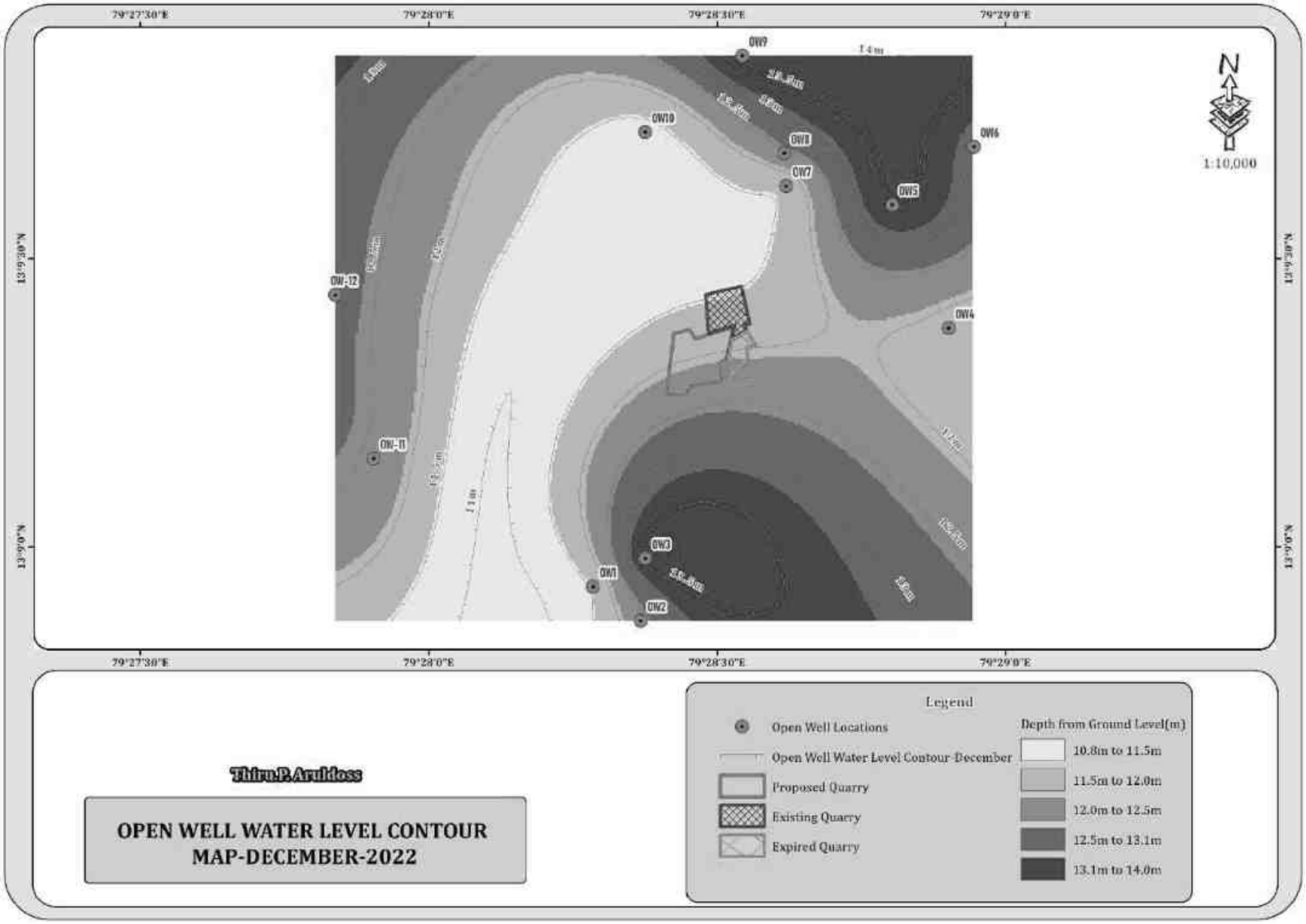


FIGURE 3.8: WATER LEVEL CONTOUR MAP OF OPEN WELLS 1 KM RADIUS – DECEMBER 2022

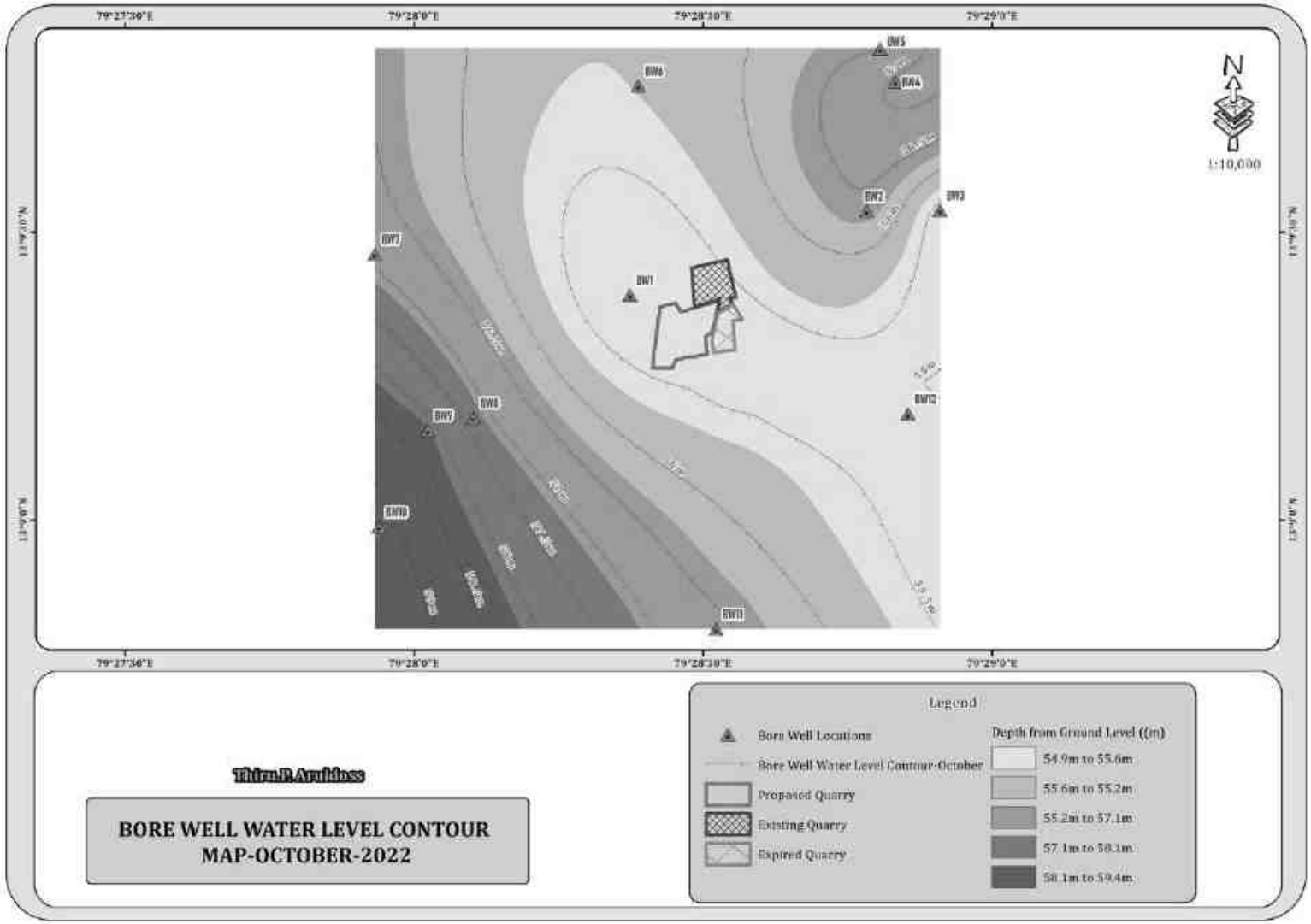


FIGURE 3.9: WATER LEVEL CONTOUR MAP OF BORE WELLS 1 KM RADIUS – OCTOBER 2022

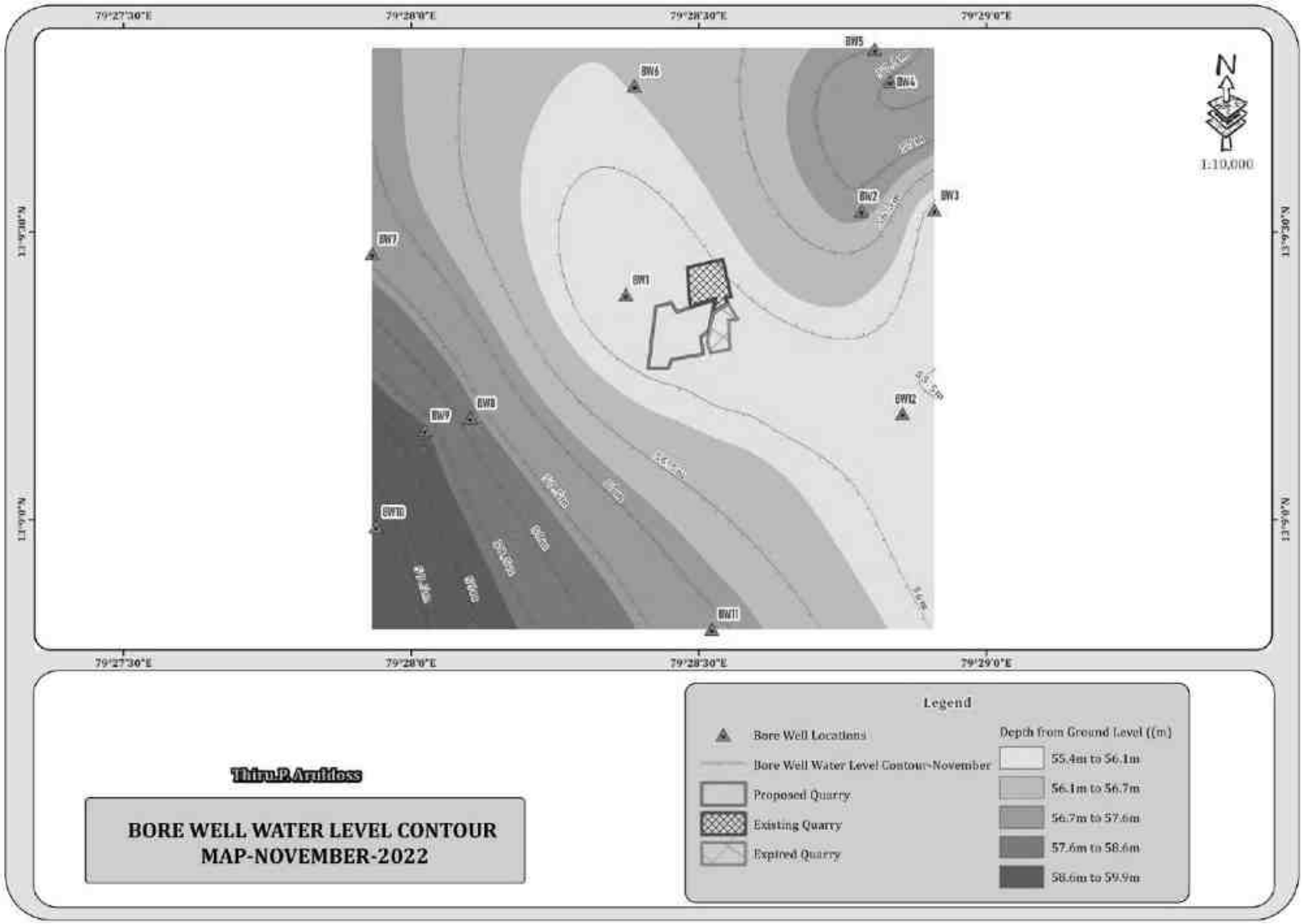


FIGURE 3.10: WATER LEVEL CONTOUR MAP OF BORE WELLS 1 KM RADIUS – NOVEMBER 2022

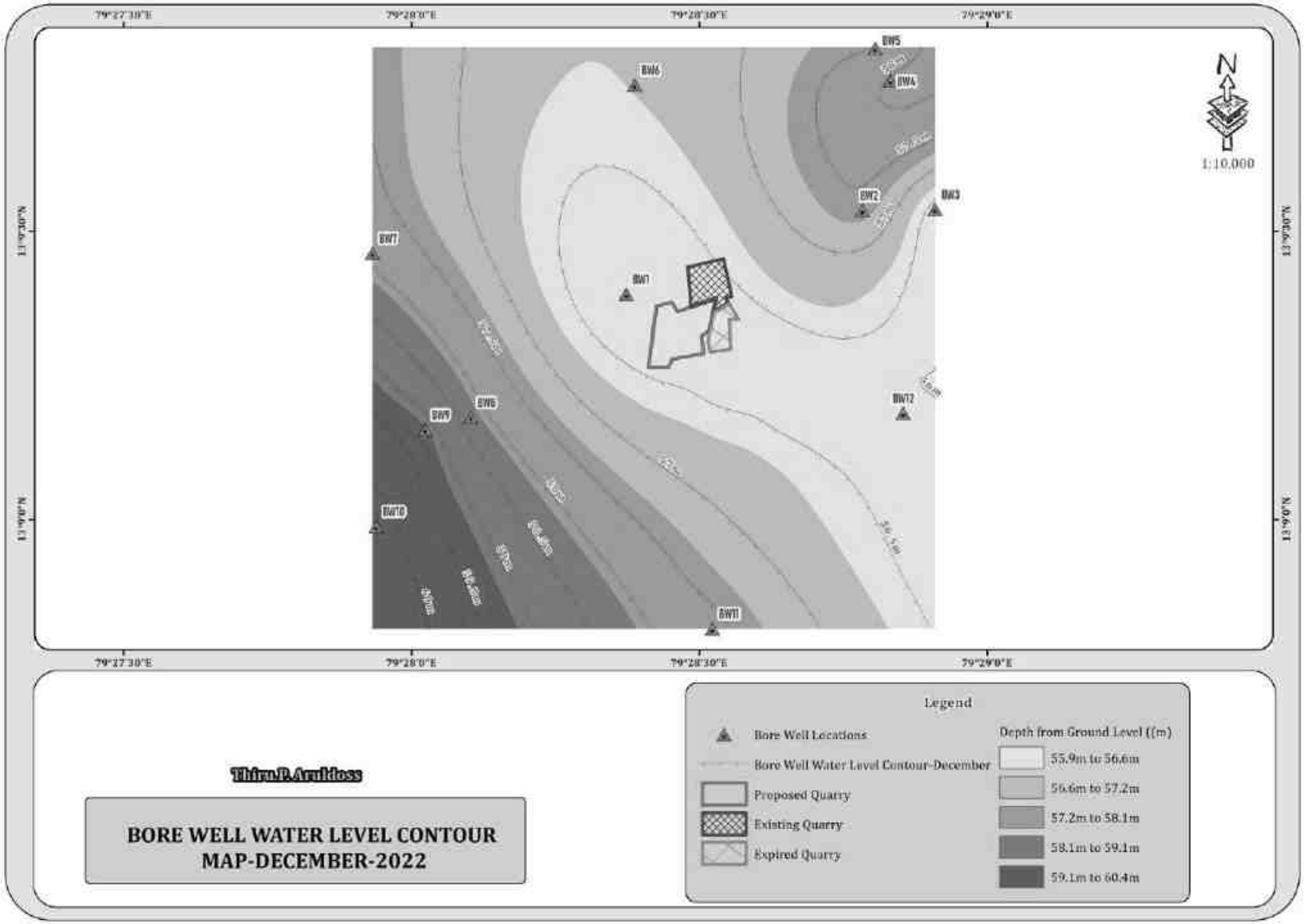


FIGURE 3.11: WATER LEVEL CONTOUR MAP OF BORE WELLS 1 KM RADIUS –DECEMBER 2022

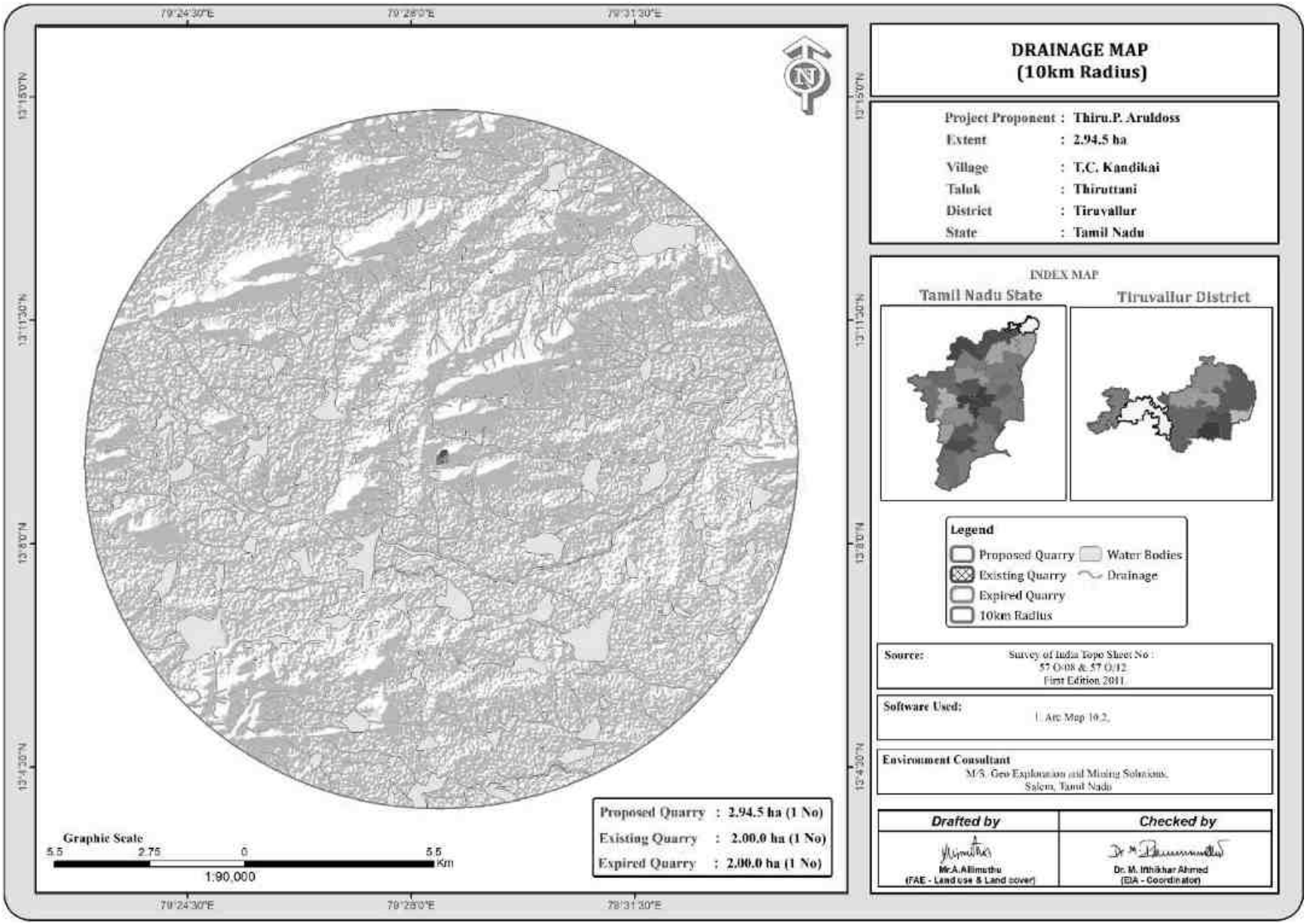
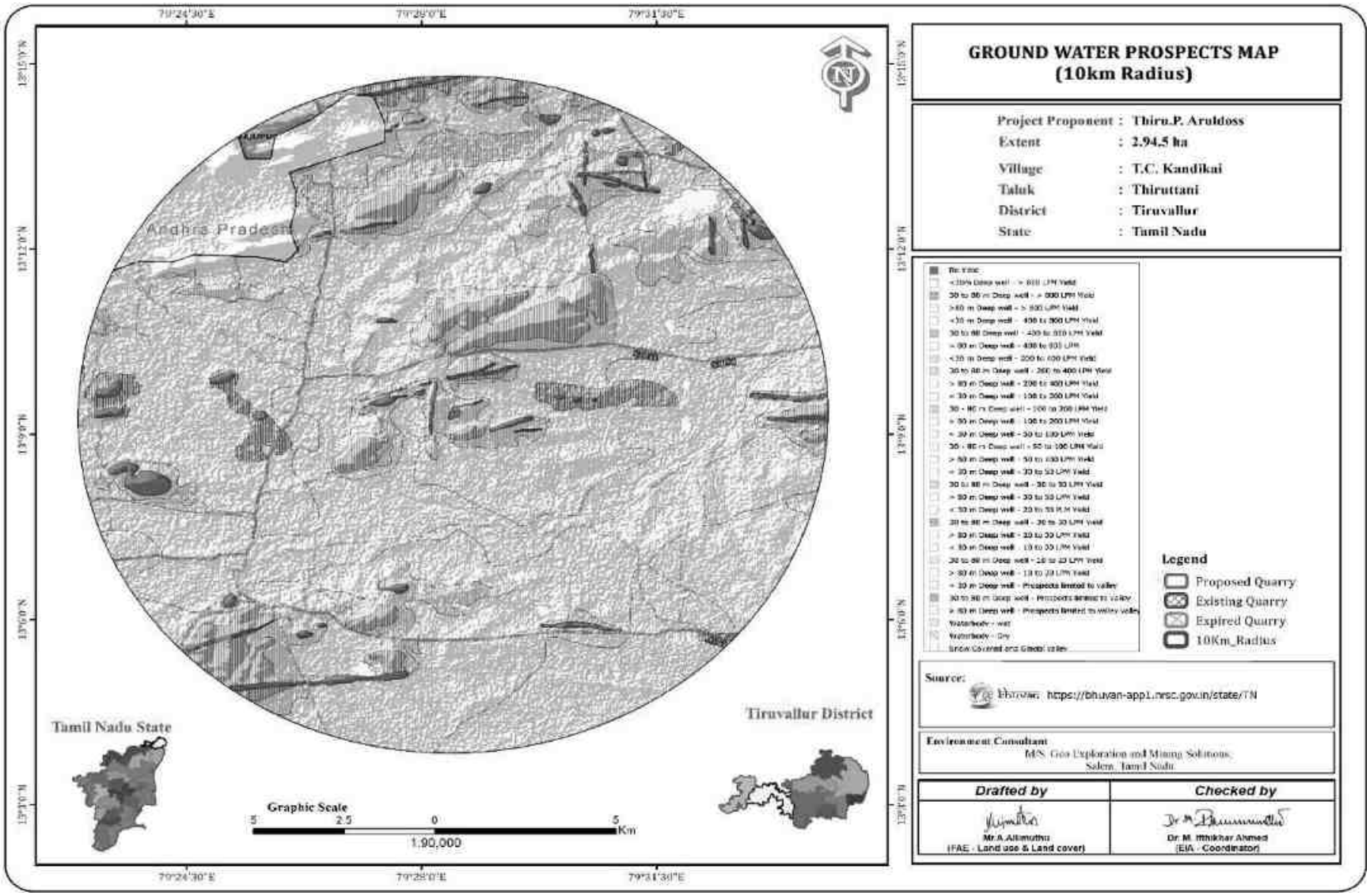


FIGURE 3.12: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE

FIGURE 3.13: GROUND WATER PROSPECT MAP



3.2.5.1 Methodology and Data Acquisition

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

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

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

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

ΔV = potential difference between receiving electrodes

G = Geometric Factor.

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

$$\rho_r = F\rho_w = a\,Ø^m\rho_w$$

ρr = Resistivity of Rocks

ρw = Resistivity of water in pores of rock

F = Formation Factor

Ø = Fractional pore volume

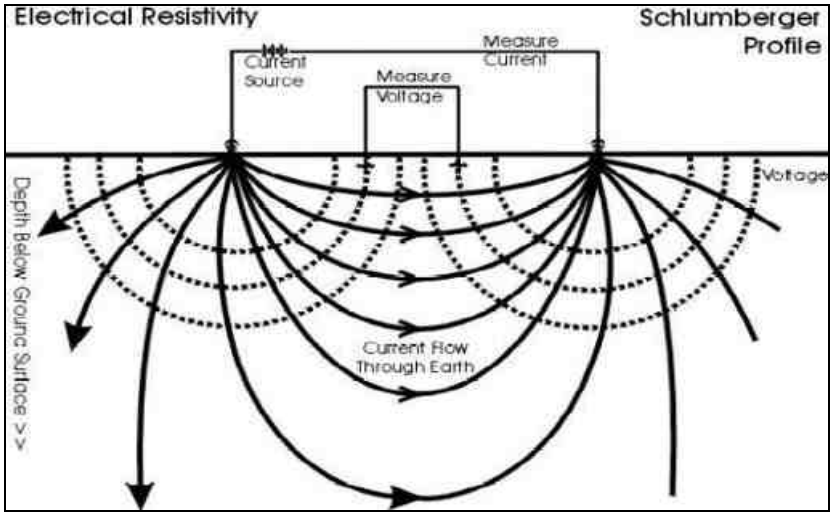
A = Constants with values ranging from 0.5 to 2.5

3.2.5.2 Survey Layout

The layout for a resistivity survey depends on the choice of the current and potential electrode arrangement, which is called electrode array. Here the present study is considered with Schlumberger array. In which the distance may be used for current electrode separation while potential electrode separation is kept on third to one fifth of the same. One interesting aspect in VES is the principle of reciprocity, which permits interchange of the potential and current electrode without any effect on the measured apparent resistivity.

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

RESISTIVITY SURVEY PROFILE



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

3.2.5.3 Data Presentation

It was inferred that the low resistance encountered at the depth between 58-62m. The maximum depth proposed out of proposed projects is 15 m to 57 m BGL. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area.

3.2.5.4 Geophysical Data Interpretation

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

3.3 AIR ENVIRONMENT

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

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

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

3.3.1 Meteorology & Climate

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

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

Climate

- This city has a tropical climate. In winter, there is much less rainfall than in summer. The climate here is classified as Aw by the Köppen-Geiger system. The average annual temperature in Chengalpattu is 27.8 °C | 82.0 °F. In a year, the rainfall is 995 mm | 39.2 inch.
- Chengalpattu experiences a moderate climate, and the summers are not easy to define. The best time to visit is January, February, March, December.
- The least amount of rainfall occurs in February. The average in this month is 9 mm | 0.4 inch. Most precipitation falls in October, with an average of 205 mm | 8.1 inch.
- The temperatures are highest on average in May, at around 31.2 °C | 88.2 °F. In January, the average temperature is 24.2 °C | 75.5 °F. It is the lowest average temperature of the whole year.
  https://en.climate-data.org/asia/india/tamil-nadu/chengalpattu-767200/

Rainfall

TABLE 3.13: RAINFALL DATA

Actual Rainfall in mm					Normal Rainfall in mm
2017	2018	2019	2020	2021	
1198.0	733.4	1174.2	1229.0	1809.6	985

Source: https://www.twadboard.tn.gov.in/content/Thiruvallur-0

TABLE 3.14: METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Oct – 2022	Nov – 2022	Dec – 2022
1	Temperature (^{0}C)	Max	26.36	25.05	24.67
		Min	23.19	21.04	20.2
		Avg	24.775	23.045	22.435
2	Relative Humidity (%)	Avg	79.935	87.125	87.125
3	Wind Speed (m/s)	Max	4.88	6.05	6.45
		Min	1.52	1.59	1.49
		Avg	3.2	3.82	3.97
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		SE, NE	NE, E	NE, SE

Source: On-site monitoring/sampling by Chennai Mettex Laboratories in association with GEMS

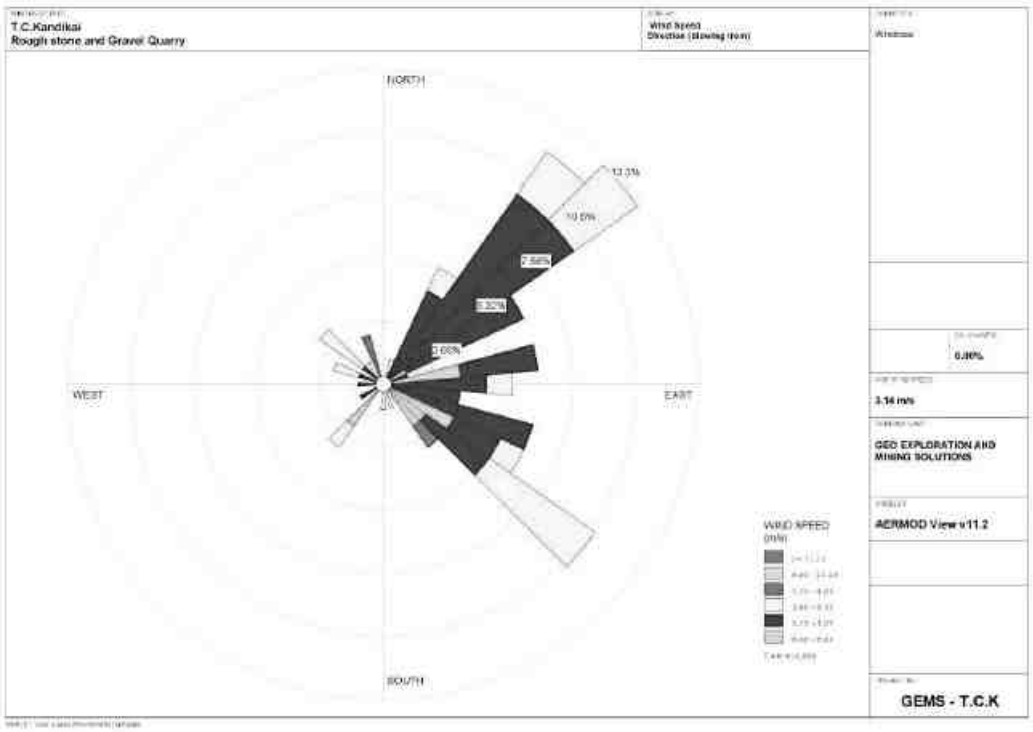
Correlation between Secondary and Primary Data

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

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

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

FIGURE 3.14: WINDROSE DIAGRAM



Source: Wind Rose plot view, Lake Environmental Software.

In the abstract of collected data wind rose were drawn on presented in figure No.3.15 during the monitoring period in the study area

- Predominant winds were from SW – NE & NE- SW
- Wind velocity readings were recorded between 0.00 to 8.80 m/s
- Calm conditions prevail of about 0.00 % of the monitoring period
- Temperature readings ranging from 27.6 to 28.4°C
- Relative humidity ranging from 50.2 to 69 %
- The monitoring was carried out continuously for three months

3.3.2 Methodology and Objective

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

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

3.3.3 Sampling and Analytical Techniques

TABLE 3.15: METHODOLOGY AND INSTRUMENT USED FOR AAQ MONITORING

Parameter	Method	Instrument
$PM_{2.5}$	Gravimetric Method Beta attenuation Method	Fine Particulate Sampler Make – Thermo Environmental Instruments – TEI 121
PM_{10}	Gravimetric Method Beta attenuation Method	Respirable Dust Sampler Make –Thermo Environmental Instruments – TEI 108
SO_2	IS-5182 Part II (Improved West & Gaeke method)	Respirable Dust Sampler with gaseous attachment
NO_x	IS-5182 Part II (Jacob & Hochheiser modifiedmethod)	Respirable Dust Sampler with gaseous attachment
Free Silica	NIOSH – 7601	Visible Spectrophotometry

Source: Sampling Methodology followed by Laboratories & CPCB Notification

TABLE 3.16: NATIONAL AMBIENT AIR QUALITY STANDARDS

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

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

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

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

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at eight (8) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period October to December, 2020. The baseline data of ambient air has been generated for PM_{10}, $PM_{2.5}$, Sulphur Dioxide (SO_2) & Nitrogen Dioxide (NO_2) Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications.

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

3.3.5 Ambient Air Quality Monitoring Stations

Eight (8) monitoring stations were set up in the study area as depicted in Figure 3.6.1 for assessment of the existing ambient air quality. Details of the sampling locations are as per given below.

TABLE 3.17: AMBIENT AIR QUALITY (AAQ) MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	**AAQ-1**	Core Zone	Project Area	13° 9'20.87"N 79°28'30.14"E
2	**AAQ-2**	Core Zone	Near Existing Quarry	13° 9'27.22"N 79°28'31.75"E
3	**AAQ-3**	Kondapuram	1.2km SW	13° 8'45.29"N 79°28'3.67"E
4	**AAQ-4**	Beerakuppam	4.5km NE	13°10'25.99"N 79°30'46.47"E
5	**AAQ-5**	Vengapattu	4.6km SE	13° 7'29.97"N 79°30'10.42"E
6	**AAQ-6**	Krishnakuppam	2.7km NW	13° 9'56.76"N 79°27'2.98"E
7	**AAQ-7**	Cherukkanur	4.3km East	13° 9'20.29"N 79°30'53.14"E
8	**AAQ-8**	Adhivaragapuram	4.3km SW	13° 8'8.55"N 79°26'18.77"E

Source: On-site monitoring/sampling by Laboratories in association with GEMS

FIGURE 3.15: AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

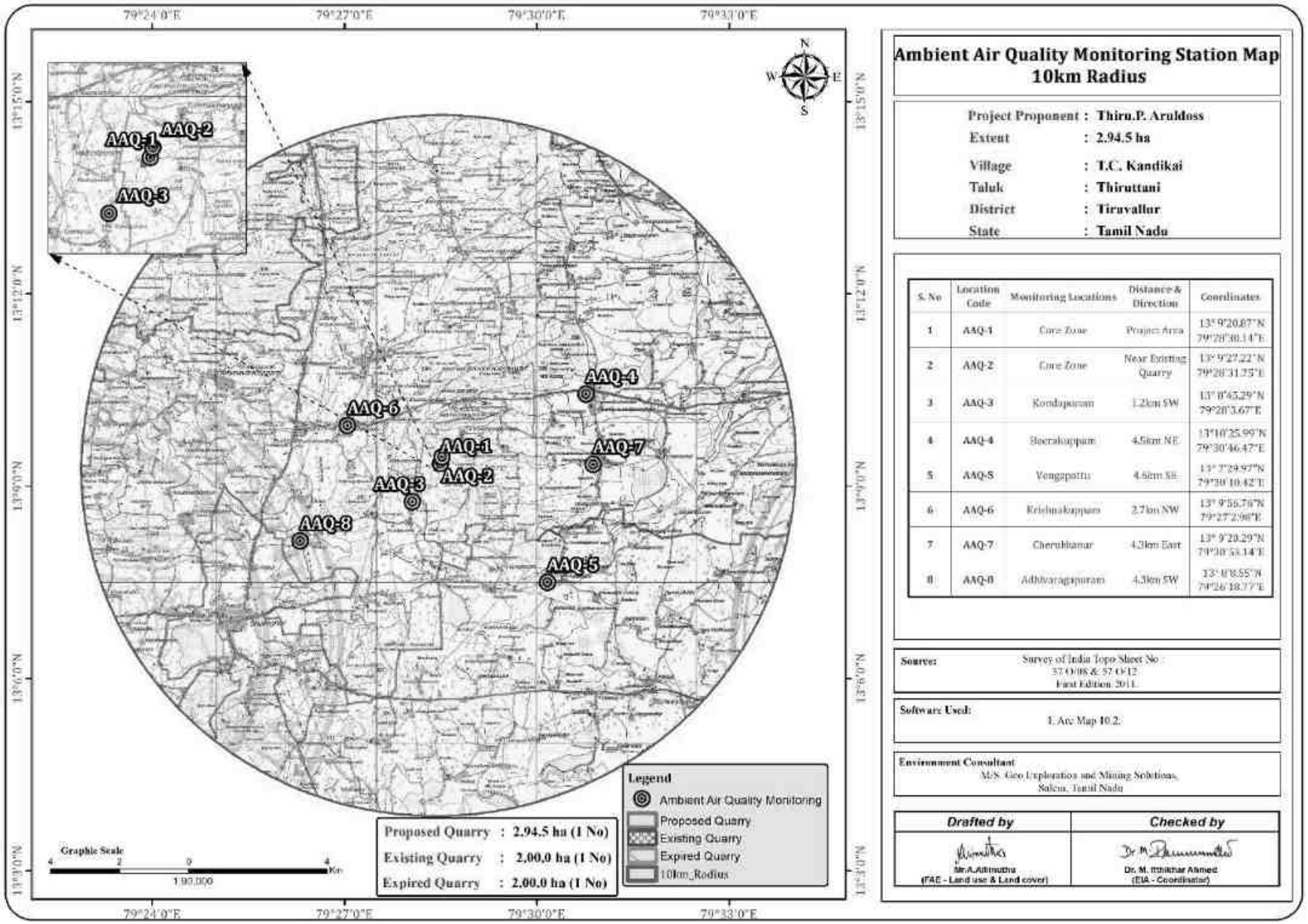


TABLE 3.18: AMBIENT AIR QUALITY DATA LOCATION AAQ1-CORE ZONE

Ambient Air Monitoring Details		**Particulate Pollutant**			**Gaseous Pollutant**					**Metals Pollutant**			**Organic Pollutant**	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	123	59.4	23.7	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	106	66.9	32.6	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	112	52.6	36.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	135	59.3	25.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	104	55.5	32.4	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	122	68.9	21.6	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	103	54.6	22.5	8.4	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	111	65.4	34.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	102	56.3	35.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	125	65.9	26.9	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	139	62.8	33.2	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	108	64.5	39.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	126	51.2	35.8	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	113	52.1	24.2	8.4	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	105	65	32.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	122	69.2	31.9	8.4	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	101	66.1	36.3	7.5	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	135	63.5	33.6	10.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	128	65.4	25.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	105	69.7	22.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	114	68.8	38.8	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	107	65.5	35.7	7.5	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	125	52.2	34.5	10.3	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	107	64	26.2	7.5	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	135	56.1	23.1	10.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	122	68.2	38.4	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	104	55.4	35.9	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	117	62.9	29.7	10.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)														
Remarks: The values observed for the pollutants given above are within the CPCB standards.														

TABLE 3.19: AMBIENT AIR QUALITY DATA LOCATION AAQ2 - CORE ZONE

Ambient Air Monitoring Details		**Particulate Pollutant**			**Gaseous Pollutant**					**Metals Pollutant**			**Organic Pollutant**	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	102	52.6	21.3	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	126	56.2	25.2	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	109	59.3	22.8	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	118	57.9	24.9	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	105	66.5	32.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	123	63.4	21.1	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	118	52.2	25	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	105	61.1	34.2	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	122	54	35.6	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	101	55.2	32.8	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	114	58.3	23.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	127	55.5	26.3	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	105	62.9	29	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	118	69.5	28.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	109	56.1	25.9	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	126	59.5	20.8	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	113	53.9	31.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	105	58.6	24.2	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	122	52.3	35	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	101	51.5	22.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	122	54.8	24.7	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	125	67.4	25.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	108	65.5	28.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	107	58.2	27.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	114	59.1	35.6	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	101	56.4	26.3	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	105	53.5	22.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	128	62.9	20.9	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)

Remarks: The values observed for the pollutants given above are within the CPCB standards.

TABLE 3.20: AMBIENT AIR QUALITY DATA LOCATION AAQ3- KONDAPURAM

Ambient Air Monitoring Details		**Particulate Pollutant**			**Gaseous Pollutant**					**Metals Pollutant**			**Organic Pollutant**	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	107	53.3	21.7	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	112	57.6	35.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	105	52.9	39.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	104	54.5	26.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	121	56.4	23.9	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	103	59.2	26.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	126	62.5	22.1	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	119	50.8	30.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	108	62.4	22.4	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	122	61.2	33.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	105	54.3	25.3	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	118	58.6	24.9	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	107	56.9	28.6	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	104	53.5	22.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	101	69.2	37.2	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	122	57.3	25	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	125	60.6	23.4	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	109	51.5	26.8	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	116	62.4	38.7	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	103	54	25.2	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	122	52.2	24.3	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	115	55.1	20	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	104	54.5	22.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	128	59.8	39.1	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	109	55.9	24.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	113	53.8	22.4	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	102	66.4	25.9	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	120	52.5	27.6	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)														
Remarks: The values observed for the pollutants given above are within the CPCB standards.														

TABLE 3.21: AMBIENT AIR QUALITY DATA LOCATION AAQ4- BEERAKUPPAM

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	126	56.1	37.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	102	51.6	22.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	125	59.9	25.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	114	65.2	39.2	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	102	53.8	24.1	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	101	52.4	38.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	123	54.3	26.4	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	122	69.6	22.9	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	119	56.9	27.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	115	52.5	25.6	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	108	55.6	21.3	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	127	68.3	20.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	108	64.2	22.2	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	119	53.5	31.1	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	101	56.4	35.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	124	59.1	34.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	115	55.5	28.8	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	102	56.8	25.6	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	123	62.4	26.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	116	64.5	23.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	105	62.6	20.4	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	124	51.8	22.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	101	56.5	25.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	100	58.2	38.9	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	112	55.4	24.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	101	54.8	27	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	125	67.5	31.3	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	104	59.3	20.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)														
Remarks: The values observed for the pollutants given above are within the CPCB standards.														

TABLE 3.22: AMBIENT AIR QUALITY DATA LOCATION AAQ5- VENGAPATTU

Ambient Air Monitoring Details		**Particulate Pollutant**			**Gaseous Pollutant**					**Metals Pollutant**			**Organic Pollutant**	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	123	53.2	26.9	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	107	50	37.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	122	51.5	25.6	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	115	65.8	29.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	114	54.4	24.5	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	101	58.5	27.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	125	69	26	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	109	56.1	38.2	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	105	55.2	35.3	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	114	52.6	24.7	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	123	60.5	22	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	102	63.1	27.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	100	65.9	25.7	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	101	54.5	24.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	115	55.4	29.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	108	59.3	31.1	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	105	51.5	25	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	126	55.2	26.2	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	108	54.9	23.3	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	104	57	27.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	105	65.2	21.4	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	122	63.1	25.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	101	69.4	22.9	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	120	55.7	34.8	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	102	52.6	32.7	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	123	54.3	31	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	125	63.5	29.1	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	114	52.4	22.5	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)														
Remarks: The values observed for the pollutants given above are within the CPCB standards.														

TABLE 3.23: AMBIENT AIR QUALITY DATA LOCATION AAQ6 - KRISHNAKUPPAM

Ambient Air Monitoring Details		**Particulate Pollutant**			**Gaseous Pollutant**					**Metals Pollutant**			**Organic Pollutant**	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	107	54.3	28.3	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	125	59.1	24.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	122	56.9	26.8	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	106	53.5	23.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	119	68.3	32.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	118	65.2	29.9	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	105	50.5	38.8	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	110	64.8	24.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	101	58.4	35	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	114	65.6	38.1	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	128	51	32.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	105	50.2	21.8	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	126	53.1	26.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	100	55.5	25.7	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	114	68.8	24.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	100	52.5	22.3	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	122	50.4	26.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	105	55.5	29.9	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	118	68	38.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	107	64.3	35.1	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	122	51.6	22	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	110	56.2	34.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	104	52.9	27.6	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	125	53.5	28.2	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	106	67.1	25.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	115	55.4	30.4	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	104	50.7	21.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	127	61.9	32.8	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)

Remarks: The values observed for the pollutants given above are within the CPCB standards.

TABLE 3.24: AMBIENT AIR QUALITY DATA LOCATION AAQ7 - CHERUKKANUR

Ambient Air Monitoring Details		**Particulate Pollutant**			**Gaseous Pollutant**					**Metals Pollutant**			**Organic Pollutant**	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	116	53.7	26.5	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	103	65.3	22	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	128	52.5	25.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	105	50.2	24	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	112	58.4	29.4	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	111	55.9	38	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	124	54	25.2	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	107	61.8	22.8	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	115	50.2	36.3	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	103	52.4	23.7	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	115	56.3	25.1	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	127	69.8	22.9	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	114	68	34.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	105	65.1	21.3	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	116	52.6	25.9	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	120	50.5	24.6	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	121	56.2	39.3	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	103	59.8	36	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	116	58.1	28.2	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	115	57.4	27.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	108	55.7	21.8	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	125	58.5	20.1	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	128	57.6	22	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	127	65.9	25.2	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	126	51.8	34.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	105	52.6	36.8	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	110	64.4	23.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	102	55	25.6	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)														
Remarks: The values observed for the pollutants given above are within the CPCB standards.														

TABLE 3.25: AMBIENT AIR QUALITY DATA LOCATION AAQ8 - AADHIVARAGAPURAM

Ambient Air Monitoring Details		**Particulate Pollutant**			**Gaseous Pollutant**					**Metals Pollutant**			**Organic Pollutant**	
Parameters		SPM	PM_{10}	$PM_{2.5}$		NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	122	53.7	29.5	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	104	57.4	25.3	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	119	51.1	22.7	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	125	65.5	21.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	133	52.8	24.6	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	128	54.6	23.8	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	122	53.3	28.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	120	59.2	25.4	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	114	55.5	26	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	121	52.8	22.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	106	56	30.3	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	123	50.5	34.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	100	68.9	20.8	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	122	55.6	25.6	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	105	50.5	20.2	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	124	54.2	28	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	109	56	20.7	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	118	55.4	36.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	103	52	21.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	127	50.2	36.6	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	106	63.8	25.9	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	112	51.4	33.1	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	101	55.7	27.4	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	125	56.5	38.5	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	107	59.3	22.3	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	114	50.7	24.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	106	62.5	29.4	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	122	54	34	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)

Remarks: The values observed for the pollutants given above are within the CPCB standards.

TABLE 3.26: SUMMARY OF AAQ

PM2.5	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	31.0	27.8	27.3	27.5	27.8	28.8	27.4	27.1
Minimum	21.6	20.8	20.0	20.4	21.4	21.5	20.1	20.2
Maximum	39.4	35.6	39.4	39.2	38.2	38.8	39.3	38.5
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	61.7	58.4	57.1	58.2	57.9	57.7	57.5	55.7
Minimum	51.2	51.5	50.8	51.8	50.0	50.2	50.2	50.2
Maximum	69.7	69.5	69.2	69.6	69.4	68.8	69.8	68.9
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

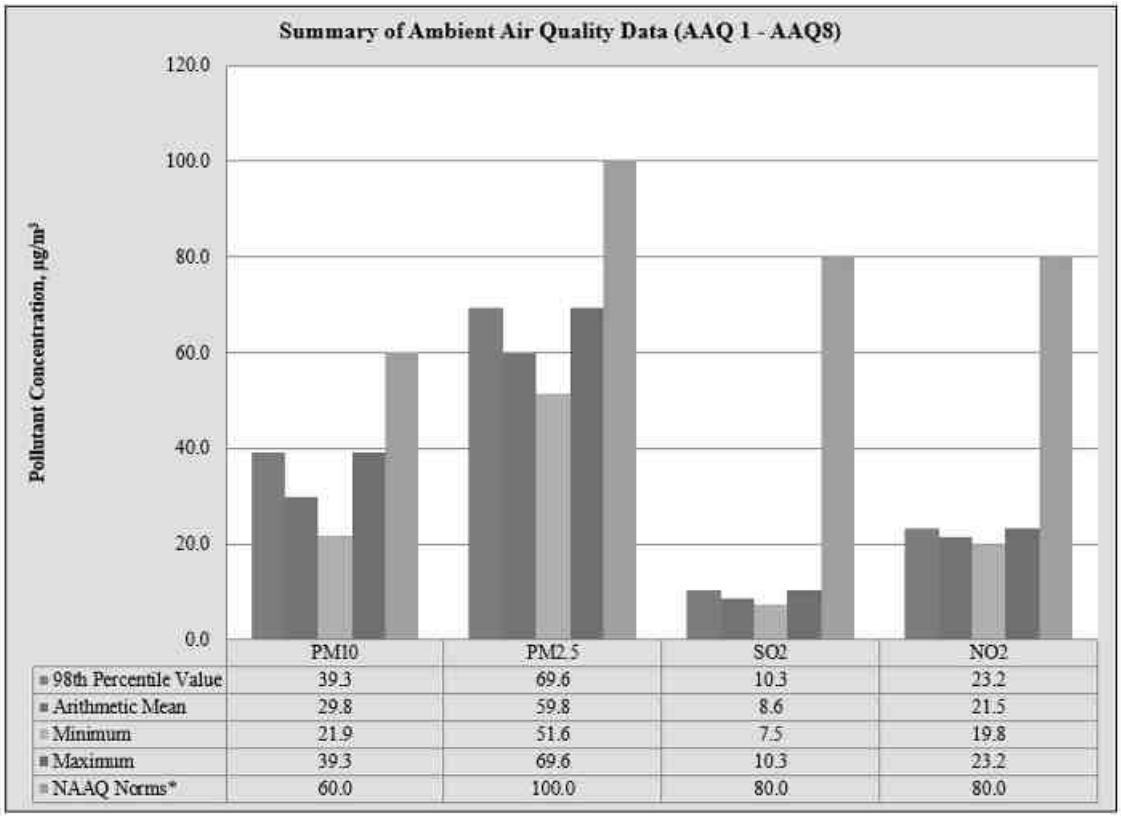
SO_2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	8.5	8.4	8.4	8.1	8.3	8.1	8.3	8.3
Minimum	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Maximum	10.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

NO_2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	22.0	21.0	21.1	21.1	21.2	21.2	21.0	21.1
Minimum	20.7	19.8	19.8	19.8	19.8	19.8	19.8	19.8
Maximum	23.2	22.3	22.3	22.3	22.3	22.3	22.3	22.3
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

TABLE 3.27: ABSTRACT OF AMBIENT AIR QUALITY DATA

1	**Parameter**	**PM2.5**	**PM10**	**SO_2**	**NO_2**
2	No. of Observations	260	260	260	260
3	10^{th} Percentile Value	21.9	51.6	7.5	19.8
4	20^{th} Percentile Value	22.8	52.6	7.5	20.7
5	30^{th} Percentile Value	24.5	54.1	7.5	20.7
6	40^{th} Percentile Value	25.3	55.4	8.4	20.7
7	50^{th} Percentile Value	26.2	56.2	8.4	20.7
8	60^{th} Percentile Value	27.6	58.3	8.4	21.5
9	70^{th} Percentile Value	30.4	60.8	8.4	22.3
10	80^{th} Percentile Value	34.4	64.3	9.3	22.3
11	90^{th} Percentile Value	36.6	66.4	9.3	22.3
12	95^{th} Percentile Value	38.5	68.8	9.3	22.3
13	98^{th} Percentile Value	39.3	69.6	10.3	23.2
14	Arithmetic Mean	29.8	59.8	8.6	21.5
15	Geometric Mean	29.2	59.5	8.5	21.5
16	Standard Deviation	6.4	6.5	0.9	1.0
17	Minimum	21.9	51.6	7.5	19.8
18	Maximum	39.3	69.6	10.3	23.2
19	**NAAQ Norms***	**100.0**	**60.0**	**80.0**	**80.0**
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

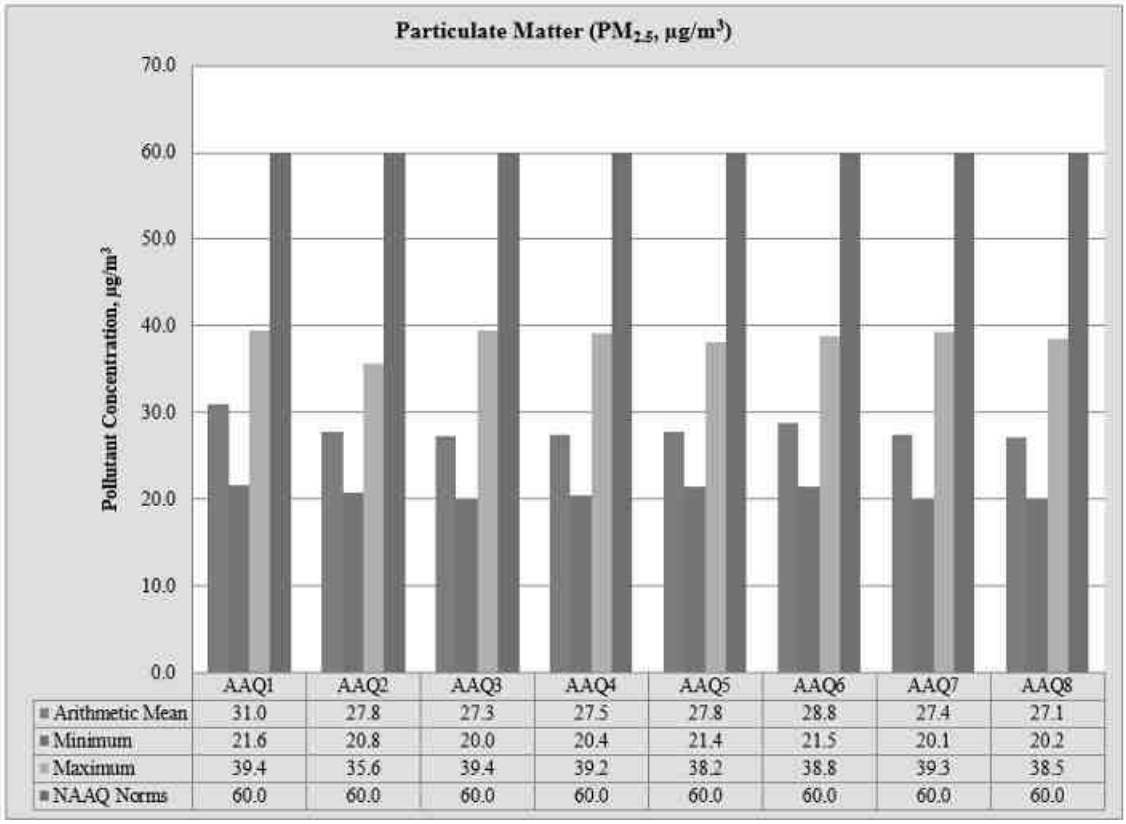
FIGURE 3.16: BAR DIAGRAM OF SUMMARY OF AAQ 1 – AAQ 8



	PM10	PM2.5	SO2	NO2
98th Percentile Value	39.3	69.6	10.3	23.2
Arithmetic Mean	29.8	59.8	8.6	21.5
Minimum	21.9	51.6	7.5	19.8
Maximum	39.3	69.6	10.3	23.2
NAAQ Norms*	60.0	100.0	80.0	80.0

Source: Table 3.17 to 3.27

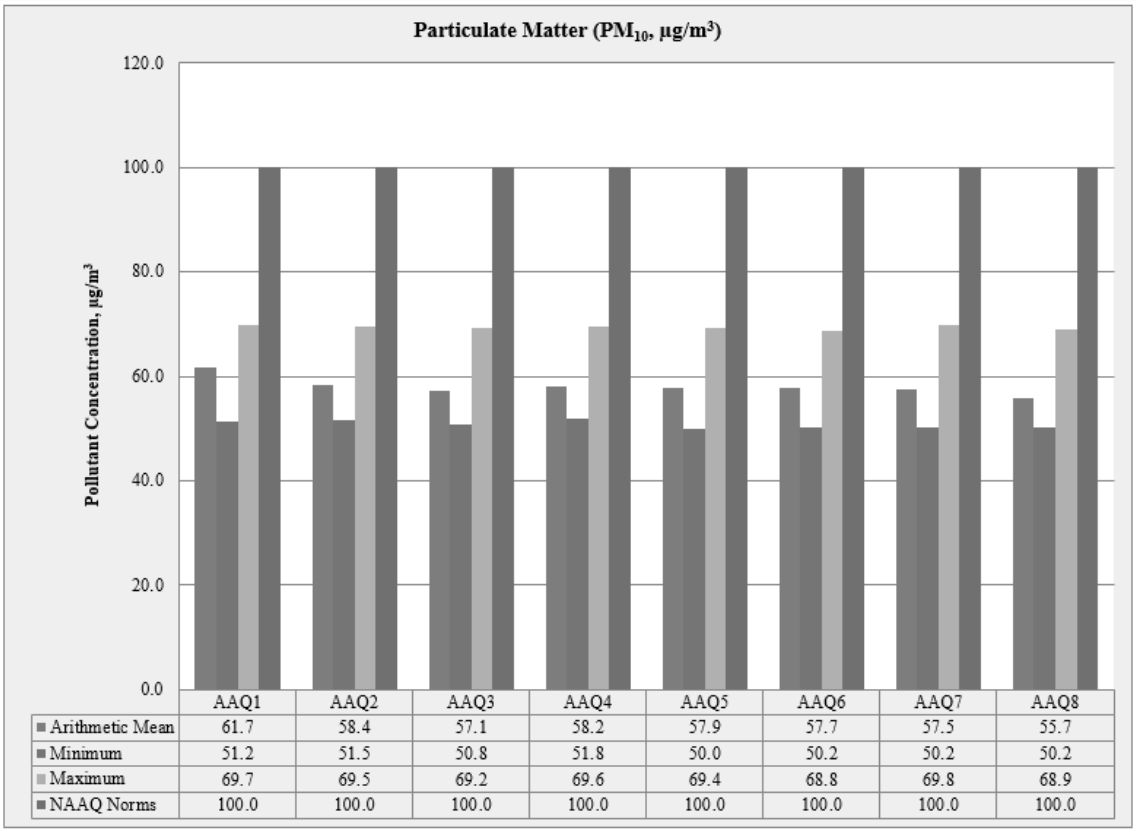
FIGURE 3.17: BAR DIAGRAM OF PARTICULATE MATTER PM2.5



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	31.0	27.8	27.3	27.5	27.8	28.8	27.4	27.1
Minimum	21.6	20.8	20.0	20.4	21.4	21.5	20.1	20.2
Maximum	39.4	35.6	39.4	39.2	38.2	38.8	39.3	38.5
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Source: Table 3.17 to 3.27

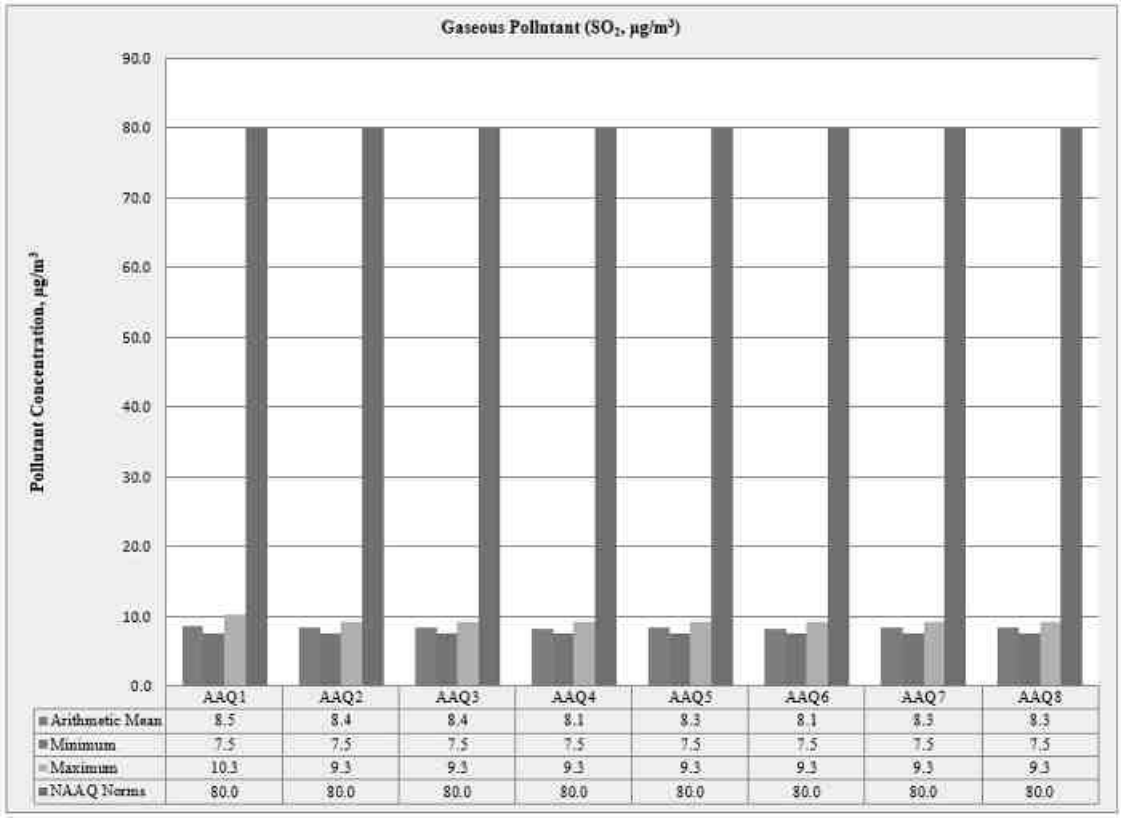
FIGURE 3.18: BAR DIAGRAM OF PARTICULATE MATTER PM_{10}



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	61.7	58.4	57.1	58.2	57.9	57.7	57.5	55.7
Minimum	51.2	51.5	50.8	51.8	50.0	50.2	50.2	50.2
Maximum	69.7	69.5	69.2	69.6	69.4	68.8	69.8	68.9
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Table 3.17 to 3.27

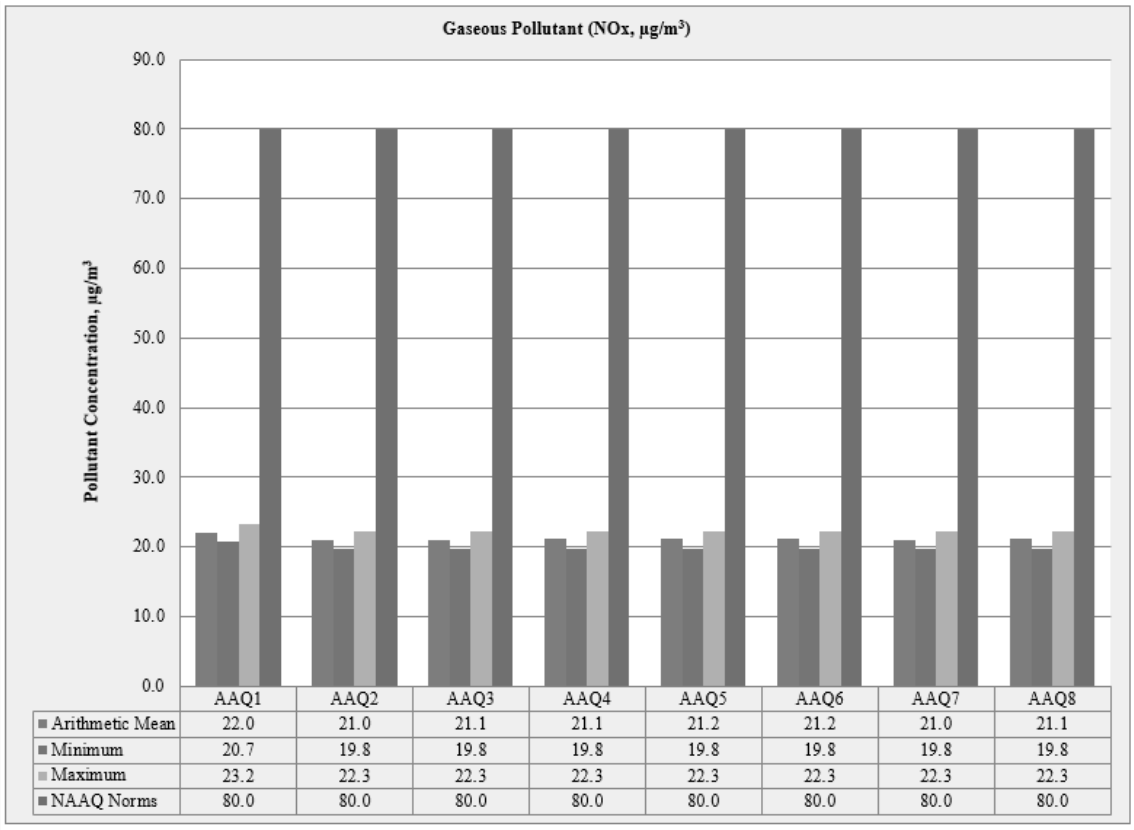
FIGURE 3.19: BAR DIAGRAM OF GASEOUS POLLUTANT SO_2



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	8.5	8.4	8.4	8.1	8.3	8.1	8.3	8.3
Minimum	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Maximum	10.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Source: Table 3.17 to 3.27

FIGURE 3.20: BAR DIAGRAM OF GASEOUS POLLUTANT NO_x



Source: Table 3.17 to 3.27

3.3.6 Interpretations & Conclusion

As per monitoring data, PM_{10} ranges from 50.0 µg/m^3 to 69.8 µg/m^3, $PM_{2.5}$ data ranges from 15.9 µg/m^3 to 24.7 µg/m^3, SO_2 ranges from 4.4 µg/m^3 to 10.5 µg/m^3 and NO_2 data ranges from 20.0 µg/m^3 to 39.4 µg/m^3. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

3.3.7 FUGITIVE DUST EMISSION –

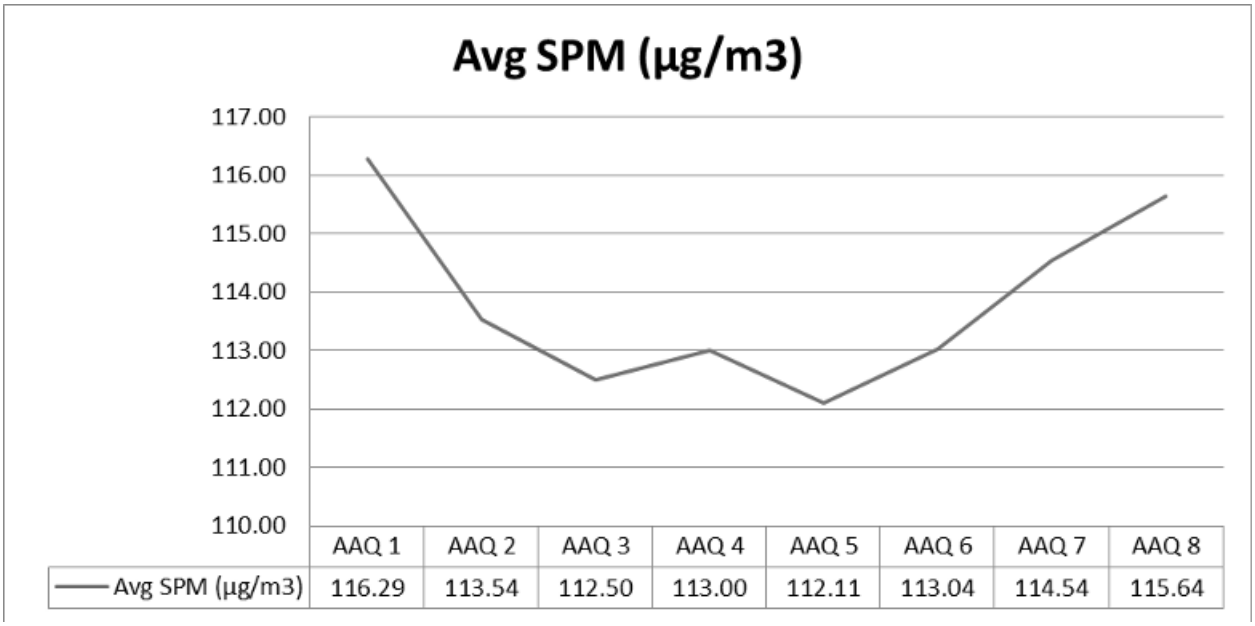
Fugitive dust was recorded at AAQ monitoring stations for 30 days average during the study period.

TABLE 3.28: AVERAGE FUGITIVE DUST SAMPLE VALUES

AAQ Locations	Avg SPM (µg/m^3)
AAQ 1	116.29
AAQ 2	113.54
AAQ 3	112.50
AAQ 4	113.00
AAQ 5	112.11
AAQ 6	113.04
AAQ7	114.54
AAQ 8	115.64

Source: Onsite monitoring/ sampling by Omega Laboratories

FIGURE 3.21: LINE DIAGRAM OF AVERAGE SPM VALUES



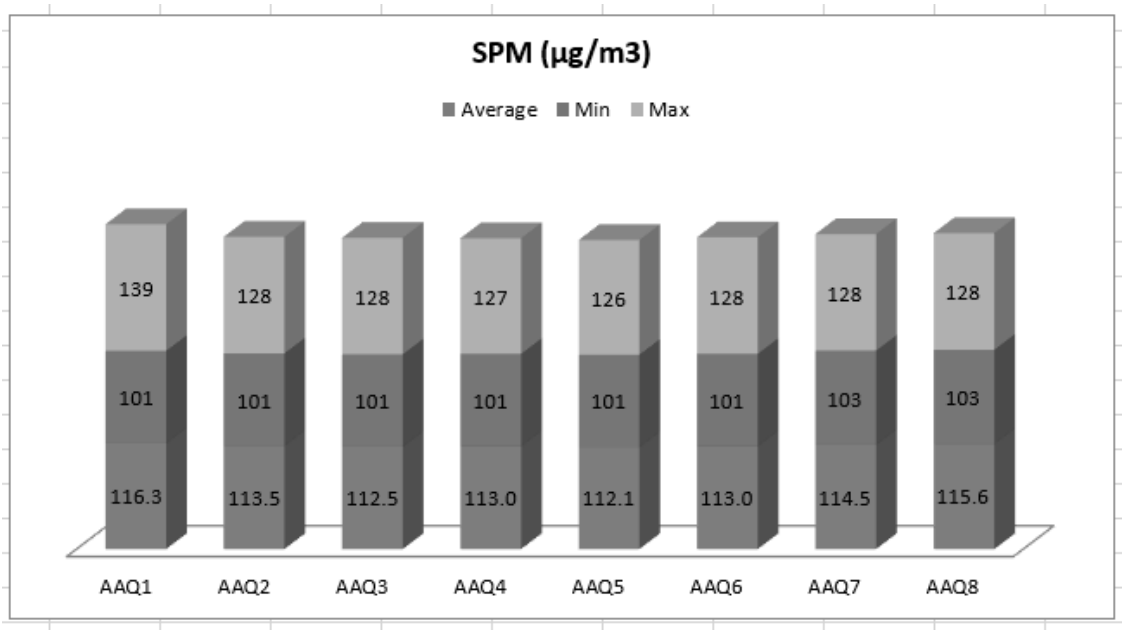
Source: Table 3.28

TABLE 3.29: FUGITIVE DUST SAMPLE VALUES IN µg/m^3

SPM (µg/m^3)	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Average	116.3	113.5	112.5	113.0	112.1	113.0	114.5	115.6
Min	101	101	101	101	101	101	103	103
Max	139	128	128	127	126	128	128	128

Source: Calculations from Lab Analysis Reports

FIGURE 3.22: BAR DIAGRAM OF SPM VALUES



Source: Table 3.29

3.4 NOISE ENVIRONMENT

The vehicular movement on road and mining activities is the major sources of noise in study area, the environmental assessment of noise from the mining activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

The main objective of noise monitoring in the study area is to establish the baseline noise level and assess the impact of the total noise expected to be generated during the project operations around the project site.

3.4.1 Identification of Sampling Locations

In order to assess the ambient noise levels within the study area, noise monitoring was carried out at Eight (8) locations. The noise level monitoring locations were carried out by covering commercial, residential, rural areas within the radius of 10km. A noise monitoring methodology was chosen such that it best suited the purpose and objectives of the study.

TABLE 3.30: DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Core Zone	Project Area	13° 9'21.80"N 79°28'30.67"E
2	N2	Core Zone	Near Existing Quarry	13° 9'27.26"N 79°28'32.18"E
3	N3	Kondapuram	1.2km SW	13° 8'45.46"N 79°28'3.56"E
4	N4	Beerakuppam	4.5km NE	13°10'26.36"N 79°30'46.61"E
5	N5	Vengapattu	4.6km SE	13° 7'29.88"N 79°30'10.21"E
6	N6	Krishnakuppam	2.7km NW	13° 9'56.47"N 79°27'2.88"E
7	N7	Cherukkanur	4.3km East	13° 9'20.10"N 79°30'52.81"E
8	N8	Adhivaragapuram	4.3km SW	13° 8'8.44"N 79°26'19.09"E

Source: On-site monitoring/sampling by Laboratories in association with GEMS

3.4.2 Method of Monitoring

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

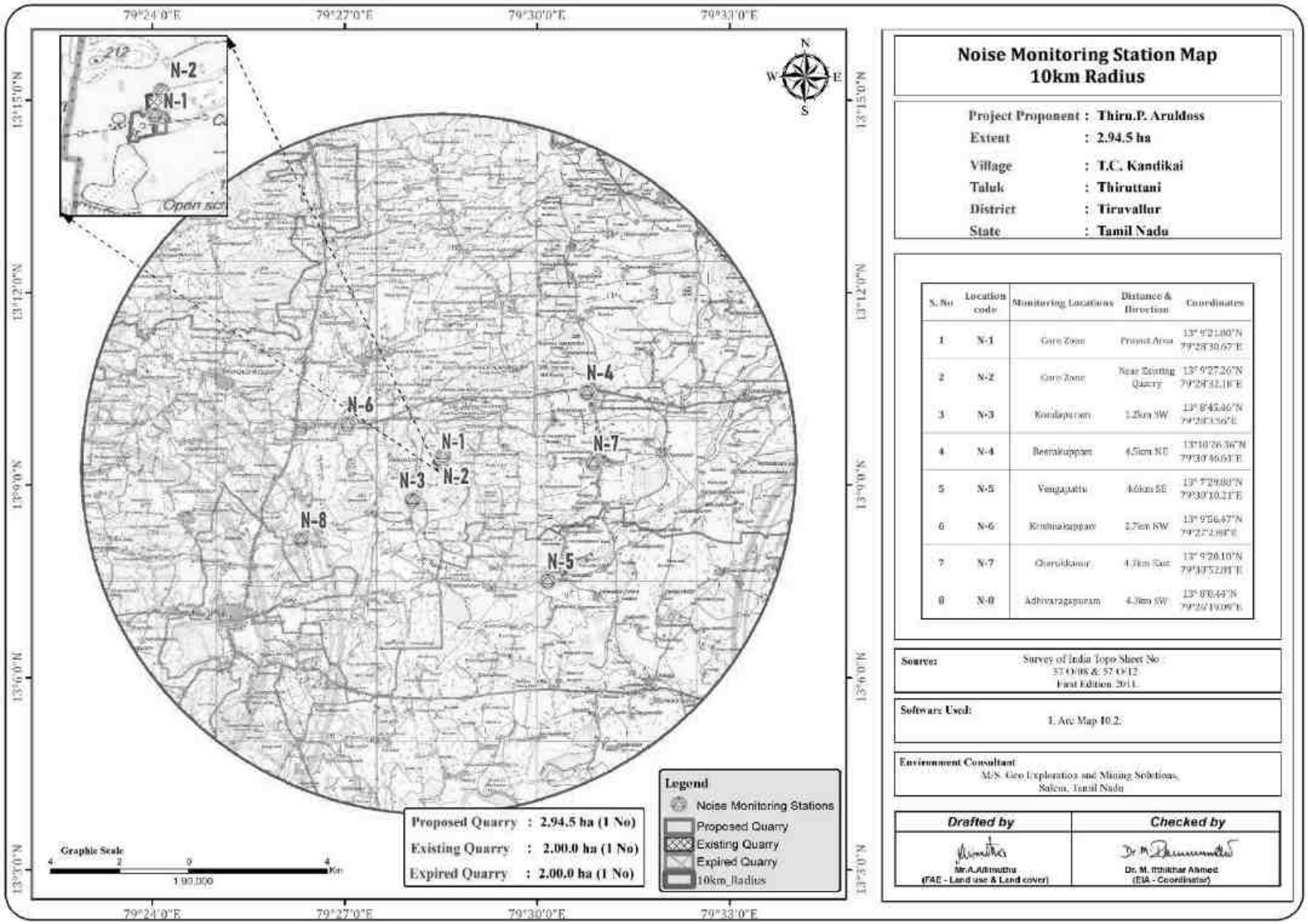
Measured noise levels, displayed as a function of time, is useful for describing the acoustical climate of the community. Noise levels recorded at each station with a time interval of about 60 minutes

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

Leq = 10 Log L / T∑ (10Ln/10)

Where L = Sound pressure level at function of time dB (A) T = Time interval of observation

FIGURE 3.23: NOISE MONITORING STATIONS AROUND 10 KM RADIUS



3.4.3 Analysis of Ambient Noise Level in the Study Area

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

The results are presented in below Table 3.31

Day time: 6:00 hours to 22.00 hours.

Night time: 22:00 hours to 6.00 hours.

TABLE 3.31: AMBIENT NOISE QUALITY RESULT

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Core Zone	62.8	53.0	**Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)**
2	Core Zone	50.8	41.3	
3	Kondapuram	51.0	40.9	**Residential Day Time– 55 dB (A) Night Time- 45 dB (A)**
4	Beerakuppam	51.3	41.4	
5	Vengapattu	52.3	40.9	
6	Krishnakuppam	51.0	42.2	
7	Cherukkanur	51.9	42.0	
8	Adhivaragapuram	51.8	42.2	

Source: On-site monitoring/sampling by Laboratories in association with GEMS

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

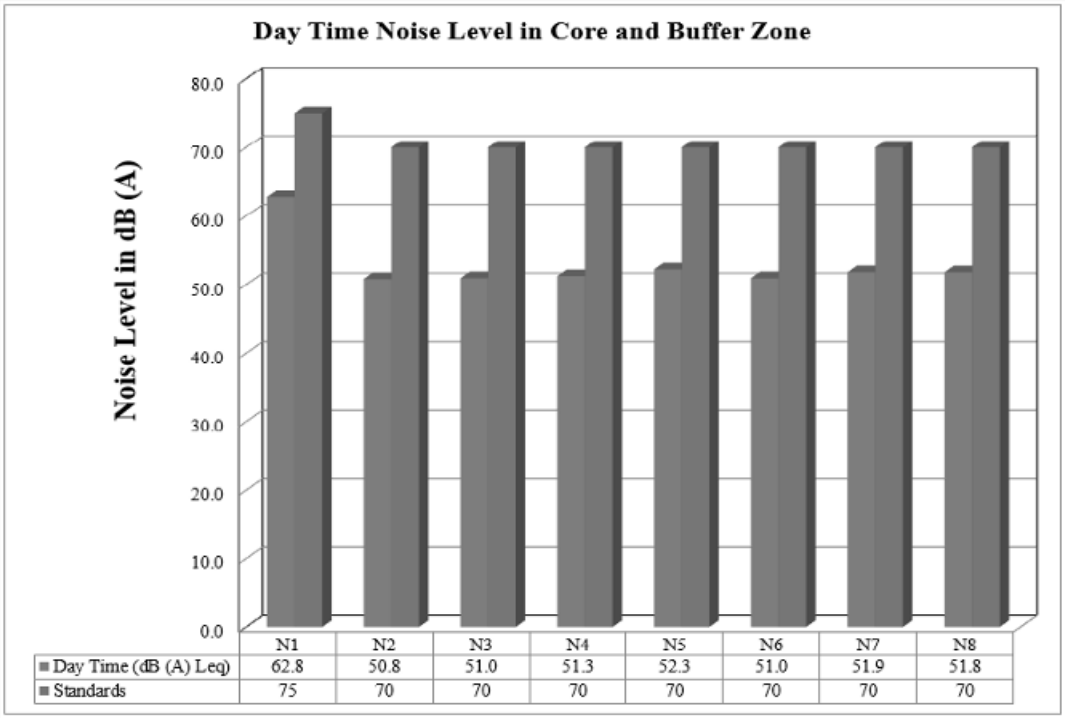
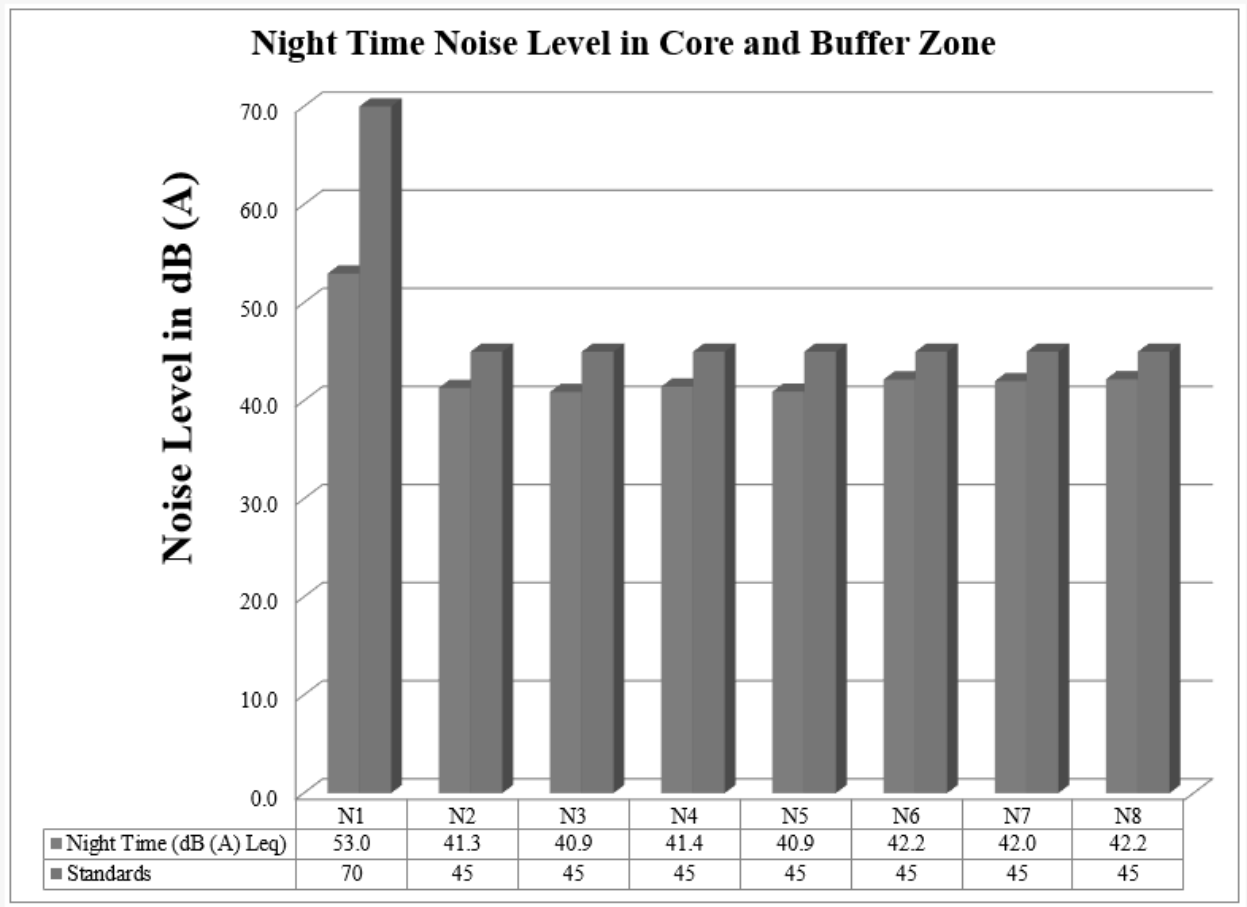


FIGURE 3.25: NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE



3.4.4 Interpretation & Conclusion:

Ambient noise levels were measured at 8 (Eight) locations around the proposed project area. Noise levels recorded in core zone during day time were from 50.0 to 62.8 dB (A) Leq and during night time were is 41.3-53.0 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 51.0 to 52.3 dB (A) Leq and during night time were from 40.9 to 38.8 dB (A) Leq.

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

3.5 ECOLOGICAL ENVIRONMENT

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

The core area extent of 2.94.5 Ha of Rough stone and Gravel quarry has an impact on diversity of flora and fauna of the surrounding area. But present work was carried out on detailed study of the impacts of Rough stone and Gravel quarry on the ecology and biodiversity of the core lease area with the proper mitigation and sustainable management plan. The proposed mine lease area is slightly elevated terrain. The following methods were applied during the baseline study of flora, fauna and diversity assessment.

3.5.1 Scope of Work

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

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

3.5.2 Objectives of Biological Studies

The present study was undertaken with the following objectives:

a) To study the likely impact of the proposed mining project on the local biodiversity and to suggest mitigation measures, if required, for vulnerable biota.
b) Undertake intensive field survey to assess the status of floral & faunal component in different habitats in the core and buffer areas of the project site.

c) Identification and listing of flora and fauna which are important as per the Wildlife (Protection) Act 1972.
d) Suggest Wildlife conservation (species specific/habitat specific) and management plan for the threatened (critically endangered & endangered species - schedule I) faunal species if any reported within the study area.
e) To identify the impacts of mining on agricultural lands and how it affects.
f) Proper collection of information about wildlife Sanctuaries/ national parks/ biosphere reserves of the project area.
g) Devise management & conservation measures for biodiversity.

3.5.3 Methodology of Sampling

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

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

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

Direct observations and bird calls were used for bird documentation. Same transects were used for counting butterflies. Opportunistic observations were made for Amphibians, reptiles and ordinates. Presence of mammals was recorded by direct and indirect signs. All possible transects were taken for

birds and butterflies. Birds and butterflies were classified into species level. Recorded bird species were identified to species level using standard books (Ali & Ripley 1987, Grimmett et al., 2016).

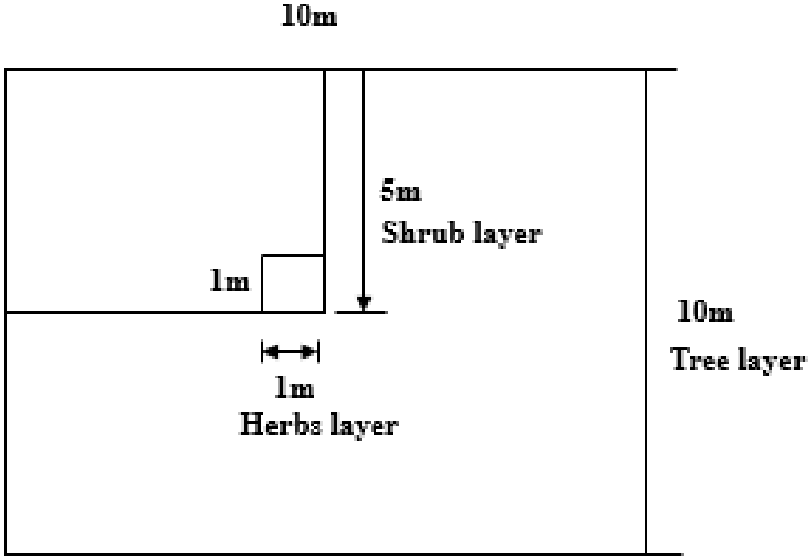
Site selection criteria: The core study area is located at Village: T.C. Kandigai, Taluk: Tiruthani, District: Thiruvallur, Tamil Nadu. The buffer study area comprises of 10 km radius from all the proposed rough stone and Gravel quarry area.

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

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

In order to provide representative ecological status for the study area, the 10-km buffer zone has been divided into four quartiles for biodiversity sampling, i.e., NE (Quartile-1), NW (Quartile-2) SW (Quartile-3) and SE (Quartile-4) is given in Fig. 3.20. Each of the quartiles have been examined for representative flora on randomly sampled quadrats for trees (25x25-m), shrubs (10x10-m) and herbs (2x2-m) depending upon prevailing geographical conditions and bio-diversity aspects of study area.

FIGURE 3.26: A SCHEMATIC DIAGRAM FOR QUADRAT SAMPLING PLOTS



Quadrats method

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

FLORA IN CORE ZONE

Taxonomically a total of 17 species belonging to 14 families have been recorded from the core mining lease area. It is very dry and exhibit plain topography. Based on habitat classification of the enumerated plants the majority of species were Herbs 5 (29%) followed by Trees 5 (29%), Shrubs 4 (24%) and Climbers 3 (18%). The result of core zone of flora studies shows that Fabaceae and Solanaceae are the main dominating species in the study area it mentioned in Table No.3.32 and the details of diversity of flora family's pattern are given in Fig No.3.21. No species found as threatened category (Table No. 3.32).

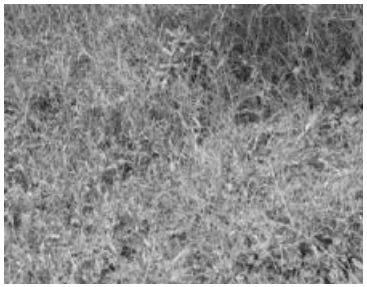
FLORA IN BUFFER ZONE

Similar type of environment also in buffer area but with more flora diversity compare than core zone area because of nearby agriculture land was found to dominate mostly in Northwest and Southeast directions. Majority of the flat landscape around project unit is occupied by agriculture fields. It contains a total of 98 species belonging to 46 families have been recorded from the buffer zone. The floral (98) varieties among them Forty-three Trees 43 (44%), eighteen Shrubs 18 (19%), seventeen Herbs 17 (17%), six Creeper 6 (6%), Climbers nine 9 (9%), four Grass 4 (4%) and one Cactus 1 (1%) were identified. Eleven numbers of Aquatic plants are given in table No. 3.3. The result of buffer zone of flora studies shows that Poaceae and Fabaceae, Euphorbiaceae are the main dominating species in the study area it mentioned in Table No.3.33

There is no Rare, Endangered and Threatened Flora species in mining area and their surrounding area. Details of flora with the scientific name were mentioned in Table No.3.33. The diversity of flora families is given in Fig No.3.22.

TABLE 3.32: FLORA IN CORE ZONE

SI.No	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Neem or Indian lilac	Vembu	*Azadirachta indica*	Meliaceae
2.	Velvet mesquite	Mullu maram	*Prosopis juliflora*	Fabaceae
3.	Jamaican cherry	Sakkarai pazham tree	*Muntingia calabura*	Muntingiaceae
4.	Millettia pinnata	Pongam oiltree	*Pongamia pinnata*	Fabaceae
5.	Madras thorn	Kodukkapuli	*Pithecellobium dulce*	Fabaceae
6.	Asian Palmyra palm	Panai maram	*Borassus flabellifer*	Arecaceae
Shrubs				
7.	Touch-me-not	Thottalchinungi	*Mimosa pudica*	Mimosaceae
8.	West Indian Lantana	Unni chedi	*Lantana camara*	Verbenaceae
9.	Avaram	Avarai	*Senna auriculata*	Fabaceae
10.	Milk Weed	Erukku	*Calotropis gigantea*	Apocynaceae
Herbs				
11.	Common leucas	Thumbai	*Leucas aspera*	Lamiaceae
12.	Coat buttons	Thatha poo	*Tridax procumbens*	Asteraceae
Climber				
13.	Stemmed vine	Perandai	*Cissus quadrangularis*	Vitaceae
14.	Wild Water Lemon	Poonai puduku chedi	*Passiflora foetida L*	Passifloraceae
Grasses				
15.	Indian doab	Arugampul	*Cynodon dactylon*	Poaceae
16.	Eragrostis	Pullu	*Eragrostis ferruginea*	Poaceae
17.	Great brome	Thodappam	*Bromus diandrus*	Poaceae


a. Cynodon dactylon


b. Prosopis juliflora


c. Azadirachta indica


d. Leucas aspera


e. Calotropis gigantea


f. Pithecellobium dulce


g. Bromus diandrus


h. Senna auriculata


i. Passiflora foetida L


j. Lantana camara


k. Tridax procumbens


l. Borassus flabellifer

TABLE 3.33: FLORA IN BUFFER ZONE

SI.No	English Name	Vernacular Name	Scientific Name	Family Name	Resource use type *(E,M,EM)
Trees					
1	Gum arabic tree	Karuvelam	*Vachellia nilotica*	Fabaceae	E
2	Neem or Indian lilac	Vembu	*Azadirachta indica*	Meliaceae	M
3	Mango	Manga	*Mangifera indica*	Anacardiaceae	E
4	Velvet mesquite	Mullu maram	*Prosopis juliflora*	Fabaceae	M
5	White Bark Acacia	Vella vela maram	*Vachellia leucophloea*	Fabaceae	E
6	Madras thorn	Kudukapuli	*Pithecellobium dulce*	Fabaceae	EM
7	Portia tree	Poovarasan	*Thespesia Populnea*	Malvaceae	E
8	Noni	Nuna maram	*Morinda citrifolia*	Rubiaceae	M
9	Lemon	Ezhumuchaipalam	*Citrus lemon*	Rutaceae	EM
10	Chinese chaste tree	Nochi	*Vitex negundo*	Verbenaceae	E
11	Asian Palmyra palm	Panai maram	*Borassus flabellifer*	Arecaceae	E
12	Curry tree Plant	Karuveppilai	*Murraya koenigii*	Rutaceae	M
13	Teak	Thekku	*Tectona grandis*	Verbenaceae	E
14	Coconut	Thennai maram	*Cocos nucifera*	Arecaceae	EM
15	Horsetail She-oak	Savukku maram	*Casuarina equisetifolia*	Casuarinaceae	E
16	Eucalyptus	Thailam maram	*Eucalyptus tereticornis*	Myrtaceae	M
17	Black plum	Navalmaram	*Sygygium cumini*	Myrtaceae	EM
18	Pongamia pinnata	Pongam	*Millettia pinnata*	Fabaceae	M
19	Agati	Agathi keerai	*Sesbania grandiflora*	Fabaceae	EM
20	Banyan tree	Alamaram	*Ficus benghalensis*	Moraceae	E
21	Guava	Koyya	*Psidium guajava*	Myrtaceae	EM
22	Siris tree	Vaagai	*Albizia lebbeck*	Fabaceae	M
23	Tamarind	Puliyamaram	*Tamarindus indica*	Legumes	EM
24	Drumstick tree	Murunga maram	*Moringa oleifera*	Moringaceae	EM
25	Henna	Marudaani	*Lawsonia inermis*	Lythraceae	EM
26	Papaya	Pappali maram	*Carica papaya L*	Caricaceae	EM
27	Indian fir tree	Nettilinkam	*Polylathia longifolia*	Annonaceae	E
28	Ashoka tree	Asoka maram	*Saraca asoca*	legume	E
29	Banana tree	Vazhaimaram	*Musa acuminata*	Musaceae	EM

30	Jack fruit	Palamaram	*Artocarpus heterophyllus*	Moraceae	E
31	Custard apple	Seethapazham	*Annona reticulata*	Annonaceae	E
32	Manilkara zapota	Sapota	*Manilkara zapota*	Sapotaceae	E
33	Malayan Cherry	Ten Pazham	*Muntingia calabura*	Muntingiaceae	M
Shrubs					
1	Common sunflower	Suriyakanthi	*Helianthus annuus*	Asteraceae	EM
2	Avaram	Avarai	*Senna auriculata*	Fabaceae	M
3	Castor bean	Amanakku	*Ricinus communis*	Euphorbiaceae	M
4	Shoe flower	Chemparuthi	*Hibiscu rosa-sinensis*	Malvaceae	EM
5	Milk Weed	Erukku	*Calotropis gigantea*	Apocynaceae	M
6	Puriging nut	Kattamanakku	*Jatropha curcas*	Euphorbiaceae	EM
7	Malabar catmint	Pei veratti	*Anisomeles malabarica*	Lamiaceae	M
8	Touch-me-not	Thottalchinungi	*Mimosa pudica*	Mimosaceae	M
9	Indian mallow	Thuthi	*Abutilon indicum*	Meliaceae	M
10	Night shade plan	Sundaika	*Solanum torvum*	Solanaceae	EM
11	Rosy Periwinkle	Nithyakalyani	*Cathranthus roseus*	Apocynaceae	M
12	Rosary pea	Kundumani	*Abrus precatorius*	Fabaceae	M
13	Indian Oleander	Arali	*Nerium indicum*	Apocynaceae	M
14	West Indian Lantana	Unni chedi	*Lantana camara*	Verbenaceae	E
Herbs					
1	Carrot grass	Parttiniyam	*Parthenium hysterophorus*	Asteraceae	NE
2	Aloe barbadensis	Katrazhai	Aloe vera	Asphodelaceae	
3	Indian Copperleaf	Kuppaimeni	*Acalypha indica*	Euphorbiaceae	M
4	Indian nettle	Nayuruvi	*Achyranthes aspera*	Amaranthaceae	M
5	Indian doab	Arugampul	*Cynodon dactylon*	Poaceae	E
6	Black gram	Ulunthu plant	*Vigna mungo*	Fabaceae	EM
7	Cleome viscosa	Nai kadugu	*Celome viscosa*	Capparidaceae	M
8	Common leucas	Thumbai	*Leucas aspera*	Lamiaceae	M
9	Poor land flatsedg	Kunnakora	*Cyperus compressus*	Cyperaceae	NE
10	Holy basil	Thulasi	*Ocimum tenuiflorum*	Lamiaceae	M
11	Peanut	Kadalai	*Arachis hypogaea*	Fabaceae	EM
12	Red Hogweed	Mukurattai	*Boerhavia diffusa*	Nyctaginaceae	M
13	Tridax daisy	Thatha poo	*Tridax procumbens*	Asteraceae	M
14	Gale of the wind	Keelaneeli	*Phyllanthus niruri*	Phyllanthaceae	EM
15	Eggplant	kathirikai	*Solanum melongena*	Solanaceae	M

16	European black nightshade	Manathakkali	*Solanumnigrum*	Solanaceae	EM
Climber					
1	Ivy gourd	Kovai	*Coccinia grandis*	Cucurbitaceae	M
2	Butterfly pea	Sangu poo	*Clitoria ternatea*	Fabaceae	M
3	Wild water lemon	Poonai puduku chedi	*Passiflora foetida*	Passifloraceae	M
4	Stemmed vine	Perandai	*Cissus quadrangularis*	Vitaceae	M
5	Bottle Guard	Sorakkai	*Lagenaria siceraria*	Cucurbitaceae	EM
Creeper					
1	Nut grass	Korai	*Cyperus rotandus*	Poaceae	M
2	Grona triflora	Siru puladi	*Desmodium triflorum*	Fabaceae	EM
Grass					
1	Sugar cane	Karumbu	*Saccharum officinarum*	Poaceae	EM
2	Pearl millet	Kambu	*Cenchrus americanus*	Poaceae	EM
3	Rice	Nellu	*Oryza sativa*	Poaceae	EM
4	Eragrostis	Pullu	*Eragrostis ferruginea*	Poaceae	E
5	Windmill grass	Chevvarakupul	*Chloris barbata*	Amaranthaceae	NE
Cactus					
1	Indian fig opuntia	Sapathikalli	*Opuntia ficus-indica*	Cactaceae	M

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

Abundance and Density

Both this term refers to the number of species in a community. Abundance of any individual species is expressed as a percentage of the total number of species present in community and therefore it is a relative measure. In sampling the abundance of species the individual of species are counted instead of just nothing their presence or absence was done while studying the frequency of a species.

Taken together abundance and frequency are of great importance in determining the community structure.

$$\textbf{Abundance} = \frac{\text{Total no.of individual of the species}}{\text{No of quadrate per units in which they occur}} \times 100$$

$$\textbf{Density} = \frac{\text{Total no.of individual of the species}}{\text{No.of quadrat per units studied}} \times 100$$

$$\textbf{Relative abundance} = \frac{\text{Total no.of species}}{\text{Total no.of individual of all species recorded}} \times 100$$

$$\textbf{Relative Density} = \frac{\text{Density of a given species}}{\text{Total densities of all the species}} \times 100$$

$$\textbf{\% Frequency} = \frac{\text{Density of a given species}}{\text{Total densities of all the species}} \times 100$$

Raunkiaer (1934) made an elaborative study on the frequency of species and based on his data, he divided species into 5 Classes viz, A, B, C, D, E. Compare the observed frequency with the Raunkiaer's Law of frequency and depict it in form of histogram (Fig No: 3.2).

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 3.34.

TABLE 3.34: AQUATIC VEGETATION

Sl. No	Scientific name	Common Name	Vernacular Name (Tamil)	IUCN Red List of Threatened Species
1	*Nymphaea nauchali*	Blue lotus	Alli	LC
2	*Cyperus exaltatus*	Tall Flat Sedge	Koraikizhangu	LC
3	*Aponogetonnatans*	Floating laceplant	Kottikizhnagu	NA
4	*Colocassia esculenta*	Taro	Seppakizhangu	LC
5	*Carex cruciata*	Cross Grass	Koraipullu	NA
6	*Cynodon dactylon*	Scutch grass	Arugampul	LC
7	*Eichornia crassipe*	Water hyacinth	Agayatamarai	NA
8	*Nymphaea nouchali*	Blue waterlily	Nellambal	LC

*LC- Least Concern, NA-Not yet assessed

FAUNA

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

FAUNA METHODOLOGY

The study of fauna takes substantial amount of time to understand the specific faunal characteristics of the area. The assessment of fauna has been done on the bases of primary data collected from the lease sites. The presence was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area. In addition, officials, local peoples were another source of information for studying the fauna of the area. Field activities are physical/active search, covering rocks, burrows, hollow inspection and location of nesting sites and habitat assessment etc. Taxonomical identification was done by the field guide book and wildlife envis data base (wiienvis.nic.in/Database/Schedule Species Database) and Zoological Survey of India (ZSI). Detailed faunas are mentioned in the Table No. 3.35 and 3.36.

Survey and Monitoring of Mammals

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

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

Survey and Monitoring of Birds

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

Survey and Monitoring of reptiles

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

FAUNA IN CORE ZONE

A total of 18 varieties of species were observed in the Core zone of T.C. Kandikai Village, Rough stone quarry (Table No.3.4) among them numbers of Insects 6, Reptiles 3, Mammals 2, and Avian 7. A total of 18 species belonging to 16 families have been recorded from the core mining lease area. None of these species are threatened or endemic in the study area and surroundings. There is no Schedule I species and seven species are under schedule IV according to the Indian wildlife Act 1972. A total of 7 species of bird were sighted in the mining lease area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

Fauna Composition in the Buffer Zone

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

There are no Sanctuaries, National Parks, Tiger Reserve or Biosphere Reserve or Elephant Corridor or other protected areas within 10 km radius from core area. It is evident from the available records, reports, and circumstantial evidence that the entire study area including the core and buffer areas were free from any endangered animals. There were no resident birds other than common bird species such as, green bee eaters, Rose-ringed parkeet, Common Mynas, Black drangos, Crows, Grey Francolin.

The list of bird species recorded during field survey and literature from the study area are given in Table 3.8. The list of reptilian species recorded during field survey and literature from the study area are given in Table 3.9. The list of insect's species recorded during field survey and literature from the study area are given in Table 3.10. The list of Amphibian species recorded during field survey and literature from the study area are given in Table 3.11. It is apparent from the list that none of the species either spotted or reported is included in Schedule I of the Wildlife Protection Act. Similarly, none of them comes under the REET category.

Taxonomically a total of 37 species belonging to 28 families have been recorded from the buffer zone area. Based on habitat classification the majority of species were Insect 9, followed by birds 13, Reptiles 8, Mammals 5, and amphibians 2. There are six Schedule II species, and twenty-two species are under schedule IV according to the Indian wildlife Act 1972. A total of 13 species of bird were sighted in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed. There are no impacts on nearby fauna species.

Dominant species are mostly birds and insects, and two amphibian was observed during the extensive field visit Sphaerotheca breviceps, Euphlyctis hexadactylus. The result of Buffer zone of fauna studies shows that Nymphalidae, Colubridae, and Scincidae are the main dominating species in the study area. There is no schedule I Species in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

TABLE 3.35: FAUNA IN CORE ZONE

SI. No	Common Name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
Insects					
1	Striped tiger	Nymphalidae	*Danaus plexippus*	Schedule IV	LC
2	Colotis danae	Pieridae	*Colotis danae*	NL	LC
3	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
4	Common Tiger	Nymphalidae	*Danaus genutia*	NL	NL
5	Termite	Blattodea	*Hamitermes silvestri*	NE	LC
6	Tawny coster	Nymphalidae	*Danaus chrysippus*	Schedule IV	LC
Reptiles					
1	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
2	Common skink	Scincidae	*Mabuya carinatus*	NL	LC
3	Green vine snake	Colubridae	*Ahaetulla nasuta*	Schedule IV	NL
Mammals					
1	Indian Field Mouse	Muridae	*Mus booduga*	Schedule IV	NL
2	Asian Small Mongoose	Herpestidae	*Herpestes javanicus*	Schedule (Part II)	LC
Aves					
1	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
2	House crow	Corvidae	*Corvussplendens*	NL	LC
3	Koel	Cucalidae	*Eudynamys*	Schedule IV	LC
4	Rose-ringed parkeet	Psittaculidae	*Psittacula krameri*	NL	LC
5	Common quail	Phasianidae	*Coturnix coturnix*	Schedule IV	LC
6	Black drongo	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
7	Cattle egret	Ardeidae	*Bubulcus ibis*	NE	LC

*NL- Not listed, LC- Least Concern

(**Sources:** Species observation in the field study)

Table 3.36. List of Fauna & Their Conservation Status, Mammals: (*directly sighted animals & Secondary data)

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

Status assigned by the IUCN, where – CR – Critically Endangered; EN – Endangered; LC – Least Concern; NT – Near Threatened; VU – Vulnerable, DA – Data Deficient, NE – Not Evaluated

Table 3.37. Listed birds

SI. No	Common Name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
1	Koel	Cucalidae	*Eudynamys*	Schedule IV	LC
2	Cattle egret	Ardeidae	*Bubulcus ibis*	NL	LC
3	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
4	House crow	Corvidae	*Corvussplendens*	NL	LC
5	Asian green bee-eater	Meropidae	*Meropsorientalis*	NL	LC
6	Small blue Kingfisher	Alcedinidae	*Alcedo atthis*	Schedule IV	LC
7	Rose-ringed parkeet	Psittaculidae	*Psittacula krameri*	NL	LC
8	Common quail	Phasianidae	*Coturnix coturnix*	Schedule IV	LC
10	Black drongo	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
11	Woodpecker bird	Picidae	*Picidae*	Schedule IV	LC
12	Two-tailed Sparrow	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
13	Grey Francolin	Phasianidae	*Francolinus pondicerianus*	Schedule IV	LC

*Status assigned by the IUCN, where – CR – Critically Endangered; EN – Endangered; LC – Least Concern; NT – Near Threatened; VU – Vulnerable, DA – Data Deficient, NE – Not Evaluated

Table 3.38. List of Reptiles either spotted or reported from the study area. (*indicates direct observations & Secondary data)

SI. No	Common Name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
1	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
2	Indian wall lizard	Gekkonidae	*Hemidactylus flaviviridis*	Schedule IV	NL
3	Green vine snake	Colubridae	*Ahaetulla nasuta*	Schedule IV	NL
4	Rat snake	Colubridae	*Ptyas mucosa*	Sch II (Part II)	LC
5	Common krait	Elapid snakes	*Bungarus caeruleus*	Schedule IV	NL
6	Indian cobra	Elapid snakes	*Naja naja*	Sch II (Part II)	LC
7	Russell's viper	Viperidae	*Vipera russseli*	Sch II (Part II)	LC
8	Common skink	Scincidae	*Mabuya carinatus*	NL	LC

Table 3.39. List of insects either spotted or reported from the study area

SI. No	Common Name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
1	Indian honey bee	Apidae	*Apis cerana*	Schedule IV	LC
2	Striped tiger	Nymphalidae	*Danaus plexippus*	Schedule IV	LC
3	Termite	Blattodea	*Hamitermes silvestri*	NE	LC
4	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
5	Ant	Formicidae	*Camponotus Vicinus*	NL	NL
6	Common Tiger	Nymphalidae	*Danaus genutia*	Schedule IV	LC
7	Dragonfly	Gomphidae	*Ceratogomphus pictus*	Schedule IV	LC
8	Milkweed butterfly	Nymphalidae	*Danainae*	NL	LC
9	Common Indian crow	Nymphalidae	*Euploea core*	Schedule IV	LC

Table 3.40. List of Amphibians either spotted or reported from the study area

SI. No	Common Name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
1	Indian Burrowing frog	Dicroglossidae	*Sphaerotheca breviceps*	Schedule IV	LC
2	Green pond frog	Dicroglossidae	*Euphlyctis hexadactylus*	Schedule IV	LC

*Status assigned by the IUCN, where – CR – Critically Endangered; EN – Endangered; LC – Least Concern; NT – Near Threatened; VU – Vulnerable, DA – Data Deficient, NE – Not Evaluated.

Table No: 3.41. Important Plants in Reserve forests (Buffer zone) with resource utilizatio

S.No	Scientific Name	Family	Local name	Habit	Common use
1	*Ximenia americana* L.	Olacaceae	Chiru-illanthai	**S**	Venereal diseases, jaundice, diarrhea, febrifuge, astringent, sores and laxative.
2	*Cissus quadrangularis* L	Vitaceae	Perandai	**S**	Juice prescribed in scurvy. Powdered root considered specific for fractures.
3	*Abrus precatorius* Linn	Faboideae	Kundumani	**S**	Diuretic, tonic, emetic Seeds used in affections of nervous system; seed paste applied locally in sciatica, stiffness of shoulder joints and paralysis.
4	*Clitoria ternatea* L.	Papilionoide	Karkakartan	C	Roots cathartic and diuretic.
5	*Vicoa indica* (L.) DC	Asteraceae	Mookutipoondu	H	Antifertility activity, scorpion sting, throat disorders
6	*Lantana aculeata* L.	Verbinaceae	Unnichedi	SH	Vulnerary, diaphoretic, carminative antispasmodic, tumours, tetanus, rheumatism, malaria.
7	*Vitex negundo* L	Verbinaceae	Nalla nochi	SH	Tonic, febrifuge, diuretic, rheumatism, dyspepsia, anthelmintic, demulcent, dysentery, piles, tonic, vermifuge, catarrh, headache, rheumatic affections.
8	*Ocimum adscendens Willd*	Lamiaceae	Kattuthulasi	SH	Cold, cough and fever.
9	*Orthosiphon diffumes Benth.*	Lamiaceae	Elithulasi	S	The leaf juice is used in diabetes in folk-medicine

3.5.4 Interpretation& Conclusion

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

3.6 SOCIO ECONOMIC ENVIRONMENT

The major developmental activities in mining /Industrial sector are required for economic development as well as creation of employment opportunities (direct and indirect) and to meet the basic/modern needs of the society, which ultimately results in overall improvement of the quality of life through upliftment of social, economic, health, education and nutritional status in the project region, state as well as the country. In this manner all developmental projects have direct as well as indirect relationships with socioeconomic aspects, which also include public acceptability for new developmental projects. Thus, the study of socioeconomic component incorporating various facets related to prevailing social and cultural conditions and economic status of the Roughstone and Gravel quarry project region is an important part of 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 study the socio-economic status of the people living in the study area Roughstone and Gravel quarry project region

f) To assess the impact on socio-economic environment due to Roughstone and Gravel quarry project region

g) To analysis of impact of socio economic and Environmental Infrastructure facilities and road accessibility.

3.6.2 Scope of Work

- To study the Socio-economic Environment of area from the secondary sources
- Developing a questionnaire for Survey
- Data Collection and Analysis
- Identification of impacts due to the mining projects
- Mitigation Measures

3.6.3 Methodology

The methodology adopted for the socio-economic impact assessment is as follows:

a) The details of the activities and population structure have been obtained from Census 2001 and 2011 and analyzed.

b) Based on the above data, impacts due to plant operation on the community have been assessed and recommendations for further improvement have been made.

3.6.4 Sources of Information and Data Base

To achieve the above objectives, the information has been collected from both primary and secondary sources. Both primary data and secondary data have been analyzed by means of suitable statistical techniques for the purpose of verifying the above selected hypotheses concerned with the surrounding area.

3.6.5 Primary Survey

The primary data collection includes the collection of data through a structured interview schedule by direct observation method. The questionnaire survey includes both open and closed methods. The sample size is limited respondents, who were selected on the basis of simple random sampling from T.C.Kandigai Village, Tiruthani Taluk, Thiruvallur District, Tamilnadu, in the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and tertiary Zone (7 - 10 km).

The questionnaires were designed to suit the subjects considering their rural background enabling to furnish correct information and data as far as possible. Data were collected at village level and household level by questionnaires and focused group discussions.

The study area for the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and Outer Zone (7 - 10 km).

3.6.6 Collection of Data From Secondary Sources

Data from secondary sources were collected on following aspects:

- Demographic profile of the area
- Economic profile of the area

Table 3.6.1 Type of Information and Sources

Information	Source
Demography	District Census Handbook, Govt. of India
Economic profile of the area	Census of India, Tamil Nadu State

b) Data Presentation and Analysis

The data collected were presented in a suitable, concise form i.e., tabular or diagrammatic or graphic form for further analysis. These tabulated data were interpreted and analyzed with the help of various qualitative techniques and ideographic approaches.

3.7 Background Information of the Area

Tamil Nadu is the 11th largest states in India in terms of area. The state is the seventh most populous state in the country and its main language Tamil has origins that date back to 500 BC. Chennai is the capital of Tamil Nadu and lies on the eastern coast line of India. Tamil Nadu is famous for its wonderful temples and monuments that have been built 1000s of years ago and has places that have been marked as heritage sites by the United Nations. In a 180 degree paradigm shift, this state with a rich historical importance is also one of the fastest developing centre for technology and trade.

The State can be divided broadly into two natural divisions (a) the Coastal plains of South India and (b) the hilly western area. Parallel to the coast and gradually rising from it is the broad strip of plain country. It can further be subdivided into coromandal plains comprising the districts of Kancheepuram, Thiruvallur, Cuddalore and Vellore. The alluvial plains of the Cauvery Delta extending over Thanjavur and part of Tiruchirapally districts and dry southern plains in Madurai, Dindigul, Ramanathapuram, Sivaganga, Virudhnagar, Tirunelveli and Tuticorin districts. It extends a little beyond Western Ghats in Kanyakumari District. The Cauvery Delta presents some extremely distinctive physical and human features, its power being a main factor in the remarkable growth, the towns of Tamilnadu have witnessed.

3.8 Geography of the Area

Tamil Nadu is one of the 28 states of India, located in the southernmost part of the country. It extends from 8°4'N to 13°35'N latitudes and from 76°18'E to 80°20'E longitudes. Its extremities are

- in eastern - Point Calimere
- in western - hills of Anaimalai
- in northern - Pulicat lake
- in southern - Cape Comorin

It covers an area of 1,30,058 sq.km and is the 11th largest state in India. It covers 4% of the area of our country. Tamil Nadu is bounded by the Bay of Bengal in the east, Kerala in the west, Andhra Pradesh in the north, Tamil Nadu in the northwest and Indian Ocean in the south. Gulf of Mannar and Palk Strait separate Tamil Nadu from the Island of Sri Lanka, which lies to the southeast of India.

Already we have learnt that the state of Tamil Nadu had only 13 districts at the time of its formation. After that, the state was reorganised several times for the administrative convenience. At present there are 37 districts in Tamil Nadu, including the newly created districts such as Kallakurichi, Tenkasi, Chengalpet, Ranipet and Tirupathur.

3.9 Population Growth Rate

In 1991, there were only 21 districts in the State of Tamil Nadu. In 2001, eight new districts were created by reorganising the territorial jurisdiction. The nine districts are – Thiruvallur, Namakkal, Karur, Perambalur, Viluppuram, Thiruvarur, Nagapattinam, and Theni. The population and its growth trend are important economic factors in a developing economy.

Year	Tamil Nadu	India
1941	11.91	14.22
1951	14.66	13.31
1961	11.85	21.51
1971	22.30	24.80
1981	17.50	24.66
1991	15.39	23.86
2001	11.19	21.34
2011	15.61	5.96
2021	5.96	1.0

3.10 Thiruvallur District

The district of Thiruvallur has been carved out by bifurcating erstwhile Chengalpattu District (which was renamed as Chengalpattu-MGR/Kancheepuram at the time of 1991 Census). According to the said bifurcation Thiruvallur revenue division which included Thiruvallur, Thiruttani taluks and Uthukkottai and Pallipattu sub-taluks separated from Chengalpattu District along with Ponneri and Gummindipoondi taluks of Saidapet revenue division and formed this new District.

Thiruvallur is a town located on the Chennai-Tirupathi highway, approximately forty-four kilometers from Chennai. The railway station falls mid-way between the Chennai-Arakkonam railway line. A small town, and now the district headquarters of the recently made Thiruvallur district is developing very fast. It is one of thirty-two districts in Tamil Nadu.

At present this District is comprised of 8 taluks namely Gummindipoondi, Ponneri, Uthukkottai, Thiruvallur, Poonamallee, Thiruttani, Pallipattu and Avadi and three Revenue Divisions namely Ponneri, Thiruvallur and Thiruttani.

3.11 Study Area

Detailed socio-economic survey was conducted in the study area (Core and buffer zone) within 10 km radius of the area at T.C.Kandigai village, Tiruthani taluk, Thiruvallur District, Tamil Nadu state. In order to determine the impact of the proposed project on nature and inhabitant. To get an overview of the villagers and their perspectives about this proposed activity, different demographic parameters and social aspects such population density, sex ratio, literacy rate, worker ratio etc. has been identified, analyzed, studied together. These impacts may be beneficial or disadvantageous. If disadvantageous anticipated suggestions measures are advocated in order to have collective development.

3.12 Demographic pattern of 10km study area characteristics a comparative analysis

Table 3.12.1shows the socio-economic profile of the study area as compared to district, state and national level socio-economic profile

Particular	India	Tamil Nadu	Thiruvallur District	Study Area (10km Radius)
Area (in sq. km.)	3,287,263	130058	3394	321
Population Density/ sq. Km.	368	554	1098	358
No. of Households	249454252	13357027	946949	27255
Population	1210569573	72147030	3728104	115149
Male	623121843	36137975	1876062	57924
Female	587447730	36009055	1852042	57225
Scheduled Tribes	104281034	794697	47243	1533
Scheduled Castes	201378086	14438445	821646	26833
Literacy Rate	**72.99%**	**80%**	**84%**	**76.68%**
Sex Ratio (Females per 1000 Males)	**943**	**996**	**987**	**988**

Source: Census of India, 2011

Table no 3.12.1 show demographic pattern of India, Tamil Nadu, Thiruvallur District & Study area (10km Radius). In India had total area of 3.2sqkm, State of Tamil Nadu area was 130058 sqkm, District of Thiruvallur area was 3394 sqkm and study area is about 321 sqkm. Population density is total population per sqkm. So, India population density was 368sqkm, state of Tamil Nadu density was 554 sqkm, District

had density about 1098 sqkm and study area density is about 358 sqkm. as per Census 2011, about 5.96percent of population in the state lives in areas. Thiruvallur had comparing state wise 5.17 percent of population lives in the district. In study area has 3.09 % around 10km radius. State, District and study area. In Tamil Nadu state SC categories people had about 20.02 %, District of Thiruvallur about 22 % it has increasing to Study area about 23.30% increasing in the total population Similarly ST population is about 1.10%, 1.26% and 1.33% of the total population in the study area. State level Literacy rate is 80%, district level is 84% but study area has almost decreased about 77%. There is literacy rate is study area decrease comparing district level decrease in the study area. Sex ratio female per thousand males about state level is 996, District level is 987 and study area is 988.

The study area has population density 358 persons per sq.km of total population about 115149 as per census 2011. There were about 50.30 percent male and 49.70% female population. Study area has literate rate is about 77%. District had about 84% of literate rate as per census 2011.

3.13 Population Projection of the Study Area

A population projection is an estimation of the number of people expected to be alive at a future date that is made based on assumptions of population structure, fertility, mortality and migration. It is an essential to assess the need for new jobs, schools, doctors and nurses, planning urban housing, foods, clothing and requirements of energy and resources. It is also needed for policy discourse i.e., helps to the policy-makers to understand the existing problems and finally supports to develop the suitable solutions.

Table 3.13.1 Total Population of Study Area

Sl No.	Population in 2001	Population in 2011
1	98005	115149

Source: https://censusindia.gov.in/census.website/

Table 3.13.2 Population Projection of Study Area

S. No	Year	Projected Population (Approximately)
1.	2021	132293
2.	2031	149437
3.	2041	166581
4.	2051	183725

Source: Calculated by SPSS v29, 2022.

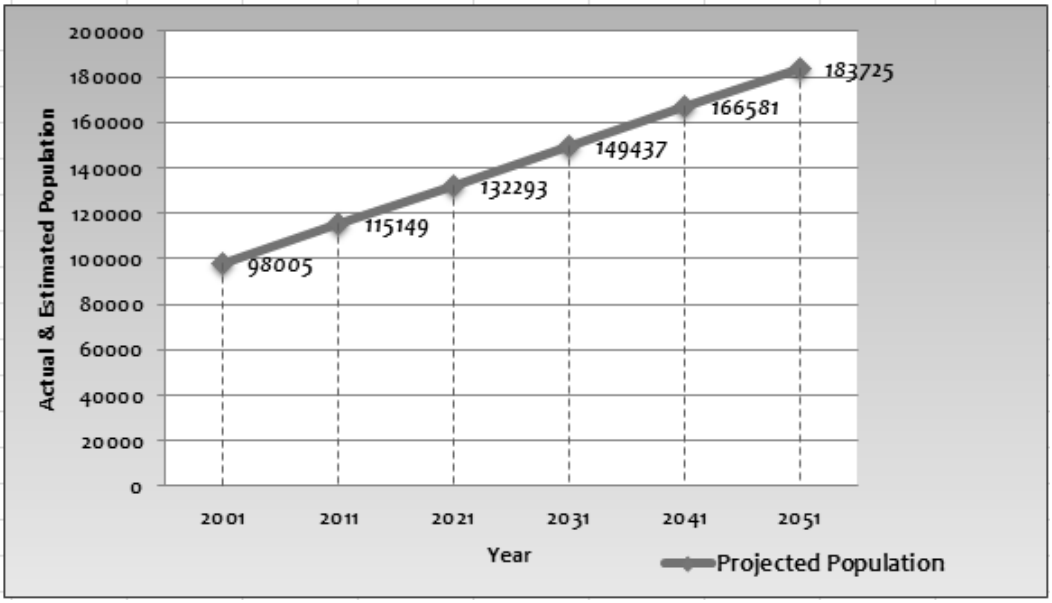


Fig 3.13.3 Graph Showing Population Projection

Following formula has been used for the projection of population.

$$Y=a+b_t$$

Where: Y= Dependent variable (Population)

a=Intercept

b=Slope

t=Interdependent variables (Time)

Above formula is applied to project population for the years (2021, 2031,2041,2051). Due to avoid the errors in manual calculation the statistical software SPSS (demo version 29) is used to calculate the intercept and the slope.

Due to the shortage of data on population the results show same value of growth for the years (2021,2031,2041,2051). If the researcher gets enough the data on population for earlier years the data projection will be accurate.

- Ref: Indian Economic survey, the SLR (Simple Linear Regression) techniques are used by statistical department, Government of India to project population.
- Source: https://www.ibm.com/in-en/analytics/spss-statistics-software

3.14 Population Growth of the Study Area

Table 3.14.1 Population Growth rate in Study area

Year	Actual Population	Growth Rate %
2001	98005	-
2011	115149	11.75
2021	132293	11.49
2031	149437	11.30
2041	166581	11.15
2051	183725	11.03

Source: Compiled by Author-2022

Above table no 3.14.1 is showing the growth rate of population since 2001, as per census in 2001 the population of study area was 98005 and 2011 it was 115149 if the population growth rate is 11.75%, it will approximately 132293 in year 2021 and 183725 in the year of 2051. It has approximately population growth rate decline will be 11.03%.

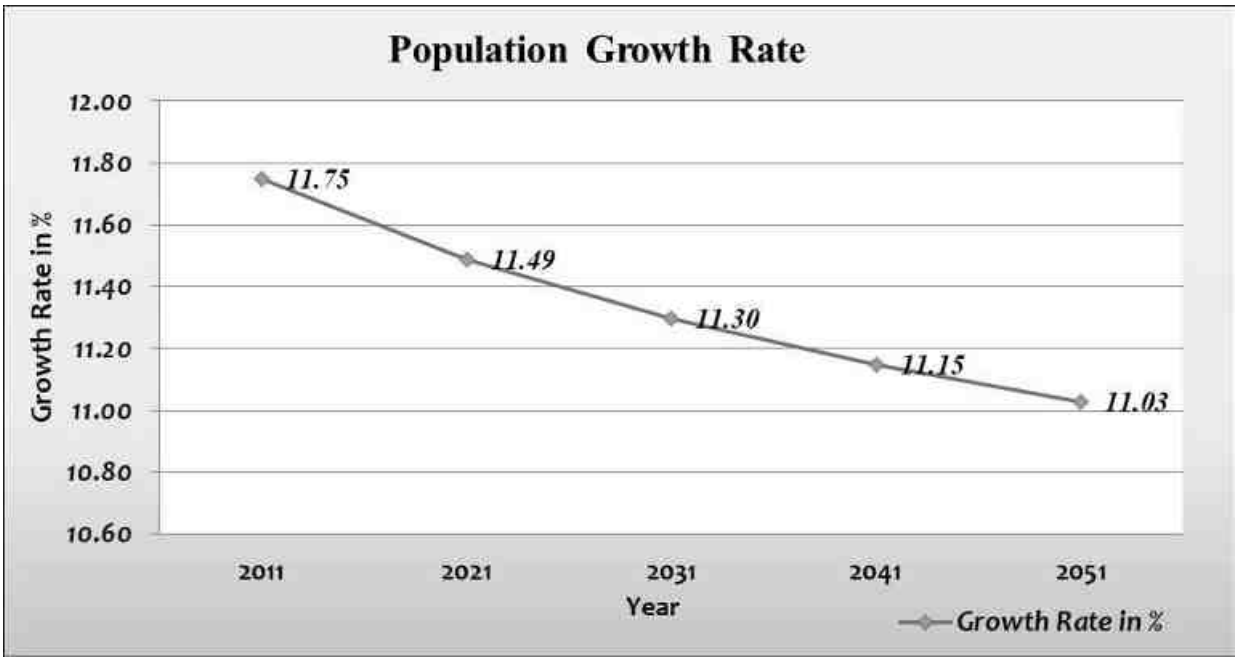


Fig.3.14.2Graph Showing Population Growth Rate

Planning Analysis:

Calculating Growth Rates

The percent change from one period to another is calculated from the formula:

Where:

$$PR = \frac{(V_{Present} - V_{Past})}{V_{Past}} x100$$

PR=PercentRate

$V_{Present}$ =PresentorFutureValue

V_{Past} = Past or Present Value

The *annual* percentage growth rate is simply the percent growth divided by N, the number of years.

Source: **https://pages.uoregon.edu/rgp/PPPM613/class8a.htm**

3.15 Population Distribution and Composition of Study Area

The population as per 2011 Census records is 27255 (for 10 km radius buffer zone). Total no. of household is 679, 9897 and 16679 respectively, in primary, secondary and tertiary zone. Sex ratio is 1059, 990 and 984 (females per 1000 males) observed in primary, secondary and tertiary zone respectively. SC population distribution is 786, 13253 and 12794 respectively in primary, secondary and tertiary zone. ST population distribution is 180, 691 and 662 respectively in primary, secondary and tertiary zone respectively. Average household size is 4. Zone wise Demographic profile of study area is given in the table 1.18.1 below:

Source: **https://censusindia.gov.in/census.website/data/census-tables**

Table 3.15.1 Zone wise Demographic Profile of Study Area

Zone	No. of Villages	Total Household	Total Population	Male Population	%	Female Population	%
Primary Zone (0 - 3 Km)	2	679	2646	1285	48.56	1361	51.44
Secondary Zone (3 - 7 Km)	15	9897	42121	21164	50.25	20957	49.75
Tertiary Zone (7 - 10 km)	11	16679	70382	35475	50.40	34907	49.60
Study Area (0-10 km)	**28**	**27255**	**115149**	**57924**	**50.30**	**57225**	**49.70**

Source: Census of India, 2011

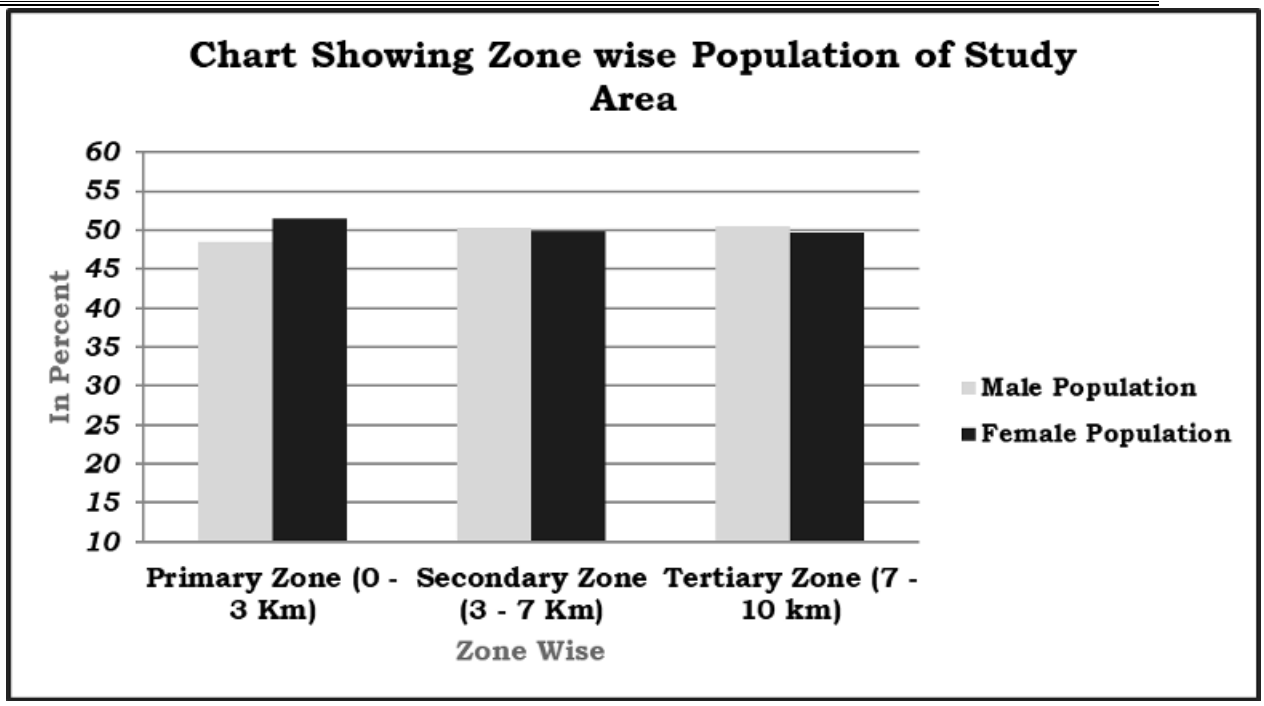


Figure 3.15.2 Population of study area

Table 3.15.3 Village wise Demographic Profile of the Study Area (Core and Buffer Zone)

0-3km

Sno	Name	No.of Households	Total population	Total Male	Total Female	Sex Ratio	Population below 6	Male below 6	Female below 6	Child Sex Ratio	SC population	SC Male	SC Female	ST population	ST Male	ST Female	Literate population	Male Literate	Female Literate	Total Lite.rate (%)	Male Lite rate (%)	Female Lite.rate (%)	Total workers	Total Workers Rate (%)	Main workers	MainWorkers Rate (%)	Marginal workers	Marginal Workers Rate (%)	Nonworkers	Non Workers Rate (%)
1	T.C.Kandigai	303	1146	539	607	1126	123	59	64	1085	228	115	113	48	21	27	678	371	307	66.28	77.29	56.54	536	46.77	249	21.73	287	25.04	610	53.23
2	V.K.N.Kandigai	376	1500	746	754	1011	133	64	69	1078	558	287	271	132	61	71	869	502	367	63.57	73.61	53.58	893	59.53	148	9.87	745	49.67	607	40.47
Total		**679**	**2646**	**1285**	**1361**	**1059**	**256**	**123**	**133**	**1081**	**786**	**402**	**384**	**180**	**82**	**98**	**1547**	**873**	**674**	**64.73**	**75.13**	**54.89**	**1429**	54.01	**397**	15.00	**1032**	39.00	**1217**	45.99

3-7km

Sno	Name	No.of Households	Total population	Total Male	Total Female	Sex Ratio	Population below 6	Male below 6	Female below 6	Child Sex Ratio	SC population	SC Male	SC Female	ST population	ST Male	ST Female	Literate population	Male Literate	Female Literate	Total Lite.rate (%)	Male Lite rate (%)	Female Lite.rate (%)	Total workers	Total Workers Rate (%)	Main workers	MainWorkers Rate (%)	Marginal workers	Marginal Workers Rate (%)	Nonworkers	Non Workers Rate (%)
1	Thadur	695	2725	1366	1359	995	280	140	140	1000	748	373	375	226	115	111	1688	964	724	69.04	78.63	59.39	1371	50.31	819	30.06	552	20.26	1354	49.69
2	Veerakaverirajapuram	468	1990	1029	961	934	248	128	120	938	341	177	164	147	76	71	1130	674	456	64.87	74.81	54.22	1164	58.49	1159	58.24	5	0.25	826	41.51
3	S.Agraharam	717	3056	1532	1524	995	347	180	167	928	1273	655	618	0	0	0	1879	1084	795	69.36	80.18	58.59	1576	51.57	409	13.38	1167	38.19	1480	48.43
4	Gowni Puram Chinnasubbaraju Kandigai	797	3580	1828	1752	958	392	213	179	840	949	480	469	10	6	4	2263	1320	943	70.98	81.73	59.95	2057	57.46	984	27.49	1073	29.97	1523	42.54
5	Somasamudram	948	4190	2109	2081	987	501	253	248	980	2070	1026	1044	0	0	0	2855	1619	1236	77.39	87.23	67.43	1750	41.77	1394	33.27	356	8.50	2440	58.23
6	Kalpattu	173	702	339	363	1071	76	42	34	810	0	0	0	0	0	0	475	256	219	75.88	86.20	66.57	349	49.72	262	37.32	87	12.39	353	50.28
7	Vengapattu	963	4037	2045	1992	974	436	232	204	879	718	362	356	0	0	0	2464	1437	1027	68.43	79.26	57.44	2323	57.54	1725	42.73	598	14.81	1714	42.46
8	Paravathur	636	2687	1358	1329	979	290	147	143	973	1357	671	686	63	37	26	1796	1012	784	74.93	83.57	66.10	1417	52.74	921	34.28	496	18.46	1270	47.26
9	Akkachikuppam	380	1500	727	773	1063	157	72	85	1181	532	244	288	30	13	17	905	501	404	67.39	76.49	58.72	728	48.53	326	21.73	402	26.80	772	51.47
10	Krishnapuram	270	1112	557	555	996	129	65	64	985	400	202	198	78	36	42	680	385	295	69.18	78.25	60.08	639	57.46	634	57.01	5	0.45	473	42.54
11	Ayipedu	801	3558	1737	1821	1048	419	189	230	1217	1760	868	892	13	7	6	2212	1249	963	70.47	80.68	60.53	1724	48.45	1720	48.34	4	0.11	1834	51.55
12	Ariyur	172	753	385	368	956	79	46	33	717	295	146	149	0	0	0	501	279	222	74.33	82.30	66.27	336	44.62	91	12.08	245	32.54	417	55.38
13	Esayanur	774	3012	1473	1539	1045	319	176	143	813	624	305	319	3	2	1	2086	1134	952	77.46	87.43	68.19	1331	44.19	1161	38.55	170	5.64	1681	55.81
14	Pallipattu	595	2635	1330	1305	981	316	166	150	904	610	299	311	34	17	17	1576	916	660	67.96	78.69	57.14	1445	54.84	1260	47.82	185	7.02	1190	45.16
15	Vanganur (CT)	1508	6584	3349	3235	966	690	369	321	870	1576	786	790	87	48	39	4653	2644	2009	78.94	88.72	68.94	3073	46.67	2631	39.96	442	6.71	3511	53.33
Total		**9897**	**42121**	**21164**	**20957**	**990**	**4679**	**2418**	**2261**	935	**13253**	**6594**	**6659**	**691**	**357**	**334**	**####**	**####**	**11689**	**72.55**	**82.55**	**62.52**	**21283**	**50.53**	**15496**	**36.79**	**5787**	**13.74**	**20838**	**49.47**

7-10km																												
Sno	Name	No.of Households	Total population	Total Male	Total Female	Sex Ratio	Population below 6	Male below 6	Female below 6	Child Sex Ratio	SC population	SC Male	SC Female	ST population	ST Male	ST Female	Literate population	Male Literate	Female Literate	Total Lite.rate (%)	Male Lite rate (%)	Female Lite.rate (%)	Total workers	Total Workers Rate (%)	Main workers	MainWorkers Rate (%)	Marginal workers	Marginal Workers Rate (%)	Nonworkers	Non Workers Rate (%)
1	Cherukkanur	877	3658	1842	1816	986	403	199	204	1025	1729	881	848	142	76	66	2293	1315	978	70.45	80.04	60.67	2110	57.68	189	5.17	1921	52.52	1548	42.32
2	Nochili	732	3083	1552	1531	986	317	164	153	933	1544	783	761	61	33	28	2042	1156	886	73.83	83.29	64.30	1614	52.35	1228	39.83	386	12.52	1469	47.65
3	Keechalam	572	2573	1313	1260	960	257	141	116	823	1153	582	571	20	4	16	1711	966	745	73.88	82.42	65.12	1155	44.89	1034	40.19	121	4.70	1418	55.11
4	Ammavarikuppam (CT)	2450	10750	5499	5251	955	1226	632	594	940	799	399	400	0	0	0	7710	4444	3266	80.95	91.31	70.13	4799	44.64	4397	40.90	402	3.74	5951	55.36
5	Paranji	1227	5008	2513	2495	993	569	289	280	969	1542	769	773	186	101	85	3209	1843	1366	72.29	82.87	61.67	2488	49.68	1503	30.01	985	19.67	2520	50.32
6	Nandi Veduthangal	443	1746	895	851	951	202	103	99	961	669	348	321	62	29	33	1060	601	459	68.65	75.88	61.04	989	56.64	571	32.70	418	23.94	757	43.36
7	Vailambadi	394	1495	752	743	988	164	83	81	976	105	54	51	7	4	3	889	539	350	66.79	80.57	52.87	925	61.87	530	35.45	395		570	38.13
8	Gudalur	949	4033	2004	2029	1012	433	201	232	1154	646	323	323	0	0	0	2433	1430	1003	67.58	79.31	55.82	1867	46.29	1469	36.42	398	9.87	2166	53.71
9	Thalikkal	819	3476	1771	1705	963	405	210	195	929	916	455	461	4	1	3	2434	1385	1049	79.26	88.73	69.47	1773	51.01	249	7.16	1524	43.84	1703	48.99
10	Karikkal	857	3704	1918	1786	931	392	225	167	742	1584	820	764	41	20	21	2548	1452	1096	76.93	85.76	67.70	1489	40.20	1156	31.21	333	8.99	2215	59.80
11	Sholingur (TP)	7359	30856	15416	15440	1002	3297	1717	1580	920	2107	1025	1082	139	66	73	23594	12622	10972	85.61	92.14	79.16	11595	37.58	10464	33.91	1131	3.67	19261	62.42
Total		**16679**	**70382**	**35475**	**34907**	**984**	**7665**	**3964**	**3701**	**934**	**12794**	**6439**	**6355**	**662**	**334**	**328**	**####**	**####**	**22170**	**79.60**	**88.07**	**71.04**	**30804**	**43.77**	**22790**	**32.38**	**8014**	**11.39**	**39578**	**56.23**
Grand total		27255	115149	57924	57225	988	12600	6505	6095	937	26833	13435	13398	1533	773	760	####	####	34533	76.68	85.77	67.54	53516	46.48	38683	33.59	14833	12.88	61633	53.52

Source: Village Wise Demographic Profile of the Study Area, *Census of India, 2011*

- ✓ Above table identifies the presence of villages and their subsequent population divided under three zones from plant boundary (i.e., Primary, secondary and tertiary zone
- ✓ Primary zone has 2 villages where as much as 679 households with 2646 population are located. Mostly lying on Built-up land for their livelihood and substance.
- ✓ Secondary and tertiary zone both comprise of 15 and 11 villages having a total population of 42121 and 70382 respectively.

3.16 Gender and Sex Ratio

Sex ratio is used to describe the number of females per 1000 of males. Sex ratio is a valuable source for finding the population of women in India and what is the ratio of women to that of men in India. In the Population Census of 2011, it was revealed that the population ratio in India 2011 is 940 females per 1000 of males. The study area has 988 females per 1000 males. Gender and sex ratio determine the Human Development Index (HDI) of an area thereby understanding the status of women in that region. Census data suggests that the study area is composed of 50.30% of male and 49.70 % of female population. Following table entails information about sex ratio of 28 villages lying in study area (buffer zone) as primary, secondary and tertiary zone.

Table 3.16.1 Sex ratio of the study area

S. No.	Buffer Zone	Sex Ratio of Study area Female/ 1000 Male
1	Primary Zone (0-3 km)	**1059**
2	Secondary zone (3-7 km)	**990**
3	Tertiary Zone (7-10 km)	**984**

Source: Census of India, 2011

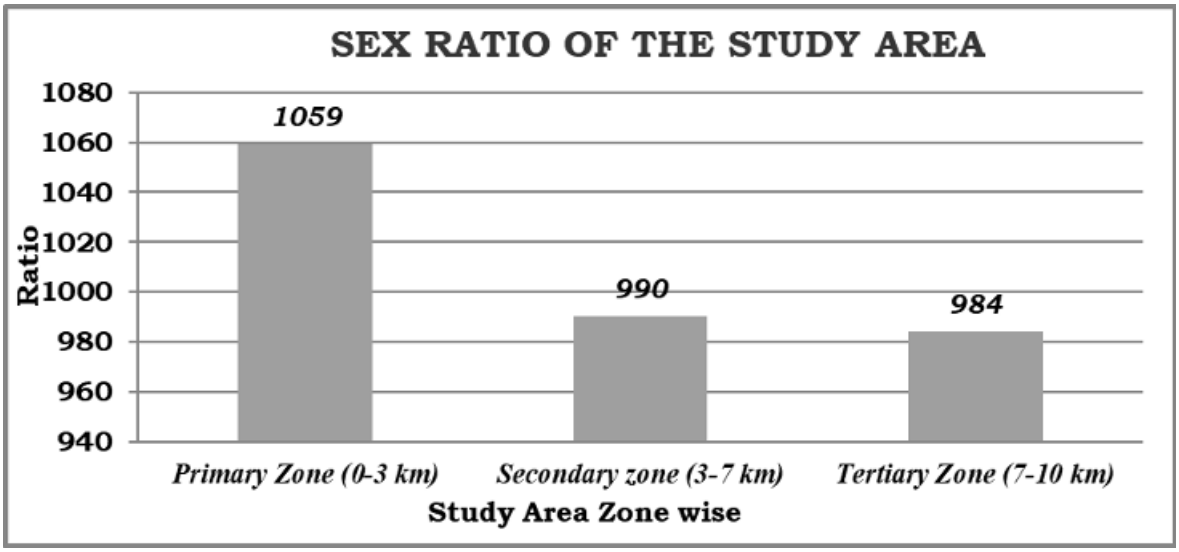


Figure 3.16.2 Sex Ratio within 10 Km study area

3.17 Literacy Rate in Study Area

Literacy Rate is the percentage of people in a country with the ability to read and write. The analysis of the literacy levels is done in the study area. The 10 km radius of study area demonstrates a literacy rate of 76.68% as per census data 2011. The male literacy rate in the study area indicates 85.77% whereas the female literacy rate, which is an important indicator for social change, is observed to be 67.54% as per the census data 2011. This needs to focus on the region and enhance further development focusing on education. (Table no 3.17.1).

Table 3.17.1 Literacy Rate of the Study Area

Zone	No. of Villages	Male Lite Population	Male literacy Rate	Female Literacy Population	Female literacy Rate	Total Literacy	Total Literacy Rate
Primary Zone (0 - 3 Km)	2	873	75.13	674	54.89	1547	64.73
Secondary Zone (3 - 7 Km)	15	15474	82.55	11689	62.52	27163	72.55
Tertiary Zone (7 - 10 Km)	11	27753	88.07	22170	71.04	49923	79.60
Study Area (0-10km)	**28**	**44100**	**85.77**	**34533**	**67.54**	**78633**	**76.68**

Source: Census of India, 2011

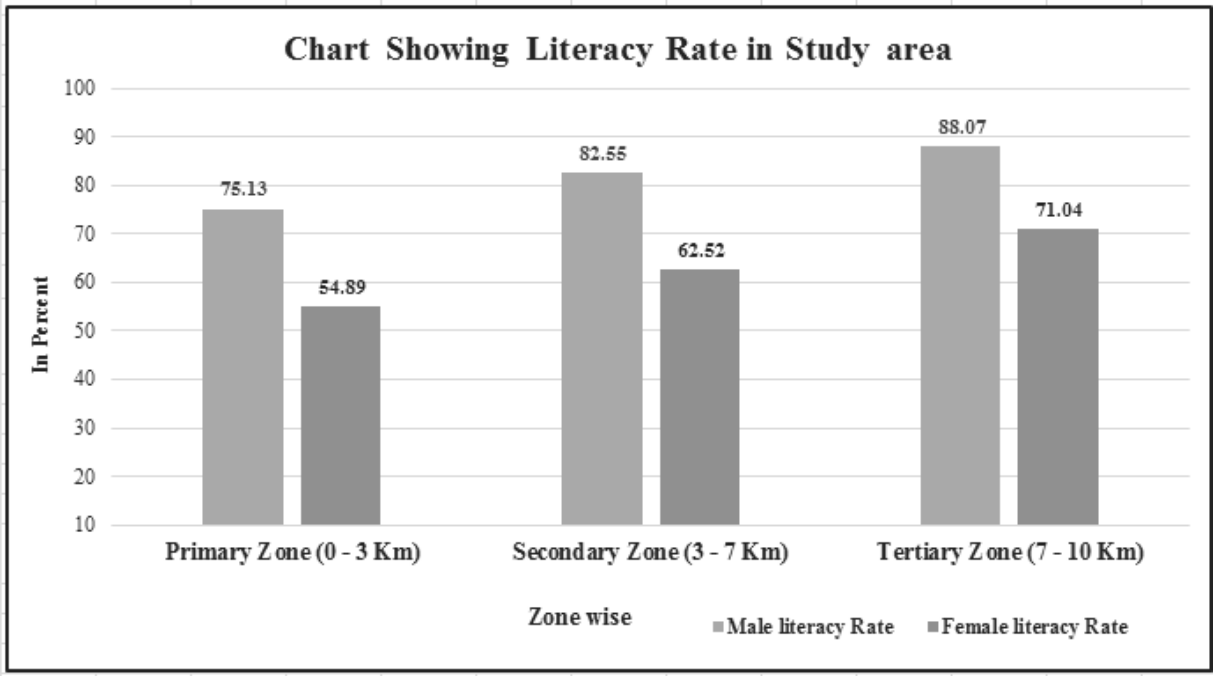


Figure 3.17.2 Gender wise Literacy Rate in the study area

3.18 Family Size

Size of family also describes about family functioning, resource consumption, total income generated and their expenditure pattern. Census 2011 data suggests that most of these households have a family size of up to 4 members, knowing the size of family also give fair understanding of relating how much resource consumption is being incurred, and annual income being generated and spent.

3.19 Vulnerable Group

While developing an action plan, it is very important to identify the population who fall under the marginalized and vulnerable groups and special attention has to be given towards these groups while making action plans. Special provisions should be made for them. In the observed villages schedule caste (SC) population is 23.30% and Schedule Tribe population 1.33%, Other Population is 75.37% in Total study area.

Table 3.19.1 vulnerable groups of the study area

Zone	No. of Villages	Vulnerable Groups					
		SC Population	%	ST Population	%	Other Population	%
Primary Zone (0 - 3 Km)	2	786	29.71	180	6.80	1680	63.49
Secondary Zone (3 - 7 Km)	15	13253	31.46	691	1.64	28177	66.90
Tertiary Zone (7 - 10 Km)	11	12794	18.18	662	0.94	56926	80.88
Total area (10km)	**28**	**26833**	**23.30**	**1533**	**1.33**	**86783**	**75.37**

Source: Census of India, 2011

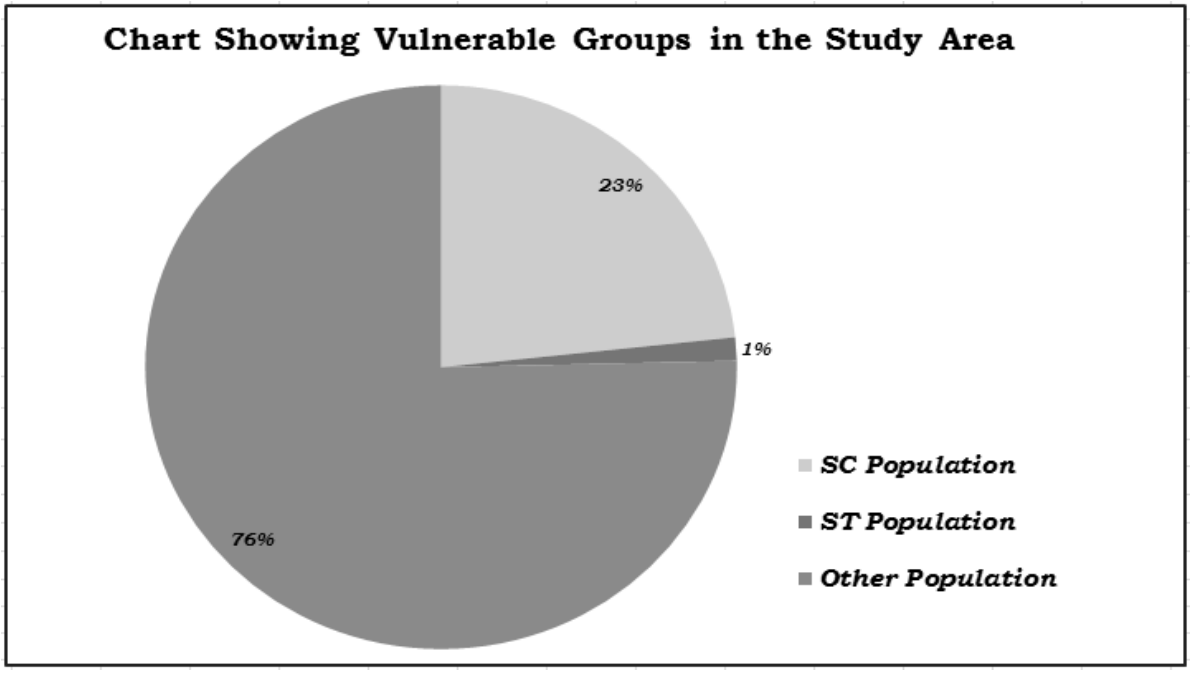


Figure 3.19.2 vulnerable groups

3.20 Economic Activities

The economy of an area is defined by the occupational pattern and income level of the people in the area. The occupational structure of residents in the study area is studied with reference to work category. The population is divided occupation wise into three categories, viz., Total workers, Main workers and non-workers. The main workers include cultivators, agricultural laborers, those engaged in household industry and other services. The non-workers include those engaged in unpaid household duties like, students, retired persons, dependents, beggars, vagrants etc. besides Institutional intimates or all other non-workers who do not fall under the above categories.

Table 3.20.1 shows the work force of the study area

Zone	No. of Villages	Total Workers	%	Main Workers	%	Marginal Workers	%	Non-Workers	%
Primary Zone (0 - 3 Km)	2	1429	54.01	397	15.00	1032	39.00	1217	45.99
Secondary Zone (3 - 7 Km)	15	21283	50.53	15496	36.79	5787	13.74	20838	49.47
Tertiary Zone (7 - 10 Km)	11	30804	43.77	22790	32.38	8014	11.39	39578	56.23
Study Area (10 Km)	**28**	**53516**	**46.48**	**38683**	**33.59**	**14833**	**12.88**	**61633**	**53.52**

Source: Census of India, 2011

The above table shows that out of the total working population, the percentage of main workers is 33.59 % while 12.88% are marginal workers. Number of working populations is 46.48% and non-working population is 53.52% in the study area. As per the data obtained from the survey (as mentioned previously in occupational structure) most of these people are employed for major period of the year. Also, to mention the natural environment also restricts the people in finding stable business is performed for only certain months. Thus, proposed project will act as possible exposure for them to get enroll and earn sustain livelihood.

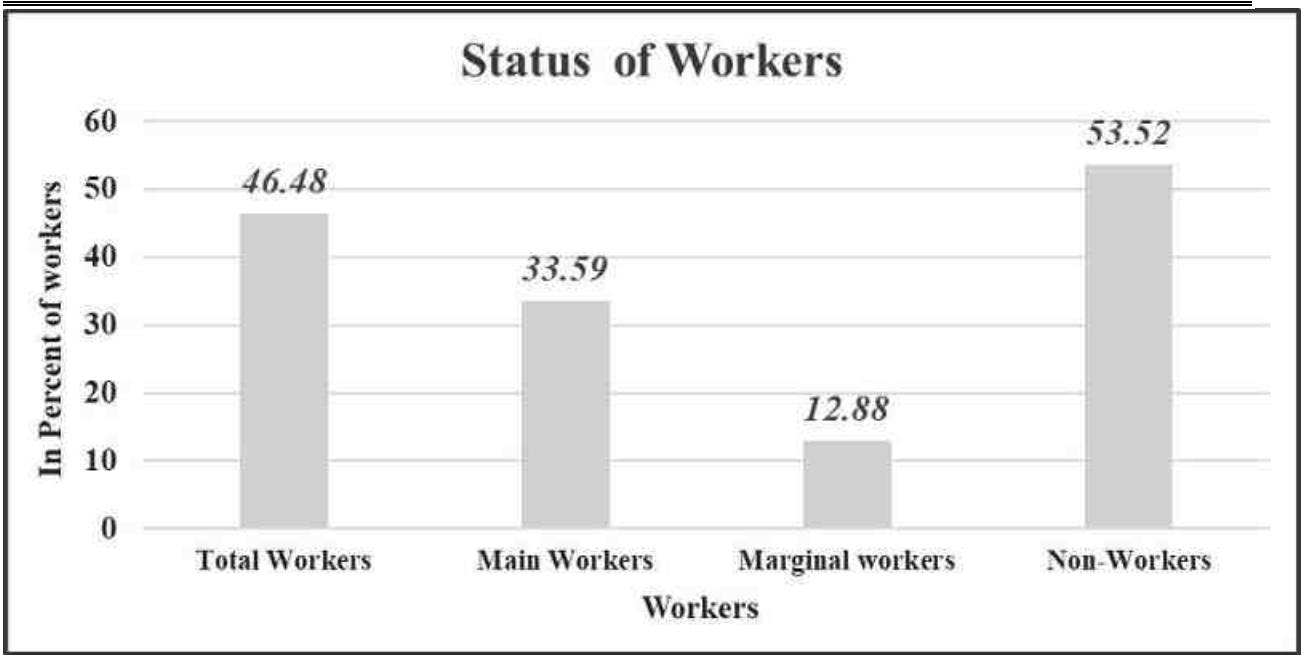


Figure 3.20.2. Working population in the study area

3.21 Infrastructure Base

A better network of physical infrastructure facilities (built up and roads, irrigation, power and social infrastructure support, viz. health and Education, water and sanitation are essential for the development of the rural economy.

A review of infrastructural facilities available in the area has been done based on the information from baseline survey & census data of the study area. Infrastructural facilities available in the area are described in the subsequent sections.

- Administrative offices are located in Tamil Nadu, Thiruvallur district (45km-E) from site which by local transport.
- Dry perennial river and tank, lakes etc.,
- Availability of Government primary schools in this village are present within 0-7km Government Elementary school, Krishnakuppam, Ayyaneri Primary school (S), Somasamudram Panchayat Union Primary school (SW), Government High school, Kondapuram Village, Government Boys Higher secondary school Ramakrishna Rajapet, Government High school, Beerakuppam Village, Government Boys Higher secondary school, Sholinghur (TP)
- Various degree colleges and institutes are Tiruthani Taluk found in study area. Govt.degree College, Sholinghur TP (SW),
- Health facilities covered in the Buffer zone area. Like Government Hospital Ramakrishna Rajapet, Government Health sub centre, Rajarajanavaram Village, Government Hospital Sholinghur T.P etc., and some clinics and private hospital found in Tiruthani taluk.

TABLE 3.21.1: EDUCATIONAL FACILITIES IN THE STUDY AREA

Sno	Village Name	Govt Primary School (Numbers)	Private Primary School (Numbers)	Govt Middle School (Numbers)	Private Middle School (Numbers)	Govt Secondary School (Numbers)	Private Secondary School (Numbers)	Govt Senior Secondary School (Numbers)	Govt Arts and Science Degree College (Numbers)
1	T.C.Kandigai	2	0	0	0	0	0	0	0
2	V.K.N.Kandigai	2	0	1	0	0	0	0	0
	Total	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
1	Thadur	2	1	1	0	0	0	0	0
2	Veerakaverirajapuram	1	0	1	0	0	0	0	0
3	S.Agraharam	2	0	1	0	0	0	0	0
4	Pallipattu	2	0	0	0	0	0	0	0
5	Gowni Puram Chinnasubbaraju Kandigai	6	0	1	0	0	0	0	0
6	Somasamudram	2	0	0	0	0	0	0	0
7	Kalpattu	1	0	0	0	0	0	0	0
8	Vengapattu	5	0	1	0	1	0	0	0
9	Paravathur	3	0	1	0	1	0	0	0
10	Akkachikuppam	2	0	0	0	0	0	0	0
11	Krishnapuram	1	0	0	0	0	0	0	0
12	Ayipedu	3	0	1	0	0	0	0	0
13	Ariyur	1	0	0	0	0	0	0	0
14	Esayanur	3	0	1	0	1	0	1	0
15	Vanganur (CT)	2	0	1	0	1	0	1	0
	Total	**36**	**1**	**9**	**0**	**4**	**0**	**2**	**0**
1	Cherukkanur	3	0	3	0	0	0	0	0
2	Nochili	5	0	1	0	1	0	0	0
3	Keechalam	2	0	1	0	1	0	0	0
4	Paranji	3	1	1	1	0	0	0	0
5	Nandi Veduthangal	2	0	1	0	0	0	0	0
6	Vailambadi	1	0	0	0	0	0	0	0
7	Gudalur	3	0	1	0	1	0	1	0
8	Thalikkal	2	0	1	0	1	0	0	0
9	Karikkal	4	1	1	0	1	1	0	0
10	Ammavarikuppam (CT)	4	2	1	0	2	1	2	0
11	Sholingur (TP)	6	7	5	0	5	0	5	0
	Total	**35**	**11**	**16**	**1**	**12**	**2**	**8**	**0**
	Grant total	**75**	**12**	**26**	**1**	**16**	**2**	**10**	**0**

Source: ***DCHB Census 2011, Tamil Nadu.***

TABLE 3.21.2: MEDICAL FACILITIES IN THE STUDY AREA

Sno	Village Name	Community Health Centre (Numbers)	Primary Health Centre (Numbers)	Primary Heallth Sub Centre (Numbers)	Maternity And Child Welfare Centre (Numbers)	Hospital Allopathic (Numbers)	Dispensary (Numbers)	Veterinary Hospital (Numbers)	Family Welfare Centre (Numbers)	Non Government Medical facilities Medicine Shop (Numbers)
1	T.C.Kandigai	0	0	0	0	0	0	0	0	0
2	V.K.N.Kandigai	0	0	1	0	0	0	0	0	0
	Total	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
1	Thadur	0	0	1	0	0	0	0	0	0
2	Veerakaverirajapuram	0	0	0	0	0	0	0	0	0
3	S.Agraharam	0	0	1	0	0	0	0	0	0
4	Pallipattu	0	0	0	0	0	0	0	0	0
5	Gowni Puram Chinnasubbaraju Kandigai	0	0	1	0	0	0	0	0	0
6	Somasamudram	0	0	1	0	0	0	0	0	0
7	Kalpattu	0	0	0	0	0	0	0	0	0
8	Vengapattu	0	0	1	0	0	0	1	0	0
9	Paravathur	0	0	1	0	0	0	0	0	0
10	Akkachikuppam	0	0	1	0	0	0	0	0	0
11	Krishnapuram	0	0	0	0	0	0	0	0	0
12	Ayipedu	0	0	1	0	0	0	0	0	0
13	Ariyur	0	0	0	0	0	0	0	0	0
14	Esayanur	0	0	1	0	0	0	0	0	0
15	Vanganur (CT)	0	0	0	1	0	1	0	1	1
	Total	**0**	**0**	**9**	**1**	**0**	**1**	**1**	**1**	**1**
1	Cherukkanur	0	0	1	0	0	0	0	0	0
2	Nochili	0	0	1	0	0	0	1	0	0
3	Keechalam	0	0	0	0	0	0	1	0	0
4	Paranji	0	1	1	1	0	1	1	1	0
5	Nandi Veduthangal	0	0	1	0	0	0	0	0	0
6	Vailambadi	0	0	0	0	0	0	0	0	0
7	Gudalur	0	0	1	0	0	0	0	0	0
8	Thalikkal	0	0	1	0	0	0	0	0	0
9	Karikkal	0	0	1	0	0	0	0	0	0
10	Ammavarikuppam (CT)	0	0	0	1	0	1	0	0	8
11	Sholingur (TP)	0	0	0	1	1	1	1	1	10
	Total	**0**	**1**	**7**	**3**	**1**	**3**	**4**	**2**	**18**
	Grant total	**0**	**1**	**17**	**4**	**1**	**4**	**5**	**3**	**19**

Source: ***DCHB Census 2011, Tamil Nadu.***

TABLE 3.21.3 WATER & DRAINAGE FACILITIES IN THE STUDY AREA

Sno	Village Name	TWTS	TWUS	Covered well	Uncovered Well	Handpump	Tubewell/Borehole	Spring	R/C	T/P/L	Closed Drainage system	Open Drainage system	No Drainage system
1	T.C.Kandigai	1	1	1	0	0	0	0	0	0	1	1	1
2	V.K.N.Kandigai	1	1	1	0	1	0	0	0	0	1	1	1
	Total	**2**	**2**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**2**	**2**
1	Thadur	1	1	0	0	0	0	2	2	2	1	1	1
2	Veerakaverirajapuram	1	1	0	0	1	1	2	2	2	1	1	1
3	S.Agraharam	1	1	1	1	1	0	2	2	2	1	1	1
4	Pallipattu	1	1	0	1	1	1	2	2	2	1	1	1
5	Gowni Puram Chinnasubbaraju Kandigai	1	1	1	1	0	1	2	2	1	1	1	1
6	Somasamudram	1	1	0	0	1	1	2	2	2	1	1	1
7	Kalpattu	1	0	0	0	0	0	2	2	2	1	1	1
8	Vengapattu	1	1	0	1	0	1	2	2	2	1	1	1
9	Paravathur	1	1	0	0	0	1	2	2	2	1	1	1
10	Akkachikuppam	1	1	0	0	0	0	2	2	2	1	1	1
11	Krishnapuram	1	1	0	1	0	0	2	2	2	1	1	1
12	Ayipedu	1	1	0	0	0	1	2	2	2	1	1	1
13	Ariyur	1	1	0	0	0	1	2	2	2	1	1	1
14	Esayanur	1	1	0	1	0	0	2	2	2	1	1	1
15	Vanganur (CT)	0	0	0	0	0	1	0	0	1	0	0	0
	Total	**1**	**11**	**2**	**6**	**4**	**9**	**0**	**0**	**2**	**14**	**14**	**14**
1	Cherukkanur	1	1	0	0	1	0	0	2	0	1	1	1
2	Nochili	1	1	0	0	1	1	1	2	0	1	1	1
3	Keechalam	1	1	1	0	0	0	0	2	0	1	1	1
4	Paranji	1	1	0	1	1	1	0	2	0	1	1	1
5	Nandi Veduthangal	1	1	0	0	0	0	0	2	0	1	1	1
6	Vailambadi	1	0	0	1	0	1	0	2	0	1	1	1
7	Gudalur	1	1	0	1	0	1	0	2	0	1	1	1
8	Thalikkal	1	1	1	1	0	0	0	2	0	1	1	1
9	Karikkal	1	1	0	0	0	1	0	2	1	1	1	1
10	Ammavarikuppam (CT)	0	0	0	0	0	1	0	1	1	0	0	0
11	Sholingur (TP)	0	0	0	0	0	0	0	0	1	0	0	0
	Total	**9**	**8**	**2**	**4**	**5**	**6**	**1**	**0**	**3**	**9**	**9**	**9**
	Grant Total	**12**	**21**	**6**	**10**	**10**	**15**	**1**	**0**	**5**	**25**	**25**	**25**

Source: DCHB Census 2011, Tamil Nadu.

TABLE 3.21.4 Transport and Other Infrastructure Facilities in the Surveyed Area

Sno	Village Name	Post Office (Status A(1)/NA(2))	Sub Post Office (Status A(1)/NA(2))	Post And Telegraph Office (Status A(1)/NA(2))	Telephone (landlines) (Status A(1)/NA(2))	Public Call Office /Mobile (PCO) (Status A(1)/NA(2))	Mobile Phone Coverage (Status A(1)/NA(2))	Private Courier Facility (Status A(1)/NA(2))	Public Bus Service (Status A(1)/NA(2))	Private Bus Service (Status A(1)/NA(2))	Railway Station (Status A(1)/NA(2))	Auto/Modified Autos (Status A(1)/NA(2))	Taxi (Status A(1)/NA(2))	Vans (Status A(1)/NA(2))	Tractors (Status A(1)/NA(2))	Cycle-pulled Rickshaws (manual driven) (Status A(1)/NA(2))	Cycle-pulled Rickshaws (machine driven) (Status A(1)/NA(2))	Carts Drivens by Animals (Status A(1)/NA(2))	National Highway (Status A(1)/NA(2))	State Highway (Status A(1)/NA(2))	Major District Road (Status A(1)/NA(2))	Other District Road (Status A(1)/NA(2))	Black Topped (pucca) Road (Status A(1)/NA(2))	Gravel (kuchha) Roads (Status A(1)/NA(2))	Water Bounded Macadam (Status A(1)/NA(2))	All Weather Road (Status A(1)/NA(2))	Foothpath (Status A(1)/NA(2))
1	T.C.Kandigai	2	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1
2	V.K.N.Kandigai	2	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
	Total	**2**	**2**	**2**	**0**	**2**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	0	0	0	0	0	0	1	1	2	2	2	2	2	
1	Thadur	2	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1
2	Veerakaverirajapuram	2	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1
3	S.Agraharam	1	2	1	1	1	1	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
4	Pallipattu	2	2	2	1	1	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
5	Gowni Puram Chinnasubbaraju Kandigai	2	1	2	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
6	Somasamudram	2	1	2	1	1	1	2	1	1	2	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1
7	Kalpattu	2	1	2	1	1	1	2	1	1	2	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1
8	Vengapattu	2	1	2	1	1	1	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
9	Paravathur	2	1	2	1	1	1	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
10	Akkachikuppam	2	1	2	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
11	Krishnapuram	2	2	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1
12	Ayipedu	2	1	2	1	1	1	2	1	1	2	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1
13	Ariyur	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
14	Esayanur	2	1	2	1	1	1	2	1	1	2	2	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1
15	Vanganur (CT)	1	1	1	1	0	1	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Total	**2**	**11**	**2**	**15**	**15**	**9**	**0**	**11**	**10**	**0**	**7**	**2**	**5**	**0**	**0**	**0**	**0**	**0**	**5**	**7**	**7**	**14**	**14**	**14**	**14**	**15**
1	Cherukkanur	2	1	2	1	1	1	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
2	Nochili	2	1	2	1	1	1	2	1	1	2	1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1
3	Keechalam	2	1	2	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
4	Paranji	2	1	2	1	1	1	2	1	1	2	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
5	Nandi Veduthangal	2	2	2	1	2	1	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
6	Vailambadi	2	2	2	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
7	Gudalur	2	1	2	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1
8	Thalikkal	2	1	2	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1

9	Karikkal	2	1	2	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
10	Ammavarikuppam (CT)	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	Sholingur (TP)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**0**	**7**	**0**	**9**	**8**	**10**	**1**	**0**	**3**	**18**	**15**	**18**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**4**	**5**	**9**	**9**	**9**	**9**	**9**
	Grant Total	**4**	**20**	**4**	**24**	**25**	**19**	**1**	**13**	**13**	**18**	**22**	**20**	**5**	**0**	**0**	**0**	**0**	**0**	**9**	**12**	**13**	**25**	**25**	**25**	**25**	**26**

Source: DCHB Census 2011, Tamil Nadu.

3.22. Other Issues in the Study Area

1. Deforestation of Land (Cutting Trees or Plant etc.)
2. Agriculture Land decreases
3. Lack of awareness among vulnerable groups for their welfare
4. Medical/Clinic facilities and PHC need for the Core and Buffer zone area
5. Environmental clean with solid wastage pin each village.
6. Functioning of Hospital facilities with Sub Health care centers.
7. Need proper drainage system with public toilet men and women separately.

3.23 Interpretation

Based on the data, following inferences could be drawn:

- Total literacy rate in the study area is 76.68%.
- The study area had average educational facilities. The overall status depicts that the education is limited to primary and middle level.
- The schedule tribe community forms 1.33% and Scheduled Caste forms 23.30% of the total population of study area.
- The Other Population forms 75.37% of the total population of study area.
- The study area is connected by District/Village Road.
- The study area not well health facilities of primary level.
- Considering the above facts, the proposed project will boost the socio-economic development activities in the area and hence will leave positive impact.
- The study area has mobile connectivity.

3.24 Recommnedation 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, additional schools for girls, furniture and equipment in schools, up-gradation of existing school infrastructure.
- **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 Covid-19, malaria, typhoid, tuberculosis, yellow fever and pneumonia. Repairing of PHCs and Anganwadi centers.
- **People with disability –** Establishment of center for special education, sensitization of the community towards disabled and awareness on Government schemes.
- 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 –**Road network and transport connectivity to easiness accessibility to the region.

3.25 Conclusion

To evaluate the impacts of proposed quarry project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the locality of the site. Hence it can be concluded that the present environment status of the study area will not be affected by the project as Thiru.P. Aruldoss, will adopt adequate control measures to protect the surrounding environment and will contribute in development of the study areas.

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

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

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

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

To identify and validate a model for a particular situation, predictions have been arrived at based on logical reasoning / consultation / extrapolation.

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

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

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

4.1 LAND ENVIRONMENT

4.1.2 Anticipated Impact from Proposed Project

- Permanent or temporary change on land use and land cover.
- Change in Topography: Topography of the ML area will change at the end of the life of the mine.
- Movement of heavy vehicles sometimes cause problems to agricultural land, human habitations due to dust, noise and it also causes traffic hazards.
- Due to degradation of land by pitting the aesthetic environment of the core zone may be affected.
- Earthworks during the rainy season increase the potential for soil erosion and sediment laden water entering the water ways.
- If no due care is taken wash off from the exposed working area may choke the water course & can also causes the siltation of water course

4.1.3 Common Mitigation Measures for Proposed Project

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

4.1.4 Soil Environment

All the proposed project area is covered by thin layer of gravel formation and the average thickness is about 2 m – 3 m, the excavated gravel will be dumped sold to needy customers in open market.

4.1.5 Impact on Soil Environment from Proposed Project

Erosion and Sedimentation (Removal of protective vegetation cover; Exposure of underlying soil horizons that may be less pervious, or more erodible than the surface layers; Reduced capacity of soils to absorb rainfall; Increased energy in storm-water runoff due to concentration and velocity; and Exposure of subsurface materials which are unsuitable for vegetation establishment).

4.1.6 Common Mitigation Measures for Proposed Project

- Run-off diversion – Garland drains will be constructed all around the project boundary to prevent surface flows from entering the quarry works areas. And will be discharged into vegetated natural drainage lines, or as distributed flow across an area stabilised against erosion.
- Sedimentation ponds - Run-off from working areas will be routed towards sedimentation ponds. These trap sediment and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil

characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.

- Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season

4.1.7 Waste Dump Management

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

4.2 WATER ENVIRONMENT

4.2.1 Anticipated Impact from Proposed Project

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

Detail of water requirements in KLD as given below:

TABLE 4.1: WATER REQUIREMENT

PROPOSAL		
***Purpose**	**Quantity**	**Source**
Dust Suppression	1.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Green Belt development	1.5 KLD	Rainwater accumulated in Mine Pit/ Water Tanker
Domestic purpose	0.5 KLD	Water Tankers
Total	**3.5 KLD**	

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

Source: Approved Mining Plan Pre-Feasibility Report

4.2.2 Common Mitigation Measures for Individual Proposed Project

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

4.3 AIR ENVIRONMENT

4.3.1. Anticipated Impact from Proposed Project

- During mining, at various stages activities such as excavation, drilling, blasting, and transportation of materials, particular matter (PM), gases such as Sulphur dioxide, oxides of Nitrogen from vehicular exhaust are the main air pollutants.
- Emissions of noxious gases due to incomplete detonation of explosive may sometimes pollute the air.

- The fugitive dust released from the mining operations may cause effect on the mine workers who are directly exposed to the fugitive dust.
- Simultaneously, the air-borne dust may travel to longer distances and settle in the villages located near the mine lease area.

4.3.2 Modelling of Incremental Concentration from Proposed Project

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

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

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

The impact on Air Environment is due to the mining and allied activities during Land Development phase, Mining process and Transportation. The emissions of Sulphur dioxide (SO_2), Oxides of Nitrogen (NOx) due to excavation/loading equipment and vehicles plying on haul roads are marginal. Loading - unloading and transportation of Rough Stone, wind erosion of the exposed area and movement of light vehicles will be the main polluting source in the mining activities releasing Particulate Matter (PM_{10}) affecting Ambient Air of the area. Prediction of impacts on air environment has been carried out taking into consideration cumulative production three proposed quarries. Air environment and net increase in emissions by Open pit source modelling in AERMOD Software.

4.3.3 Emission Estimation

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

The general equation for emissions estimation is:

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

Where:

E = emissions;

A = activity rate;

EF = emission factor, and

ER =overall emission reduction efficiency, %

The proposed mining activity includes various activities like ground preparation, excavation, handling and transport of Rough Stone. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 4-2.

TABLE 4.2: ESTIMATED EMISSION RATE FOR PM_{10}

Activity	Source type	Value	Unit
Drilling	Point Source	0.149278520	g/s
Blasting	Point Source	0.017930858	g/s
Mineral Loading	Point Source	0.051045131	g/s
Haul Road	Line Source	0.002544974	g/s/m
Overall Mine	Area Source	0.072947190	g/s

TABLE 4.3: ESTIMATED EMISSION RATE FOR SO_2

Activity	Source type	Value	Unit
Overall Mine	Area Source	0.003900311	g/s

TABLE 4.4: ESTIMATED EMISSION RATE FOR NO_X

Activity	Source type	Value	Unit
Overall Mine	Area Source	0.000284156	g/s

4.3.4 Frame work of Computation & Model details

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

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

FIGURE 4.1: AERMOD TERRAIN MAP

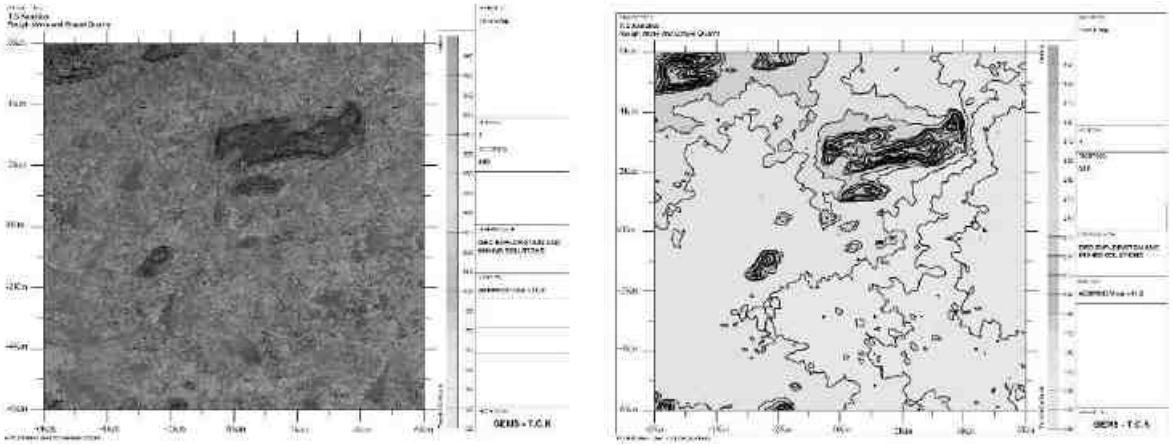


FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM_{10}

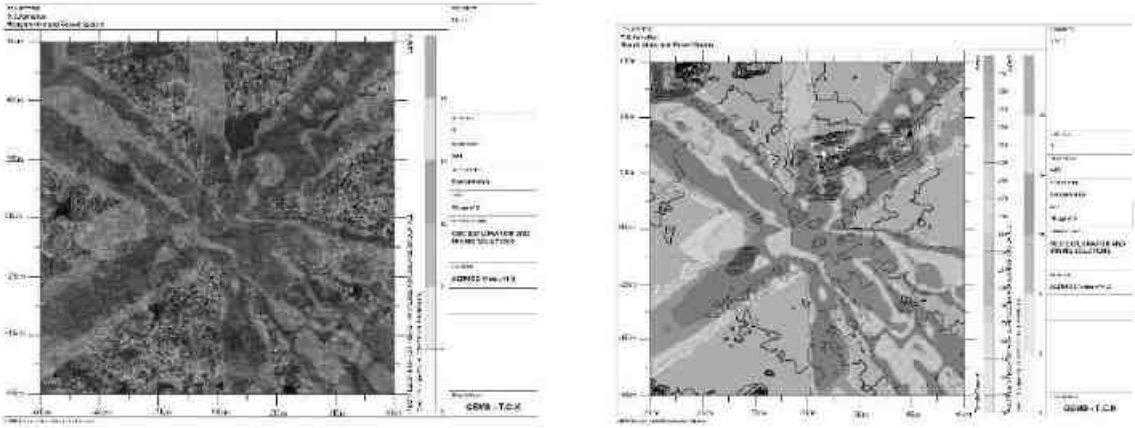


FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF SO_2

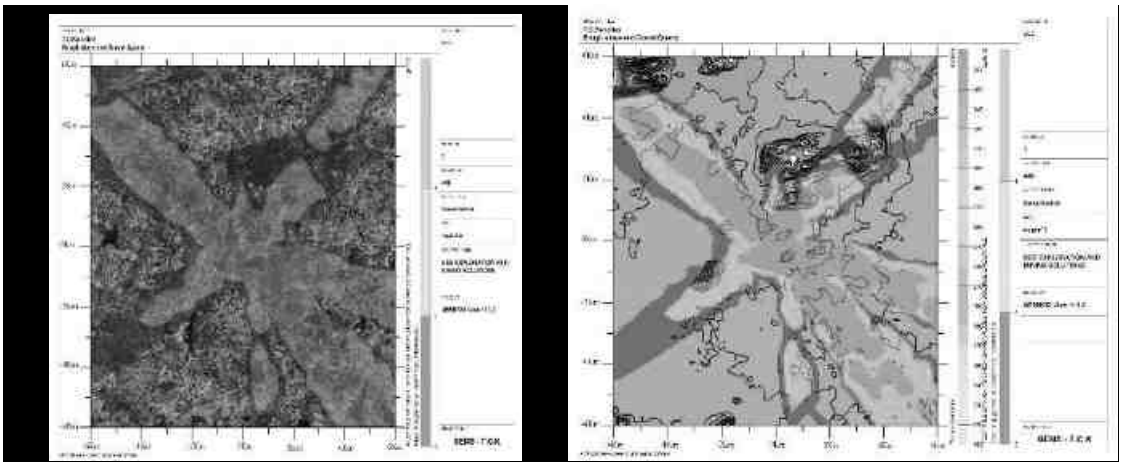


FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF NO_X

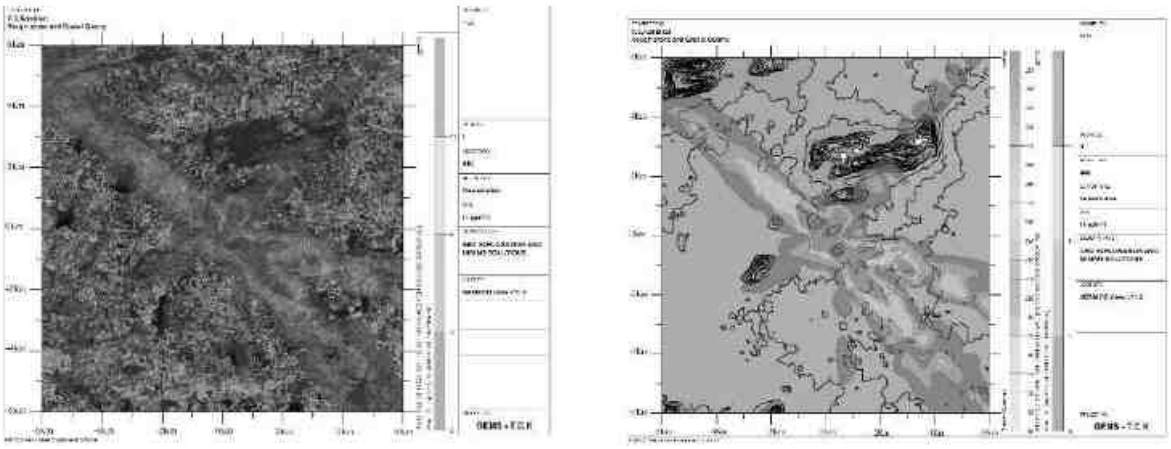
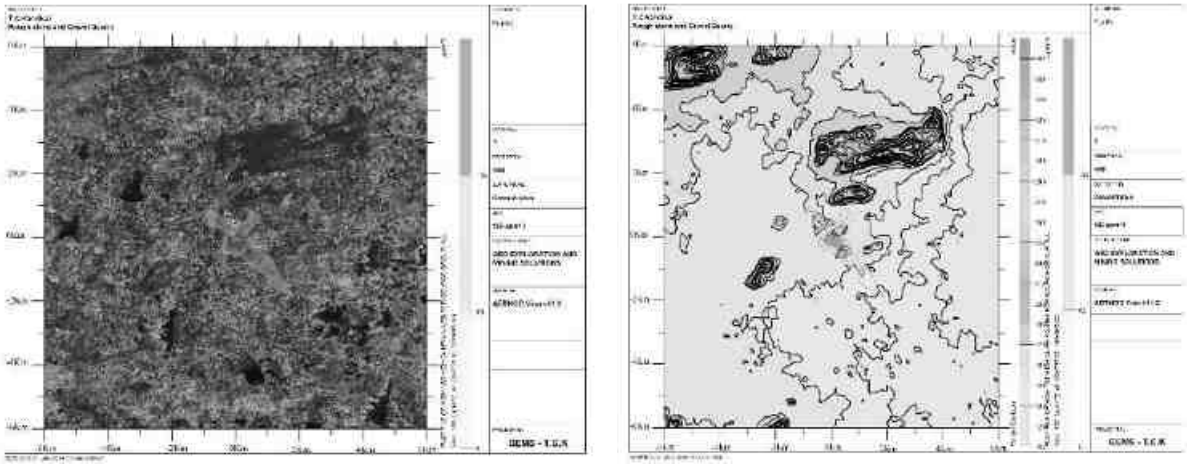


FIGURE 4.5: PREDICTED INCREMENTAL CONCENTRATION OF FUGITIVE DUST



4.3.5 Model Results

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

TABLE 4.5: INCREMENTAL & RESULTANT GLC OF PM_{10}

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM_{10} (µg/m^3)	Incremental value of PM_{10} due to mining (µg/m^3)	Total PM_{10} (µg/m^3)
AAQ1	13° 9'20.87"N 79°28'30.14"E	58	39	61.69	18.92	80.61
AAQ2	13° 9'27.22"N 79°28'31.75"E	321	1779	58.37	8.77	67.14
AAQ3	13° 8'45.29"N 79°28'3.67"E	-580	-1962	57.11	1.02	58.13
AAQ4	13°10'25.99"N 79°30'46.47"E	4188	2048	58.38	5.00	63.38
AAQ5	13° 7'29.97"N 79°30'10.42"E	3097	-3388	57.85	18.00	75.85
AAQ6	13° 9'56.76"N 79°27'2.98"E	-2585	1144	57.68	16.28	73.96
AAQ7	13° 9'20.29"N 79°30'53.14"E	4579	-165	57.48	0	57.48

AAQ8	13° 8'8.55"N 79°26'18.77"E	-3923	-2194	55.68	12.56	68.24

TABLE 4.6: INCREMENTAL & RESULTANT GLC OF $PM_{2.5}$

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline $PM_{2.5}$ ($\mu g/m^3$)	Incremental value of $PM_{2.5}$ due to mining ($\mu g/m^3$)	Total $PM_{2.5}$ ($\mu g/m^3$)
AAQ1	13° 9'20.87"N 79°28'30.14"E	58	39	31.0	10.83	41.83
AAQ2	13° 9'27.22"N 79°28'31.75"E	321	1779	26.92	5.46	32.38
AAQ3	13° 8'45.29"N 79°28'3.67"E	-580	-1962	27.33	1.50	28.83
AAQ4	13°10'25.99"N 79°30'46.47"E	4188	2048	27.46	3.00	30.46
AAQ5	13° 7'29.97"N 79°30'10.42"E	3097	-3388	27.76	10.08	37.84
AAQ6	13° 9'56.76"N 79°27'2.98"E	-2585	1144	28.83	9.05	37.88
AAQ7	13° 9'20.29"N 79°30'53.14"E	4579	-165	27.43	0.53	27.96
AAQ8	13° 8'8.55"N 79°26'18.77"E	-3923	-2194	27.11	7.00	34.11

TABLE 4.7: INCREMENTAL & RESULTANT GLC OF SO_2

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline SO_2 ($\mu g/m^3$)	Incremental value due to mining ($\mu g/m^3$)	Total SO_2($\mu g/m^3$)
AAQ1	13° 9'20.87"N 79°28'30.14"E	58	39	8.54	4.45	12.99
AAQ2	13° 9'27.22"N 79°28'31.75"E	321	1779	8.43	0.63	9.06
AAQ3	13° 8'45.29"N 79°28'3.67"E	-580	-1962	8.4	0	8.4
AAQ4	13°10'25.99"N 79°30'46.47"E	4188	2048	8.14	0	8.14
AAQ5	13° 7'29.97"N 79°30'10.42"E	3097	-3388	8.30	4.05	12.35
AAQ6	13° 9'56.76"N 79°27'2.98"E	-2585	1144	8.07	3.01	11.08
AAQ7	13° 9'20.29"N 79°30'53.14"E	4579	-165	8.35	0	8.35
AAQ8	13° 8'8.55"N 79°26'18.77"E	-3923	-2194	8.35	2.56	10.91

TABLE 4.8: INCREMENTAL & RESULTANT GLC OF NO_X

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline NOx ($\mu g/m^3$)	Incremental value due to mining ($\mu g/m^3$)	Total NOx ($\mu g/m^3$)
AAQ1	13° 9'20.87"N 79°28'30.14"E	58	39	22.01	11.25	33.26
AAQ2	13° 9'27.22"N 79°28'31.75"E	321	1779	20.98	0	20.98
AAQ3	13° 8'45.29"N 79°28'3.67"E	-580	-1962	21.05	0	21.05
AAQ4	13°10'25.99"N 79°30'46.47"E	4188	2048	21.12	0	21.12
AAQ5	13° 7'29.97"N 79°30'10.42"E	3097	-3388	21.16	9.86	31.02

AAQ6	13° 9'56.76"N 79°27'2.98"E	-2585	1144	21.22	2.58	23.8
AAQ7	13° 9'20.29"N 79°30'53.14"E	4579	-165	20.98	0	20.98
AAQ8	13° 8'8.55"N 79°26'18.77"E	-3923	-2194	21.11	0	21.11

TABLE 4.9: INCREMENTAL & RESULTANT GLC OF FUGITIVE DUST

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Fugitive ($\mu g/m^3$)	Incremental value due to mining ($\mu g/m^3$)	Total Fugitive Dust ($\mu g/m^3$)
AAQ1	13° 9'20.87"N 79°28'30.14"E	58	39	116.29	126	242.29
AAQ2	13° 9'27.22"N 79°28'31.75"E	321	1779	113.54	0	113.54
AAQ3	13° 8'45.29"N 79°28'3.67"E	-580	-1962	112.50	0	112.5
AAQ4	13°10'25.99"N 79°30'46.47"E	4188	2048	113.00	0	113
AAQ5	13° 7'29.97"N 79°30'10.42"E	3097	-3388	112.11	0	112.11
AAQ6	13° 9'56.76"N 79°27'2.98"E	-2585	1144	113.04	0	113.04
AAQ7	13° 9'20.29"N 79°30'53.14"E	4579	-165	114.54	0	114.54
AAQ8	13° 8'8.55"N 79°26'18.77"E	-3923	-2194	115.64	0	115.64

From the resultant of cumulative concentration i.e., Background + Incremental Concentration of pollutant in all the receptor locations without effective mitigation measures are still within the prescribed NAAQ limits of 100, 80 & 80 $\mu g/m^3$ for PM_{10}, SO_2 & NO_X respectively. By adopting suitable mitigation measures, the pollutant levels in the atmosphere can be further being controlled.

4.3.6 Common Mitigation Measures for Individual Proposed Project

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

Advantages of Wet Drilling: -

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

Blasting –

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

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

Haul Road & Transportation –

- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with taurpaulin
- The speed of tippers plying on the haul road will be limited below 20 km/hr to avoid generation of dust.
- Water sprinkling on haul roads & loading points will be carried out twice a day
- Main source of gaseous pollution will be from vehicle used for transportation of mineral; therefore, weekly maintenance of machines improves combustion process & makes reduction in the pollution.
- The un-metalled haul roads will be compacted weekly before being put into use.
- Over loading of tippers will be avoided to prevent spillage.
- It will be ensured that all transportation vehicles carry a valid PUC certificate
- Grading of haul roads and service roads to clear accumulation of loose materials

Green Belt –

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

Occupational Health –

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

4.4 NOISE ENVIRONMENT

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

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

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

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

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

Where:

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

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

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

4.4.1 Anticipated Impact from Proposed Projects

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

- Source data
- Receptor data
- Attenuation factor

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

TABLE 4.10: ACTIVITY AND NOISE LEVEL PRODUCED BY MACHINERY

Sl.No.	Machinery / Activity	Impact on Environment?	Noise Produced in dB(A) at 50 ft from source*
1	Blasting	Yes	94
2	Jack Hammer	Yes	88
3	Compressor	No	81
4	Excavator	No	85
5	Tipper	No	84
Total Noise Produced			95.8

*50 feet from source = 15.24 meters

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

The total noise to be produced by mining activity is calculated to be 95.8 dB (A). Generally, most mining operations produce noise between 100-109 dB (A). We have considered equipment and operation noise levels (max) to be approx. 109 dB (A) for nose prediction modelling.

TABLE 4.11: PREDICTED NOISE INCREMENTAL VALUES

Location ID	N1	N2	N3	N4	N5	N6	N7	N8
Maximum Monitored Value (Day) dB(A)	79.8	60.3	68.8	63.2	61.4	62.1	71.7	68.4
Incremental Value dB(A)	56.5	43.6	44.5	38.5	37.2	36.3	35.8	35.5
Total Predicted Noise level dB(A)	79.8	60.4	68.8	63.2	61.4	62.1	71.7	68.4

The incremental noise level is found within the range of 56.5 –43.6 dB (A) in Core Zone and 35.5 – 44.5 dB (A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A) the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations are within permissible limits of Industrial area (core zone) & Residential area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.).

4.4.2 Common Mitigation Measures for Individual Proposed Project

The following noise mitigation measures are proposed for control of Noise

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

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

4.4.3 Ground Vibrations

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

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

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

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

Where –

V = peak particle velocity (mm/s)

K = site and rock factor constant

Q = maximum instantaneous charge (kg)

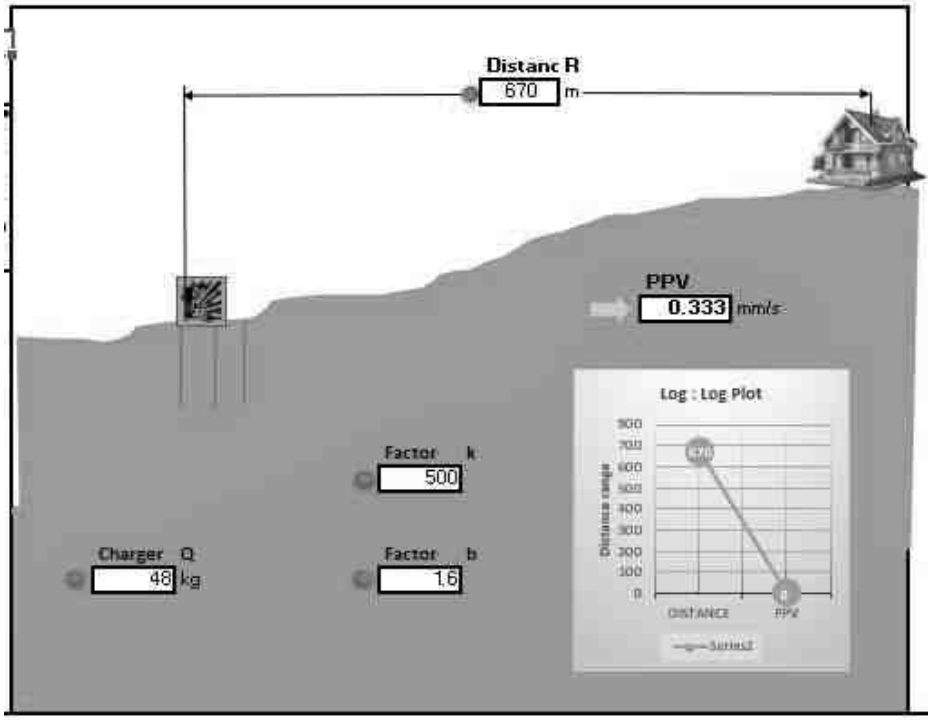
B = constant related to the rock and site (usually 1.6)

R = distance from charge (m)

TABLE 4.12: PREDICTED PPV VALUES DUE TO BLASTING

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	48	670	0.333

FIGURE 4.6: GROUND VIBRATION PREDICTION



From the above graph, the charge per blast of 48 kg is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. But the all the project proponents ensure that the charge per blast shall be less than 100 kg and carry out blasting twice or thrice a day based on the onsite conditions under the supervision of competent person employed. However, as per statutory requirement control measures will be adopted to avoid the impacts due to ground vibrations and fly rocks due to blasting.

4.4.3.1 Common Mitigation Measures for Proposed Project

- The blasting operations in the cluster quarries are carried out without deep hole drilling and blasting using delay detonators, which reduces the ground vibrations;
- Proper quantity of explosive, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting;
- Adequate safe distance from blasting will be maintained as per DGMS guidelines;
- Blasting shelter will be provided as per DGMS guidelines;
- Blasting operations will be carried out only during day time;
- The charge per delay will be minimized and preferably more number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity will be temporarily stopped;
- Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast;
- A fully trained explosives blast man (Mining Mate, Mines Foreman, 2nd Class Mines Manager/ 1st Class Mines Manager) will be appointed.

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

4.5 IMPACT ON BIOLOGICAL ENVIRONMENT

The developmental programs, policies, and projects operated or managed by government or private bodies can cause potentially significant changes in the physical, biological and socio-economic environment. In some cases, the changes may be beneficial while in others it may be detrimental to the environment. Accordingly, environmental impact studies are required for systematic identification, qualification, and interpretation of the anticipated changes.

The main environmental problems associated with mining activities are deforestation, land degradation (change in topography, soil erosion), visual intrusion, disturbance to the hydrological system, and water, air, and noise pollution which ultimately impact upon the floral and faunal status of the project area.

4.5.1. Impact Identification and Evaluation

In general, impact prediction methods argue that the foremost step in impact appraisal must consider and identify project actions that are likely to bring significant changes in the project environment. The present study determined to predict the likely impacts of the Proposed Rough and Gravel quarry Mining Project in the surrounding environment with a specific focus on biological attributes covering habitats/ecosystems and associated biodiversity. Likely impacts identified were categorized into different levels like, direct or primary and indirect or secondary impacts based on the influence of sources of impacts

There is no National Park or Wildlife Sanctuary in the study area. In addition, No Biosphere Reserves, Wildlife corridors, or, Tiger / Elephant reserves within 10 km of the project area. No Schedule-I species were found in the buffer zone of the proposed project area during the biodiversity assessment.

4.5.2. Impact on Flora

The proposed mine lease area is slightly elevated terrain and it is Patta land which is not fit for cultivation. It is mostly devoid of any considerable vegetation. The proposed mine lease area (core zone) not encompasses any designated forest land within it. The vegetation is very sparse and scanty. So, there

will be no impact on flora from the mining operation. There will not be much contamination of soil or any other materials from the mining operation. No threatened plant species were reported in the core and buffer study area during the field survey.

4.5.2.1. Species Recommendation for Plantation granted in the district

1. There are no impacts on the nearby agricultural land due to this mining activity.
2. None of the plants will be cut during the operational phase of the mine.
3. 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.

Most of the land in the buffer area is undulating terrain with croplands, grass patches, and small shrubs. Hence, there will be no effect on the flora of the region.

4.5.3 Mitigation Measures

4.5.3.1. General Guidelines for Green Belt Development

In selecting plant species for green belt and plantation purposes in and around the proposed mine lease area native species, fruit-bearing trees, medicinal plants, and dense canopy trees should be selected. These species should be tolerant to pollution levels as per Bio-Geography zones of India.

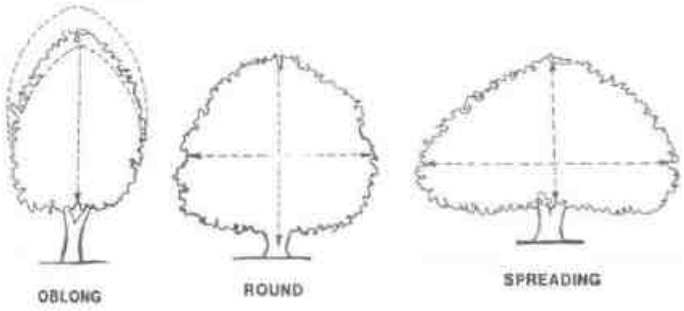
After the operation of mining production capacity, Green belt and Plantation species should be in accordance with the Terms and Conditions of the Environmental Clearance Green belt is created not only for the purpose of protecting sensitive areas or maintaining the ecological balance but because they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

- **Design of Green Belt**

The present plan comprises the details of field investigations. Plant species for greenbelt development are selected as per CPCB guidelines. The green belt will be developed along the periphery of the Proposed Rough stone and Gravel quarry. The greenbelt development plan has been formulated considering the parameters such as climate, soil types, topography, etc.

a. Characteristic features of plants to be used for Absorption of pollutant gases

- Plant species should be perennial and evergreen with thick canopy cover.
- The crown of the tree (mass of foliage/leaves and branches growing outward from the trunk of the tree) should be either Oblong, Round, or Spreading for effective absorption of pollutant gases.
- Plant should have foliage of longer duration.
- The foliage should be freely exposed through: Adequate height of crown, Openness of foliage/leaves in canopy, Big leaves (long and broad laminar surfaces).



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

Table No 4.13. List of plant species proposed for Greenbelt development

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

(*Source: Term of Reference-ToR)

Table No 4.14. Species suitable for abatement of noise and dust pollution

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

9	*Delonix regia*	Neruppu Kondrai
10	*Cassia Fistula*	Sara Kondrai

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

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

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

Some of the important aspects to be considered are:

- ✓ Planting of trees in each row will be in staggered orientation.
- ✓ In the front row, shrubs will be grown.
- ✓ Since the trunks of the tall trees are generally devoid of foliage, it will be useful to have shrubs in front of the trees so as to give coverage to this portion.
- ✓ The spacing between the trees will be maintained slightly less than the normal spaces, so that the trees may grow vertically and slightly increase the effective height of the green belt.

4.5.4. Anticipated Impact on Fauna

- Since the terrestrial fauna in the study area are distributed away from the mine site, the impacts of project are likely to be much low on terrestrial fauna of the region. The proposed mining lease area is devoid of any significant vegetation, it is not suitable for permanent habitat for any specific wildlife.
- Habitat degradation and disturbance to faunal group due to ground vibration and increase in noise level will be minimize or resolved by modern technologies. So, from above facts it is revealed that there will be no impact on fauna. No threatened fauna species reported in the core and buffer study area.

4.5.4.1. Measures for protection and conservation of wildlife species

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

4.5.5. Impact on Aquatic Biodiversity

Mining activities will not disturb the aquatic ecology as there is no effluent discharge proposed from the Rough stone and Gravel quarry. There is no natural perennial surface water body within the mine lease area, like wetlands, rivers streams, lakes, and farmer sites. There is no impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. There are few seasonal water bodies' located southeast and southwest sides. Aquatic biodiversity is observed in the study area.

TABLE 4.15: GREENBELT DEVELOPMENT PLAN

Year	No. of tress proposed to be planted	Survival %	Area to be covered sq.m	Name of the species	No. of trees expected to be grown
I	1800	80%	Near Safety distance, panchayat road, village road	Neem, Pongamia Pinnata, Casuarina, etc.,	1500

TABLE 4.16: BUDGET FOR GREENBELT DEVELOPMENT PLAN

ACTIVITY	YEAR		RATE	COST (Rs.)
Plantation (In Nos.)	1800		@100 Rs Per sapling Including Maintenance	1,80,000
Plantation Cost	17500	17500		
Plantation in quarried out benches and approach road (In Nos.)	200	200		40,000
Plantation Cost	20000	20000		
Wire Fencing for 760 Mtrs length	228000		@300 Rs Per Meter	2,28,000
Garland Drain with settling traps for 490 Mtrs length	147000		@300 Rs Per Meter	1,47,000
Total				**5,95,000**

After complete extraction of mineral, the excavated pits will be allowed to collect rainwater and seepage water to serve as a reservoir to charge the nearby wells. Fish culture will also be attempted. A bund will be constructed around the pits. In order to minimize the impact of mining on the vegetation outside the mine lease area, it is recommended that adequate protection measures must be implemented. As mining involves movement of vehicles and increased anthropogenic activities, some of the areas can be fenced by involving local people and educating them about increased benefits of such activities.

4.5.3. Anticipated Impact on Fauna

- There is no Wildlife Sanctuary and Biosphere Reserve within 10 km radius of the project site.
- No rare, endemic & endangered species are reported in the buffer zone. However, during the course of mining, the management will practice scientific method of mining with proper Environmental Management Plan including pollution control measures especially for air and noise, to avoid any adverse impact on the surrounding wildlife.
- Fencing around all the proposed mine lease areas will be constructed to restrict the entry of stray animals
- Green belt development will be carried out which will help in minimizing adverse impact on the flora found in the area.

1. Measures for protection and conservation of wildlife species

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

4.5.3.2. Mitigation Measures

- All the preventive measures will be taken for growth & development of fauna.
- Creating and development awareness for nature and wildlife in the adjoin villages.
- The workers shall be trained to not harm any wildlife, should it come near the project site. No work shall be carried out after 6.00 pm.

4.5.4. Impact on Aquatic Biodiversity

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

4.5.5. Impact Assessment on Biological Environment

A detail of impact and assessments was mentioned in Table No 4.15.

TABLE 4.17: ECOLOGICAL IMPACT ASSESSMENTS

SI.No	Attributes	Assessment
1	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/ coastline/estuary/sea	Cauvery Wildlife Sanctuary-178km-SW Venganoor R.F- -4.44km-N Santhavenugopalapuram03.0km-NE Nochili R.F-8.7km-N
2	Proposed mining project impact surface water quality that also provide water to wildlife	'NO 'scheduled or threatened wildlife animal sighted regularly core in core area.
3	Located near an area populated by rare or endangered species	NO endangered, critically endangered, vulnerable species sighted in core mining lease area.
4	Proposed project restricts access to waterholes for wildlife	'NO'
5	Project likely to affect migration routes	'NO 'migration route observed during monitoring period.
6	Proposed mining project increase siltation that would affect nearby biodiversity area.	Surface runoff management such as garland drains is proposed to be constructed, so there will be no siltation nearby mining area.
7	Risk of fall/slip or cause death to wild animals due to project activities	'NO'
8	Activities of the project affects the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in mining lease site. The fauna sighted mostly migrated from buffer area.
9	Mining project effect the forest-based livelihood/ any specific forest product on which local livelihood depended	'NO'
10	The project release effluents into a water body that also supplies water to a wildlife	No water body near to core zone so chances of water become polluted is low.
11	The project likely to affect wetlands, Fish breeding grounds, marine ecology	'NO'. Wetland was not present in near core Mining lease area. No breeding and nesting ground present in core mining area.
12	Project likely to affect flora of an area, which have medicinal value	'NO'
13	Forestland is to be diverted, has carbon high sequestration	'NO 'There was no forest land diverted.

TABLE 4.18: ANTICIPATED IMPACT OF ECOLOGY AND BIODIVERSITY

Sl. No	Aspect Description	Likely Impacts on Ecology and Biodiversity (EB)	Impact Consequence - Probability Description / Justification	Significance	Mitigation Measures
Pre-Mining Phase					
1	Uprooting of vegetation of lease area	Site specific loss of common floral diversity (Direct impact)	Site possesses common floral (not trees) species. Clearance of these species will not result in loss of flora	Less severe	No immediate action required. However, Greenbelt /plantation will be developed in project site and in periphery of the project boundary, which will improve flora and fauna diversity of the project area.
		Site specific loss of associated faunal diversity (Partial impact)	Site supports only common species, which use wide variety of habitats of		

			the buffer zone reserve forest area. So, there is no threat of faunal diversity.		
		-Loss of Habitat (Direct impact)	Site does not form Unique / critical habitat structure for unique flora or fauna.		
Mining phase					
2	Excavation of mineral using machine and labours, Transportation activities will generate noise.	Site-specific disturbance to normal faunal movements at the site due to noise. (Partial impact)	Site does not form unique / critical habitat structure for unique flora or fauna.	Less severe	Mining activity should not be operated after 5PM. Excavation of dump and transportation work should stop before 7PM.
3	Vehicular Movement for transportation of materials will result in generation of dust (SPM) due to haul roads and emission of SO2,NO2,CO etc.	Impact on surrounding agriculture and associated fauna due to deposition of dust and Emission of CO. (Indirect impact)	Impact is less as the agricultural land far from core area.	Less severe	All vehicles will be certified for appropriate Emission levels. More plantation has been suggested Upgrade the vehicles with alternative fuel such biodiesel, methanol and biofuel around the mining area.

4.6 SOCIO ECONOMIC

4.6.1 Anticipated Impact from Proposed Project

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

4.6.2 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.

4.7 OCCUPATIONAL HEALTH AND SAFETY

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

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

4.7.1 Respiratory Hazards

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

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

4.7.2 Noise

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

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

4.7.3 Physical Hazards

The following measures are proposed for control of physical hazards

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

4.7.4 Occupational Health Survey

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

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

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

4.8 MINE WASTE MANAGEMENT

No waste is anticipated from any of the proposed quarries.

4.9 MINE CLOSURE

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

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

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

4.9.1 Mine Closure Criteria

The criteria involved in mine closure are discussed below:

4.9.1.1 Physical Stability

All anthropogenic structures, which include mine workings, buildings, rest shelters etc., remaining after mine decommissioning should be physically stable. They should present no hazard to public health and

safety as a result of failure or physical deterioration and they should continue to perform the functions for which they were designed. The design periods and factors of safety proposed should take full account of extreme events such as floods, hurricane, winds or earthquakes, etc. and other natural perpetual forces like erosion, etc.,

4.9.1.2 Chemical Stability

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

4.9.1.3 Biological Stability

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

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

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

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

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 INTRODUCTION

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

5.2 FACTORS BEHIND THE SELECTION OF PROJECT SITE

P.Aruldoss Rough Stone & Gravel Quarry Projects at T.C. Kandigai Village is a mining project for excavation of Rough Stone and gravel, which is site specific. The proposed mining lease areas have following advantages: -

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

5.3 ANALYSIS OF ALTERNATIVE SITE

No alternatives are suggested as all the mine sites are mineral specific

5.4 FACTORS BEHIND SELECTION OF PROPOSED TECHNOLOGY

Mechanized open cast mining operation with drilling and blasting method will be used to extract Rough Stone and gravel in the area. All the applied mining lease areas have following advantages

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

5.5 ANALYSIS OF ALTERNATIVE TECHNOLOGY

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

6. ENVIRONMENTAL MONITORING PROGRAMME

6.0 GENERAL

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

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

6.1 METHODOLOGY OF MONITORING MECHANISM

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

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

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

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

The sampling and analysis report of the monitored environmental attributes will be submitted to the Tamil Nadu Pollution Control Board (TNPCB) at a frequency of half-yearly and yearly by each

proposed project proponent. The half-yearly reports are submitted to Ministry of Environment and Forest, Regional Office and SEIAA as well.

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

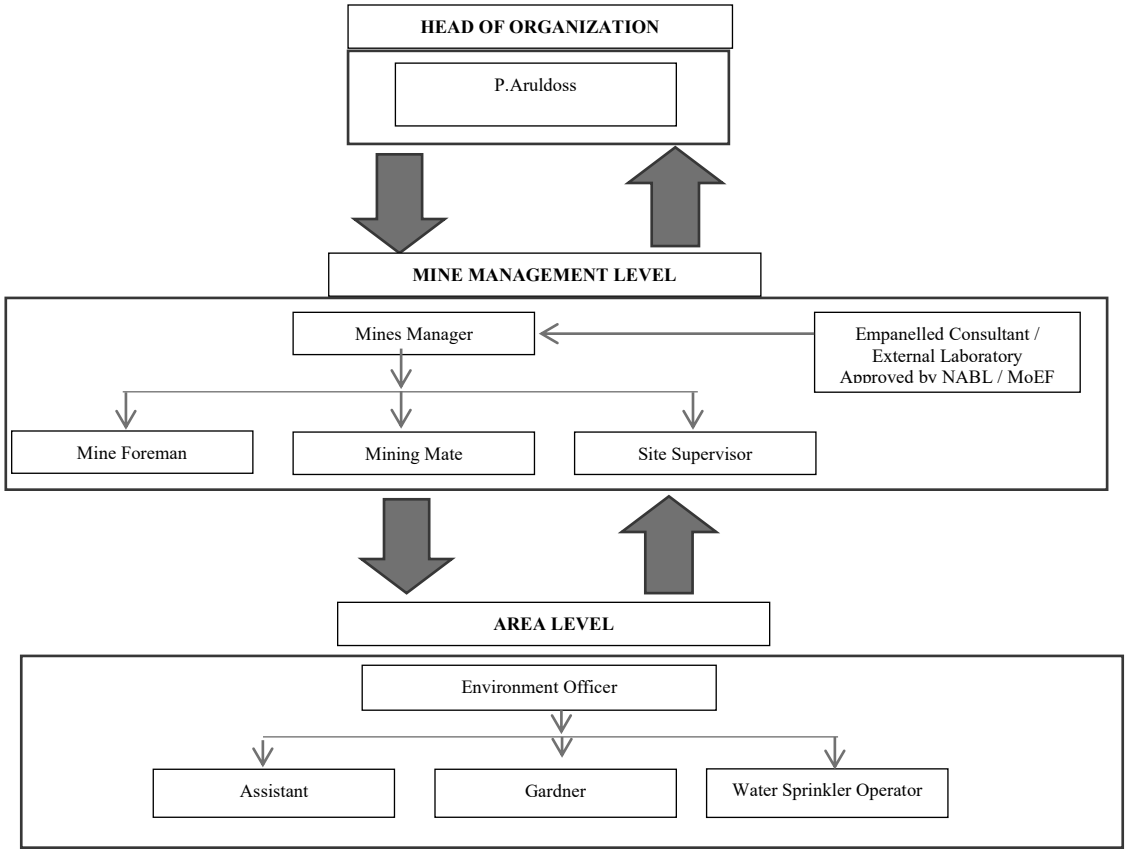


FIGURE 6.1: PROPOSED ENVIRONMENTAL MONITORING CELL PROPOSAL

* The Environmental Monitoring Cell will be formed in all the proposed projects

6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

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

TABLE 6.1 IMPLEMENTATION SCHEDULE FOR ALL PROPOSED PROJECTS

Sl No.	Recommendations	Time Period	Schedule
1	Land Environment Control Measures	Before commissioning of the project	Immediately after the commencement of project
2	Soil Quality Control Measures	Before commissioning of the project	Immediately after the commencement of project
3	Water Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
4	Air Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress

5	Noise Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
6	Ecological Environment	Phase wise implementation every year along with mine operations	Immediately and as project progress

6.3 MONITORING SCHEDULE AND FREQUENCY

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

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

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

The details of monitoring are detailed in Table 6.2

TABLE 6.2: PROPOSED MONITORING SCHEDULE FOR P1

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

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

6.4 BUDGETARY PROVISION FOR EMP

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

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

TABLE 6.3 ENVIRONMENT MONITORING BUDGET

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

Source: Approved Mining Plan

6.5 REPORTING SCHEDULES OF MONITORED DATA

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

Periodical reports to be submitted to: -

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

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

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

7. ADDITIONAL STUDIES

7.0 GENERAL

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

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

7.1. PUBLIC CONSULTATION

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

7.2 RISK ASSESSMENT

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

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

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

TABLE 7.1 RISK ASSESSMENT& CONTROL MEASURES

S. No	Risk factors	Causes of risk	Control measures
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	▪ All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations; ▪ Workers will be sent to the Training in the nearby Group Vocational Training Centre ▪ Entry of unauthorized persons will be prohibited; ▪ Fire-fighting and first-aid provisions in the mine office complex and mining area; ▪ Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use ▪ Working of quarry, as per approved plans and regularly updating the mine plans; ▪ Cleaning of mine faces on daily basis shall be daily done in order to avoid any overhang or undercut; ▪ Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of a Mine Manager; ▪ Maintenance and testing of all mining equipment as per manufacturer ‘s guidelines.
2	Drilling	Improper and unsafe practices Due to high pressure of compressed air, hoses may burst Drill Rod may break	▪ Safe operating procedure established for drilling (SOP) will be strictly followed. ▪ Only trained operators will be deployed. ▪ No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places, ▪ Drilling shall not be carried on simultaneously on the benches at places directly one above the other. ▪ Periodical preventive maintenance and replacement of worn-out accessories in the compressor and drill equipment as per operator manual. ▪ All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition. ▪ Operator shall regularly use all the personal protective equipment.
4	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/ fining of blast holes Vibration due to movement	▪ Restrict maximum charge per delay as per regulations and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blasting can be conducted safely. ▪ SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation

		of vehicles	▪ Shots are fired during daytime only. ▪ All holes charged on any one day shall be fired on the same day. ▪ The danger zone will be distinctly demarcated (by means of red flags)
5	Transportation	Potential hazards and unsafe workings contributing to accident and injuries Overloading of material While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	▪ Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio-visual reversing alarm, rear view mirrors, side indicator lights etc., are in good condition. ▪ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. ▪ Concave mirrors should be kept at all corners ▪ All vehicles should be fitted with reverse horn with one spotter at every tipping point ▪ Loading according to the vehicle capacity ▪ Periodical maintenance of vehicles as per operator manual
6	Natural calamities	Unexpected happenings	▪ Escape Routes will be provided to prevent inundation of storm water ▪ Fire Extinguishers & Sand Buckets
7	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	▪ Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m height.

Source: Analysed and Proposed by FAE & EC

7.3 DISASTER MANAGEMENT PLAN

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

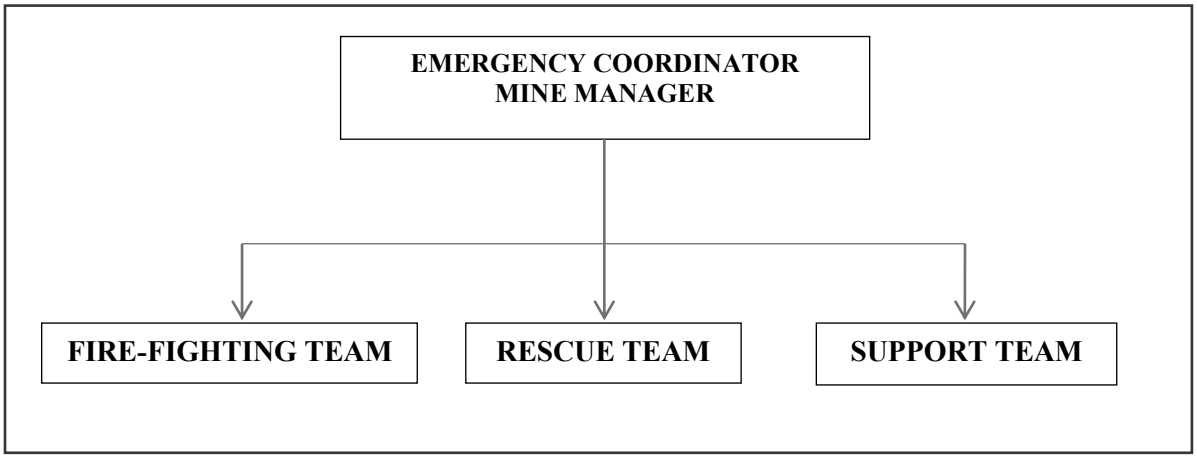
The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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

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

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

FIGURE 7.1: DISASTER MANAGEMENT TEAM LAYOUT



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

TABLE 7.2: PROPOSED TEAMS TO DEAL WITH EMERGENCY SITUATION

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

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

Roles and responsibilities of emergency team –

(a) Emergency coordinator (EC)

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

(b) Incident controller (IC)

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

(c) Communication and advisory team

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

(d) Roll call coordinator

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

(e) Search and rescue team

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

(f) Emergency security controller

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

Emergency control procedure –

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

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

- He will receive information continuously from incident controller and give decisions and directions to:
  - Incident controller
  - Mine control rooms
  - Emergency security controller

Proposed fire extinguishers at different locations –

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

TABLE 7.3: PROPOSED FIRE EXTINGUISHERS AT DIFFERENT LOCATIONS

LOCATION	TYPE OF FIRE EXTINGUISHERS
Electrical Equipment's	CO_2 type, foam type, dry chemical powder type
Fuel Storage Area	CO_2 type, foam type, dry chemical powder type, Sand bucket
Office Area	Dry chemical type, foam type

Alarm system to be followed during disaster –

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

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

- All safety precautions and provisions of Metalliferous Mines Regulations (MMR), 1961 is strictly followed during all mining operations.
- Observance of all safety precautions for blasting and storage of explosives as per MMR 1961.
- Entry of unauthorized persons into mine & allied areas is completely prohibited.
- Fire-fighting and first-aid provisions in the mines office complex and mining area are provided.
- Provisions of all the safety appliances such as safety boot, helmets, goggles, dust masks, ear plugs and ear muffs etc. are made available to the employees and the use of same is strictly adhered to through regular monitoring.
- Training and refresher courses for all the employees working in hazardous premises.
- Working of mine, as per approved plans and regularly updating the mine plans.
- Cleaning of mine faces is regularly done.
- Handling of explosives, charging and blasting are carried out only by qualified persons following SOP.
- Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit.

- Provision of high-capacity standby pumps with generator sets with enough quantity of diesel for emergency pumping especially during monsoon.
- A blasting SIREN is used at the time of blasting for audio signal.
- Before blasting and after blasting, red and green flags are displayed as visual signals.
- Warning notice boards indicating the time of blasting and NOT TO TRESPASS are displayed at prominent places.
- Regular maintenance and testing of all mining equipment were carried out as per manufacturer's guidelines.

7.4 CUMULATIVE IMPACT STUDY

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

TABLE 7.4: LIST OF QUARRIES IN CLUSTER

PROPOSED QUARRY				
CODE	**Name of the Owner**	**S.F. Nos**	**Extent**	**Status**
P1	**P.Aruldoss,** S/o. Ponnusamy, No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai, Tamil Nadu State – 600 048	41/2, 66/1A (P), 66/1B and 66/8	2.94.5 ha	TOR Obtained: Lr. No. SEIAA-TN/F.No.8730/ToR-1085/2021 Dated: 17.03.2022
TOTAL			**2.94.5 ha**	
EXISTING QUARRY				
CODE	**Name of the Owner**	**S.F. No**	**Extent**	**Status**
E1	**Thiru. S.Sriram** S/o.C.Shanmuganathan, No2, Lakshmipuram Extension-II, Mudichur Road, West Tambaram, Chennai -6000045	58/2 (P)	2.00.0 ha	Operation
	TOTAL		**2.00.0 ha**	
	EXPIRED QUARRY			
CODE	**Name of the Owner**	**S.F. No**	**Extent**	**Status**
Ex-1	**Thiru.R.Subramani,** S/o. Rangasamy, No.126,Periyar Nagar, Thiruttani Village & Taluk, Thiruvallur District**.**	41/1 (P)	2.00.0 ha	Lease Period Expired on 17.05.2021
	TOTAL		2.00.0 ha	
TOTAL CLUSTER EXTENT			**6.94.5 ha**	

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

TABLE 7.5: SALIENT FEATURES OF PROPOSAL

Name of the Quarry	P.Aruldoss Rough Stone & Gravel Quarry Project	
Toposheet No	57-O/08	
Latitude between	13°09'15.82"N to 13°09'22.89"N	
Longitude between	79°28'24.73"E to 79°28'31.68"E	
Highest Elevation	158m AMSL	
Proposed Depth of Mining	54m (2m above ground level + 52m below ground level)	
Geological Resources	Rough Stone in m^3	Gravel m^3
	14,70,840	1,19,920

Mineable Reserves	Rough Stone in m^3	Gravel m^3
	3,40,887	63,856
Ultimate Pit Dimension	154 m (L) * 119 m (W) * 54 m (D)	
Water Level in the surrounds area	59m in summer and at 55m in rainy seasons	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is elevated terrain. The gradient is gentle towards Southwestern side and altitude of the area is 154m above from Mean Sea level. The area is covered by 4m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the nearby existing pits.	
Machinery proposed	Jack Hammer	6 Nos
	Compressor	2Nos
	Excavator with Bucket and Rock Breaker	1Nos
	Tippers	3Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	27 Nos	
Project Cost	Rs.96,10,000/-	
CER Cost	Rs.5,00,000	
Nearby Water Bodies	Tank -900m-SW	
Greenbelt Development Plan	Proposed to plant 1800 trees in the 7.5 m Safety Zone,panchayat roan and village road	
Proposed Water Requirement	3.0 KLD	
Nearest Habitation	1km -North East	

Source: Approved Mining Plan

TABLE 7.6: SALIENT FEATURES OF PROPOSAL

Existing – E1		
Name of the Quarry	Sriram Rough Stone & Gravel Quarry Project	
Toposheet No	57-O/08	
Proposed Depth of Mining	11m	
Proposed Production	Rough Stone in m^3	Topsoil m^3
	50,463	717
Water Level in the surrounds area	59m in summer and at 55m in rainy seasons	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is elevated terrain. The gradient is gentle towards Southwestern side and altitude of the area is 154m above from Mean Sea level. The area is covered by 4m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the nearby existing pits.	
Machinery proposed	Jack Hammer	3 Nos
	Compressor	1No
	Excavator with Bucket and Rock Breaker	1No
	Tippers	2Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Proposed Manpower Deployment	20 Nos	
Project Cost	Rs.25,43,500/-	
CER Cost @ 2% of Project Cost	Rs.50,870	
Greenbelt Development Plan	Proposed to plant 100 trees in 400 Sq.m area in the 7.5 m Safety Zone	

Air Environment –

Calculating the Cumulative Load of Mining within the cluster is as shown in table 7.17& 7.18.

TABLE 7.7: CUMULATIVE PRODUCTION LOAD OF ROUGH STONE

	PROPOSED PRODUCTION DETAILS			
Quarry	**5 Years in m^3**	**Per Year in m^3**	**Per Day in m^3**	**Number of Lorry Load Per Day**
P1	1,65,677	33,135	110	9
Total	**1,65,677**	**33,135**	**110**	**9**
E1	50463	10092	33	3
Total	**50463**	**10092**	**33**	**3**
Grand Total	**2,16,140**	**43,227**	**143**	**12**

TABLE 7.8: CUMULATIVE PRODUCTION LOAD OF GRAVEL

	PROPOSED PRODUCTION DETAILS			
Quarry	**1 - 3 Years in m^3**	**Per Year in m^3**	**Per Day in m^3**	**Number of Lorry Load Per Day**
P1	63,856	21,285	71	6
Total	**63,856**	**21,285**	**71**	**6**

On a cumulative basis considering all the 2 quarries it can be seen that the overall production of Rough Stone is 143 m^3 per day and overall production of Gravel is 71 m^3 per day with a capacity of 12 trips of Rough Stone per day and 6 Trips per day of Gravel from the cluster.

Note: Per day production of Rough Stone is calculated for 5 Years Lease Period and for Gravel production with 1, 2 or 3 or 5 years of production period. And the load of existing quarries is covered under existing environment of the cluster.

Based on the above production quantities the emissions due to various activities in all the 2 mines includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.19.

TABLE 7.9: EMISSION ESTIMATION FROM QUARRIES WITHIN 500 METER RADIUS

EMISSION ESTIMATION FOR QUARRY "P1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.149278520	g/s
	Blasting	Point Source	0.017930858	g/s
	Mineral Loading	Point Source	0.051045131	g/s
	Haul Road	Line Source	0.002544974	g/s/m
	Overall Mine	Area Source	0.072947190	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.003900311	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000284156	g/s
EMISSION ESTIMATION FOR QUARRY "E1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.058484606	g/s
	Blasting	Point Source	0.000165509	g/s
	Mineral Loading	Point Source	0.042543770	g/s
	Haul Road	Line Source	0.002492319	g/s/m
	Overall Mine	Area Source	0.051927623	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000600559	g/s

Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000027260	g/s

Source: Emission Calculations

TABLE 7.10: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM2.5	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	31.0	27.8	27.3	27.5	27.8	28.8	27.4	27.1
Minimum	21.6	20.8	20.0	20.4	21.4	21.5	20.1	20.2
Maximum	39.4	35.6	39.4	39.2	38.2	38.8	39.3	38.5
NAAQ Norms	60.0							
PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	61.7	58.4	57.1	58.2	57.9	57.7	57.5	55.7
Minimum	51.2	51.5	50.8	51.8	50.0	50.2	50.2	50.2
Maximum	69.7	69.5	69.2	69.6	69.4	68.8	69.8	68.9
NAAQ Norms	100.0							
SO_2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	8.5	8.4	8.4	8.1	8.3	8.1	8.3	8.3
Minimum	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Maximum	10.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
NAAQ Norms	80.0							
NO_2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	22.0	21.0	21.1	21.1	21.2	21.2	21.0	21.1
Minimum	20.7	19.8	19.8	19.8	19.8	19.8	19.8	19.8
Maximum	23.2	22.3	22.3	22.3	22.3	22.3	22.3	22.3
NAAQ Norms	80.0							

Noise Environment –

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

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

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

Where:

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

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

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

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

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

TABLE 7.11: PREDICTED NOISE INCREMENTAL VALUES FROM CLUSTER

Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	70.1	48.2	51.0	55
Habitation Near E1	43.1	42.0	45.6	

Source: Lab Monitoring Data

The incremental noise level is found within the range of 42.0– 48.2 dB (A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A)the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (The Principal Rules were published in the Gazette of India, vide S.O.123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E),dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment(Protection) Act, 1986.).

Ground Vibrations

Ground vibrations due to mining activities in the all the 2 Mines within cluster are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc. However, the major source of ground vibration from the all the 2 mines is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements. Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining areas and may cause injury to persons or damage to the structures. Nearest Habitations from 2 mines respectively are as in below Table 7.22

TABLE 7.12: NEAREST HABITATION FROM EACH MINE

Location ID	Distance in Meters
Habitation Near P1	670
Habitation Near E1	860

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

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

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

TABLE 7.13: GROUND VIBRATIONS AT MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	48	670	0.333
E1	65	860	0.359

Source: Blasting Calculations

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

Socio Economic Environment –

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

TABLE 7.14: SOCIO ECONOMIC BENEFITS FROM MINES

	Project Cost	CER @ 2%
P1	Rs.91,10,000/-	Rs.5,00,000/-
Total	**Rs.91,10,000/-**	**Rs.5,00,000/-**
E1	Rs.25,43,500/-	Rs 50,870/-
Total	**Rs.25,43,500/-**	**Rs 50,870/-**
Grand Total	**Rs. 1,16,53,500/-**	**Rs 5,50,870/-**

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

- 1 Proposed project shall fund towards CER – **Rs 5,00,000/-**
- 1Existing project shall fund towards CER – **Rs 50,870/-**
- 2 Projects in Cluster shall fund towards CER – **Rs 5,50,870/-**
-

TABLE 7.15: EMPLOYMENT BENEFITS FROM MINES

Quarry	Employment
P1	27
Total	**27**
E1	20
Total	**20**
Grand Total	**47**

A total of 27 people will get employment due to one proposed mines in cluster and 20 people are already employed at existing mines.

TABLE 7.16: GREENBELT DEVELOPMENT BENEFITS FROM QUARRY

CODE	No of Trees proposed to be planted	Survival %	Area Covered Sq.m	Name of the Species	No. of Trees expected to be grown
P1	1800	80%	Near by safety distabce, panchayat road and village road -	Neem, Casuarina, Pongamia, Pinnata, etc.,	1500
Total	**1800**				**1500**
E1	150				120
Total	**150**				**120**
Grand Total	**1950**				**1620**

Based on the Proposed Mining Plans it's anticipated that there shall growth of native species of Neem, Casuarina, etc in the Entire Cluster at a rate of 1950 Trees Planted over a period of 5 Years with Survival Rate of 80% and expected growth is around 1620 Trees.

7.5 PLASTIC WASTE MANAGEMENT PLAN FOR PROPOAL

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.

Objective –

- To investigate the actual supply chain network of plastic waste.
- To identify and propose a sustainable plastic waste management by installing bins for collection of recyclables with all the plastic waste
- Preparation of a system design layout, and necessary modalities for implementation and monitoring.

TABLE 7.17: ACTION PLAN TO MANAGE PLASTIC WASTE

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

Source: Proposed by FAE's and EC

8. PROJECT BENEFITS

8.0 GENERAL

Proposed Project for Quarrying Rough Stone and Gravel at T.C. Kandigai Village aims to produce cumulatively 1,65,677 m^3 Rough Stone & 63,856 m^3 of Gravel over a period of 5 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 27 persons for carrying out mining operations and give preference to the local people in providing employment in this cluster. In addition, there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.2 SOCIO-ECONOMIC WELFARE MEASURES PROPOSED

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

8.3 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

The proposed quarries are located in T.C. Kandigai Village, Tiruthani Taluk and Thiruvallur District of Tamil Nadu and the area have communications, roads and other facilities already well established. The following physical infrastructure facilities will further improve due to proposed mine.

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

8.4 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

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

8.5 OTHER TANGIBLE BENEFITS

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

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

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 10 km of the project site. For this purpose, separate budget will be provided every year. For finalization of these schemes, proponent will interact with LSG. The schemes will be selected from the following broad areas –

- Health Services
- Social Development
- Infrastructure Development
- Education & Sports
- Self-Employment

8.7 CSR Cost Estimation

CSR activities will be taken up in the T.C. Kandigai village mainly contributing to education, health, training of women self-help groups and contribution to infrastructure etc., CSR budget is allocated as 2.5% of the profit.

8.8 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, All the proposed projects shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC. Capital cost is Rs. 96,10,000 and 2% of the same works out to Rs 1,92,000/-

TABLE 8.1: CER – ACTION PLAN

Activity	Beneficiaries	Total
Installation of Solar lamps at T.C. Kandigai village roads	T.C. Kandigai village	Rs 5,00,000/-
Providing funds for improving Sanitation facilities at T.C. Kandigai village Government School		
Providing funds for smart class facilities at T.C. Kandigai village Government School		
TOTAL		**Rs 5,00,000/-**

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

9. ENVIRONMENTAL COST BENEFIT ANALYSIS

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

10. ENVIRONMENTAL MANAGEMENT PLAN

10.0 GENERAL

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 ENVIRONMENTAL POLICY

The Project Proponent is committed to conduct all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent Thiru.P. Aruldoss

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

Description of the Administration and Technical Setup –

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

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory

- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
- Co-ordination of the environment related activities within the project as well as with outside agencies
- Collection of health statistics of the workers and population of the surrounding villages
- Green belt development
- Monitoring the progress of implementation of the environmental monitoring programme
- Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

10.2 LAND ENVIRONMENT MANAGEMENT

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

TABLE 10.1: PROPOSED CONTROLS FOR LAND ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.3 SOIL MANAGEMENT

There is no overburden or waste anticipated from proposed project.

TABLE 10.2: PROPOSED CONTROLS FOR SOIL MANAGEMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.4 WATER MANAGEMENT

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

The quarrying operation is proposed upto a depth of 54 m BGL, the water table in the area is 55m – 59 m below ground level, hence the proposed projects will not intersect the Ground water table during entire quarry period.

TABLE 10.3: PROPOSED CONTROLS FOR WATER ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

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

TABLE 10.4: PROPOSED CONTROLS FOR AIR ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.6 NOISE POLLUTION CONTROL

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

TABLE 10.5: PROPOSED CONTROLS FOR NOISE ENVIRONMENT

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

Source: Proposed by FAE's & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

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

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

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

Source: Proposed by FAE's & EIA Coordinator

10.8 BIOLOGICAL ENVIRONMENT MANAGEMENT

The proponent will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of quarried out area etc., Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to implement the greenbelt development programme and post plantation status will be regularly checked for every season.
- The main attributes that retard the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and installing a sprinkler unit near the newly planted area.
- Year wise greenbelt development will be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods

- Lopping period, interval of watering
- Survival rate
- Density of plantation

- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

10.8.1 Green Belt Development Plan

About 100 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES FOR 5 YEAR PLAN PERIOD

Year	No. of trees proposed to be planted	Survival %	Area to be covered sq.m	Name of the species	No. of trees expected to be grown
I	1800	80%	Near by safety distance, panchayat road, village road	Neem, Pongamia Pinnata, Casuarina etc.,	1500

Source: Conceptual Plan of Approved Mining plan& proposed by FAE's & EIA Coordinator

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well-planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.2 Species Recommended for Plantation

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

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

TABLE 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
1.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2.	Tamarindus indica	Tamarind	Edible & Medicinal and other Uses

3.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
4.	Borassus Flabellifer	Palmyra Palm	Tall Wind breaker tree and its fruits are edible

Source: Proposed by FAE's & EIA Coordinator

10.9 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

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

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

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

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

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

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE

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

A	Physical Check – up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

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

10.9.2 Proposed Occupational Health and Safety Measures –

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

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS

10.9.3 Health and Safety Training Programme

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

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation Ground control hazards Occupational health hazards Electrical hazards

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

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

10.9.4 Budgetary Provision for Environmental Management

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

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT

	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	29450	29450
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring	800000	50000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance - 6 Units	150000	15000
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governers @ Rs. 5000/- per Tipper/Dumper deployed - 3 Units	15000	750
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour	0	5000
	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Provision for 2 labours @ Rs.10,000/labour (Contractual) per Hectare	0	58900
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	20000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	430760

Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff managent	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	29450	5000
	2. Progressive Closure Activity Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	589000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 1800 Trees - (400 Inside Lease Area & 1400 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)	80000	12000
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	420000	42000
	4. Implementation of Final Mine Closure Actity as per Approved Mining Plan on Last Year	Few activities already covered as progressive closure activities as greenbelt development, wire fencing, garland drain. *For Final Closure Activities 15% of the proposed closure cost will be spent during the final mine closure stage - Last Year	89250	0
	5. Contribution towards Green Fund. As per TNMMCR 1959, Rule 35 A	The Contribution towards Green Funds @ 10% of Seigniorage fee are indicated as part of EMP Budge and not necessarily implemented in the Project Site	977494	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000
	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) -27 Employees	108000	27000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	27000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	5890
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	147250	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
CER	As per MoEF &CC OM 22-65/2017-IA.III Dated 25.02.2021	Detailed Description in following slides and Budget allocation is included as per MoeEF & CC OM	500000	0
TOTAL			**3028150**	**1630750**

In order to implement the environmental protection measures, an amount of Rs.30.28 lakhs as capital cost and recurring cost as Rs. 16.30 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	4658900
2nd Year	1712288
3rd Year	1797902
4th Year	1887797
5th Year	2071437

10.10 CONCLUSION

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

11. SUMMARY AND CONCLUSION

P. Aruldoss Rough Stone & Gravel Cluster (Extent: 6.94.5ha) falls under "B" category as per MoEF & CC Notification (S.O. 3977 (E)).

Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B- 1 and appraised by SEAC/ SEIAA as well as for cluster situation.

A detailed Draft EIA EMP Report is prepared for public and other stakeholders' suggestions and a final EIA/EMP Report will be prepared based on the outcome of Public Consultation.

Environmental monitoring and audit mechanism have been recommended before and after commencement of the project, where necessary, to verify the accuracy of the EIA predictions and the effectiveness of recommended mitigation measures.

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries and formulate the effective mitigation measures for each individual leases. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during the months Octo to Dec 2022 for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suitable mitigation measures for likely adverse impacts due to the proposed project is suggested individually for the proposed project under Chapter 10.

The project proponent ensures to obtain necessary clearances and quarrying will be carried out as per rules and regulations. The Mining Activity will be carried out in a phased manner as per the approved mining plan after obtaining EC, CTO from TNPCB, execution of lease deed and obtaining DGMS Permission and working will be carried out under the supervision of Competent Persons employed.

Overall, the EIA report has predicted that the project will comply with all environment standards and legislation after commencement of the project and operational stage mitigation measures are implemented.

Mining operations has positive impact on environment and socio economy such as landscape improvement, water as by-product, economy development and better public services, providing and supply of Rough Stone & Gravel as per market demand.

Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 27 people directly in the cluster and indirectly around 100 people.

As discussed, it is safe to say that the proposed quarries are not likely to cause any significant impact to the ecology of the area, as adequate preventive measures will be adopted to keep the various pollutants within the permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigate technique, as well as to serve as biological indicators for the pollutants released from the P. Aruldoss Rough Stone & Gravel Cluster (Extent: 6.94.5 ha)

12. DISCLOSURE OF CONSULTANT

P. Aruldoss Rough Stone & Gravel have engaged M/s Geo Exploration and Mining Solutions, an Accredited Organization under Quality Council of India – National Accreditation Board for Education & Training, New Delhi, for carrying out the EIA Study as per the ToR Issued and Standard ToR.

Name and address of the consultancy:
GEO EXPLORATION AND MINING SOLUTIONS
No 17, Advaitha Ashram Road,
Alagapuram, Salem – 636 004
Tamil Nadu, India
Email:infogeoexploration@gmail.com
Web: www.gemssalem.com
Phone: 0427 2431989.

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

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

Abbreviations

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

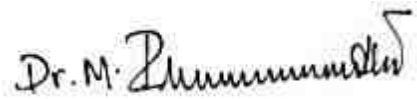
DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

Declaration by experts contributing to the Cluster EIA/EMP for P. Aruldoss Rough Stone & Gravel Quarry Project over a Cluster Extent of 6.94.5 ha in T.C.Kandigai Village of Tiruthani Taluk, Thiruvallur District of Tamil Nadu. It is also certified that information furnished in the above EIA study are true and correct to the best of our knowledge.

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

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

Designation**:** **EIA Coordinator**

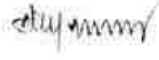
Date & Signature: 

Period of Involvement: **January 2022 to till date**

Associated Team Member with EIA Coordinator:

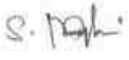
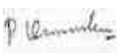
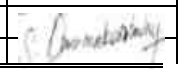
1. **Mr. S. Nagamani**
2. **Mr. Viswathanan**
3. **Mr. Santhoshkumar**
4. **Mr. S. Ilavarasan**

FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

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

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

LIST OF TEAM MEMBERS ENGAGED IN THIS PROJECT

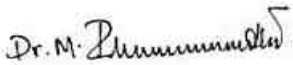
Sl.No.	Name	Functional Area	Involvement	Signature
1	Mr. S. Nagamani	AP; GEO; AQ	▪ Site Visit with FAE ▪ Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures ▪ Provide inputs on Geological Aspects ▪ Analyse & provide inputs and assist FAE with meteorological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

	Umamahesvaran		▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	
5	Mr. A. Allimuthu	SE	▪ Site Visit with FAE ▪ Assist FAE with collection of data's ▪ Provide inputs by analysing primary and secondary data	
6	Mr. S. Ilavarasan	LU; SC	▪ Site Visit with FAE ▪ Assisting FAE in preparation of land use maps ▪ Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
7	Mr. E. Vadivel	HG	▪ Site Visit with FAE ▪ Assist FAE & provide inputs on aquifer characteristics, ground water level/table ▪ Assist with methods of ground water recharge and conduct pump test, flow rate	
8	Mr. Panneer Selvam	EB	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above-mentioned Functional Area Experts and Team Members prepared the Cluster EIA/EMP for P. Aruldoss Rough Stone & Gravel Quarry Project over a Cluster Extent of 6.94.5 ha in T.C.Kandigai Village of Tiruthani Taluk, Thiruvallur District of Tamil Nadu. It is also certified that information furnished in the EIA study are true and correct to the best of our knowledge.

Signature& Date:



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

Designation: **Managing Partner**

Name of the EIA Consultant Organization: **M/s. Geo Exploration and Mining Solutions**

NABET Certificate No & Issue Date: **NABET/EIA/2225/RA 0276 Dated: 20-02-2023**
Validity: **Valid till 06.08.2025**

ANNEXURE

THIRU. P. ARULDOSS ROUGH STONE AND GRAVEL QUARRY

T.C. Kandikai Village, Thiruttani Taluk, Tiruvallur District

ToR obtained vide

Lr.No. SEIAA-TN/F.No. 8730/ToR- 1085/2021 Dated: 17.03.2022

CLUSTER EXTENT = 6.94.5 ha

Proponent Name & Address	Project Location	Extent
Thiru. P. Aruldoss, S/o. Ponnusamy, No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai– 600 048	S.F.No. 41/2, 66/1A (P), 66/1B and 66/8, T.C. Kandikai Village, Thiruttani Taluk, Tiruvallur District	2.94.5 ha

LIST OF ANNEXURES

THIRU. P. ARULDOSS CLUSTER		
Proposed Quarry		
P1 **Thiru. P. Aruldoss**	Copy of ToR	1A – 18A
	Copy of 500m Radius Letter & Mining plan approval letter	19A – 22A
	Copy of Approved Mining plan and Drawing	23A – 98A
	Baseline Data	99A-128A
	NABET Certificate	129A

TMT.P.RAJESWARI, I.F.S.,
MEMBER SECRETARY

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY – TAMIL NADU
3rd Floor, Panagal Maaligai,
No.1, Jeenis Road, Saidapet,
Chennai-15.
Phone No. 044-24359973
Fax No. 044-24359975

TERMS OF REFERENCE (ToR)

Lr No.SEIAA-TN/F.No.8730/ToR-1085/2021 Dated: 17.03.2022.

To

Thriu.P. Aruldoss
S/o. Ponnusamy
No.180/4, Ambethkar Street
Anna Nagar, Kolapakkam
Chengalpattu Taluk
Chennai-600048

Sir / Madam,

Sub: SEIAA, Tamil Nadu – Terms of Reference with public Hearing (ToR) for the proposed Rough stone & gravel quarry lease over an extent of 2.94.5Ha at S.F.Nos.41/2, 66/1A (P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu by Thiru. P.Aruldoss - 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/66597/2021 Dt.13.08.2021
2. Your application submitted for Terms of Reference dated: 23.08.2021.
3. Minutes of the 248th SEAC meeting held on 24.02.2022
4. Minutes of the 492nd Authority meeting held on 16.03.2022.

Kindly refer to your proposal submitted to the State Level Impact Assessment Authority for Terms of Reference.

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The proponent, Thiru. P.Aruldoss has submitted application for Terms of Reference (ToR) with public Hearing on 23.08.2021, in Form-I, Pre- Feasibility report for the proposed Rough stone & gravel quarry lease over an extent of 2.94.5Ha at S.F.Nos.41/2, 66/1A (P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu.

Discussion by SEAC and the Remarks:-

Proposed Rough stone & gravel quarry lease over an extent of 2.94.5 Ha at S.F.Nos.41/2, 66/1A (P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu by Thiru. P.Aruldoss - For Terms of Reference.

(SIA/TN/MIN/66597/2021 Dt.13.08.2021)

The proposal was placed in 248th SEAC meeting held on 24.02.2022. The details of the project furnished by the proponent are given in the website (parivesh.nic.in).

The SEAC noted the following:

1. The Project Proponent, Thiru.P.Aruldoss has applied for Terms for Reference for the proposed Rough stone & gravel quarry lease over an extent of 2.94.5 Ha at S.F.Nos.41/2, 66/1A (P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu.
2. The project/activity is covered under Category "B1" of Item 1(a) "Mining Projects" of the Schedule to the EIA Notification, 2006.
3. The Production for the five years states that total quantity should not exceed 1,65,677 m^3 of rough stone & 63,856 m^3 of gravel with a ultimate depth of mining is 19 m (2m above ground level + 17m below ground level) [4m gravel+15m Rough stone].

Based on the presentation made by the proponent and the documents furnished, SEAC decided to **recommend the proposal for the grant of Terms of Reference (TOR) with Public Hearing** for the total Production for the period of five years states that total quantity should not exceed 1,65,677 m^3 of rough stone & 63,856 m^3 of gravel with a ultimate depth of mining is 19 m (2m above ground level + 17m below ground level), Subject to the following TORs, in addition to the standard terms of reference for EIA study for non-coal mining projects and details issued by the MOEF & CC to be included in EIA/EMP Report:

1. The Proponent shall carry out the cumulative & comprehensive environmental impact assessment study due to mining operations carried out in the quarry cluster specifically with reference to the environment in terms of air pollution, water pollution, & health impacts, and

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accordingly the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.

2. The Proponent shall carry out the Socio Economic Impact Assessment study in the vicinity of the villages located in the proposed quarry.
3. 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,
    a) What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?
    b) Quantity of minerals mined out.
    c) Highest production achieved in any one year
    d) Detail of approved depth of mining.
    e) Actual depth of the mining achieved earlier.
    f) Name of the person already mined in that leases area.
    g) If EC and CTO already obtained, the copy of the same shall be submitted.
    h) Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.
4. 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).
5. 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.
6. The Project Proponent shall provide the details of geological 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 proposed mitigation measures for the same.
7. The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.
8. The Project Proponent shall conduct the hydro-geological study considering the contour map

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of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.

9. A detailed study shall be carried out in order to ascertain the status of existing trees (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.
10. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific, along with the exclusive photographs/images/plans showing the proposed closure activities conceptually..
11. The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.
12. The recommendation for the issue of "Terms of Reference" is subjected to the outcome of the Hon'ble NGT, Principal Bench, New Delhi in O.A No.186 of 2016 (M.A.No.350/2016) and O.A. No.200/2016 and O.A.No.580/2016 (M.A.No.1182/2016) and O.A.No.102/2017 and O.A.No.404/2016 (M.A.No.758/2016, M.A.No.920/2016, M.A.No.1122/2016, M.A.No.12/2017 & M.A. No. 843/2017) and O.A.No.405/2016 and O.A.No.520 of 2016 (M.A.No.981/2016, M.A.No.982/2016 & M.A.No.384/2017).
13. The purpose of Green belt around the project is to capture the fugitive dust emissions, carbon sequestration and to attenuate the noise generated, in addition to reduce the visual impacts. A wide range of indigenous plant species should be planted as given in the **appendix** in consultation with the DFO, State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.
14. Taller/one year old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted in proper spacing 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

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15. A Disaster management Plan shall be prepared and included in the EIA/EMP Report.
16. A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.
17. 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.
18. 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.
19. 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 Reference besides attracting the penal provisions as given in the Environment (Protection) Act, 1986.

Appendix

List of Native Trees for Planting

1. *Aegle marmelos* – Vilvam
2. *Adenaanthera pavonina* - Manjadi
3. *Albizia lebbeck* – Vaagai
4. *Albizia amara* - Usil
5. *Baulinia purpurea* - Mantharai
6. *Bauhinia racemosa* - Aathi
7. *Bauhinia tomentosa* – Iruvathi
8. *Buchanania aillaris* - Kattuma
9. *Borassus flabellifer* - Panai
10. *Butea monosperma* - Murukka maram
11. *Bobax ceiba* – Ilavu, Sevvilavu
12. *Calophyllum inophyllum* - Punnai
13. *Cassia fistula* - Sarakondrai
14. *Cassia roxburghii*- Sengondrai
15. *Chloroxylon sweitenia* - Purasa maram
16. *Cochlospermum religiosum* – Kongu, Manjal Ilavu

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17. *Cordia dichotoma* – Mookuchali maram
18. *Creteva adansonii* – Mavalingum
19. *Dillenia indica* – Uva, Uzha
20. *Dillenia pentagyna* – Siru Uva, Sitruzha
21. *Diospyros ebenum* - Karungali
22. *Diospyros chloroxylon* – Vaganai
23. *Ficus amplissima* – Kal Itchi
24. *Hibiscus tiliaceous* – Aatru poovarasu
25. *Hardwickia binata* – Aacha
26. *Holoptelia integrifolia* - Aayili
27. *Lannea coromandelica* - Odhiam
28. *Lagerstroemia speciosa* - Poo Marudhu
29. *Lepisanthus tetraphylla* - Neikottai maram
30. *Limonia acidissima* - Vila maram
31. *Litsea glutinosa* –Pisin pattai
32. *Madhuca longifolia* - Illuppai
33. *Manilkara hexandra* – Ulakkai Paalai
34. *Mimusops elengi* - Magizha maram
35. *Mitragyna parvifolia* - Kadambu
36. *Morinda pubescens* – Nuna
37. *Morinda citrifolia* – Vellai Nuna
38. *Phoenix sylvestre* - Eachai
39. *Pongamia pinnata* – Pungam
40. *Premna mollissima* – Munnai
41. *Premna serratifolia* – Narumunnai
42. *Premna tomentosa* - Purangai Naari, Pudanga Naari
43. *Prosopis cinerea* - Vanni maram
44. *Pterocarpus marsupium* - Vengai
45. *Pterospermum canescens* – Vennangu, Tada
46. *Pterospermum xylocarpum* - Polavu
47. *Puthranjiva roxburghii* – Puthranjivi
48. *Salvadora persica* – Ugaa Maram
49. *Sapindus emarginatus* - Manipungan, Soapu kai
50. *Saraca asoca* - Asoca
51. *Streblus asper* - Piraya maram
52. *Strychnos nuxvomica* – Yetti
53. *Strychnos potatorum* - Therthang Kottai
54. *Syzygium cumini* - Naval

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55. *Terminalia bellerica* - Thandri
56. *Terminalia arjuna* - Ven marudhu
57. Toona ciliate – Sandhana vembu
58. Thespesia populnea - Puvarasu
59. Walsura trifoliata – valsura
60. Wrightia tinctoria - Vep

Discussion by SEIAA and the Remarks:-

The subject was placed in the 492nd Authority meeting held on 16.03.2022. After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant Terms of Reference (ToR) along with Public Hearing 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 & normal condition in addition to the following conditions:

1. 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.
2. 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.
3. The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.
4. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.
5. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.
6. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.
7. The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.

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8. The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.
9. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.
10. The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.
11. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.
12. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.
13. The project proponent shall study and furnish the impact of project on plantations in adjoing patta lands, Horticulture, Agriculture and livestock.
14. The project proponent shall study and furnish the details on potential fragmentation impact of natural environment, by the activities.
15. 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.
16. 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.

A. 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.

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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.

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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

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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

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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

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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.

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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 refereneed 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.

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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 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 is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)

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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.

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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.

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Copy to:

1. The Additional Chief Secretary to Government, Environment & Forests Department, Govt. of Tamil Nadu, Fort St. George, Chennai - 9
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi 110032.
3. The Member Secretary, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai-600 032.

4. The APCCF (C), Regional Office, MoEF & CC (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungambakkam, Chennai -34.
5. Monitoring Cell, IA Division, Ministry of Environment, Forests & CC, Paryavaran Bhavan, CGO Complex, New Delhi 110003
6. The District Collector, Tiruvallur District.
7. The EO/BDO, T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District
8. Stock File.

From
Thiru.K.Vijayaragavan,M.Sc.,
Assistant Director,i/c
Dept. of Geology and Mining,
Tiruvallur District.

To
The Member Secretary,
State Level Environmental Impact
Assessment Authority, Tamil Nadu,
Chennai-15

Rc.No. 301/2019/G&M-2,dt.19.07.2021

Sir,

Sub: Mines and quarries-Minor Minerals-Tiruvallur District- Tiruttani taluk- T.C.Kandigai Village- Rough Stone and Gravel quarry -S.No. 41/2, 66/1A(P), 66/1B and 66/8 -over an extent of 2.94.5 hectares – Patta lands- Application of Thiru.P.Aruldoss- details of quarries situated around 500 metres under cluster-Reg.

Ref:
1) Assistant Director, Geology and Mining, Tiruvallur precise area notice in Rc.No. 301/2019/G&M-2,dt. 17.12.2020
2) Representation of Thiru.P.Aruldoss, Rough stone and Gravel quarry seeking details of mines/quarries around 500m radius from the above mines.

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This has reference to the representations of Thiru. P.Aruldoss, S/o.Ponnusamy, Chennai-48, I hereby inform that the number and extent of working and Non-working quarries around 500m from the periphery of the above mines is given as under:-

a) Details of Existing Quarries;-

Sl.No.	Name of the lessee	Village & Taluk	S.F.No.	Extent (in Hectrs)	Minerals	Remarks
1	Thiru.S.Sriram, S/o.C.Shanmuganathan, No.2, Lakshmipuram Extension-II, Mudichur Road, West Tambaram, Chennai-45.	T.C.Kandigai Village, Tiruttani taluk	58/2 (P)	2.00.0	Rough stone	Operation
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b) Details of Abandoned Quarries:-

Sl.No.	Name of the owner	Village & Taluk	S.F.No.	Extent (in Hectrs)	Minerals	Remarks
-NIL-						

c) Details of Expired Quarries

Sl.No.	Name of the Ex-lessee	Village & Taluk	S.F. No.	Extent (in Hectrs)	Minerals	Remarks
1	Thiru.R.Subramani, S/o.Rangasamy, No.126, Periyar Nagar,Tiruttani Village & Taluk, Tiruvallur District.	T.C.Kandigai Village, Tiruttani taluk	41/1 (P)	2.00.0	Rough stone	Lease period expired on 17.05.2021

d) Details of Proposed Quarries:-

Sl.No.	Name of the Applicant	Village & Taluk	S.F. No.	Extent (in Hectrs)	Minerals	Remarks
1	Thiru.P.Aruldoss, S/o.Ponnusamy, No.180/4, Ambedkar Street,Anna Nagar, Kolapakkam, Chengalpattu, Chennai-48	T.C.Kandigai Village, Tiruttani taluk	41/2, 66/1A (P), 66/1B and 66/8	2.94.5	Rough stone and Gravel	Fresh

15/12/21

Assistant Director i/c
Geology & Mining,
Tiruvallur.

Copy to:-
Thiru.P.Aruldoss,
S/o.Ponnusamy,
No.180/4, Ambedkar Street,
Anna Nagar,Kolapakkam,
Chengalpattu,Chennai-48

19/07/21

From
Thiru.K.Vijayaragavan,M.Sc.,
Assistant Director,
Geology and Mining,
Tiruvallur.

To
Thiru. P.Aruldoss,
S/o.Ponnusamy,
No.180/4, Ambedkar Street,
Anna Nagar, Kolapakkam,
Chengalpattu, Chennai-48.

Rc.No. 301/2019/G&M-2,dt. / .04.2021

Sir,

Sub: Mines and Quarries – Tiruvallur District – Tiruttani taluk – T.C.Kandigai Village – S.Nos. 41/2, 66/1A(P), 66/1B and 66/8-over an extent of 2.94.5 Hectrs- Patta lands- permission requested for Quarrying Rough stone and Gravel under rule 19(1) of Tamil Nadu Minor Mineral Concession Rules 1959 – applied by Thiru. P.Aruldoss- Mining Plan submitted for approval – **Mining Plan approved for 1st Five years** - directed to obtain Environmental clearance from State Level Environment Impact Assessment Authority, Tamil Nadu -Reg.

Ref:

1) Application of Thiru. P.Aruldoss, S/o. Ponnusamy, Chennai-48, dated 20.11.2019

2) Precise are notice issued by the Assistant Director, Geology and Mining, Tiruvallur in Rc.No.301 /2019/G&M-2, dated 17.12.2020.

3) Representation of Thiru. P.Aruldoss, S/o. Ponnusamy, Chennai-48, dated 25.02.2021.

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In the reference 1st cited, one Thiru. P.Aruldoss, S/o. Ponnusamy, Chennai-48, has applied for quarrying Rough stone and gravel from S.No. 41/2, 66/1A(P), 66/1B and 66/8 Patta lands of T.C.Kandigai village, Tiruttani taluk, Tiruvallur District under Rule 19(1) of Tamil Nadu Minor Mineral Concession Rules, 1959.

In this regard, based on the recommendations of the Revenue Divisional Officer, Tiruttani, Tahsildar, Tiruttani and joint inspection report submitted by the Assistant Geologist(G&M), Sub-Inspector of Survey(G&M) and Revenue Inspector(G&M),Tiruvallur, the above application was considered for quarrying Rough stone and Gravel from the above area under rule 19(1) of Tamil Nadu Minor Mineral Concession Rules,1959 for a period of **Ten years**

subject to certain conditions and precise area has been communicated to the applicant vide reference 2nd cited.

In exercise of the power delegated under Rule 42 of Tamil Nadu Minor Mineral Concession Rules, 1959, I hereby approve the mining plan submitted by Thiru. P.Aruldoss for the grant of lease to quarry Rough Stone and Gravel over an extent of 2.94.5 Hectares in S.F.No. 41/2, 66/1A(P), 66/1B and 66/8 patta lands of T.C.Kandigai Village, Tiruttani taluk, Tiruvallur District and the mineable reserves of Rough stone & Gravel after leaving safety distance is arrived as **1,65,677 m3 of Rough stone and 63,856 m3 of Gravel** for **first five years** upto a depth of 19 metre (2m above ground level + 17m below ground level). This approval is subject to the following conditions:-

i) That the Mining Plan is approved without prejudice to any other Law applicable to quarrying Rough stone and Gravel from time to time whether such laws are made by the Central Government/State Government or any other authority.

ii) The approval of the Mining Plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development and Regulation) Act, 1957 or any other connected laws inducling Forest (Conservation) Act, 1980 Forest Conservation Rules 1981, Environment Protection Act, 1980, Indian Explosives Act, 1884 (Central Act IV of 1884) and the rules made there under 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) The applicant is directed to submit the application in Form –I as prescribed by the MoEF along with the approved Mining Plan.

11/4/21

Assistant Director,
Geology and Mining,
Tiruvallur.

Encl: Approved Mining Plan

01/04/2021 01/04/21

MINING PLAN AND PROGRESSIVE QUARRY CLOSURE PLAN FOR T.C.KANDIKAI ROUGH STONE AND GRAVEL QUARRY

(PREPARED UNDER RULES 41 & 42 AS PER THE AMENDED UNDER TAMIL NADU MINOR MINERAL CONCESSION RULES, 1959)

Patta Land/ Lease period = Ten years

IN

LOCATION OF THE QUARRY LEASE APPLIED AREA

EXTENT	:	2.94.5 Ha
S.F.Nos.	:	41/2, 66/1A (P), 66/1B and 66/8
VILLAGE	:	T.C.KANDIKAI
TALUK	:	THIRUTTANI
DISTRICT	:	TIRUVALLUR
STATE	:	TAMIL NADU

FOR

APPLICANT

THIRU. P.ARULDOSS,
S/o. Ponnusamy,
No. 180/4, Ambedkar Street,
Anna Nagar, Kolapakkam,
Chengalpattu, Chennai,
Tamil Nadu State – 600 048.

PREPARED BY

Dr. P. Thangaraju, M.Sc., Ph.D.,
Qualified Person

No.17, Advaitha Ashram Road,
Alagapuram, Salem – 636 004.
Cell: +91 94422 78601 & 94433 56539.
E-Mail: infogeoexploration@gmail.com

P.Aruldoss,
S/o. Ponnusamy,
No. 180/4, Ambedkar Street,
Anna Nagar, Kolapakkam,
Chengalpattu, Chennai,
Tamil Nadu State – 600 048.

CONSENT LETTER FROM THE APPLICANT

The Mining Plan and Progressive Quarry Closure Plan in respect of T.C.Kandikai Rough stone and Gravel Quarry lease over an extent of 2.94.5 Ha in S.F.Nos. 41/2, 66/1A(P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu State has been prepared by

Dr. P. Thangaraju, M.Sc., Ph.D.,
Qualified Person

I request the Assistant Director, Department of Geology and Mining, Tiruvallur to make further correspondence regarding the modification of the Mining Plan with the said Qualified Person at his following address.

Dr. P. Thangaraju, M.Sc., Ph.D.,
No.17, Advaitha Ashram Road,
Alagapuram, Salem-636 004.
Cell: +91 94422 78601 & 94433 56539.

I hereby undertake that all the modifications, if any 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.

Signature of the Applicant

P.Aruldoss

Place: Chennai
Date: 18.12.2020

P.Aruldoss,
S/o. Ponnusamy,
No. 180/4, Ambedkar Street,
Anna Nagar, Kolapakkam,
Chengalpattu, Chennai,
Tamil Nadu State – 600 048.

DECLARATION OF THE APPLICANT

The Mining Plan and Progressive Quarry Closure Plan in respect of T.C.Kandikai Rough stone and Gravel Quarry lease over an extent of 2.94.5 Ha in S.F.Nos. 41/2, 66/1A(P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu State has been prepared in full consultation with me.

I have understood its contents and agree to implement the same in accordance with Laws, Rules and Act applicable to Quarry.

Signature of the Applicant

P.Aruldoss

Place: Chennai

Date: 18.12.2020

CERTIFICATE

Certified that I am, **Dr. P. THANGARAJU, M.Sc., Ph.D.,** having an office at Regd. Off. No. 17, Advaitha Ashram Road, Alagapuram, Salem – 636 004, holding a Post Graduate Degree in Geology (M.Sc. Geology) from Madras University, Chennai and I worked in the field of Geology in a role of Geologist.

Rule 15(I)(a) and (b) of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 stipulates the eligibility for preparing Mining plans as "(I)(a) a post graduate degree in Geology granted by a university established" and (I)(b) "Professional experience of five years of working in a supervisory capacity in the field of mining after obtaining the degree". Since my qualification and experience are satisfied the Rule (I)(a) and (I)(b) of 15 of the said Rules, I am eligible to prepare Mining Plans for both Major and Minor Minerals.

Accordingly, I am prepare this Mining Plan and Progressive Quarry Closure Plan in Respect of T.C.Kandikai Rough stone and Gravel Quarry in S.F.No. 41/2, 66/1A(P), 66/1B and 66/8 over an extent of 2.94.5ha of Patta land in T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur, Tamil Nadu State for **Thiru. P.Aruldoss,** S/o.Ponnusamy, residing at No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai, Tamil Nadu State – 600 048. Since the Mining Plan is prepared as per the provisions contained in Rule 15(I)(a) and (I)(b) of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016.

Signature of the Qualified Person

Dr.P.Thangaraju, M.Sc., Ph.D.,

Place: Salem

Date: 25.02.2021

Dr. P. Thangaraju, M.Sc., Ph.D.,
No.17, Advaitha Ashram Road,
Alagapuram, Salem – 636 004.
Cell: +91 94422 78601 & 94433 56539.

Assistant Director (G&M) Tiruvallur Tiruvallur District

CERTIFICATE FROM THE QUALIFIED PERSON

This is to certify that the Provisions of under Rules 41 & 42 as per the Amended under Tamil Nadu Minor Mineral Concession Rules, 1959 have been observed in the preparation of Mining Plan and Progressive Quarry Closure Plan for T.C.Kandikai Rough stone and Gravel Quarry lease over an extent of 2.94.5 Ha in S.F.Nos. 41/2, 66/1A(P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu State has been prepared for

Thiru. P.Aruldoss,
S/o. Ponnusamy,
No. 180/4, Ambedkar Street,
Anna Nagar, Kolapakkam,
Chengalpattu, Chennai,
Tamil Nadu State – 600 048.

Whenever specific permissions / exemptions / relaxations and approvals are required, the Applicant will approach the concerned authorities of the Assiatant Director, Department of Geology and Mining, Tiruvallur, Tamil Nadu for such permissions/ exemptions / relaxations and approvals.

It is also certified that information furnished in the above Mining plan are true and correct to the best of my knowledge.

Signature of the Qualified Person

Dr.P.Thangaraju, M.Sc., Ph.D.,

Place: Salem
Date: 25.02.2021

Dr. P. Thangaraju, M.Sc., Ph.D.,
No.17, Advaitha Ashram Road,
Alagapuram, Salem-636 004.
Cell: +91 94422 78601 & 94433 56539.

Assistant Director (G&M) Tiruvallur Tiruvallur District

CERTIFICATE FROM THE QUALIFIED PERSON

Certified that the Provisions of Mines Act, Rules and Regulations and Orders made there under have been observed in the preparation of Mining Plan and Progressive Quarry Closure Plan for T.C.Kandikai Rough stone and Gravel Quarry over an extent of 2.94.5 Ha in S.F.Nos. 41/2, 66/1A(P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu State has been prepared for

Thiru. P.Aruldoss,
S/o. Ponnusamy,
No. 180/4, Ambedkar Street,
Anna Nagar, Kolapakkam,
Chengalpattu, Chennai,
Tamil Nadu State – 600 048.

Whenever specific permissions / exemptions / relaxations and approvals are required, the Applicant will approach the concerned authorities of Director General of Mines Safety (DGMS), No. 5, IInd Street, Block – AA, Anna Nagar, Chennai-40, Tamil Nadu for such permissions/exemptions/relaxations and approvals.

It is also certified that information furnished in the mining plan are true and correct to the best of my knowledge.

Signature of the Qualified Person

Dr.P.Thangaraju, M.Sc., Ph.D.,

Place: Salem
Date: 25.02.2021

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4.	Copy of Patta	IV
5.	Copy of A-Register	V
6.	Copy of Adangal	VI
7.	Copy of Consent Document	VII
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2.	TOPOSKETCH OF QUARRY LEASE APPLIED AREA FOR 10KM RADIUS	IA
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MINING PLAN ALONG WITH PROGRESSIVE QUARRY CLOSURE PLAN FOR T.C.KANDIKAI ROUGH STONE AND GRAVEL QUARRY OVER AN EXTENT OF 2.94.5Ha IN T.C.KANDIKAI VILLAGE, THIRUTTANI TALUK, TIRUVALLUR DISTRICT, TAMIL NADU

(PREPARED UNDER RULES 41 & 42 AS PER THE AMENDED UNDER TAMIL NADU MINOR MINERAL CONCESSION RULES, 1959)

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

The Mining Plan and Environmental Management plan is prepared for **Thiru. P.Aruldoss,** S/o. Ponnusamy, residing at No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai, Tamil Nadu State – 600 048.

The applicant applied to quarry Rough stone and Gravel for over an extent of 2.94.5 Ha of Patta Lands in S.F.Nos. 41/2, 66/1A(P), 66/1B and 66/8 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District for a period of Ten Years under Rule 19 (1) of Tamil Nadu Minor Mineral Concession Rules, 1959.

The application was processed by the Assistant Director, Department of Geology and Mining, Tiruvallur and passed a Precise Area Communication letter vide **Rc.No. 301/2019/Mines.2, Dated:17.12.2020** to submit Mining Plan for obtain approval from Department of Geology and Mining, Tiruvallur and obtain Environmental Clearance from the State Level Environment Impact Assessment Authority, Tamil Nadu with the following conditions to provide (Annexure No. I):

1. The applicant should be submitted the approved mining plan, Environmental Clearance from the State Level Environment Impact Assessment Authority and Consent to operation from the Tamil Nadu Pollution Control Board within the time stipulated as per Rules 41 and 42 of Tamil Nadu Minor Mineral Concession Rules, 1959 for the quarry lease applied area as earmarked in the F.M.B Sketch for quarrying Rough Stone and Gravel for the period of 10 years from the date of execution of lease deed.
2. As per amended rules 41 and 42 of Tamil Nadu Minor Mineral Concession Rules, 1959 if the applicant failed for submission within three months from the date of grant of precise area communication letter appropriate action will be taken as per Rules.
3. The applicant should be commencement the quarry operation after submitted the above said documents also executed the quarry lease deed. If any violation pointed out appropriate action will be taken as per Rule 36(A) of Tamil Nadu Minor Mineral Concession Rules, 1959.

4. The applicant should be obtained the prior consent from the concerned department for transport the quarried out materials through him heavy vehicles passes through the Government lands and Forest lands situated on the adjacent to the applied area.
5. Quarrying operation should be carried out without hindrance to the Public and Transportation.
6. The applicant should not quarry other than the permitted minerals.

In order to ensure compliance of the order of the Honourable Supreme Court Dated: 27.02.2012 in I.A.No.12.13.2011 in Special Leave Petition SLP (C) No 19628-19629/2009, it has been now decided that all mining projects of minor minerals including their renewal irrespective of sizes of the lease would hence forth require prior environmental clearance mining project within the lease applied area up to less than 100Ha including projects or minor mineral with lease applied area less then 5Ha would be treated as category B as defined in the EIA notification 2006 and will be considered by the state notified by MoEF & CC as prescribed procedure under EIA notification 2006.

In the above circumstances the applicant through his consultant is hereby preparing the Mining Plan along with Progressive Quarry Closure Plan for approval and subsequent submission of Form-I, Form-IM and Pre feasibility report to obtain environmental clearance from the SEIAA, Tamil Nadu, Rough stone and Gravel quarry. This mining plan is prepared by considering the Rules 41 & 42 as Amended in Tamil Nadu Minor Mineral Concession Rules, 1959 and as per the EIA Notification 2006 and its subsequent Amendment and judgments till 24.01.2019.

Short Notes of Mining plan:

a. Village Panchayat - T.C.Kandikai

b. Panchayat Union - Thiruttani

c. The Geological Resources are **14,70,840m^3** of Rough stone, and **1,19,920m^3** of Gravel formation in the entire area.

d. The Total Mineable Reserves are **3,40,887m^3** of Rough stone and **63,856m^3** of Gravel formation in the entire area.

e. The proposed quantity of reserves/ (level of production) to be mined are **1,65,677m^3** of Rough stone and **63,856m^3** of Gravel formation for first five years and **1,75,210m^3** of Rough stone formation for last five years in the entire area.

f. Total extent of the lease applied area is about 2.94.5 Ha.

g. Topography of the area = The area is exhibits elevated terrain

h. Depth of mining = 54m (4m Gravel + 50m Rough Stone) {2m above ground level + 52m below ground level}.

i. Lease Period = Ten years.

j. This Mining Plan period = First Five Years

k. It is a fresh lease application. No existing quarry pit.

l. Method of mining / level of mechanization.

Opencast mechanized method, the quarry operation involves shallow jack hammer drilling, slurry blasting.

m. Type of machineries proposed in the quarrying operation is given below.

Excavators attached with rock breaker (Rental Basis).

Jack hammer, Compressor (Diesel drive) (4 Jack Hammer capacity) (Rental Basis).

n. No trees will be uprooted due to this quarry operation.

o. The approach road from the main road to quarry will be constructed and maintained in a good condition for the haulage of Blue metals and machineries.

p. There is No Export of this Rough stone and Gravel.

q. Topo sketch covering 10Km and 1Km radius around the proposed area with markings of habitations, water bodies including streams, rivers, roads, major structure like bridges, wells, archeological importance, and place of worship is marked and enclosed as Plate No. IA and IB.

r. The lease applied area is about 2.94.5 Ha bounded by ten corners; the corners are designated as 1-10 clock-wise from the Southwestern side and the Co–ordinates for all the corners are clearly marked in the Quarry Lease and Surface Plan enclosed as Plate No-II.

s. The plans of proposed quarrying area showing the dimensions of the pit, their proposed depth and maximum area of proposed quarrying are marked in the Topography, Geological Plan and sections enclosed as Plate No. III.

t. The General conditions will not applicable for the proposed area. Based on the EIA Notification 2006 the general condition shall apply except mining of minor minerals category B2 (upto 5Ha of mining lease applied area)The area applied for quarry lease is 10Km away from the,

i) Protected area under wild life protection ACT, 1972,

ii) Critically polluted areas as identified by CPCB,

iii) Notified Eco sensitive areas.

u. The Interstate Boundary (Andra Pradesh – Tamil Nadu) is situated about 6km on the Northwestern side of the lease applied area.

v. There is no wastage anticipated during this quarry operation, hence waste dump is not proposed in the lease applied area.

w. Around 27 employees are deploying in the quarrying operation.

x. Total Cost of the project is about **Rs.1,00,68,000/-.**

y. Infrastructures around the quarry lease applied area are given below table:

Table – 1

Particulars	Location	Approximate aerial distance from lease applied area.
Nearest Post Office	T.C.Kandikai	1km – NE
Nearest School	T.C.Kandikai	1km – NE
Nearest Dispensary	Sholinghur	7km – SW
Nearest Town	Thiruttani	15km – NE
Nearest Police Station	Thiruttani	15km – NE
Nearest govt. Hospital	Sholinghur	7km – SW
Nearest D.S.P. Office	Thiruttani	15km – NE
Nearest Railway Station	Thiruttani	15km – NE
Nearest Airport	Chennai	89km – East
Nearest Seaport	Chennai	89km – East
District Head quarters	Tiruvallur	47km – East

Assistant Director (G&M) Tiruvallur District

2.0 GENERAL INFORMATION

2.1 a) Name of the Applicant : **Thiru. P.Aruldoss,**
: S/o. Ponnusamy

b) Address of the Applicant (With Phone No and Aadhaar No.)

Address	:	No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai.
Pin Code	:	600 048
Mobile No	:	+91 99403 52888
Aadhaar No	:	6702 4660 2039 (Refer Annexure No. VIII)
Email ID	:	aruldossquarry@gmail.com

c) Status of the Applicant (Individual / Company / Firm):

The applicant is an individual.

2.2 a) Mineral which the Applicant intends to mine:

The Applicant intends to quarry Rough stone and Gravel.

b) Precise area communication letter details received from the Competent Authority of the Government:

The precise area communication letter was received from the Assistant Director, Department of Geology and Mining, Tiruvallur vide **Rc. No. 301/2019/Mines.2, Dated: 17.12.2020** to submit approved mining plan and obtain Environmental Clearance from the SEIAA, Tamil Nadu (Refer Annexure No. I).

c) Period of permission / lease to be granted:

Ten Years.

d) Name and address of the Qualified Person who preparing the Mining Plan:

Name	:	**Dr.P.Thangaraju, M.Sc., Ph.D.,** Qualified Person
Address	:	Reg. No.17, Advaitha Ashram Road, Alagapuram, Salem District – 636 004.
Telephone	:	0427- 2431989 (Office)
Cell No	:	+91 94422 78601 & 94433 56539
Email	:	infogeoexploration@gmail.com

(Refer Annexure Nos. IX and X).

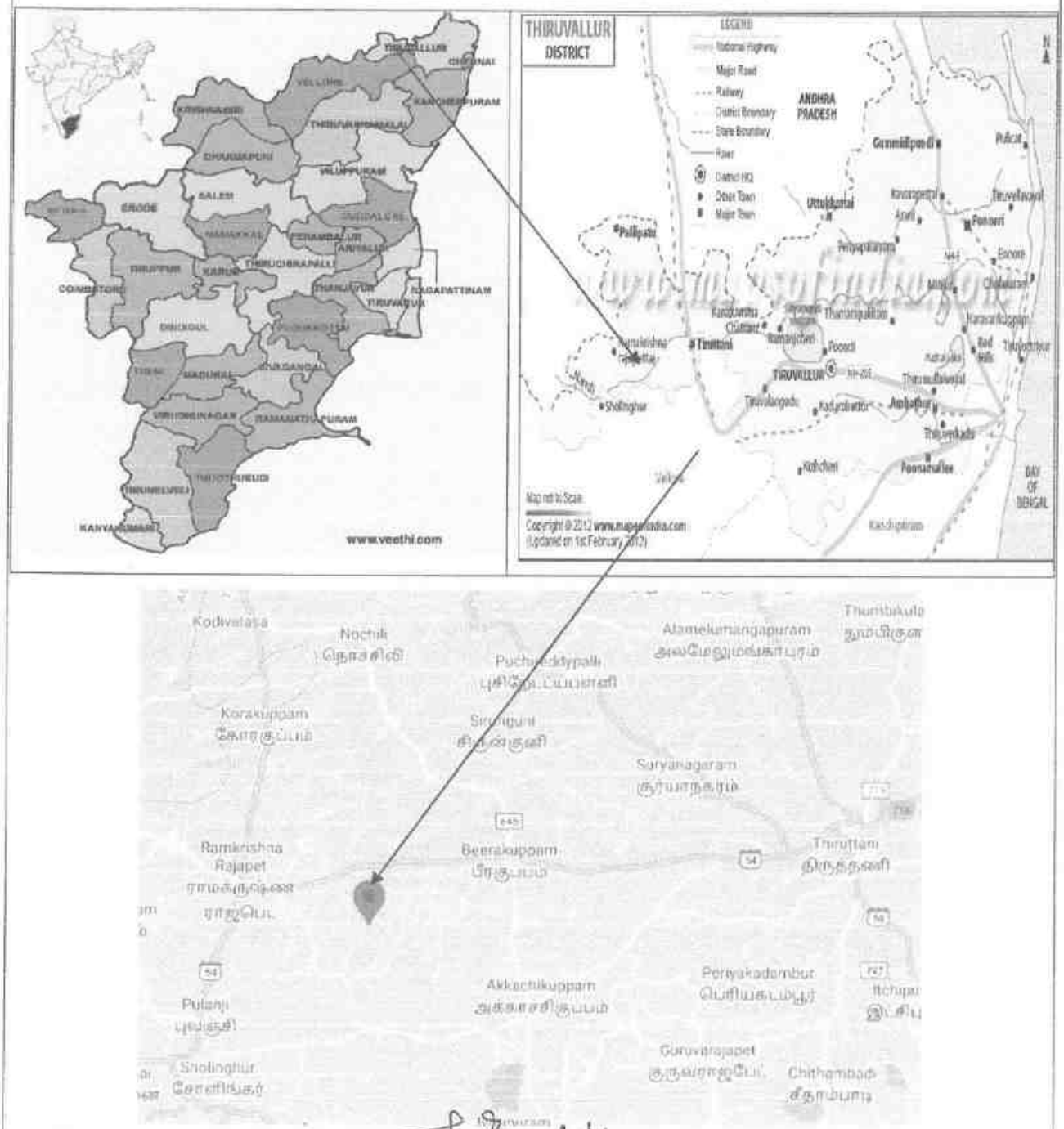
3.0 LOCATION

a) Details of the area with location map:

The lease applied area is located about 47km Western side of Tiruvallur town, 15km Western side of Thiruttani town and 1km Southwest of T.C.Kandikai Village.

Tiruvallur —32km West→ Thiruttani —14km West→ T.C.Kandikai —1km Southwest→ Lease applied area

Location Map of the Lease Applied area



Assistant Director
Dept. of Geology & Mining
Tiruvallur District.
@ Tiruvallur.

01/04/2021

36 A

Table – 2

District	Taluk	Village	S.F. No.	Area in Ha.	Patta No.	Classification
Tiruvallur	Thiruttani	T.C.Kandikai	41/2	0.50.5	895	Patta land (Refer Annexure No. IV to VII)
			66/1A(P)	0.46.0		
			66/1B	0.90.5		
			66/8	1.07.5	893	
Total Extent				**2.94.5**		

b) Classification of the area (Ryotwari/ Poramboke / others):

It is a Patta land (Ryotwari).

c) Ownership / Occupancy of the applied area (surface right):

It is Patta lands Registered in the name of Company (A.G. Foundations Pvt ltd) vide Patta No. 895 and 893. The applicant has obtained consent from the Pattadhar. Refer Annexure Nos. IV to VII.

d) Toposheet No. with latitude and longitude:

The lease applied area falls in the Toposheet No: **57-O/08** Latitude between: **13°09'15.82"N** to **13°09'22.89"N** and Longitude between: **79°28'24.73"E** to **79°28'31.68"E** on WGS datum-1984. Please refer the Plate Nos. I to II.

e) Existence of public road / Railway line, if any nearby and approximate distance:

The approach road is situated on the Northern side of the applied area which connects to the State Highway (58) road situated at 1.7km on the Northwestern side.

Multiple road access is available from the quarry to state highways and National Highway, no towns are enrooted hence the traffic density is not much more due to the transportation of Rough stone and Gravel.

The approach road from the quarry will be constructed, the same will be utilized for haulage and maintained during the entire lease period, tree sapling will be planted on the either side of the road to prevent dust and noise propagation to the nearby areas.

The Nearest Railway line is Chennai - Vellore which is about 15km on the Southeastern side of the area.

PART – A

4.0 GEOLOGY AND MINERAL RESERVES

4.1 Brief description of the Topography and general Geology of the area (with plans):

The lease applied area is slightly elevated terrain. The gradient is gentle towards Southwestern side and altitude of the area is 154m above from Mean sea level. The area is covered by 4m thickness of Gravel and followed by Massive Charnockite which is clearly inferred from the nearby existing pits. The Water level in the surrounding area is 59m in summer and at 55m in rainy seasons below general ground profile which is observed from the nearby bore wells. Average annual rainfall is about 1139mm.

Images of T.C.Kandikai Rough Stone and Gravel Quarry lease applied area

Peninsular gneiss forms the oldest rock formations, in which the massive formation of Charnockite lies over with rich accumulation of recent quaternary formation. On regional scale the Charnockite body N30°W – S30°E with dipping towards SW60°.

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

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

4.2 Details of exploration already carried out if any:

State Geology and Mining Dept, Govt. of Tamil Nadu, has carried out the Regional prospecting and exploration in these areas during 1992 to 1993.

Geological Survey of India has carried out detailed mapping in Tiruvallur District. Besides, the Qualified Person and his team members made a detailed geological study of the proposed area. The Rough stone formation is clearly inferred from the nearby existing.

4.3 Estimation of Reserves:

a) Geological reserves with geological sections on a scale of 1:1000 / 1:2000

As far as Rough stone (Charnockite) is concerned, the only practical method is the systematic geological mapping and delineation of Rough stone within the field and careful evaluation of body luster, physical properties, engineering properties, commercial aspects etc.,

Totally three sections have been drawn, one section is drawn Length wise as (X-Y) and another two sections are drawn Width wise as (A-B) & (C-D) to cover the maximum area considered for lease up to 59m depth.

The Topographical, Geological plan and sections demarcated the commercial marketable Rough stone (Charnockite) deposit has been prepared in the scale of Plan and Sections 1:1000 (please refer the Geological plan and sections Plate No- III). As the sale of Rough stone are in terms of cubic meters (Volume) only and not in terms of tonnage.

Geological Resources (Plate No. III):

The Geological Resources of Rough Stone and Gravel Quarry are calculated upto a maximum depth of 54m {2m above ground level + 52m below general ground level}. The total Geological resources are given table below:

Table – 3

GEOLOGICAL RESOURCES						
Section	**Bench**	**Length in (m)**	**Width in (m)**	**Depth in (m)**	**Geological Resources of Roughstone in (m^3)100%**	**Gravel (m^3)**
XY-AB	I	80	176	4		56320
	II	80	176	3	42240	
	III	80	176	5	70400	
	IV	80	176	5	70400	
	V	80	176	5	70400	
	VI	80	176	5	70400	
	VII	80	176	5	70400	
	VIII	80	176	5	70400	
	IX	80	176	5	70400	
	X	80	176	5	70400	
	XI	80	176	5	70400	
	Total				**675840**	**56320**
XY-CD	I	106	150	4		63600
	II	106	150	5	79500	
	III	106	150	5	79500	
	IV	106	150	5	79500	
	V	106	150	5	79500	
	VI	106	150	5	79500	
	VII	106	150	5	79500	
	VIII	106	150	5	79500	
	IX	106	150	5	79500	
	X	106	150	5	79500	
	XI	106	150	5	79500	
	Total				**795000**	**63600**
Grand Total					**1470840**	**119920**

Total Geological Resources of Gravel : **1,19,920m^3**

Total Geological Resources of Rough Stone : **14,70,840m^3**

Mineable Reserves:

The mineable reserves are calculated after leaving the safety distance and Bench loss.

Table – 4

MINEABLE RESERVES						
Section	**Bench**	**Length in (m)**	**Width in (m)**	**Depth in (m)**	**Mineable Reserves of Roughstone in (m^3)100%**	**Gravel (m^3)**
XY-AB	I	58	118	4	-	27376
	II	58	118	3	20532	-
	III	53	108	5	28620	-
	IV	48	98	5	23520	-
	V	43	88	5	18920	-
	VI	38	78	5	14820	-
	VII	33	68	5	11220	-
	VIII	28	58	5	8120	-
	IX	23	48	5	5520	-
	X	18	38	5	3420	-
	XI	13	28	5	1820	-
	Total				**136512**	**27376**
XY-CD	I	96	95	4	-	36480
	II	96	95	5	45600	-
	III	91	85	5	38675	-
	IV	86	75	5	32250	-
	V	81	65	5	26325	-
	VI	76	55	5	20900	-
	VII	71	45	5	15975	-
	VIII	66	35	5	11550	-
	IX	61	25	5	7625	-
	X	56	15	5	4200	-
	XI	51	5	5	1275	-
	Total				**204375**	**36480**
Grand Total					**340887**	**63856**

Total Mineable Reserves of Gravel @ 100% : 63,856m^3

Total Mineable Reserves of Rough Stone @ 100% : 3,40,887m^3

The mineable reserves have been computed as **3,40,887m^3** of Rough stone and **63,856m^3** of Gravel at the rate of 100% recovery upto a depth of 54m (2m above ground level + 52m below ground level) for a period of Ten Years for Rough stone and Gravel.

5.0 MINING

5.1. Method of mining (opencast / underground):

Open cast Mechanized Mining is being carried out with 5.0 meter vertical bench with a bench width is not less than the bench height.

However, as far as the quarrying of Rough stone is concerned, observance of the provisions of Regulation 106 (2) (b) as above is seldom possible due to various inherent petro genetic factors coupled with mining difficulties. Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Director of Mines Safety for which necessary provision is available with the Regulation 106 (2) (b) of MMR-1961, under Mine Act - 1952.

5.2. Mode of working (mechanized, semi mechanized, manual):

The Rough Stone is proposed to quarry at 5m bench height & width with conventional Opencast Mechanized Method.

The quarry operation involves shallow jack hammer drilling, slurry explosives in blasting, excavation, Loading and transportation of Rough stone to the needy crusher.

The production of Rough stone in this quarry involves the following method which is typical for Rough Stone quarrying in contrast to other major mineral mining.

Splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pithead to the needy crushers.

Occasionally hydraulic excavators are attached with rock breakers for fragmentation to avoid secondary blasting. The primary boulders thus splitted are removed from the pits by excavators and further made to smaller sizes by rock breakers attached in excavators. It is a conventional opencast mechanized method of mining.

5.3. Proposed Bench Height and Width:

The bench height is proposed 5.0 meter vertical bench in Rough stone of the bench is not less than the Height.

5.4. Indicate the overburden / mineral production expected pit wise as detailed below (composite plan and section showing pit layout, dumps, disposal of waste if any etc.):

The overburden is in the form of Gravel formation. The quarried out Gravel will be directly loaded into tippers for the filling and levelling of low lying areas, this will be done only after obtaining permission and paying necessary seigniorage fee to the Government. The excavated Rough stone will be directly loaded into tippers to the needy customers. The Composite year wise Development and production plan and sections indicating the Pit lay out, Green belt development are shown in Plate No – III.

Year wise Development and Production Table

Table – 5

FIRST FIVE YEAR PRODUCTION DETAILS							
Section	Year	Bench	Length in (m)	Width in (m)	Depth in (m)	Recoverable Reserve of Roughstone in(m^3)100%	Gravel (m^3)
XY-AB	I	I	58	118	4		27376
		II	58	118	3	20532	
XY-CD		I	24	95	4		9120
		II	18	95	5	8550	
		III	13	85	5	5525	
		Total				**34607**	**36496**
	I	I	40	95	4		15200
		II	40	95	5	19000	
		III	40	85	5	17000	
		Total				**36000**	**15200**
	III	I	32	95	4		12160
		II	38	95	5	18050	
		III	38	85	5	16150	
		Total				**34200**	**12160**
	IV	IV	86	75	5	32250	
		Total				**32250**	
XY-AB	V	III	53	108	5	28620	
		Total				**28620**	
Grand Total						**165677**	**63856**

The Recoverable reserves have been computed as **1,65,677m^3** of Rough stone and **63,856m^3** of Gravel for first five years at the rate of 100% recovery upto a depth of 19m [RL.154m to RL.135m] (2m above ground level + 17m below ground level).

Table – 5A

SECOND FIVE YEAR PRODUCTION DETAILS						
Section	Year	Bench	Length in (m)	Width in (m)	Depth in (m)	Recoverable Reserve of Roughstone in (m^3)100%
XY-AB	VI	IV	48	98	5	23520
		V	43	88	5	18920
		Total				**42440**
XY-CD	VII	VI	38	78	5	14820
		V	81	65	5	26325
		Total				**41145**
XY-AB	VIII	VI	76	55	5	20900
		VII	33	68	5	11220
		Total				**32120**
XY-CD	IX	VII	71	45	5	15975
		VIII	66	35	5	11550
		Total				**27525**

	X	IX	61	25	5	7625
		X	56	15	5	4200
		XI	51	5	5	1275
XY-AB		VIII	28	58	5	8120
		IX	23	48	5	5520
		X	18	38	5	3420
		XI	13	28	5	1820
		Total				**31980**
Grand Total						**175210**

The Recoverable reserves have been computed as **1,75,210m^3** of Rough stone for second five years at the rate of 100% recovery upto a depth of 40m [RL.140m to RL.100m] (40m below ground level) form the existing ground profile. The ultimate depth is 54m (2m above ground level + 52m below ground level) for the lease period of ten years.

The applicant ensures the total quantity proposed in the benches will not exceed during the quarrying operation. Besides the rough stone locked up in benches will be exploited after obtaining necessary permission from the office of Director General of Mine Safety, Chennai region by submitting relevant documents, appropriate safety plans and its Mitigation measures.

One lorry load	=	6m^3 (approx.)
Total No of Working days	=	300 Days per year
Total quantity to be removed in this Ten Years plan period	=	3,40,887m^3
Hence total Lorry loads per day	=	3,40,887m^3/6m^3
	=	56,815 Lorry loads
	=	56,815/10 years
	=	5,682/300
Rough Stone	=	**18 – 19** Lorry loads per day
Lorry loads per day (Gravel)	=	63,856m^3/6m^3
	=	10,643 Lorry loads
	=	10,643/3 years
	=	3,548/300
Gravel	=	**11 – 12** Lorry loads per day

Working hours = 8.30 am to 5.30 pm (with 12.30-1.30 P.M. lunch break)

5.5. Machineries to be used:

For Mining:

The following machineries are utilized on rental basis for the development and production work at this quarry.

I. DRILLING MACHINE:

Table – 6

S.No.	Type	Nos	Dia Hole mm	Size Capacity	Motive power
1	Jack hammer	6	30-35	1.2m to 2.0m	Compressed air
2	Compressor	2	-	400 psi	Diesel Drive

II. EXCAVATION & LOADING EQUIPMENT:

S.No.	Type	Nos	Capacity	Motive Power
1	Excavator with Bucket and Rock Breaker	1	300	Diesel Drive

III. HAULAGE WITHIN THE MINE & TRANSPORT EQUIPMENT:

S.No.	Type	Nos	Capacity	Motive Power
1	Tippers	3	20 tonnes	Diesel Drive

5.6. Disposal of Overburden/Waste:

The overburden is in the form of Gravel formation. The quarried out Gravel will be directly loaded into tippers for the filling and levelling of low lying areas. The excavated rough stone will be directly loaded into tippers to the needy customers. Hence, there is no Waste anticipated and disposal of waste does not arise.

5.7. Brief note on conceptual mining plan for the entire lease period base on the geological, mining and environmental considerations:

Conceptual mining plan is prepared with an object of long term systematic development of benches, layouts, selection of permanent structures, depth of quarrying and ultimate pit dimensions, selection of sites for construction of infrastructure, etc.,

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

As the applicant has applied quarry lease for Ten Years, the ultimate pit limit (dimension) at the end of this mining plan period is given below:

Table – 7

Length (Max) (m)	Width (Max) (m)	Depth (Max) (m)
154	119	54m (2m AGL + 52m BGL) [R.L.154m to R.L.100m]

All the base line information studies like Air quality monitoring, Noise and vibration monitoring, Water analysis studies will be carried out every year as per the MoEF & CC Norms. Please refer Plate No. III & IV.

It is propose to engage any local institution to monitor the EIA and EMP during the course of quarrying operation after the grant of quarry lease.

There is no waste anticipated during the entire life of quarry. Hence, backfilling is not possible in this quarry. The quarry pit will be allowed to collect the seepage and rain water and the water storage will be kept as reservoir to charging the nearby wells and will be utilized for greenbelt development. When the quarry reaches its ultimate pit limit or at the end of life of quarry, suitable soil type will be brought from outside and preserved over the quarried out top benches to facilitate the greenbelt development. The quarry area will be fenced with barbed wire fencing also safety bund constructed around the quarry to prevent inadvertent entry of public and cattle (Refer plate no. IV and V).

6.0 BLASTING

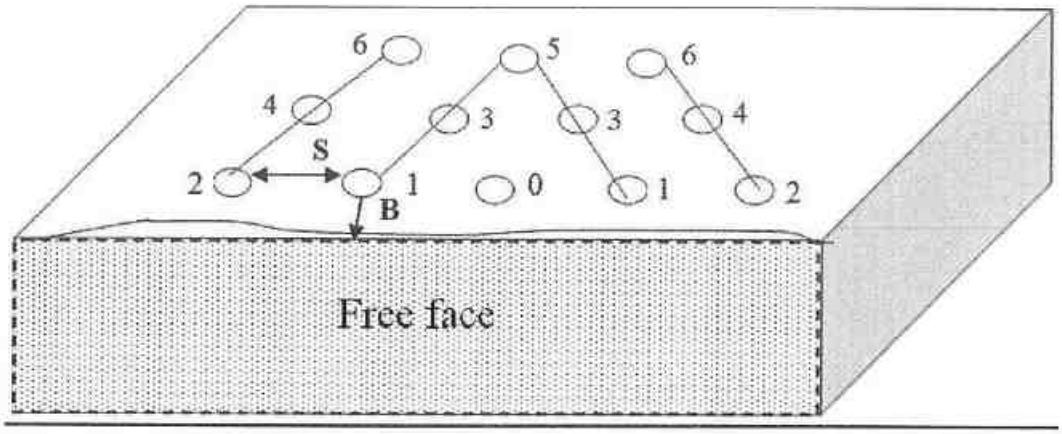
6.1 Blasting pattern:

The quarrying operation is proposed to carried out by Mechanized Opencast Method in conjunction with conventional method of mining using Jack hammer drilling and blasting of shattering effect for loosen the Rough stone.

Drilling and blasting parameters are as follows:

Depth of Each hole	:	1.5m
Diameter of hole	:	30-32mm
Spacing between holes	:	1.2m
Burden for hole	:	1.0m
Pattern of hole	:	Zigzag – Multi-rows
Inclination of holes	:	80^0 from horizontal
Use of delay detonators	:	25millisecond relays
Detonating fuse	:	"Detonating" Cord

BLASTING PATTERN DRAWING



Staggered "V" Pattern of Blasting Design

Spacing	=	**1.2m**
Burden	=	**1.0m**
Depth of the hole	=	**1.5m**
No of holes proposed per day=		**98 Holes**

6.2 Type of explosives to be used:

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 or primary blasting is proposed.

6.3 Measures proposed to minimize ground vibration due to blasting:

The quarry is situated more than 300m away from the nearby villages, Controlled blasting measures is being adopt for minimizing ground vibration and fly rock.

Shallow depth jackhammer drilling & blasting is proposed to be carried out with minimum use of explosive mainly to give heaving effect in rough stone for easy excavation and to control fly rock.

Delay detonators:

Delay blasting (millisecond delays) permits to divide the shot in 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	= 98 Holes
Yield	= 294 Tons
Powder factor	= 6 Tons/Kg of explosives
Total explosive required	= 49 Kg-Slurry explosives
Charge/ hole	= 0.5 Kg
Blasting at day time only	= 12.30 P.M – 1.00P.M.(whenever required)

6.4 Storage and safety measures to be taken while blasting:

The applicant will engage authorized explosive agency to carry out the small amount of blasting and it will be supervised by competent and statutory foreman/Permit Mines Manager. The explosives agencies should be have the valid Blaster certificate. He will blast holes in the quarry site. After the completion of Blasting the explosives Agencies will take it out back the remaining quantity of Explosives. The magazine is available at the quarry site to temporarily store the explosives.

7.0 MINE DRAINAGE

7.1 Depth of water table (based on nearby wells and water bodies):

From the Geo physical investigation, it has been inferred that the lease applied area's has poor ground water potential. The water table in the area is about 59m in summer season and 55m in Rainy season which is observed from the existing private boreholes. The lease area is fully covered by Massive Charnockite formation. Hence the Ground Water problem will not arise. If water seepage may occur due to the fracture, the same will be used for Greenbelt.

Table – 8

Type	Distance & Direction	Location
Bore Well	500m Southwest side	13°09'15.75"N 79°28'09.89"E

7.2 Arrangements and places where the mine water is finally proposed to be discharged:

The quarry operations are confined to well above the water table during the entire lease period. If water is encountered at quarry due to rain water and seepage, the same will be pumped out by 5HP water pump and discharge to the Green belt development areas. Besides, the water will also be used for dust suppression on haul roads during Haulage of machineries.

8.0 OTHER PERMANENT STRUCTURES (also shown in the map)

8.1 Habitations/ Villages natham:

There is no approved habitation within 300m radius from the lease applied area.

8.2 Power Lines (HT/LT):

EB Line (LT) is situated on the Western and Southern side of the lease applied area. Hence, 50m safety distance has been provided. There is no other EB(LT/HT) line or Housing area situated within 50m radius of the area.

8.3 Water bodies (river, pond, lake, odai, canal, etc.,):

There is no other River, Pond, Canal, Reservoir located within 50m radius of the area.

8.4 Archaeological / historical monuments:

There is no Archaeological / historical monuments within 300m radius of the area.

8.5 Road (NH, SH):

The Nearest National Highway (NH - 716) Tirupati – Chennai Road is situated about 15km on the Northeastern side of the lease applied area.

The State Highway (SH-58) Thiruttani – Ramakrishnarajapettai Road is located about 2km on the Northwestern side of the lease applied area.

8.6 Places of worships:

There is no place of worship within the radius of 300m from the lease applied area.

8.7 Reserved forest / forest / social forest / wild life sanctuary etc.:

There is no reserved forest / forest / social forest / wild life sanctuary etc., situated within 500m radius of the lease applied area.

SALIENT FEATURES

Table – 9

<table>
<tr><th>S. No.</th><th>Salient Features Present around site</th><th>Prescribed safety distance</th><th>If any present within Prescribed distance - Actual Distance from the site</th></tr>
<tr><td>1.</td><td>Railways, Highways, Reservoirs or Canal</td><td>50m</td><td>None of the above situated within 50m radius.</td></tr>
<tr><td>2.</td><td>Village Road</td><td>10m</td><td>No village road is situated within 10m radius of the lease applied area.</td></tr>
<tr><td>3.</td><td>Habitation / Village</td><td>300m</td><td>There is no approved habitation located within 300m radius of the lease applied area (Refer Plate No I-B).</td></tr>
<tr><td>4.</td><td>Adjacent Patta/Govt. Land</td><td>7.5m/10m</td><td>
<table>
<tr><th>Direction</th><th>Classification</th><th>Safety Distance</th></tr>
<tr><td rowspan="2">North</td><td>Patta land</td><td>7.5m</td></tr>
<tr><td>Govt land</td><td>10m</td></tr>
<tr><td>East</td><td>Govt. land</td><td>10m</td></tr>
<tr><td rowspan="2">South</td><td>EB line</td><td>50m</td></tr>
<tr><td>Patta land</td><td>7.5m</td></tr>
<tr><td rowspan="2">West</td><td>EB line</td><td>50m</td></tr>
<tr><td>Patta land</td><td>7.5m</td></tr>
</table>
(Refer Plate No. II).</td></tr>
<tr><td>5.</td><td>Power House, EB line (HT & LT Line)</td><td>50m</td><td>EB Line (LT) is situated on the Western and Southern side of the lease applied area. Hence, 50m safety distance has been provided.</td></tr>
<tr><td>6.</td><td>Boundaries of the permitted area</td><td>7.5m</td><td>The boundaries of the permitted areas as follows:
North – S.F.Nos. 60/13E and 41/1
East – S.F.No. 41/1
South – S.F.Nos. 40, 66/10, 66/9A, 66/9B and 66/1D
West – S.F.No. 66/1 (P)
(Refer Plate No. II).</td></tr>
<tr><td>7.</td><td>Reserve forest / protected area / ECO sensitive area</td><td>60m</td><td>There is no reserved forest located within the radius of 60m from the lease applied area.</td></tr>
<tr><td>8.</td><td>Protected area / ECO sensitive area/ Wild Life Sanctuary/ Interstate Border</td><td>10km</td><td>Interstate Border = Andra Pradesh – Tamil Nadu - 6km - Northwestern.
There is no ECO sensitive Zone/ Interstate Border/ Critically Polluted Area/ HACA/ CRZ located within 10km radius of the area.</td></tr>
</table>

9.0 EMPLOYMENT POTENTIAL & WELFARE MEASURES

9.1 Employment potential (skilled, semi-skilled, un skilled):

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

a.	Skilled labour:		
	Mine Foreman	:	1
	Blaster/mate	:	1
	Excavator – Operator & Driver	:	4
	Jack hammer operator	:	12
b.	Semi-skilled:		
	Security	:	1
c.	Unskilled:		
	Labour & Helper	:	4
	Co-operator and Cleaner	:	4
	Total	:	**27**

The above manpower is adequate to meet out the production schedule and the machinery strength envisaged in the mining plan and to comply with the statutory provisions of the Mines Safety Regulations. It is been ensured that the labour will not be employed less than 18 years, **No child labour** will engaged or entertained for any kind of quarrying operations. All the labours engaged for quarrying operations will be insured during the quarry lease period.

9.2 Welfare Measures:

a) Drinking Water:

Packaged drinking water is available from the nearby water vendors in Ramakrishnarajapettai which is about 4km on the Northwestern side of the lease applied area.

b) Sanitary Facilities:

Hygienic modern Sanitary Facilities will be constructed with in the safety area as semi permanent structure and it will be maintained periodically.

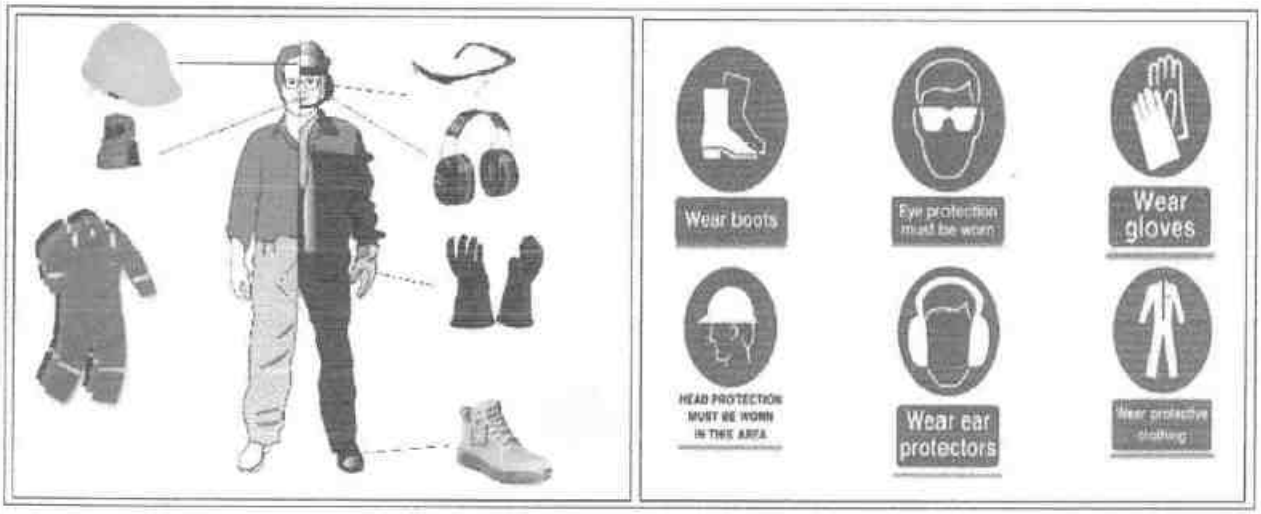
c) First aid facility:

First aid kits are kept in Mines office room, in case of such eventuality is the victim will be given first aid immediately at the site by the competent and statutory foreman/permit manager/mate will be in charge of first aid and injured person will be taken to the hospital by the applicant's vehicle. Hospital is available in Sholinghur located at a distance of 7km on the Southwestern side.

d) Labour Health:

Periodically medical check-up related to occupational health safety will be conducted to all the workers in applicant own cost.

e) Precautionary safety measures to the labourers:



- Helmets,
- Mine Goggles,
- Ear plugs,
- Ear muffs,
- Dust mask,
- Reflector jackets
- Safety Shoes

All personnel protective devices will be provided as per the specification approved by Director of mines safety. Periodically medical check-up will be conducted for all workers for any mine health related problems. Proper training and vocational education will be given by qualified and experienced safety officer to all the employees about the safety and systematic Rough stone quarrying operations. The drillers and workers will be sent for vocational training periodically, to carry out the quarrying operations scientifically and to safe guard the men and machinery and to create awareness about conventional opencast quarrying operations.

PART – B

10.0 ENVIRONMENT MANAGEMENT PLAN

10.1 Existing Land use pattern:

The quarry lease applied area is slightly elevated terrain. The area is a dry barren land devoid of Agriculture and Habitations. The land is previously did not used any specific purpose.

Land Use Pattern

Table – 10

Description	Present area in (ha)	Area at the end of this quarrying period (ha)
Area under quarry	Nil	1.53.0
Infrastructure	Nil	0.01.0
Roads	Nil	0.02.0
Green Belt	Nil	0.30.0
Unutilized	2.94.5	1.08.5
Grand Total	**2.94.5**	**2.94.5**

10.2 Water Regime:

It is a simple opencast quarry operation. The water table in the area is about 59m in summer season and 55m in Rainy season. The quality of water will not be affected due to this quarrying operation. However, mitigation measures will be carried out like Garland drains constructed on all sides of quarry pit to avoid surface run-off rain water entering into the pit.

The waste water discharged to water bodies will be met the standard prescribed under the Environment (Protection) Act – 1986 by The Ministry of Environment, Forest and Climate change.

10.3 Flora and Fauna:

Table – 11

S.No	Name of the plant (Scientific)	Family Name	Common Name	Habit	Picture
1.	Cocos nucifera	Arecaceae	Coconut, Thennai	Tree	
2.	Azadirachta indica	Meliaceae	Neem, Vembu	Tree	
3.	Eucalyptus obliqua	Myrtaceae	Eucalyptus	Tree	
4.	Borassus flabellifer	Arecaceae	Palm tree	Tree	

List of Fauna			
S.No.	Scientific Name	Common Name	Picture
1.	Capra aegagrus hircus	Goat	
2.	Funambulus palmarum	Squirrel	
3.	Bos taurus	Cow	
4.	Danaus plexipppus	Striped tiger	
5.	Corvus levaillantii	Crow	
6.	Gallus gallus domesticus	Hen	

10.4 Climatic Conditions:

The area receives rainfall of about 1139mm/annum and the rainy season is mainly from Oct - Dec during monsoon. The summer is hot with maximum temperature of 42°C and winter encounters a minimum temperature of 23°C.

10.5 Human settlement:

There are few villages located within 5km radius of the area; the approximate distance, direction and populations are given below:

Table – 12

S. No	Name of the Village	Approximate distance & Direction from lease applied area	Approximate population
1.	T.C.Kandikai	1km – Northeast	400
2.	Krishnakuppam	3km – Northwest	600
3.	Veeranathur	4km – Southwest	5,600
4.	Chinna Paravathur	4km – Southeast	1,300

Basic human welfare Amenities such as Health Centre, Schools, Communication Facilities, and Commercial Centres etc are available at Thiruttani located at a distance of 15km on the Eastern side of the area.

10.6 Plan for air, dust suppression:

The air quality will be affected by the Suspended Particulate Matter (SPM) generated by the blasting, jack hammer drilling, Loading and unloading during the Rough stone quarry operation.

The following Mitigations measures will be carried out:

- Mist Water spraying will be carried out by means of water sprinklers to suppress the dust emission in the Haul roads.
- Vegetations will be formed on the non quarrying area.
- Avoiding spillages during the transportation.

Air quality will be monitored periodically as per Norms and Mitigate measures carried out to prevent dust and Air propagation in to air. The estimated budget for dust suppression would be around **Rs.52,000**/year.

10.7 Plan for Noise level control:

The noise level increased due to the Excavation, Drilling, Blasting and Transportation.

Engineering Noise control:

Noise will be created due to the usage of Machineries and Vehicles. The Noise will be controlled in the following manner.

- Selection of new low – noise equipments for the Rough stone quarry operation.
- Modifications of older equipments.
- Implementation of effective preventive maintenance which reduces noise more than 50%.
- Developing Green belts which act as Acoustic barrier, pollution absorbent and noise controller.
- The drivers will be strictly instructed to move the vehicle during the transportation not exceed 40km per hour.
- Sentries with flags & whistle will posted in village road junction and populated area to control and regulate traffic.

Shallow holes of 32mm diameter and maximum depth of 1.5m will be drilled and conventional low power explosives such as Slurry Explosives, ordinary safety fuse will be used for rough stone. Hence, ground vibration and noise pollution i.e., minimal and restricted within the quarry working area.

Noise level monitoring and other Mitigation measures will be carried out to reduce Noise and Vibration. The estimated budget for Noise level monitoring would be around **Rs. 2,000**/Year.

10.8 Environmental impact assessment statement describing impact of mining on the next Ten Years:

In the mining plan proposed for a production of Rough stone does not involve deep hole drilling and blasting. Such limited mining activity is not likely to cause any impact adversely on the environment. As far as pollution of air, water and noise concerned, the environmental impact studies will be conducted as per EIA notification issued by MoEF& CC. It is B2 Category mine. The estimated budget would be around **Rs.7,60,000/-.**

10.9 Proposal for waste management:

There is no waste anticipated in this Rough stone and Gravel quarrying operation. The entire quarried out materials will be utilized (100%). Hence, Waste management does not arise.

10.10 Proposal for reclamation of land affected during mining activities and at the end of mining (refilling / fencing etc.):

In the mining plan proposed only to a maximum depth of 54m [2m above ground level + 52m below ground level] has been envisaged as workable depth for safe & economic mining during entire lease applied area. There is no waste generated hence, backfilling is not possible. Hence, the quarry area will be fenced with Barbed wire fencing also safety bund constructed around the quarry to prevent inadvertent entry of public and cattle. The barbed wire fencing cost would be around **Rs.2,28,000/-.**

10.11 Programme of Greenbelt development (indicate extend, number, name of species to be afforested):

The safety zone along the side boundary barrier has been utilized for Greenbelt development. Appropriate species of Neem, Pongamia pinnata, Casuarina, etc., trees will be planted in a phased manner as described below.

Table – 13

Year	No. of tress proposed to be planted	Survival %	Area to be covered sq.m	Name of the species	No. of trees expected to be grown
I	35	80%	300	Neem, Pongamia Pinnata, Casuarina, etc.,	28
II	35	80%	300		28
III	35	80%	300		28
IV	35	80%	300		28
V	35	80%	300		28
VI	35	80%	300		28
VII	35	80%	300		28
VIII	35	80%	300		28
IX	35	80%	300		28
X	35	80%	300		28

Nearly 3,000 sq.m area is proposed to use under Greenbelt by planting 350 Numbers of trees during mining plan period with an anticipated survival rate of 80% (Please refer Plate No.III). The estimated budget for plantation and maintenance of Green belt development would be around **Rs. 35,000/-** for the period of Ten Years.

The Greenbelt will be carried out over all along the quarried out top bench, approach road and Panchayat road. The cost would be around **Rs. 40,000/-.**

10.12 Proposed financial estimate / budget for (EMP) environment management:

Budget Provision for the entire quarrying period:

Table – 14

S. No	Monitory and Analysis Description	Rate per location	No. of location	Total Charges/ six months	Total Charges/ year
1	Ambient air quality monitoring	6500	4	26000	52000
2	Noise level monitoring	250	4	1000	2000
3	Ground vibration monitoring	1000	2	2000	4000
4	Water sampling and analysis	9000	1	9000	18000
Total EMP Cost/ year					**76,000**

The EMP cost would be around **Rs. 7,60,000/-** for the period of Ten Years.

A. Project cost / investment		
i) Land cost	The Land value as per the Government Guideline land cost is calculated as follows, Total Extent = 2.94.5Ha Cost per Hectare = Rs. 14,90,500/- 2.94.5Ha x 14,90,500 = Rs. 43,89,522/- **Total Land Cost = Rs. 43,89,522/-** (source : https://tnreginet.gov.in/portal/)	Rs.43,90,000/-
ii) Machinery to be used	The following machineries are proposed to meet out the productions. Excavator attached with rock breaker, Tipper, Tractor mounted compressor With jack Hammer and loose tools (Rental Basis)	Rs.35,00,000/-
iii) Refilling/ Fencing	Fencing will be constructed around the quarry pit to prevent the inadvertent entry of public and cattle cost would be around	Rs.2,28,000/-
iv) Labourers shed	Labour sheds will be constructed as semi permanent structure. The cost would be around	Rs. 2,00,000/-
v) Sanitary facility	Adequate latrine and urinal accommodation shall be provided at conveniently accessible places the cost would be around	Rs. 80,000/-
vi) Others items	First aid room & accessories	Rs. 80,000/-
vii) Drinking water facility for the labourers	Packaged drinking water will be provided for all the Labors. Drinking water will be readily available at conveniently accessible points during the whole of the working shift the cost would be around	Rs.1,50,000/-
viii) Sanitary arrangement	The latrine and urinal will keep clean and sanitary condition. The maintenance cost would be around	Rs.80,000/-
ix) Safety kit	All the Safety kit such as Helmet, Earmuffs, Goggles, Reflector Jackets, Safety shoes etc., will be provided to the workers by the applicant own cost which would be around	Rs.80,000/-
x) Water sprinkling	Water will be sprinkled in the haul roads by water sprinklers the cost would be around	Rs.1,00,000/-
xi) Garland drain	Construction of Garland drain with check dam to prevent surface run-off rain water in to the quarry pit, the construction cost is around	Rs. 1,47,000/-
xii) Greenbelt etc.	Greenbelt development and maintenance will be carried out in the safety zone, the cost would be around	Rs.35,000/-
	Greenbelt program will be carried out in the quarried out top benches, approach road and Panchayat road.	Rs.40,000/-
	Total Project Cost	**Rs.91,10,000/-**

A. EMP Cost :- (Per year)	
Air Quality monitoring	Rs.52,000/-
Water Quality Sampling	Rs.18,000/-
Noise Monitoring	Rs. 2,000/-
Ground vibration test	Rs. 4,000/-
Total Cost	**Rs.76,000/-**
Total EMP Cost for the ten years period is **Rs.7,60,000/-**	

Description	Amount (Rs.)
A. Operational Cost	**91,10,000**
B. EMP Cost	**7,60,000**
Total Project Cost (A+ B)	**98,70,000**
The applicant indents to involve corporate environment responsibilities (CER) activity like Water Purifier, Medicine Storage rack facilities to the nearby Dispensary and Water Purifier and Table facilities to the nearby Govt. School at 2.0% from the total project cost. The Cost would be around **Rs.1,98,000/-.**	**1,98,000**
Total Cost	**1,00,68,000**
The Total cost would be around one crore and sixty eight thousands only.	

11.0 PROGRESSIVE QUARRY CLOSURE PLAN

11.1 Introduction:

The Progressive Quarry Closure Plan for Rough stone and Gravel quarry lease applied area over an extent of 2.94.5 Hectares of patta lands in S.F.Nos. 41/2, 66/1A(P), 66/1B and 66/8/1 of T.C.Kandikai Village, Thiruttani Taluk, Tiruvallur District, Tamil Nadu State has been prepared for **Thiru. P.Aruldoss,** S/o. Ponnusamy, residing at No. 180/4, Ambedkar Street, Anna Nagar, Kolapakkam, Chengalpattu, Chennai, Tamil Nadu State – 600 048.

11.2 Present Land use pattern:

Land Use Table – 15

Description	Present area (Ha)
Quarry Pit	Nil
Infrastructure	Nil
Roads	Nil
Green Belt	Nil
Unutilized Area	2.94.5
Grand Total	**2.94.5**

11.3 Method of Mining:

Open cast Mechanized Mining is being carried out with 5.0 meter vertical bench with a bench width is not less than the bench height for Rough stone.

However, as far as the quarrying of Rough stone is concerned, observance of the provisions of Regulation 106 (2) (b) as above is seldom possible due to various inherent petro genetic factors coupled with mining difficulties. Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Director of Mines Safety for which necessary provision is available with the Regulation 106 (2) (b) of MMR-1961, under Mine Act – 1952.

11.4 Mineral Processing Operations:

The quarried out Rough stone will be transported by the 20tons capacity Tippers to the needy crushers. Splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pithead to the needy crushers.

11.5 Reasons for closure:

As the mineral is not going to be exhausted during the proposed plan period no immediate closure is planned due to sufficient reserves are available to carry on the activities. Hence, the reason for closure will be discussed in the ensuing mining plan or in final mine closure plan.

11.6 Statutory obligations:

The applicant ensures to comply all the conditions stipulated in the precise area communication letter before grant of quarry lease and during the course of quarry operations.

11.7 Progressive quarry closure plan preparation:

Name and address of the Recognised Qualified Person who prepared the progressive closure plan and name and address of the executing agency who is involved in the Preparation of progressive quarry closure plan.

Name	:	**Dr.P.Thangaraju, M.Sc., Ph.D.,** Qualified Person
Address	:	Reg. No.17, Advaitha Ashram Road, Alagapuram, Salem District – 636 004.
Telephone	:	0427- 2431989 (Office)
Cell No	:	+91 94422 78601 & 94433 56539

Applicant will himself implement the closure plan; no outside agency will be involved.

11.8 Review of Implementation of Mining Plan including Progressive Closure Plan upto the Final Closure Plan:

Mining Plan and Progressive quarry closure plan are being submitted for the first time. It will be reviewed after Ten Years and review of implementation will be given in the next mining plan.

11.9 Closure Plan:

(i) Mined Out Land:

At the end of mining plan period, about 1.53.0 Ha of area will be mined out. Land use at various stages is given in the table below.

Land Use Table – 16

Description	Present area in (ha)	Area at the end of Lease period (ha)
Area under quarry	Nil	1.53.0
Infrastructure	Nil	0.01.0
Roads	Nil	0.02.0
Green Belt	Nil	0.30.0
Unutilized Area	2.94.5	1.08.5
Grand Total	**2.94.5**	**2.94.5**

(ii) Water quality management:

Following control measures will be adopted for controlling water pollution:-

- Garland drain will be constructed around the quarry area to prevent surface runoff rainwater entering in to the pit.
- Construction of check dams / gully plugs at strategic places to arrest silt wash off from broken up area.
- Collection of surface run-off from broken up area in mine pits for settling and only properly settled excess water from mine pit will be discharged to nearby users. The storm water/ mine water will be used for dust suppression, greenbelt development, etc.
- Periodic analysis of mine pit water and ground water quality in nearby villages.
- The quarried out pit will be allowed to collect rain and seepage water which will act as a reservoir for storage. This water storage will enhance the static level and ground water recharge of nearby wells and it will be used for agriculture purpose to the nearby agriculture lands.
- Domestic sewage from site office & urinals/latrines provided in QL is discharged in septic tank followed by soak pits.

(iii) Air Quality Management:

The proposed mining method is not likely to produce much of dust and fugitive emissions to cause damage to ambient air quality of the area. Workers will be provided with personnel protective equipment like face-mask, earplug/ muffs.

For air pollution management at the progressive quarry closure plan, greenbelt will be developed to prevent and control air pollution.

(iv) Top Soil and Waste Management:

There is no topsoil. There is no waste generated during entire life of quarry, hence waste management does not arise.

(v) Disposal of mining machinery:

All the Machineries will be engaged on rental basis and the same has been maintained in good condition during entire life of quarry. Hence, disposal or decommissioning of mining machinery does not arise.

(vi) Safety & Security:

Safety measures will be implemented to prevent access in the excavation area an un-authorized persons as per Mine Act 1952, MMR 1961.

- Safety measures will be implemented as per Mine Act 1952, MMR 1961, and Mines Rules 1955.
- Provisions of MMR 1961 shall be strictly followed and all roads shall be wider than the height of the bench or equal to the height of the bench and have a gradient of not more than 1 in 16.
- The bench height will be 5.0m.
- Width of working bench will be kept about 5.0 m for ease of operations and provide sufficient room for the movement of equipments.
- Protective equipment like dust masks, ear-plugs/ muffs and other equipments shall be provided for use by the work persons.
- Notices giving warning to prevent inadvertent entry of persons shall be displayed at all conspicuous places and in particular near mine entries.
- Danger signs shall be displayed near the excavations also proper signal by siren alarm will be provide to the public before blasting to prevent accident.
- Security guards will be posted.
- In the event of temporary closer, approaches will be fenced off and notice displayed.

(vii) Disaster Management and Risk Assessment:

This should deal with action plan for high risk accidents like landslides, subsidence, flood, fire, seismic activities, tailing dam failures etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc. The capability of applicant to meet such eventualities and the assistance to be required from the local authorities should be described.

- The mechanized mining activities in the area may involve any high risk accident due to side falls/collapse, flying stones due to blasting etc.
- The complete mining operation will be carried out under the Management and control of experienced and qualified Mines Manager having Certificate of Competency to manage the mines granted by DGMS.
- All the provisions of Mines Act 1952, MMR 1961 and Mines Rules 1955, TNMMCR 1959 and other laws applicable to mine will be strictly complied with.
- During heavy rainfall the mining activities will be suspended.
- All persons in supervisory capacity will be provided with proper communication facilities.
- Competent persons will be provided FIRST AID kits which they will always carry.
- The quarried out benches, Greenbelt Development will be formed in all around the benches and safety barrier of the lease applied area.

(viii) Care and Maintenance during Temporary Discontinuance:

In case of any temporary discontinuance due to court order or due to statutory requirement or any other unforeseen circumstance following measures shall be taken for care, maintenance and monitoring of conditions.

- Notice of temporary discontinuance of work in mine shall be given to the DGMS as per the MMR 1961.
- All the mining machinery shall be shifted to a safe place.
- Entrance to the mine or part of the mine, to be discontinued shall be fenced off. Fencing shall be as per the circular 11/1959 from DGMS.
- Security Guards shall be posted for the safety and to prevent any unauthorized entry to the area.
- Carry out regular maintenance of the facilities/area detailed below in such a way as would have been done as if the mines were operation:

  Quarry roads and approach roads,

  Fencing on approach roads,

  Checking and maintenance of machines and equipment,

  Drinking water arrangements,

  Quarry office, first aid stations etc.
- Competent persons shall inspect the area regularly.
- Air, water and other environmental monitoring shall be carried out as per CPCB and IBM Guideline.
- Care and upkeep of plantation shall be carried out on regular basis.
- Status of the working and status monitoring for re-opening of the mines shall be discussed daily.

In case of discontinuance due to any natural calamities/abnormal conditions, mining operation will be restarted as early as possible after completing rescue work, restoring safety and security, repairs of roads etc.

(ix) Economic Repercussion of Closure of Quarry and manpower Retrenchments:

The quarry lease is granted for a period of Ten Years only. As per the production Programme envisaged, there will be no effect on the man power as the majority of persons belong to nearby villages and will have an option either to be available for employment for the next contract/ lease or do the agriculture in their fields.

(x) Time Scheduling For Abandonment:

The lease applied area has enormous potential for continuance of operations even after the expiry of the lease period. The details of time schedule of all abandonment will be given at the time of final closure plan.

(xi) Abandonment Cost:

As at present mining is not going to be closed so abandonment cost could not be assessed. However based on the progressive quarry closure activities during the plan period, cost is assessed as given below:

Table – 17

ACTIVITY	YEAR		RATE	COST (Rs.)
	I - V	VI - X		
Plantation (In Nos.)	175	175	@100 Rs Per sapling Including Maintenance	35,000
Plantation Cost	17500	17500		
Plantation in quarried out benches and approach road (In Nos.)	200	200		40,000
Plantation Cost	20000	20000		
Wire Fencing for 760 Mtrs length	228000		@300 Rs Per Meter	2,28,000
Garland Drain with settling traps for 490 Mtrs length	147000		@300 Rs Per Meter	1,47,000
Total				**4,50,000**

Assistant Director (G&M) Tiruvallur Tiruvallur District

12 ANY OTHER DETAILS INTEND TO FURNISH BY THE APPLICANT

This Mining plan for Rough stone (Charnockite) and Gravel is under Rules 41 & 42 as per the Amended under Tamil Nadu Minor Mineral Concession Rules, 1959. The provisions of the Mines Act, Rules and Regulations and orders made there under shall be complied within the quarrying operation, so that the safety of the mine, machinery and person will be well protected. Permission, relaxation or exemption wherever required for the safe and scientific quarrying of the deposit will be obtained from the Department of Mines Safety. Any violation pointed out by the inspecting authorities shall be rectified as per the guidelines of the Concerned Department.

Prepared by

Dr. P.Thangaraju, M.Sc., Ph.D.,
Qualified person

Place: Salem
Date: 25.02.2021

DONATE RED
SPREAD GREEN
SAVE BLUE

11/4/24

Assistant Director
Dept. of Geology & Mining
Tiruvallur District.
@ Tiruvallur.

01/04/2024 01/04/21

ANNEXURE-I

Assistant Director (G&M) Tiruvallur Tiruvallur District

புவியியல் மற்றும் சுரங்கத் துறை,
திருவள்ளூர்.

குறிப்பாணை

ந.க.எண்.301/2019/கனிமம்.2 நாள்.17.12.2020

பொருள் கனிமங்களும்,குவாரிகளும்-திருவள்ளூர் மாவட்டம்-திருத்தணி வட்டம்-டி.சி.கண்டிகை கிராமம்- பட்டா புல எண்கள். 41/2(0.50.5), 66/1எ(பகுதி) (0.46.0), 66/1பி (0.90.5) மற்றும் 66/8(1.07.5) ஆக மொத்த விஸ்தீர்ணம் 2.94.5 ஹெக்டேர்ஸ் பரப்பிலிருந்து சாதாரண கற்கள் மற்றும் சாதாரண மண் வெட்டி எடுக்க திரு.பொ.அருள்தாஸ் என்பவருக்கு குவாரி உரிமம் வழங்குவது தொடர்பாக- சுரங்க அபிவிருத்தி திட்டம் (Mining Plan) - சமர்ப்பிக்க கோருவது-குறித்து.

பார்வை 1)திரு.பொ.அருள்தாஸ், த/பெ. பொன்னுசாமி, சென்னை.48 என்பவரது விண்ணப்ப மனு நாள். 20.11.2019.

2)இவ்வலுவலக கடித ந.க.எண். 301/2019/கனிமம்.2, நாள்.22.11.2019.

3)வட்டாட்சியர், திருத்தணி அறிக்கை ந.க.எண்.67/ 2020/ அ1. நாள்.21.1.2020

4)வருவாய்கோட்ட அலுவலர்(பொ), திருத்தணி அறிக்கை ந.க.எண். 99/2020/அ1.நாள். 28.1.2020.

5)உதவி புவியியலாளர்(கனிமம்), தனி துணை வட்டாட்சியர் (கனிமம்) மற்றும் சார் நில ஆய்வாளர்(கனிமம்) ஆகியோரது கூட்டு புலத்தணிக்கை குறிப்பு நாள்.15.12.2020

6)அரசாணை எண். 169, தொழில்(எம்எம்சி-1)துறை, நாள். 4.8.2020.

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சென்னை.48, செங்கல்பட்டு, கொளப்பாக்கம், அண்ணா நகர், அம்பேத்கார் தெரு, எண். 180/4 என்ற முகவரியில் வசிக்கும், திரு.பொ.அருள்தாஸ், த/பெ.பொன்னுசாமி என்பவர், திருவள்ளூர் மாவட்டம், டி.சி.கண்டிகை கிராமம், புல எண்கள். 41/2, 66/1எ(ப), 66/1பி மற்றும் 66/8 ஆகிய பட்டா நிலங்களின் மொத்த விஸ்தீர்ணம் 2.94.5 ஹெக்டேர்ஸ் பரப்பிலிருந்து சாதாரண கற்கள் மற்றும் கிராவல் மண் வெட்டி எடுக்க, விண்ணப்ப கட்டணமாக ரூ.1500/-ஐ அரசுக் கணக்கில் செலுத்தி, 1959 ஆம் ஆண்டு தமிழ்நாடு சிறுவகை கனிமச்சலுகை விதி 19(1)ன் கீழ் விண்ணப்பித்துள்ளார்.

இது தொடர்பாக, பார்வை 3 மற்றும் 4ல் காணும், வருவாய்கோட்ட அலுவலர்(பொ), திருத்தணி மற்றும் வட்டாட்சியர், திருத்தணி ஆகியோர்களது அறிக்கைகளில், மனுதாரர் திரு. பொ.அருள்தாஸ், த/பெ. பொன்னுசாமி என்பவர் கிராவல் மற்றும் சக்கைக்கல் குவாரி செய்ய அனுமதி கோரும், திருத்தணி வட்டம், டி.சி.கண்டிகை கிராமம், புல எண்.41/2 பரப்பு 0.50.5 ஹெறக்டேர், புல எண். 66/1எ(ப) பரப்பு 0.46.0 ஹெறக்டேர், புல எண். 66/1பி பரப்பு 0.90.5 மற்றும் புல எண்.66/8 பரப்பு 1.07.5 ஹெறக்டேர்ஸ் ஆக மொத்தம் 2.94.5 ஹெறக்டேர் புஞ்செய் புலங்கள் பட்டா எண்.895 மற்றும் 893ன்படி, தி/ள். ஏ.ஜி.பவுண்டேசன்ஸ் பிரைவேட் லிமிடெட் என்ற பெயரில் கிராம கணக்குகளில் தாக்கலாகியுள்ளது எனவும், தி/ள். .ஜி.பவுண்டேசன்ஸ் பிரைவேட் லிமிடெட் என்ற நிறுவனத்தின் இயக்குனரான தூத்துக்குடி மாவட்டம், அருங்குளம், வேலாயுதபுரம், மேற்கு தெரு, எண்.1/60 என்ற முகவரியில் வசித்து வரும் திரு.ப.சத்தியமூர்த்தி, த/பெ. பழனிச்சாமி என்பவர் மனுதாரருக்கு 10 ஆண்டு காலத்திற்கு குத்தகை அனுமதி வழங்கி குத்தகை பத்திரம் நிறைவேற்றப்பட்டுள்ளதென்றும், மேற்கண்ட புலத்தில் அரசு புறம்போக்கு நிலம் ஏதும் இல்லை என்றும், மேற்கண்ட புலங்களில் குவாரி அனுமதிகோரியது தொடர்பாக பொது விளம்பரம் மற்றும் பொதுமக்கள் வாக்குமூலம் பெறப்பட்டுள்ளதென்றும், மேற்படி புலத்தில் கல்குவாரி அனுமதி கோரியது தொடர்பாக நாளது வரையில் ஆட்சேபனை ஏதும் பெறப்படவில்லை என்றும், இப்புலங்களில் உயர்/தாழ்வழுத்த மின் கம்பிகள், மின் மாற்றிகள், தேசிய/மாநில நெடுஞ்சாலைகள், வழிபாட்டு தலங்கள் ஏதும் இல்லை என்றும், இப்புலங்கள் நில எடுப்புக்கு உட்படவில்லை என்றும், இப்புலங்களில் புராதன சின்னங்கள் மற்றும் பிரஸ்தாப புலத்தைச் சுற்றி சுமார் 300மீ சுற்றளவில் கிராம குடியிருப்புகள், அங்கீகரிக்கப்பட்ட வீட்டு மனைப்பிரிவுகள், மயானம் போன்றவை ஏதும் இல்லை எனவும், மேற்படி புலங்களுக்கு சென்றுவர பட்டாதாரர்களுக்கு சொந்தமான அதன் துணை நிறுவனமான ஆர்.எஸ்.எண்டர்பிரைசஸ் என்ற நிறுவனம் குத்தகை பெற்றுள்ள சர்வே எண்.60/12-ன் வழியாக பாதை வசதி உள்ளதென்றும், மேற்படி கிராம புலங்கள் டி.சி.கண்டிகை ஊராட்சிக்கு உட்பட்டது எனவும் தெரிவித்துள்ளனர். எனவே, திருத்தணி வட்டம், டி.சி.கண்டிகை கிராமம், புல எண்கள். 41/2, 66/1எ(ப), 66/1பி மற்றும் 66/8 ஆகியவற்றின் மொத்த பரப்பு 2.94.5 ஹெறக்டேர்ஸ் பரப்புள்ள புஞ்செய் பட்டா நிலங்களில், சக்கைக்கல் மற்றும் கிராவல் சவுடுமண் வெட்டி எடுத்திட, தமிழ்நாடு சிறு கனிம விதிகளுக்கு உட்பட்டு மனுதாரருக்கு அனுமதி வழங்கலாம் என பரிந்துரை செய்து கிராம கணக்குகள், வாக்குமூலங்கள், புல வரைபடம் மற்றும் ஆவணங்களை இணைத்தனுப்பியுள்ளனர். மேலும், நில உரிமையாளரை தணிக்கையின்போது செருக்கனூர் குறுவட்ட வருவாய் ஆய்வாளர் முன்னிலையில் ஆஜராகி அளிக்கப்பட்ட வாக்குமூலத்தில், மேற்கண்ட புலங்களின் மொத்த விஸ்தீர்ணம் 2.94.5 ஹெறக்டேர்ஸ் பரப்பில் மனுதாரர் திரு.பொ.அருள்தாஸ் என்பவருக்கு 8 ஆண்டு காலத்திற்கு சக்கைகல், கிராவல், சவுடுமண் வெட்டி எடுக்க சம்மதம் தெரிவித்துள்ளார்.

பார்வை 5ல் காணும் உதவி புவிமியலாளர்(கனிமம்), தனி துணை வட்டாட்சியர் (கனிமம்) மற்றும் சார் நில ஆய்வாளர்(கனிமம்) ஆகியோரது கூட்டு புலத்தணிக்கை குறிப்பில், மனுதாரர் திரு.பொ.அருள்தாஸ் என்பவர் சாதாரண கற்கள் மற்றும் கிராவல் மண் வெட்டி எடுக்க அனுமதி கோரும் திருவள்ளூர் மாவட்டம், திருத்தணி வட்டம், டி.சி.கண்டிகை கிராமம், புல எண்கள். 41/2, 66/1எ(ப), 66/1பி மற்றும் 66/8 ஆகிய புன்செய்

புலங்கள் திருத்தணி-ஆர்.கே.பேட்டை செல்லும் நெடுஞ்சாலையின் தெற்கே சுமார் 5 கி.மீ தொலைவில் அமைந்துள்ளது எனவும், மேற்கண்ட புலங்கள் டி.சி. கண்டிகை கிராம கணக்கில் பின்வருமாறு தாக்கலாகியுள்ளது என்றும்,

வ.எண்.	புல எண்.	விஸ்தீர்ணம்	வகைபாடு	பட்டா எண் மற்றும் பட்டாதாரர் பெயர்.
1	41/2	0.50.5	புன்செய்	895. ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிடெட்
2	66/1எ(ப)	0.46.0	புன்செய்	
3	66/1பி	0.90.5	புன்செய்	
4	66/8	1.07.5	புன்செய்	893. ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிடெட்
	மொத்தம்	2.94.5		

மேற்கண்ட தி/ள். ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிடெட் நிறுவனத்தின் இயக்குநர் திரு. ப்பி.சத்தியமூர்த்தி நில உரிமையாளர் என்பவரிடமிருந்து அனுமதி கோரும் புலங்களில் 2.87.0 ஹெறக்டேர்ஸ் பரப்பில் மட்டும் அரசின் அனுமதி பெற்று கற்குவாரி செய்ய 1.8.2019 முதல் 10 ஆண்டு காலத்திற்கு மனுதாரர் பதிவு செய்யப்படாத முத்திரைத்தாளில் குத்தகை ஒப்பந்தம் செய்ததற்கான ஆவணத்தினை சமர்ப்பித்துள்ளார் என்றும், மேற்காணும் புலங்கள் சமதளமாகவும், ஒருங்கிணைந்த புலங்களாகவும் அமைந்துள்ளது என்றும், இப்புலங்களில் தற்போது ஆங்காங்கே கழிவுமண் குவித்து வைக்கப்பட்டுள்ளது தணிக்கையின்போது கண்டறியப்பட்டது என்றும், இப்புலங்களில் தரைப்பகுதியிலிருந்து கீழே (Below the surface level) சுமார் 3மீ முதல் 4மீ ஆழம் வரையில் மண் படிமங்களாக உள்ளது என ஊகிக்கப்படுகிறது என்றும், மேலும், 4மீ ஆழத்திற்கு கீழ் புறத்தில் பாறை படிமங்களாக உள்ளது என ஊகிக்கப்படுகிறது எனவும், மேலும், மேற்கண்ட புலத்தினை ஏற்கெனவே 6.9.2020 அன்று புலத்தணிக்கை மேற்கொண்டபோது அனுமதி கோரும் புலங்களின் மையப்பகுதியில் கிழக்கு-மேற்காக மற்றும் வடக்கு-தெற்காக தாழ்வழுத்த மின்கம்பி செல்வது கண்டறியப்பட்டது தொடர்பாக, இம்மின்னழுத்த கம்பிகளை மின்வாரிய துறையின் மூலம் அப்புறப்படுத்திடுமாறு மனுதாரரை அறிவுறுத்தப்பட்டது குறித்து, தற்போது 15.12.2020 அன்று புலத்தணிக்கை மேற்கொண்ட சமயம் புலங்களின் மையப்பகுதியில் அமைந்திருந்த தாழ்வழுத்த மின்கம்பி செல்லும் தடம் புல எண். 66/1எ-க்கு மேற்கு எல்லையில் வடக்கு-தெற்காகவும், தெற்கு எல்லையில் கிழக்கு-மேற்காகவும் அகற்றப்பட்டுள்ளது தணிக்கையின்போது கண்டறியப்பட்டது என்றும், மேலும், மனுதாரர் கிராவல் மண்/சாதாரண கற்கள் குவாரி செய்ய அனுமதி கோரும் புலங்களின் வடக்கே புல எண். 60/13E (R.S.Enterprises-Stockyard), தெற்கே-66/1D, 66/9A மற்றும் 66/10 ஆகிய பட்டா புலங்களும், மேற்கே -புல எண்.65 குளம்(அரசு புறம்போக்கு), கிழக்கே புல எண்.41/1 (திரு.ஆர்.சுப்பிரமணி என்பவருக்கு கற்குவாரி குத்தகை உரிமம் வழங்கப்பட்டுள்ள அரசு பாறை புறம்போக்கு) ஆகியவை நான்கெல்லைகளாக அமைந்துள்ளது என்றும், அனுமதி கோரும் புலங்களில் நிலையான அமைப்புகள் ஏதுமில்லை எனவும், இப்புலங்களிலிருந்து கனிமம் வெட்டி எடுத்து வாகனங்களின் மூலம் கொண்டு செல்ல அணுகு பாதை உள்ளது என்றும், எனவே, திருவள்ளூர் மாவட்டம், திருத்தணி வட்டம், டி.சி.கண்டிகை கிராமம், புல எண்கள். 41/2, 66/1எ(ப), 66/1பி மற்றும் 66/8 ஆகிய பட்டா நிலங்களின் மொத்த விஸ்தீர்ணம் 2.87.0

ஹெறக்டேரில் மட்டும் கற்குவாரி செய்ய நில உரிமையாளரிடம் மனுதாரர் குத்தகை ஒப்பந்தம் பெற்றுள்ளார் எனவும், ஆனால், கிராம வருவாய் ஆவணங்கள் மற்றும் வருவாய்கோட்டாட்சியர் பரிந்துரை அறிக்கை ஆகியவற்றில் மேற்கண்ட புலங்களின் மொத்த விஸ்தீர்ணம் 2.94.5 ஹெறக்டேர்ஸ் என குறிப்பிடப்பட்டுள்ளதால், மேற்கண்ட புலங்களின் மொத்த விஸ்தீர்ணம் 2.94.5 ஹெறக்டேர்ஸ் பரப்பில், மேற்கே உள்ள புல எண். 65 (குளம் புறம்போக்கு), மின்கம்பி செல்லும் பாதை ஆகியவற்றிற்கு 50மீ தூரம் பாதுகாப்பு இடைவெளியும், கிழக்கே புல எண்.41/1 அரசு கற்குவாரிக்கு 10மீ தூரம் பாதுகாப்பு இடைவெளியும், வடக்கு மற்றும் தெற்கே உள்ள பட்டா நிலங்களுக்கு பாதிப்பு ஏற்படாத வகையில் 7.5மீ தூரம் பாதுகாப்பு இடைவெளியும் விட்டு எஞ்சிய பரப்பில், சில நிபந்தனைகளின்படி 1959 ஆம் ஆண்டு தமிழ்நாடு சிறுவகை கனிமச்சலுகை விதி 19(1)ன்கீழ் மண் மற்றும் சாதாரண கற்குவாரி உரிமம் வழங்கிட சுற்றுப்புறச்சூழல் துறையின் அனுமதி பெறுவது குறித்து சுரங்க அபிவிருத்தி திட்டம் தயார் செய்து சமர்ப்பிக்க மனுதாரரை அறிவுறுத்தலாம் என பரிந்துரை செய்துள்ளனர்.

எனவே, மேற்கண்ட அறிக்கைகளின் அடிப்படையில், பார்வை 8ல் காணும் அரசாணையில் அளிக்கப்பட்டுள்ள அதிகாரங்களின்படி, திருவள்ளூர் மாவட்டம், திருத்தணி வட்டம், டி.சி.கண்டிகை கிராமம், புல எண்கள். 41/2(0.50.5), 66/1எ(ப) (0.46.0), 66/1பி (0.90.5)மற்றும் 66/8(1.07.5) ஆகிய பட்டா நிலங்களின் மொத்த விஸ்தீர்ணம் 2.94.5 ஹெறக்டேர்ஸ் பரப்பில், மேற்கே உள்ள புல எண். 65 (குளம் புறம்போக்கு), மின்கம்பி செல்லும் பாதை ஆகியவற்றிற்கு 50மீ தூரம் பாதுகாப்பு இடைவெளியும், கிழக்கே புல எண்.41/1 அரசு கற்குவாரிக்கு 10மீ தூரம் பாதுகாப்பு இடைவெளியும், வடக்கு மற்றும் தெற்கே உள்ள பட்டா நிலங்களுக்கு பாதிப்பு ஏற்படாத வகையில் 7.5மீ தூரம் பாதுகாப்பு இடைவெளியும் விட்டு எஞ்சிய பரப்பில், 1959 ஆம் ஆண்டு தமிழ்நாடு சிறுவகை கனிமச்சலுகை விதி 19(1)ன்கீழ், 10 ஆண்டு காலத்திற்கு சாதாரண கற்கள் மற்றும் சாதாரண மண் ஆகியவற்றை குவாரி செய்து கொள்ள (Ordinary Rough stone & Ordinary Earth) உரிமம் வழங்கிட, மாநில சுற்றுப்புறச்சூழல் தாக்க மதிப்பீட்டு ஆணையத்தின் (SEIAA) அனுமதி பெறுவது குறித்து சுரங்க அபிவிருத்தி திட்டம் (Mining Plan) 3 நகல்களில் தயார் செய்து சமர்ப்பிக்குமாறு மனுதாரர் திரு.பொ.அருள்தாஸ் என்பவரை இதன் மூலம் அறிவுறுத்தப்படுகிறது.

நிபந்தனைகள்

1. புல வரைபடத்தில் குறிப்பிட்டுள்ள பகுதியில் குவாரி குத்தகை ஒப்பந்த ஆவணம் நிறைவேற்றும் நாளிலிருந்து 10 ஆண்டுகளுக்கு மண்/ சாதாரண கற்கள் வெட்டி எடுக்க குவாரி குத்தகை வழங்குதல் தொடர்பாக, தமிழ்நாடு சிறுகனிம சலுகை விதிகள் 1959-ன் விதி 41 மற்றும் 42 ஆகியவற்றில் கண்டுள்ள காலவரையறைக்குள் அங்கீகரிக்கப்பட்ட சுரங்கத்திட்டம், மாநில சுற்றுச்சூழல் தாக்க மதிப்பீட்டு ஆணையத்தின் இசைவு மற்றும் தமிழ்நாடு மாசுகட்டுப்பாட்டு வாரிய இசைவு ஆகியவற்றை சமர்ப்பிக்க வேண்டும்.

2. தமிழ்நாடு சிறுகனிம சலுகை விதிகள் 1959ன் திருத்தப்பட்ட விதி 41 மற்றும் 42-ன் படி குறிப்பாணை கிடைக்கப்பெற்ற நாளிலிருந்து மூன்று மாத காலத்திற்குள் சமர்ப்பிக்க தவறினால் விதிகளின்படி உரிய மேல்நடவடிக்கை எடுக்கப்படும்.

3. மேற்கூறிய ஆவணங்களை சமர்ப்பித்த பின்பு குவாரி குத்தகை வழங்கப்பட்டு குவாரி குத்தகை ஒப்பந்த ஆவணம் நிறைவேற்றிய பின்பே மேற்கண்ட புலத்தில் குவாரிப்பணிகளை தொடங்க வேண்டும். தவறினால், தமிழ்நாடு சிறுகனிமச் சலுகை விதிகள் 1959-ன் விதி 36(அ)-ன்படி உரிய நடவடிக்கை எடுக்கப்படும்.

4. அனுமதி கோரும் புலங்களுக்கு அருகில் உள்ள அரசு புலங்கள் மற்றும் வனத்துறைக்கு சொந்தமான புலங்களில் கனிமங்களை கனரக வாகனங்கள் மூலம் கொண்டு செல்ல சம்மந்தப்பட்ட துறையின் முன் அனுமதி பெறப்படவேண்டும்.

5. பொதுமக்களுக்கும், போக்குவரத்திற்கும் எவ்வித பாதிப்பும் ஏற்படாத வகையில் குவாரிப்பணி மேற்கொள்ள வேண்டும்.

6. அனுமதிக்கப்பட்ட கனிமத்தினை தவிர பிறவகை கனிமங்களை குவாரி செய்யக் கூடாது.

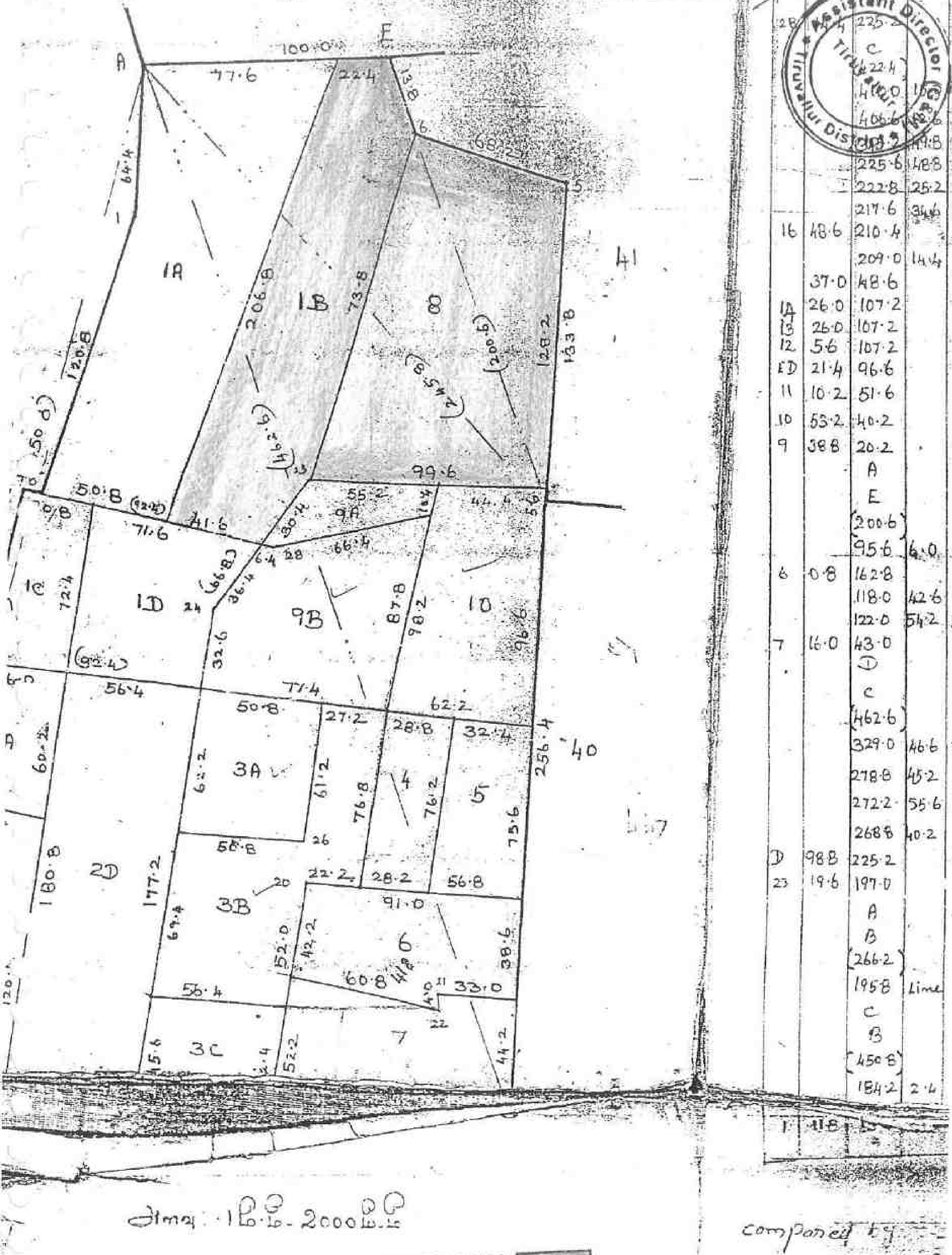
17/2/20

உதவி இயக்குநர்(பொ)
புவியியல் மற்றும் சுரங்கத்துறை,
திருவள்ளூர்.

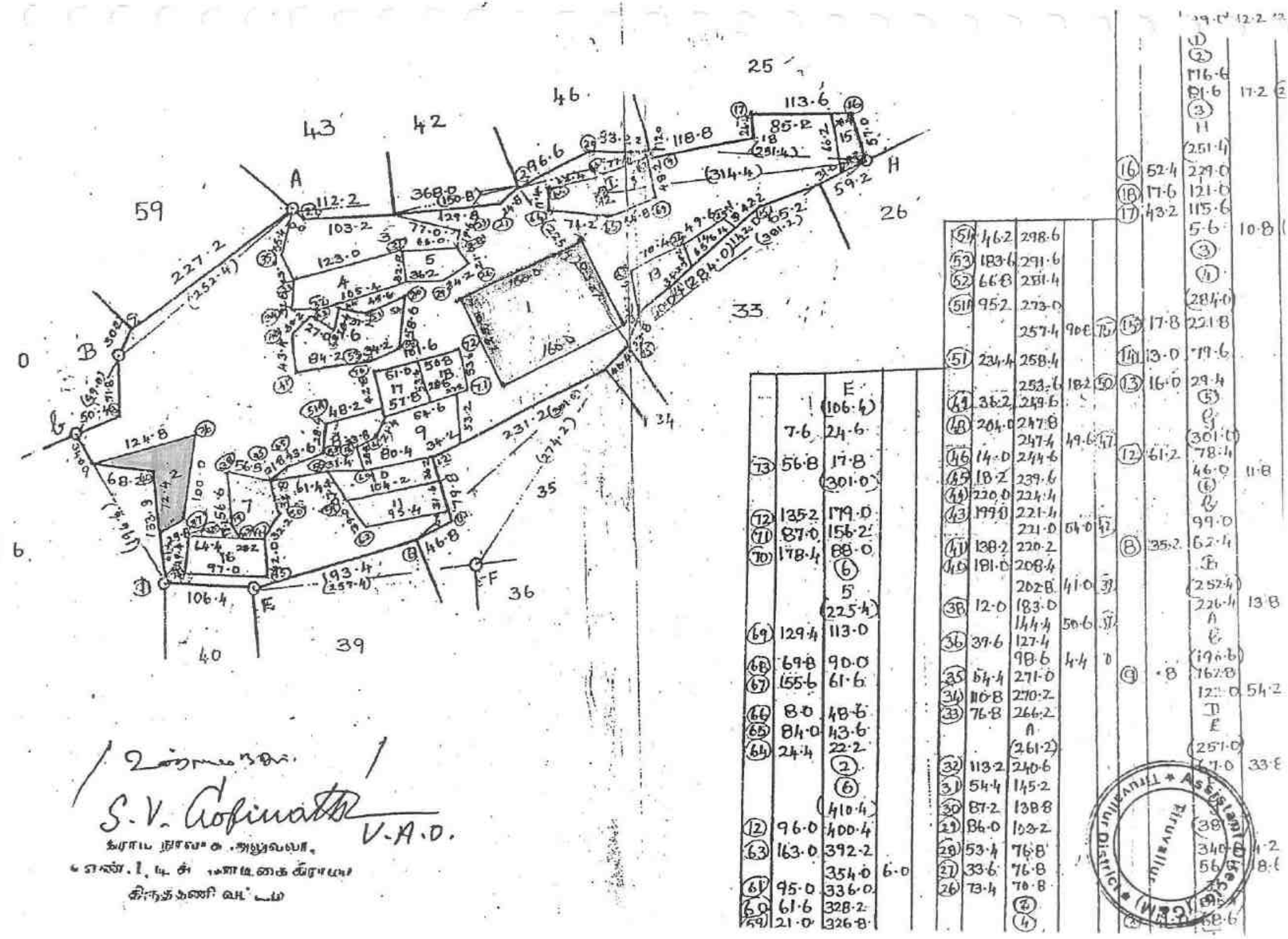
பெறுநர்

திரு.பொ.அருள்தாஸ்,
த/பெ.பொன்னுசாமி,
எண். 180/4, அம்பேத்கார் தெரு,
அண்ணா நகர்,
கொளப்பாக்கம்,
செங்கல்பட்டு, சென்னை.48.

ANNEXURE II



LEASE APPLIED AREA


LEASE APPLIED AREA
S. V. Gopinath
V.A.O.

ANNEXURE V

Assistant Director (G&M) Tiruvallur Tiruvallur District

தமிழக அரசு

வருவாய்த் துறை

நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு

மாவட்டம் : திருவள்ளூர் வட்டம் : திருத்தணி

வருவாய் கிராமம் : தும்பலசெருவுகண்டிகை பட்டா எண் : 895

உரிமையாளர்கள் பெயர்

1. - ... ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிமிடெட்

		நன்செய்		புன்செய்		மற்றவை	
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை
புல எண்	உட்பிரிவு	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை
30	2E	--	--	0 - 11.50	0.20	--	--
34	1	--	--	0 - 24.50	0.45	--	--
41	2	--	--	0 - 50.50	0.94	--	--
41	5	--	--	0 - 18.00	0.34	--	--
66	1A	--	--	1 - 13.00	2.09	--	--
66	1B	--	--	0 - 90.50	1.68	--	--
41	9	--	--	0 - 48.50	0.90	--	--
				3 - 56.50	6.60		

குறிப்பு2 :

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **01/06/001/00895/90112** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.
2. இத் தகவல்கள் 14-08-2019 அன்று 09:53:37 AM நேரத்தில் அச்சடிக்கப்பட்டது.
3. கைப்பேசி கேமராவின்2D barcode படிப்பான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்

தமிழக அரசு

வருவாய்த் துறை

நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு

மாவட்டம் : திருவள்ளூர் வட்டம் : திருத்தணி

வருவாய் கிராமம் : தும்பலசெருவுகண்டிகை பட்டா எண் : 893

Assistant Director (G&M) Tiruvallur Tiruvallur District

உரிமையாளர்கள் பெயர்

1. - ... ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிமிடெட்

		நன்செய்		புன்செய்		மற்றவை	
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை
புல எண்	உட்பிரிவு	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை
66	8	--	--	1 - 7.50	2.00	--	--
				1 - 7.50	2.00		

குறிப்பு2 :

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **01/06/001/00893/90190** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.
2. இத் தகவல்கள் 14-08-2019 அன்று 09:54:22 AM நேரத்தில் அச்சடிக்கப்பட்டது.
3. கைப்பேசி கேமராவின்2D barcode படிப்பான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்

ANNEXURE V

Assistant Director (G&M) Tiruvallur Tiruvallur District

அ-பதிவேடு விவரங்கள்

மாவட்டம் : திருவள்ளூர்

வட்டம் : திருத்தணி

கிராமம் : தும்பலசெருவுகண்டிகை

1. புல எண்	**41**	9. மண் வயனமும் ரகமும்	**7 - 4**
2. உட்பிரிவு எண்	**2**	10. மண் தரம்	**5**
3. பழைய புல உட்பிரிவு எண்	**-2**	11. தீர்வை (ரூ - ஹெ)	**1.85**
4. பகுதி	**P**	12. பரப்பு (ஹெக்டேர் - ஏர்)	**0 - 50.50**
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	**0.94**
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	**895**
7. பாசன ஆதாரம்	-	15. குறிப்பு	ஆடு
8. இரு போகமா	**1**	16. பெயர்	**1.**ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிமிடெட்

குறிப்பு **1:**

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **50112** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

Assistant Director (G&M) Tiruvallur Tiruvallur District

அ-பதிவேடு விவரங்கள்

மாவட்டம் : திருவள்ளூர்

வட்டம் : திருத்தணி

கிராமம் : தும்பலசெருவுகண்டிகை

1. புல எண்	66	9. மண் வயனமும் ரகமும்	7 - 4
2. உட்பிரிவு எண்	1A	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	66-1	11. நீர்வை (ரூ - ஹெ)	1.85
4. பகுதி	P	12. பரப்பு (ஹெக்டேர் - ஏர்)	1 - 13.00
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த நீர்வை (ரூ - பை)	2.09
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	895
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	1	16. பெயர்	1.ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிமிடெட்

குறிப்பு **1:**

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **70112** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : திருவள்ளூர்

வட்டம் : திருத்தணி

கிராமம் : தும்பலசெருவுகண்டிகை

1. புல எண்	66	9. மண் வயனமும் ரகமும்	7 - 4
2. உட்பிரிவு எண்	8	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	-8	11. தீர்வை (ரூ - ஹெ)	1.85
4. பகுதி	P	12. பரப்பு (ஹெக்டேர் - ஏர்)	1 - 7.50
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	2.00
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	893
7. பாசன ஆதாரம்	-	15. குறிப்பு	யே
8. இரு போகமா	1	16. பெயர்	1.ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிமிடெட்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **70190** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

Assistant Director (G&M) திருவள்ளூர் District

அ-பதிவேடு விவரங்கள்

மாவட்டம் : திருவள்ளூர்

வட்டம் : திருத்தணி

கிராமம் : தும்பலசெருவுகண்டிகை

1. புல எண்	66	9. மண் வயனமும் ரகமும்	7 - 4
2. உட்பிரிவு எண்	1B	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	-1	11. தீர்வை (ரூ - ஹெ)	1.85
4. பகுதி	P	12. பரப்பு (ஹெக்டேர் - ஏர்)	0 - 90.50
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	1.68
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	895
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	1	16. பெயர்	1.ஏஜி பவுண்டேஷன்ஸ் பிரைவேட் லிமிடெட்

குறிப்பு **1:**

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **70112** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

ANNEXURE VI

Assistant Director (G&M)
Tiruvallur
Tiruvallur District

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

(13)	(14)	(15)	(16)	(17)	(18)

80 A

ANNEXURE VII

भारतीय गैर न्यायिक

एक सौ रुपये Rs. 100

रु. 100 ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

தமிழ்நாடு तमिलनाडु TAMILNADU

21 NOV 2020

P. அருள்தாஸ்
சென்னை - 600048

CC 244589

I. JACINTHA
Stamp Vendor Lic No.20540/B4/87
Subbaiah Nagar, Kodungaiyur
Chennai-600 118

குத்தகை கால நீட்டிப்பு ஆவணம்

2020-ஆம் ஆண்டு நவம்பர் மாதம், 23-ஆம் தேதி, காஞ்சிபுரம் மாவட்டம், திருப்பெரும்புதூர் வட்டம், தற்போது குன்றத்தூர் வட்டம், முணிமங்கலம் கிராமம், கஜலட்சுமி நகர் மெயின் ரோடு, சந்தோஷ் நகர், முதல் தளம், மனை எண் 04, என்ற முகவரியில் இயங்கிவரும் **AG FOUNDATIONS PRIVATE LIMITED,** (PAN:AAHCA1030E) (Corporate Identity Number U45200 TN2008 PTC068157) என்னும் நிறுவனத்திற்காக, அதன் பிரதிநிதி மற்றும் இயக்குநரான, சென்னை 600 045, மேற்கு தாம்பரம், இரும்புலியூர், பெரியார் நகர், 4-வது குறுக்கு தெரு, நெம்பர் 15, வீட்டில் வசிக்கும் திரு. சந்தானமுத்து அவர்களின் குமாரர் 53 வயதுள்ள திரு. S.ஞானசேகரன் (PAN:AYQPS2474J) அவர்கள் 1-வது பார்ட்டியாகவும்,

For AG FOUNDATIONS (P) LTD

Director

1-வது பார்ட்டி

2-வது பார்ட்டி

23/11/20

D. PRASANNA, B.Sc.,LLB.,
ADVOCATE & NOTARY
No.18, Plot No.88 E1

NOTARY
D. PRASANNA, B.Sc.LLB.
ADVOCATE
G.O.Ms. No. 278/2018
GOVERNMENT OF TAMILNADU

சென்னை 600 048, கொளப்பாக்கம், அண்ணா நகர், அம்பேத்கார் தெரு, நெம்பர் 180/4 வீட்டில் வசிக்கும் திரு. பொன்னுசாமி அவர்களின் குமாரர் 47 வயதுள்ள திரு. **P. அருள்தாஸ்** (PAN:BAFPP9606P) அவர்கள் **2-வது பார்ட்டியாகவும்,**

இதனடியில் சொத்து விபரத்தில் விவரித்துள்ள நிலங்கள் நம்மில் 1-வது பார்ட்டிக்கு பூரண சொந்தமானது. **(கிரயப் பத்திர எண் 142/2019, புத்தகம் 1, சார்பதிவாளர் அலுவலகம் ராமகிருஷ்ணராஜு பேட்டை).** அந்த நிலத்தில் குவாரி வேலை செய்ய அரசிடம் அனுமதி பெறுவதற்காக நம்மில் 2-வது பார்ட்டி 10 வருடங்களுக்கு குத்தகைக்கு கேட்டுக் கொண்டதின் பேரில், அதற்கு 1-வது பார்ட்டி சம்மதித்து கடந்த 2019-ஆம் ஆண்டு ஆகஸ்ட் மாதம் 01-ஆம் தேதியில் குத்தகை ஆவணம் நிறைவேற்றி, அதன் பேரில் 2-வது பார்ட்டி திருவள்ளூர் மாவட்ட ஆட்சித்தலைவர் அவர்களிடம் விண்ணப்பித்து திருவள்ளூர் மாவட்ட ஆட்சியர் அவர்களின் ந.க.எண்.301/2019/கனிமம்.2, நாள்:22.11.2019-ன் படி குவாரி குத்தகை வழங்குவதற்கான செயல்முறை நடைபெற்று வருகிறது. மேலும் தமிழ்நாடு அரசின் புதிய அரசு ஆணையின்படி G.O.(Ms) No.208 நாள்:21.09.2020-ன் படி புதிய கல்குவாரி (Virgin Quarry) குத்தகை உரிமம் 5 ஆண்டுகளில் இருந்து மேலும் 5 ஆண்டுகளுக்கு நீட்டித்து உத்தரவு பிறப்பித்ததன் பேரில் அரசின் புதிய ஆணையின் படி 10 வருட காலம் குத்தகை செய்யும் நோக்கத்தில் நம்மில் 2-வது பார்ட்டி 1-வது பார்ட்டியை குத்தகை நீட்டித்து புதிய குத்தகை ஒப்பந்தம் நிறைவேற்ற கேட்டுக் கொண்டதின் பேரில் அதற்கு 1-வது பார்ட்டியும் சம்மதித்து அதன்படி நாம் 1 மற்றும் 2 பார்ட்டிகளும் கீழ்கண்ட நிபந்தனைகளின் படி குத்தகை கால நீட்டிப்பு ஒப்பந்தம் செய்து கொள்கிறோம். இந்த குத்தகை கால நீட்டிப்பு ஒப்பந்தம் இன்றைய தேதியில்

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இருந்து மேலும் 13 வருட காலம் அமுலில் இருக்கும். இதற்கு 1-வது பார்ட்டி சம்மதிக்கிறார்.

கீழ்கண்ட நிலத்தில் அரசிடம் அனுமதி பெற்று கருங்கற்கள் உடைத்து எடுப்பதற்கு மட்டும் 2-வது பார்ட்டி மாதம் 1-க்கு ரூ.7,000/- (எழுத்தால் ரூபாய் ஏழு ஆயிரம் மட்டும்) 1-வது பார்ட்டிக்கு கொடுத்துவிட வேண்டியது. வாடகை தொகையை ஒவ்வொரு வருடம் நவம்பர் மாதம் 1-ஆம் தேதிக்குள் 2-வது பார்ட்டி 1-வது பார்ட்டிக்கு செலுத்த வேண்டியது. இதற்கு முன்பணம் எதுவும் 2-வது பார்ட்டி 1-வது பார்ட்டிக்கு செலுத்தவில்லை.

மேற்படி நிலத்தில் உள்ள கருங்கற்களை வெட்டி எடுப்பதற்கான உரிமம் போன்றவற்றை 2-வது பார்ட்டி தன் பெயரிலேயே அரசிடம் அனுமதி பெற்று குவாரி வேலை செய்துவர வேண்டியது. மற்ற நபர்களின் பெயரில் உள்ள உரிமத்தை வைத்து கற்கள் எடுக்க அவருக்கு உரிமை இல்லை. குவாரி வேலை செய்யும் போது அரசின் கனிம விதிகளின் படி 2-வது பார்ட்டி குவாரி வேலை செய்ய வேண்டும். விதிமீறல்கள் ஏதாவது இருப்பின் அதன் முழு பொறுப்பும் 2-வது பார்ட்டியையே சாரும்.

2-வது பார்ட்டி அரசு கனிம விதிகளை மீறும் பட்சத்தில் குத்தகை வழங்கப்படும் 13 வருட காலத்தில் குத்தகையை எந்த நேரத்திலும் இரத்து செய்ய 1-வது பார்ட்டிக்கு முழு உரிமையுண்டு. குத்தகை இரத்து செய்யும் போது 2-வது பார்ட்டியின் சம்மதம் தேவையில்லை என்பதை இரு பார்ட்டிகளும் ஒப்புக் கொள்கின்றனர். மேலும் கனிம விதிகளை 2-வது பார்ட்டி மீறுவதால் அரசால் விதிக்கப்படும் எந்த ஒரு அபராதக் தொகையையும் 2-வது பார்ட்டியே செலுத்த சம்மதிக்கிறார். இந்த அபராதத் தொகை செலுத்துவதற்கும் 1-வது பார்ட்டிக்கும் எந்த சம்மந்தமும் இல்லை என 2-வது பார்ட்டி ஒப்புக்கொள்கிறார்.

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மேற்படி நிலத்தில் கற்கள் உடைத்து எடுப்பதற்கான அனைத்து செலவுகளும் நம்மில் 2-வது பார்ட்டியையே சாரும். 2-வது பார்ட்டி கல்வெட்டி எடுப்பதற்காக மறு குத்தகைக்கு வேறு நபர்களுக்கு வழங்கக்கூடாது. மேற்படி கற்களை உடைத்து எடுப்பதற்கான அனைத்து அரசாங்க கட்டணங்களையும், GST, தொழில் வரி, மின்சார கட்டணம் போன்றவற்றையும் 2-வது பார்ட்டியே செலுத்த வேண்டியது.

மேற்படி நிலத்தை காலி செய்யும் சமயத்தில் அரசுக்கு செலுத்த வேண்டிய வரி வகையறாக்களை நிலுவை ஏதுமின்றி 2-வது பார்ட்டி 1-வது பார்ட்டி வசம் ஒப்படைக்க வேண்டியது. நிலத்தை 2-வது பார்ட்டி 1-வது பார்ட்டி வசம் ஒப்படைத்த பிறகு அரசுக்கு செலுத்த வேண்டிய வரி வகையறாக்கள் நிலுவையில் இருப்பது தெரியவந்தால், 2-வது பார்ட்டியே முன்னின்று வரி வகையறாக்களை செலுத்தி நிலுவையின்றி தீர்த்து வைக்க ஒப்புக்கொள்கிறார்.

மேலும், குத்தகை காலம் முடிவதற்கு முன்னதாகவே 2-வது பார்ட்டி காலி செய்ய விருப்பப்பட்டால் 2 மாதம் முன்னதாகவே எழுத்து மூலம் முன்னறிவிப்பு கொடுக்க வேண்டியது. இன்றைய தேதி முதல் சொத்து விபரத்தில் குறிப்பிட்டுள்ள சொத்தின் சுவாதீனத்தை 1-வது பார்ட்டி 2-வது பார்ட்டியின் வசம் ஒப்படைக்கிறார்.

இன்று முதல் இந்த நிலத்தில் எந்தவித கலன்களோ அல்லது அரசு விதி மீறல்களோ இல்லாமல் பாதுகாக்க வேண்டியது 2-வது பார்ட்டியின் பொறுப்பாகும். அவ்வாறு ஏற்பட்டால் 2-வது பார்ட்டியே பொறுப்பேற்று 1-வது பார்ட்டிக்கு எந்த பாதிப்பும் இன்றி தீர்த்து வைப்பதற்கு 2-வது பார்ட்டி ஒப்புக்கொள்கிறார்.

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இந்தப்படிக்கு நாம் இரு பார்ட்டிகளும் சேர்த்து மனுபூர்வமாய் சம்மதித்து எழுதிக் கொண்ட குத்தகை கால நீட்டிப்பு ஒப்பந்தப் பத்திரம்.

சொத்து விபரம்

காஞ்சிபுரம் பதிவு மாவட்டம், ஆர்.கே.பேட்டை துணை பதிவு மாவட்டம், திருவள்ளூர் மாவட்டம், திருத்தணி வட்டம், தும்மல் செருவு கண்டிகை கிராம பஞ்சாயத்து எல்லைக்கு உட்பட்ட **டி.சி.கண்டிகை கிராமத்தில் 424** நெம்பர் பட்டாவில் அடங்கிய **சர்வே எண் 41/2**-ல் பூரா விஸ்தீரணம் **ஏக்.1.25** சென்ட் நிலமும், **சர்வே எண் 66/1A**-ல் பூரா விஸ்தீரணம் ஏக் 2.80 சென்ட் நிலத்தில் **ஏக்.1.14** சென்ட் நிலமும், **சர்வே எண் 66/1B**-ல் பூரா விஸ்தீரணம் **ஏக்.2.04** சென்ட் நிலமும், **சர்வே எண் 66/8**-ல் பூரா விஸ்தீரணம் **ஏக்.2.66** சென்ட் நிலமும், ஆக மொத்த விஸ்தீரணம் ஏக்.7.09 சென்ட் (ஹெக்டேர் 2.87.0 ஏர்ஸ்) நிலம் மட்டும் இந்த குத்தகை கால நீட்டிப்பு ஒப்பந்தப் பத்திரத்திற்கு உட்பட்டது.

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1-வது பார்ட்டி

2-வது பார்ட்டி

சாட்சிகள்:-

1. (D.சதீஸ்குமார்)

த/பெ. துரைசாமி, நெம்பர் 1/36எ,
கோம்பைக்காடு, சாம்பள்ளி கிராமம்,
மாசிலாப்பாளையம் அஞ்சல்,
மேட்டூர் தாலுகா, சேலம் 636 452.

2. (R.சீனிவாசன்)

த/பெ. ராமலிங்கம், நெம்பர் 5/496,
வால்மீகி தெரு, ஒட்டேரி விரிவு பகுதி,
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அருள்நாஸ் பொன்னுசாமி
Aruldoss Ponnusamy

பிறந்தவருடம்/Year of Birth: 1973
ஆண்/ Male

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Unique Identification Authority of India

முகவரி: S/O பொன்னுசாமி, எண் 180/4
அம்பேத்கர் தெரு, அண்ணா நகர்
செங்கல்பட்டு, கோலப்பாக்கம்
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ANNEXURE IX

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அறிவியல் புலம்

FACULTY OF SCIENCE

சென்னைப் பல்கலைக் கழகப் பேரவை 1994 ஆம் ஆண்டு ஏப்ரல் மாதம் நடந்த கனிமவியல் தேர்வில் பெ. ரங்கராஜு என்பவர் முதல் வகுப்பில் தேர்ச்சி பெற்றார் என்று தக்க தேர்வாளர்கள் சான்றளித்தபடி அறிவியல் நிறைஞர் என்னும் பட்டத்தை அவருக்குப் பல்கலைக் கழக இலச்சினையின் வழங்குகிறது.

The Senate of the UNIVERSITY OF MADRAS hereby makes known that P. Thangaraju has been admitted to the Degree of Master of Science, he/she having been certified by duly appointed Examiners to be qualified to receive the same in Geology and was placed in the First Class, at the Examination held in April 1994

Given under the seal of the University

சேப்பாக்கம், Chepauk
சென்னை, Madras
நாள், Dated 25-01-1999

பதிவாளர் Registrar

P.T. [illegible]
துணை வேந்தர் Vice-Chancellor

ANNEXURE

Assistant Director (G&M) Tiruvallur Tiruvallur District

GOVERNMENT OF INDIA
MINISTRY OF LABOUR AND REHABILITATION
OFFICE OF THE DIRECTOR GENERAL OF MINES SAFETY

Certificate of Practical experience granted by the Manager to a candidate for a Manager's / Surveyor's / Foremen's / Over man's / Sirdar's / Mate's / Short firer's/ Blaster's Certificate of competency (Restricted) examination under the Metalliferous Mines Regulations 1961.

I T.VENKATARAJAGOPALAN being the Mines Agent of M/S.LIMENAPH CHEMICALS, RAJAPALAYAM OF LIMESTONE PRODUCTS (Thenmali Limestone Mine) do hereby certify that Thiru. P.THANGARAJU, son of S.PERIASAMY (whose signature is appended) worked as a Geologist in the above mine from 02.05.1994 to 30.12.1999. During his term of work aforesaid, he has obtained practical experience as detailed overleaf. The duties connected with his work have involved continuous attendance at the mine and have been efficiently performed by him.

I believe him to be of good character and a fit and proper candidate to be examined for Certificate of Competency.

THENMALAI LIME STONE MINES

10/6/06

Agent (Mines)

(Signature with date and official Seal)
[T.VENKATARAJAGOPALAN]

Mines Agent:

P.O. : ARUKANGULAM

District : TIRUNELVELI

State : TAMIL NADU

(Signature of Candidate)

(State name of Mineral) : LIMESTONE

S.No	Particulars of practical Experience (a)	Place of Experience (b)	Period of practical experience(c)		Total Experience (c)		
			From	To	Yr.	Month	Day
01.	As a Trainee in Drilling Operation.	Semi Mechanised Opencast working	02.05.1994	15.07.1995	01	02	14
02.	As a Trainee in Blasting Operation		16.07.1995	10.12.1996	01	04	25
03.	Exploration		11.12.1996	31.01.1998	01	01	20
04.	Surveying		01.02.1998	25.06.1998	00	04	25
05.	Sampling Quality control and		26.06.1998	20.07.1999	01	00	24
06.	Supervision in HEMM Operation.		21.07.1999	30.12.1999	00	05	10
GRAND TOTAL					05	07	28
(Five Years Seven Months Twenty Eight Days Only)							

AVERAGE MONTHLY OUTPUT (D) / AVERAGE DAILY EMPLOYMENT (e) DURING THE ABOVE PERIOD IS GIVEN BELOW :

In below ground working	In open – cast working	In all
Nil Nil	35	35

for THENMALAI LIME STONE MINES

Signature of Candidate

Signature of Manager with Date & Seal
[T.VENKATARAJAGOPALAN]

Name of the Mine :

Instructions :-

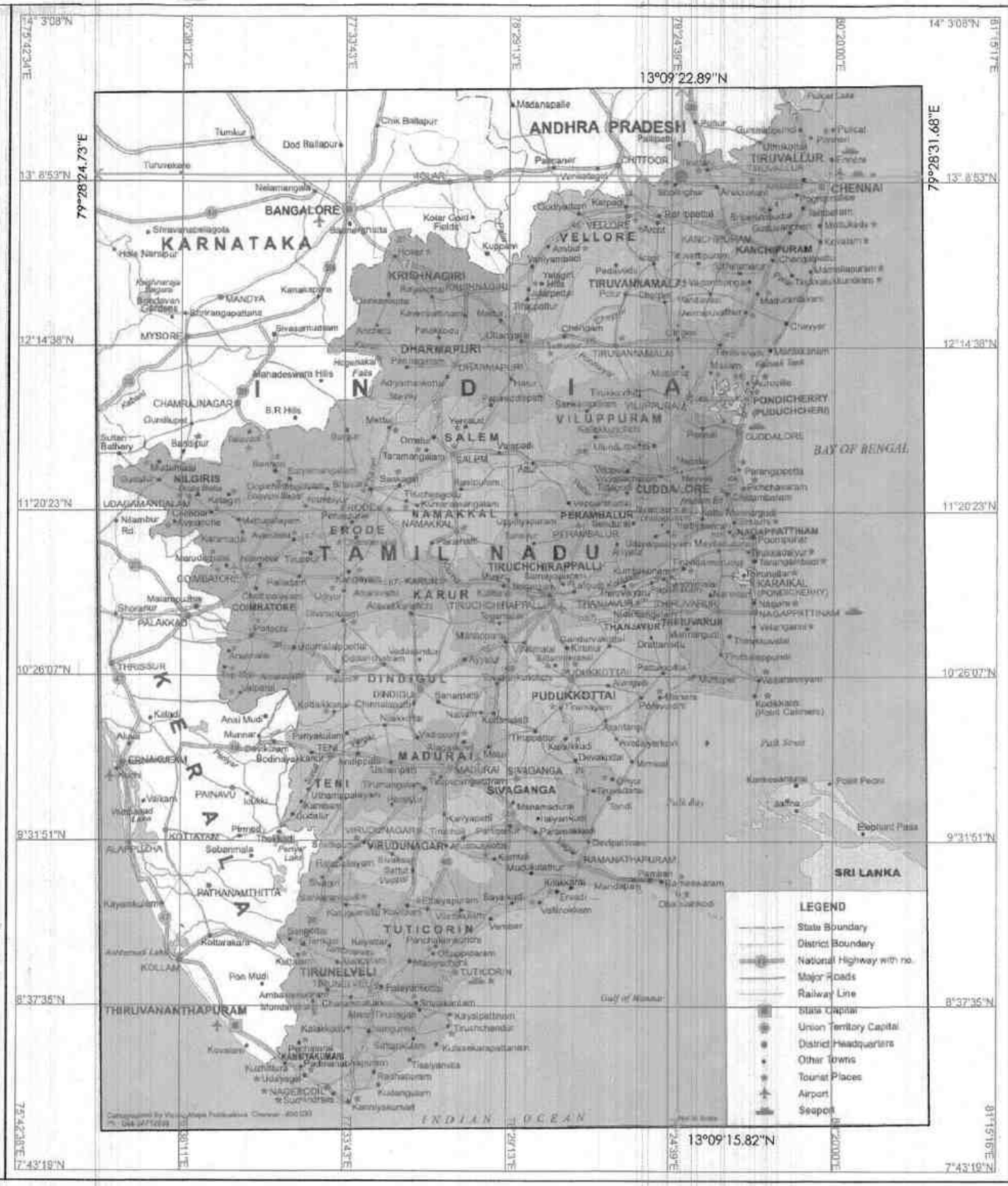
01. State clearly the nature of duties

02. State whether on surface, in open cast workings or below ground

03. State specifically the period spent by the applicant in different mining operations, or surveying operations, as the case may be. If the employment has not been such as to involve continuous attendance of the applicant at the mine,it must be stated how many days a week he was employed at the mine, whether underground or above ground and in what capacity.

04. Delete if the mine is a Metalliferous mine.

05. Delete if the mine is a Coal mine



N

Assistant Director (G&M) Tiruvallur District Tiruvallur

INDEX

Q.L.APPLIED AREA :

TOPO SHEET NO. : 57 O/08

LATITUDE : 13°09'15.82"N to 13°09'22.89"N
LONGITUDE : 79°28'24.73"E to 79°28'31.68"E

APPLICANT :

Thiru. P. ARULDOSS,
S/o. PONNUSAMY,
No. 180/4, AMBEDKAR STREET,
ANNA NAGAR, KOLAPAKKAM,
CHENGALPATTU, CHENNAI - 600 048.

LOCATION OF Q.L.A AREA:

S.F.No : 41/2, 66/1A(P), 66/1B & 66/8.
EXTENT : 2.94.5 Ha,
VILLAGE : T.C. KANDIGAI,
TALUK : THIRUTTANI,
DISTRICT : TIRUVALLUR,
STATE : TAMIL NADU.

PLATE NO - I

DATE OF SURVEY : 19.02.2021

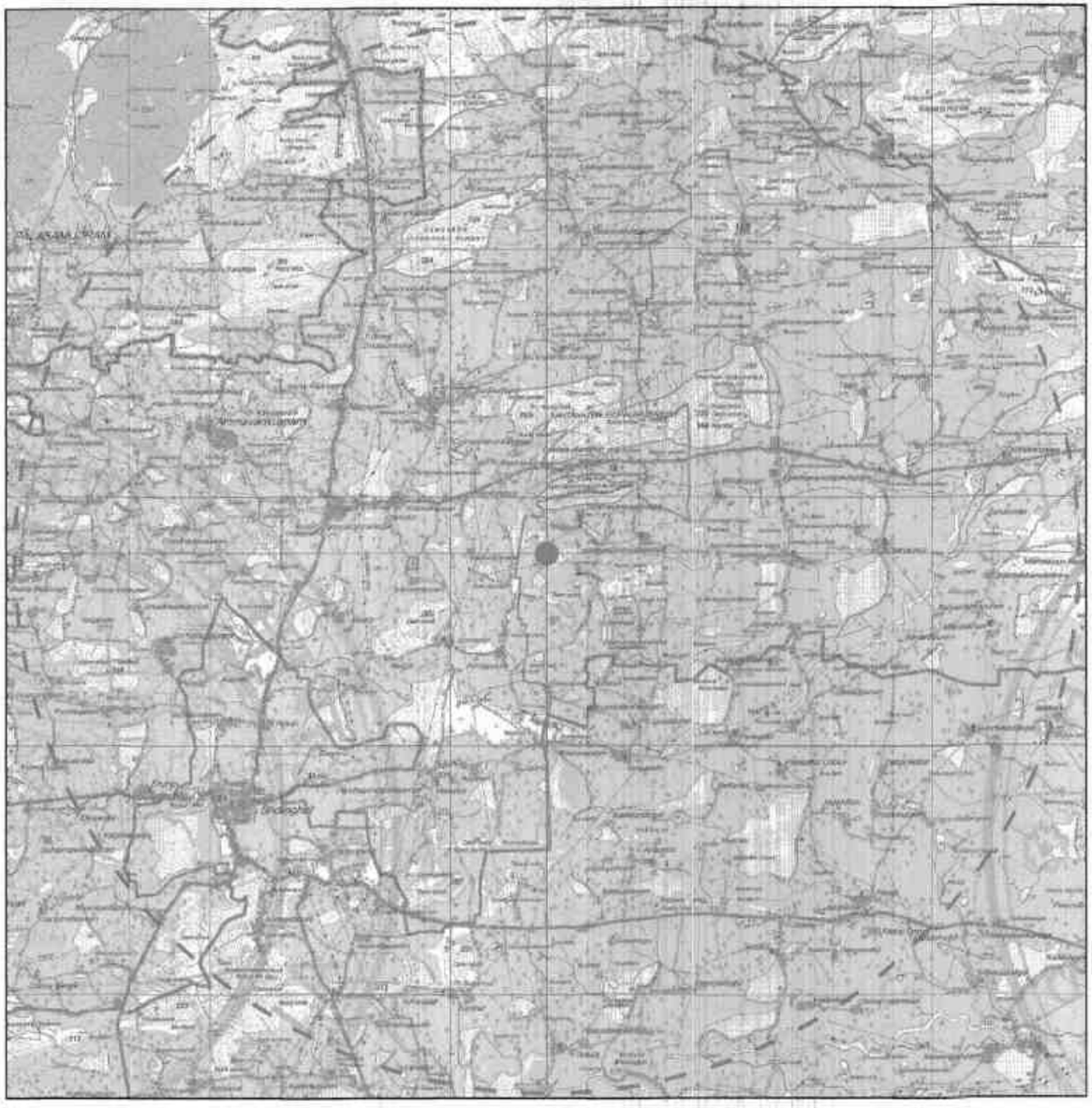
LOCATION PLAN

SCALE. 1:24,00,000

PREPARED BY :

THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT

Dr.P.THANGARAJU,M.Sc.,Ph.D.,
QUALIFIED PERSON



TOPO SHEET NO. : 57 O/08

LATITUDE : 13°09'15.82"N to 13°09'22.89"N
LONGITUDE : 79°28'24.73"E to 79°28'31.68"E

10km RADIUS :

Q.L. APPLIED AREA :

INDEX

Express highway: with toll; with bridge; with distance stone.....
Roads metalled: according to importance.....
Roads, double carriageway; according to importance.....
Unmetalled road. Cart-track. Pack-track with pass. Foot-path.....
Streams: with track in bed; undefined. Canal.....
Dams: masonry or rock-filled; earthwork. Weir.....
River; dry with water channel; with island & rocks. Tidal river.....
Submerged rocks. Shoal. Swamp. Reeds.....
Wells: lined; unlined. Tubewell. Spring. Tanks:perennial; dry.....
Embankments: road or rail; tank. Broken ground.....
Railways, broad gauge: double; single with station; under constrn.
Railways, other gauges: double; single with distance stone; do.....
Mineral line or tramway. Kiln. Cutting with tunnel.....
Contours with sub-features. Rocky slopes. Cliffs.....
Sand features: (1)flat. (2)sand-hills(permanent). (3)dunes(shifting).
Towns or Villages: inhabited; deserted. Fort.....
Huts: permanent; temporary. Tower. Antiquities.....
Temple. Chhatri. Church. Mosque. Idgah. Tomb. Graves.....
Lighthouse. Lightship. Buoys: lighted; unlighted. Anchorage.....
Mine. Vine on trellis. Grass. Scrub.....
Palms: palmyra; other. Plantain. Conifer. Bamboo. Other trees.....
Areas: cultivated; Wooded. Surveyed trees.....
Boundary, international.....
Boundary, state: demarcated; undemarcated.....
Boundary, district; subdivision; tahsil or taluk; forest.....
Boundary pillers: surveyed; unlocated.....
Heights. triangulated: station: point; approximate.....
Bench-mark: geodetic; tertiary; canal.....
Post office. Telegraph office. Overhead tank.....
Rest house or inspection bungalow. Circuit house. Police station....
Camping Ground. Forest: reserved; protected.....
Spaces names: administrative; locality or tribal.....
Hospital. Dispensary. Veterinary: Hospital/Dispensary.....
Aerodrome. Helipad. Tourist site.....
Powerline: with pylons surveyed; with poles unsurveyed.....

Assistant Director (G&M) Tiruvallur District

APPLICANT :

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CHENGALPATTU, CHENNAI - 600 048.

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EXTENT : 2.94.5 Ha.
VILLAGE : T.C. KANDIGAI.
TALUK : THIRUTTANI.
DISTRICT : TIRUVALLUR.
STATE : TAMIL NADU.

PLATE NO - I-A

DATE OF SURVEY : 19.02.2021

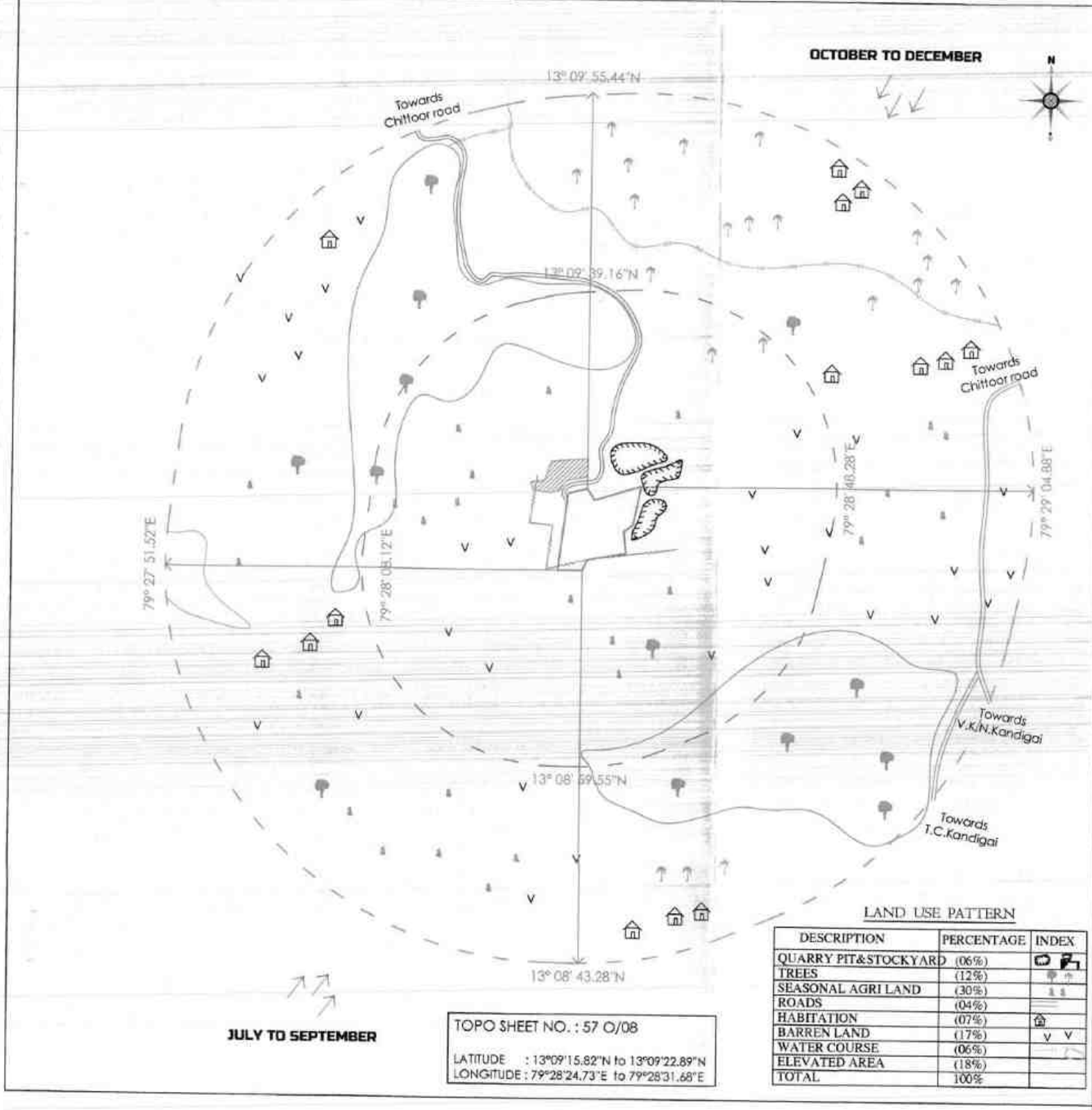
TOPO SKETCH OF QUARRY LEASE APPLIED AREA FOR 10Km RADIUS

SCALE. 1:1,00,000

PREPARED BY :

THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT

Dr.P.THANGARAJU,M.Sc.,Ph.D.,
QUALIFIED PERSON



TOPO SHEET NO. : 57 O/08

LATITUDE : 13°09'15.82"N to 13°09'22.89"N
LONGITUDE : 79°28'24.73"E to 79°28'31.68"E

LAND USE PATTERN

DESCRIPTION	PERCENTAGE	INDEX
QUARRY PIT&STOCKYARD	(06%)	
TREES	(12%)	
SEASONAL AGRI LAND	(30%)	
ROADS	(04%)	
HABITATION	(07%)	
BARREN LAND	(17%)	
WATER COURSE	(06%)	
ELEVATED AREA	(18%)	
TOTAL	100%	

INDEX

- Q.L. APPLIED AREA
- 1 Km RADIUS
- 500m RADIUS
- SEASONAL AGRICULTURE LAND
- TREES
- HABITATION
- QUARRY PIT / STOCK YARD
- WIND DIRECTION
- PANCHAYAT ROAD
- APPROACH ROAD
- BARREN LAND
- ODAI & TANK
- ELEVATED AREA

Assistant Director (G&M) Tiruvallur Tiruvallur District

APPLICANT :

Thiru. P. ARULDOSS,
S/o. PONNUSAMY,
No. 180/4, AMBEDKAR STREET,
ANNA NAGAR, KOLAPAKKAM,
CHENGALPATTU, CHENNAI - 600 048.

LOCATION OF Q.L.A AREA:

S.F.No : 41/2, 66/1A(P), 66/1B & 66/8.
EXTENT : 2.94.5 Ha.
VILLAGE : T.C. KANDIGAI.
TALUK : THIRUTTANI.
DISTRICT : TIRUVALLUR.
STATE : TAMIL NADU.

PLATE NO - I-B

DATE OF SURVEY : 19.02.2021

ENVIRONMENTAL & LAND USE PLAN

SCALE. 1:10,000

PREPARED BY :

THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT

Dr. P. THANGARAJU, M.Sc., Ph.D.,
QUALIFIED PERSON

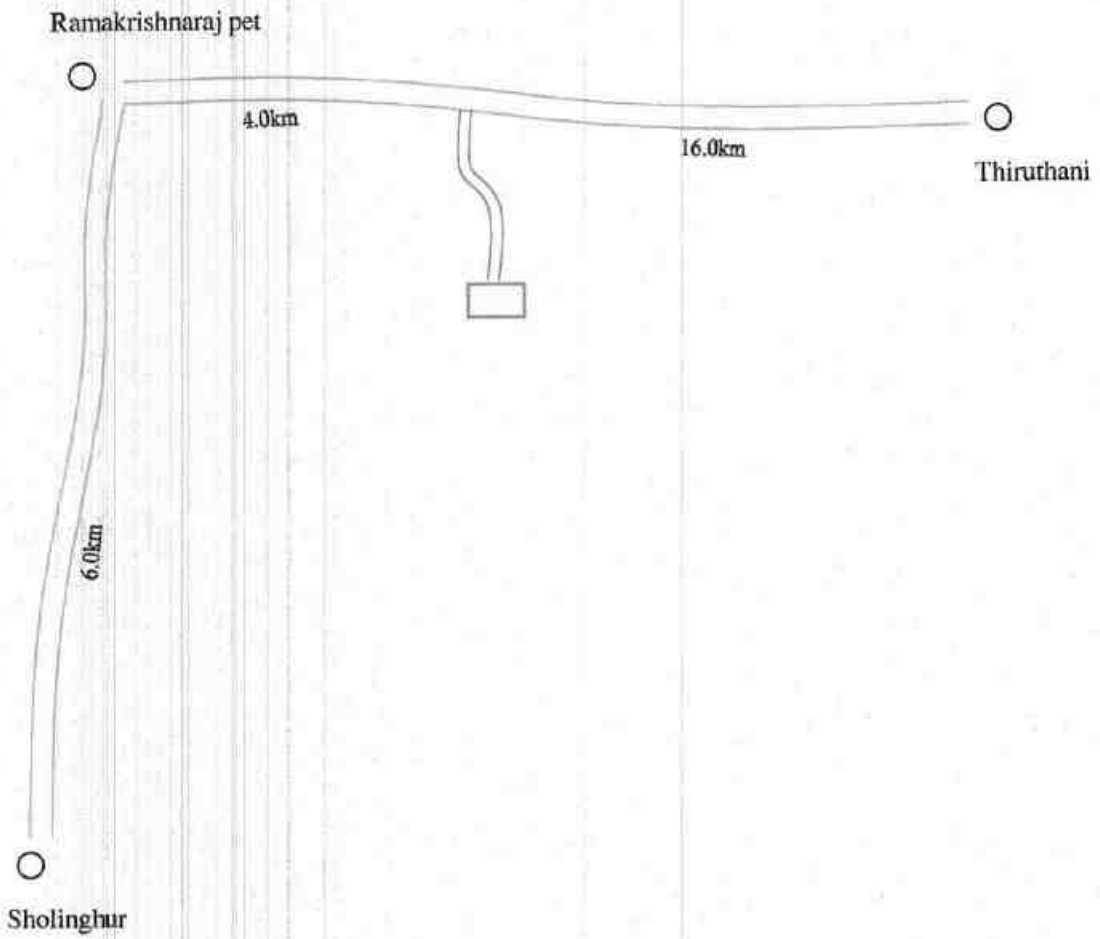
∀ 86

PLATE NO : I-C

ROUTE MAP

N

Assistant Director (G&M) Tiruvallur Tiruvallur District



INDEX

LEASE APPLIED AREA

DISTRICT ROAD

APPROACH ROAD

APPLICANT :

Thiru. P. ARULDOSS,
S/o. PONNUSAMY,
No. 180/4, AMBEDKAR STREET,
ANNA NAGAR, KOLAPAKKAM,
CHENGALPATTU,
CHENNAI - 600 048.

LOCATION OF Q.L.A AREA:

S.F.No : 41/2.66/1A(P).66/1B&66/8.
EXTENT : 2.94.5 Ha,
VILLAGE : T.C. KANDIGAI,
TALUK : THIRUTTANI,
DISTRICT : TIRUVALLUR,
STATE : TAMIL NADU.

SCALE :

NOT TO SCALE

PREPARED BY:

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Dr.P.THANGARAJU,M.Sc.,Ph.D.,
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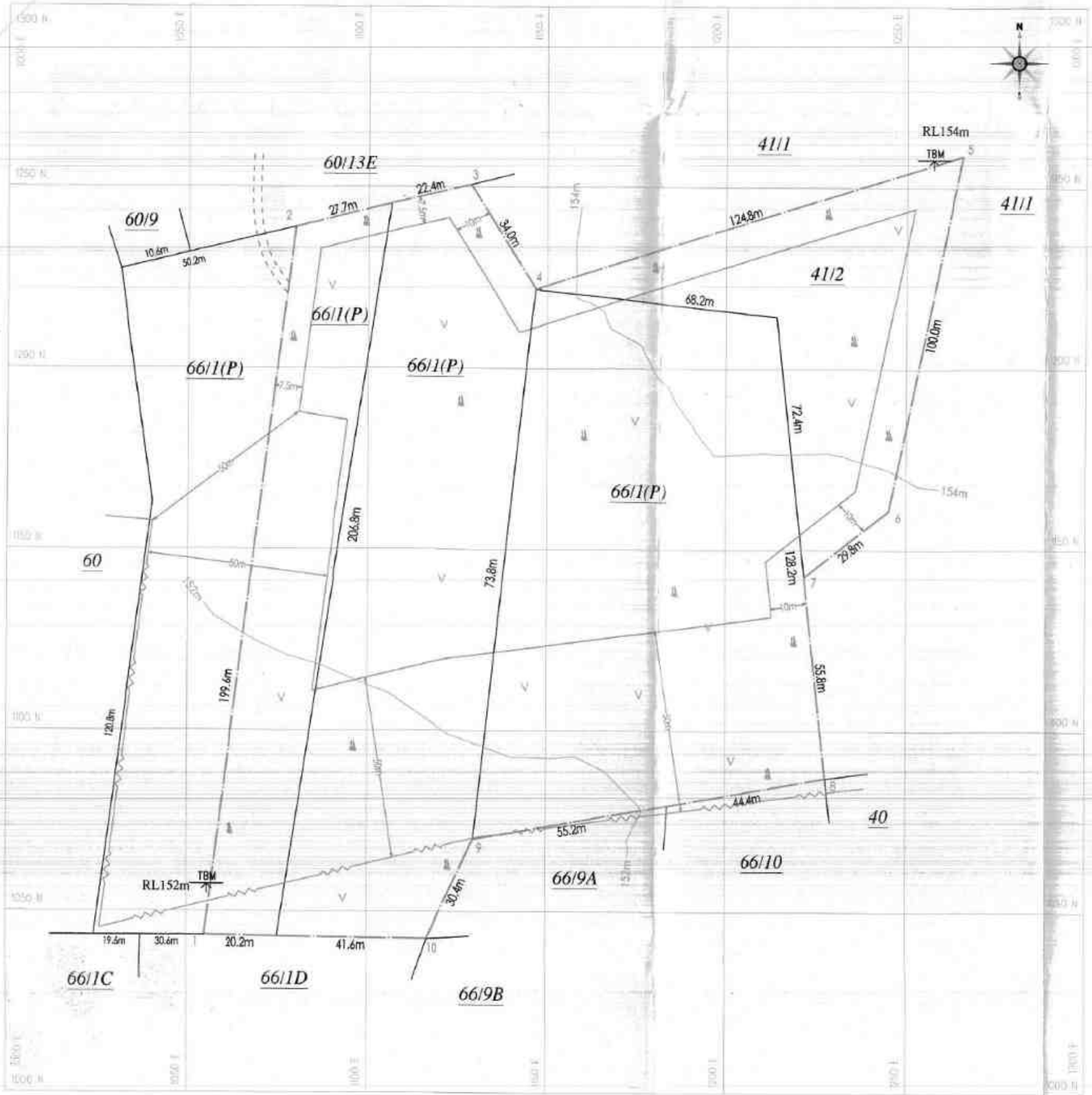


BOUNDARY CO-ORDINATES

S.N.	LATITUDE	LONGITUDE
1	13° 09' 15.84"N	79° 28' 24.73"E
2	13° 09' 22.21"N	79° 28' 25.51"E
3	13° 09' 22.60"N	79° 28' 27.12"E
4	13° 09' 21.47"N	79° 28' 27.73"E
5	13° 09' 22.88"N	79° 28' 31.66"E
6	13° 09' 19.70"N	79° 28' 31.02"E
7	13° 09' 19.10"N	79° 28' 30.25"E
8	13° 09' 17.29"N	79° 28' 30.46"E
9	13° 09' 16.72"N	79° 28' 27.21"E
10	13° 09' 15.82"N	79° 28' 26.78"E

DATUM : UTM-WGS84

INDEX

- Q.L. APPLIED AREA BOUNDARY
- 50m,10m&7.5m SAFETY DISTANCE
- TBM TEMPORARY BENCH MARK
- GRAVEL
- CONTOUR
- SHRUBS
- APPROACH ROAD
- L.T. LINE

APPLICANT :

Thiru. P. ARULDOSS,
S/o. PONNUSAMY,
No. 180/4, AMBEDKAR STREET,
ANNA NAGAR, KOLAPAKKAM,
CHENGALPATTU, CHENNAI - 600 048.

LOCATION OF Q.L.A AREA:

S.F.Nos : 41/2, 66/1A(P), 66/1B & 66/8,
EXTENT : 2.94.5 Ha,
VILLAGE : T.C. KANDIGAI,
TALUK : THIRUTTANI,
DISTRICT : TIRUVALLUR,
STATE : TAMIL NADU.

PLATE NO - II

DATE OF SURVEY : 19.02.2021

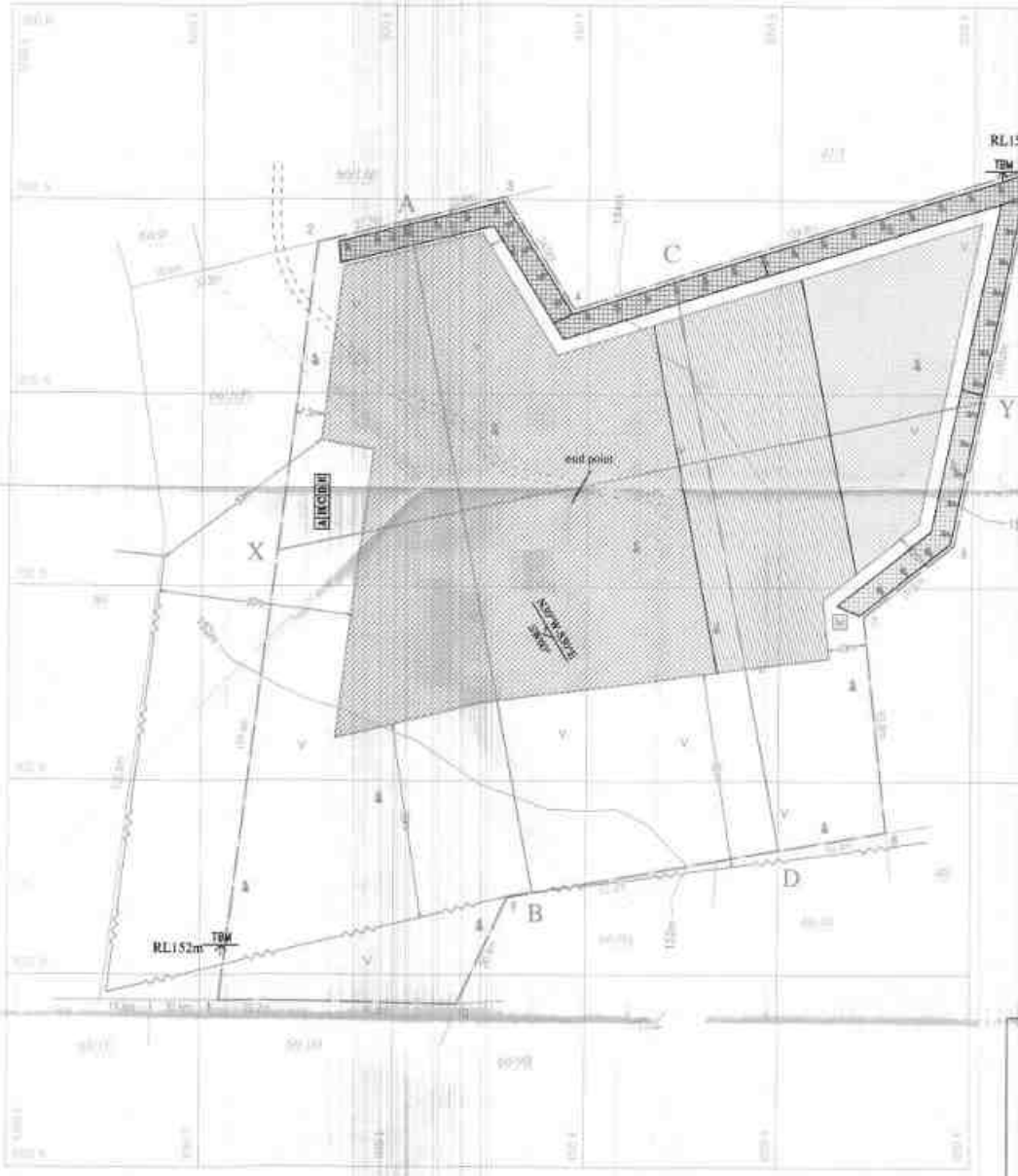
QUARRY LEASE PLAN & SURFACE PLAN

SCALE. 1:1000

PREPARED BY :

THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT

Dr.P.THANGA[illegible] M.Sc.,Ph.D.,
QUALIFIED PERSON



Assistant Director (G&M) Tiruvallur Tiruvallur District

BOUNDARY CO-ORDINATES

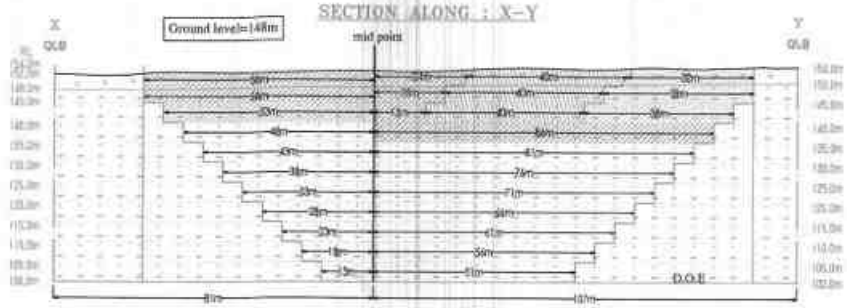
S.N.	LATITUDE	LONGITUDE
1	13°09'13.58"N	79°18'24.73"E
2	13°09'23.21"N	79°18'26.31"E
3	13°09'22.92"N	79°18'27.12"E
4	13°09'21.67"N	79°18'27.73"E
5	13°09'22.89"N	79°18'31.48"E
6	13°09'19.70"N	79°18'31.02"E
7	13°09'18.18"N	79°18'30.33"E
8	13°09'17.28"N	79°18'30.44"E
9	13°09'16.70"N	79°18'27.21"E
10	13°09'15.82"N	79°18'26.78"E

DATUM : STM-WGS84

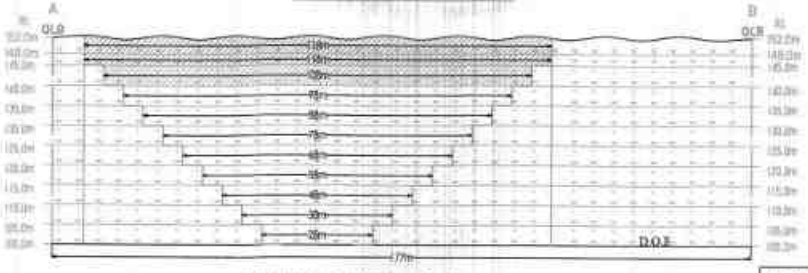
SITE SERVICES (Proposed)

A - OFFICE
B - STORE ROOM
C - FIRST AID ROOM
D - REST SHELTER
E - TOILET
F - MAGAZINE

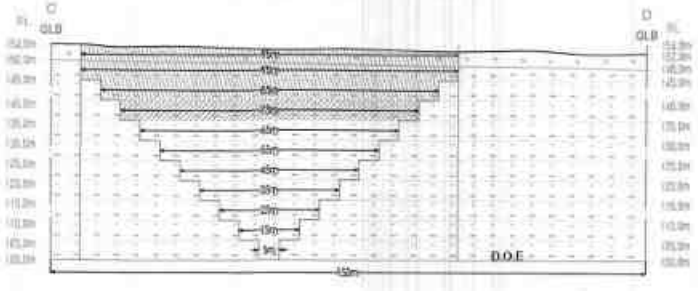
SECTION ALONG : X-Y



SECTION ALONG : A-B



SECTION ALONG : C-D



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- STRIKE & DIP
- CONTOUR
- SHRUBS
- QUARRY HAUL ROAD
- APPROACH ROAD
- L.T. LINE
- D.O.E DEPTH OF ESTIMATION

I - yr Proposed area to be Quarried
II - yr Proposed area to be Quarried
III - yr Proposed area to be Quarried
IV - yr Proposed area to be Quarried
V - yr Proposed area to be Quarried

I - yr Proposed area to be Planted
II - yr Proposed area to be Planted
III - yr Proposed area to be Planted
IV - yr Proposed area to be Planted
V - yr Proposed area to be Planted

APPLICANT :

Thiru. P. ARULDOSS,
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CHENGALPATTU, CHENNAI - 600 048.

LOCATION OF Q.L.A. AREA:

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EXTENT : 2.94.5 Ha.
VILLAGE : T.C. KANDIGAI
TALUK : THIRUTTANI,
DISTRICT : TIRUVALLUR.
STATE : TAMIL NADU.

PLATE NO - III-A

DATE OF SURVEY : 19.02.2021

TOPOGRAPHY, GEOLOGICAL PLAN, YEARWISE DEVELOPMENT & PRODUCTION PLAN & SECTIONS

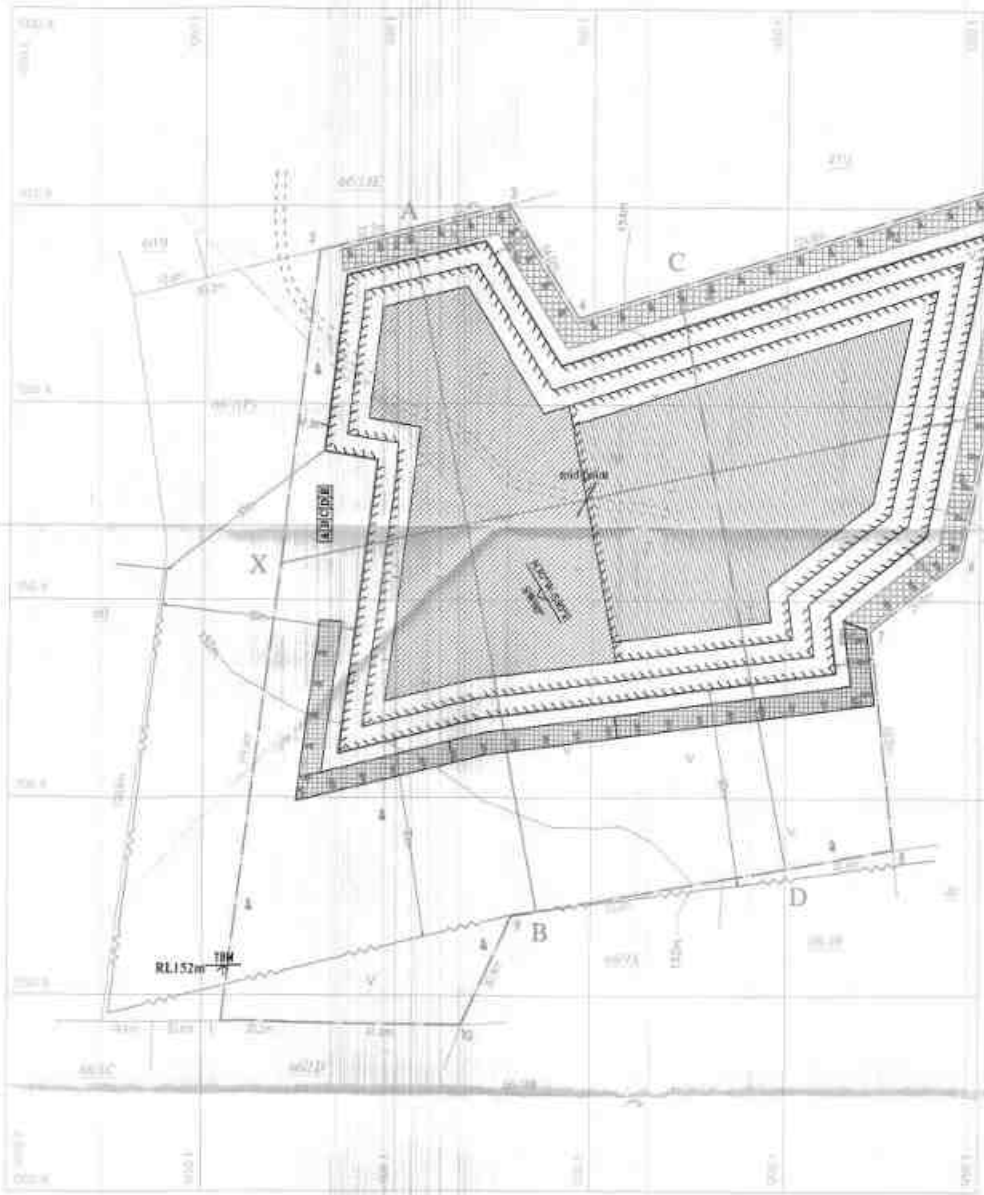
SCALE. 1:1000

PREPARED BY :

THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT.

95 A

Dr.P.THANDAPANI,M.Sc., Ph.D.,
QUALIFIED PERSON



Assistant Director (G&M)
Tiruvallur
Tiruvallur District

BOUNDARY CO-ORDINATES

S.N.	LATITUDE	LONGITUDE
1	13°09'13.84"N	79°28'26.73"E
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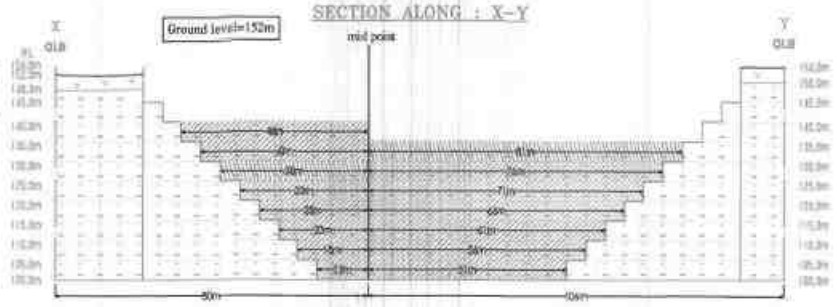
4	13°09'21.67"N	79°28'37.73"E
5	13°09'22.88"N	79°28'37.68"E
6	13°09'19.70"N	79°28'31.28"E
7	13°09'19.10"N	79°28'30.29"E
8	13°09'17.29"N	79°28'30.44"E
9	13°09'16.72"N	79°28'27.21"E
10	13°09'13.82"N	79°28'26.78"E

DATUM : UTM-WGS84

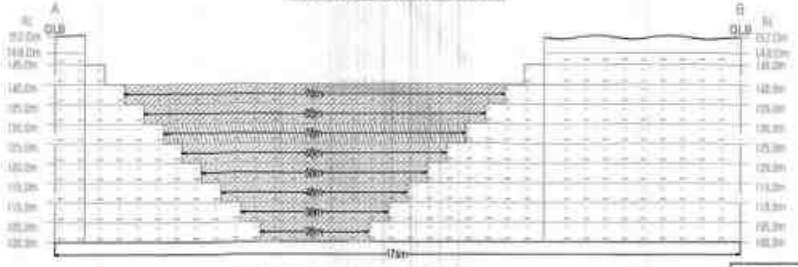
SITE SERVICES

A - OFFICE
B - STORE ROOM
C - FIRST AID ROOM
D - REST SHELTER
E - TOILET
F - MAGAZINE

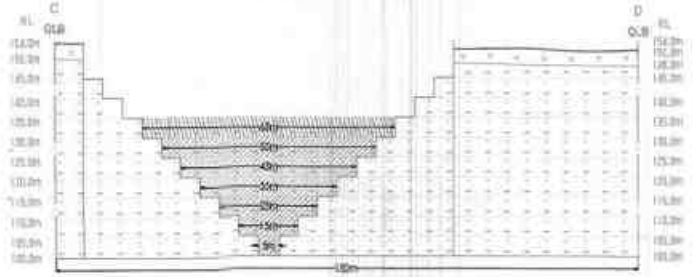
SECTION ALONG : X-Y



SECTION ALONG : A-B



SECTION ALONG : C-D



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- SHRUBS
- QUARRY HAUL ROAD
- APPROACH ROAD
- L.T. LINE
- I-V Yr PLANTATION

VI - yr Proposed area to be Quarried
VII - yr Proposed area to be Quarried
VIII - yr Proposed area to be Quarried
IX - yr Proposed area to be Quarried
X - yr Proposed area to be Quarried

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TALUK : THIRUTTANI.
DISTRICT : TIRUVALLUR.
STATE : TAMIL NADU.

PLATE NO - III-B

DATE OF SURVEY : 19.02.2021

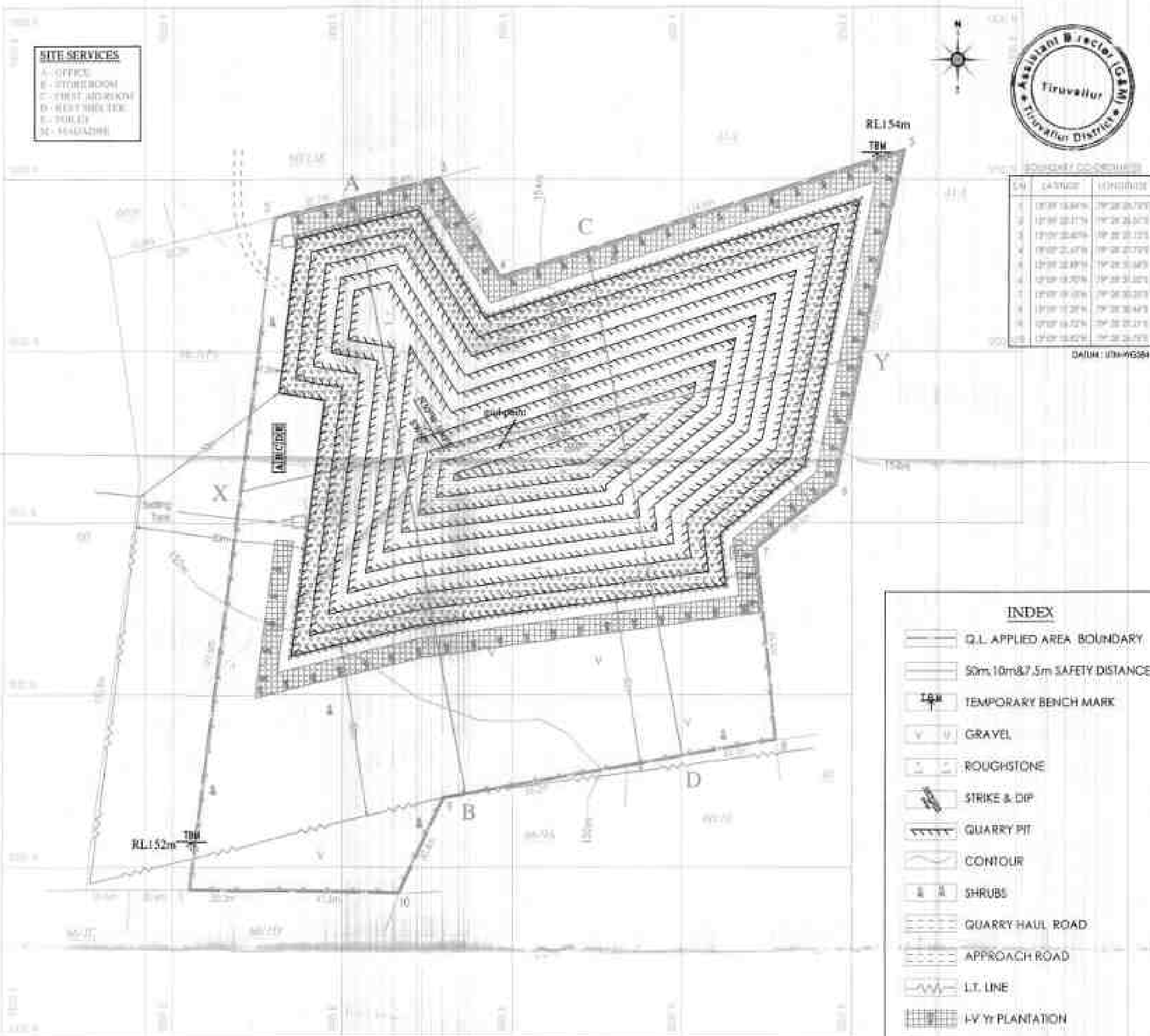
TOPOGRAPHY, GEOLOGICAL PLAN, YEARWISE DEVELOPMENT & PRODUCTION PLAN & SECTIONS

SCALE. 1:1000

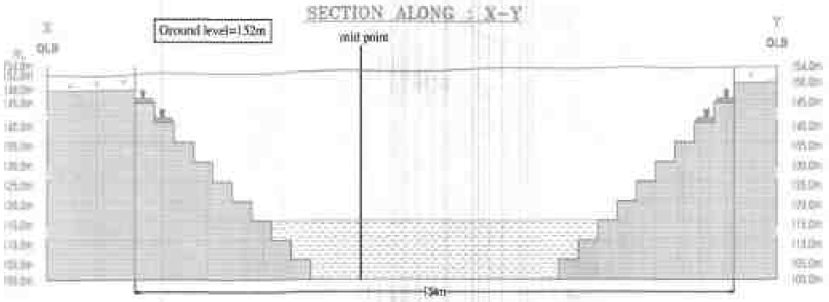
PREPARED BY :

THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT

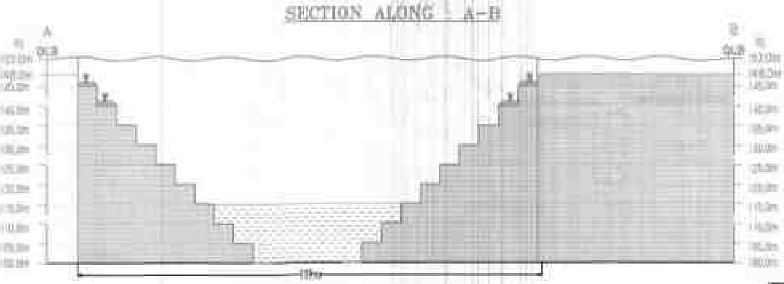
ARUMUGAM M.Sc., M.Phil.,
LICENSED PERSON



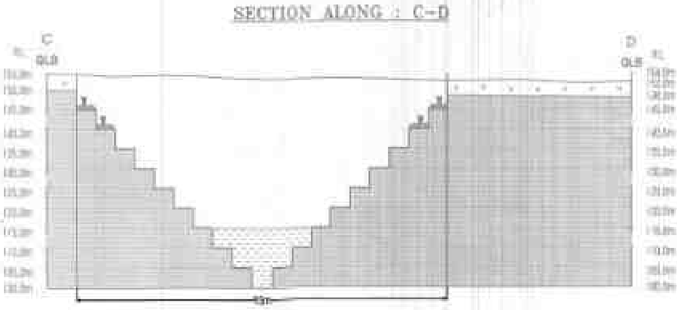
SECTION ALONG : X-Y



SECTION ALONG : A-B



SECTION ALONG : C-D



Proposed Pit Dimension (max)
= 154mX119mX54m(d)
Depth: AGL=2m ; BGL=52m

LAND USE PATTERN

DESCRIPTION	PRESENT AREA IN (Ha)	AREA AT THE END OF THIS QUARRYING PERIOD (Ha)
QUARRYING PIT	Nil	1.53.0
INFRASTRUCTURE	Nil	0.01.0
ROADS	Nil	0.02.0
GREEN BELT	Nil	0.30.0
UN-UTILIZED AREA	2.94.5	1.08.5
TOTAL	2.94.5	2.94.5

INDEX

- Q.L. APPLIED AREA BOUNDARY
- 50m,10m&7.5m SAFETY DISTANCE
- TEMPORARY BENCH MARK
- GRAVEL
- ROUGHSTONE
- STRIKE & DIP
- QUARRY PIT
- CONTOUR
- SHRUBS
- QUARRY HAUL ROAD
- APPROACH ROAD
- L.T. LINE
- I-V Yr PLANTATION
- VI-X Yr PLANTATION
- BARBED WIRE FENCING
- EXISTING LAND FORM
- SOIL LAYER
- REHABILITATED LAND FORM
- PROPOSED GARLAND DRAIN
- OLD SURFACE LEVEL
- FINISHED SURFACE LEVEL
- RAIN WATER STORAGE

APPLICANT :
Thiru. P. ARULDOSS,
S/o. PONNUSAMY,
No. 180/4, AMBEDKAR STREET,
ANNA NAGAR, KOLAPAKKAM,
CHENGALPATTU, CHENNAI - 600 048.

LOCATION OF Q.L.A AREA:
S.F.No : 41/2, 66/1A(P), 66/1B & 66/8.
EXTENT : 2.94.5 Ha.
VILLAGE : T.C. KANDIGAI.
TALUK : THIRUTTANI.
DISTRICT : TIRUVALLUR.
STATE : TAMIL NADU.

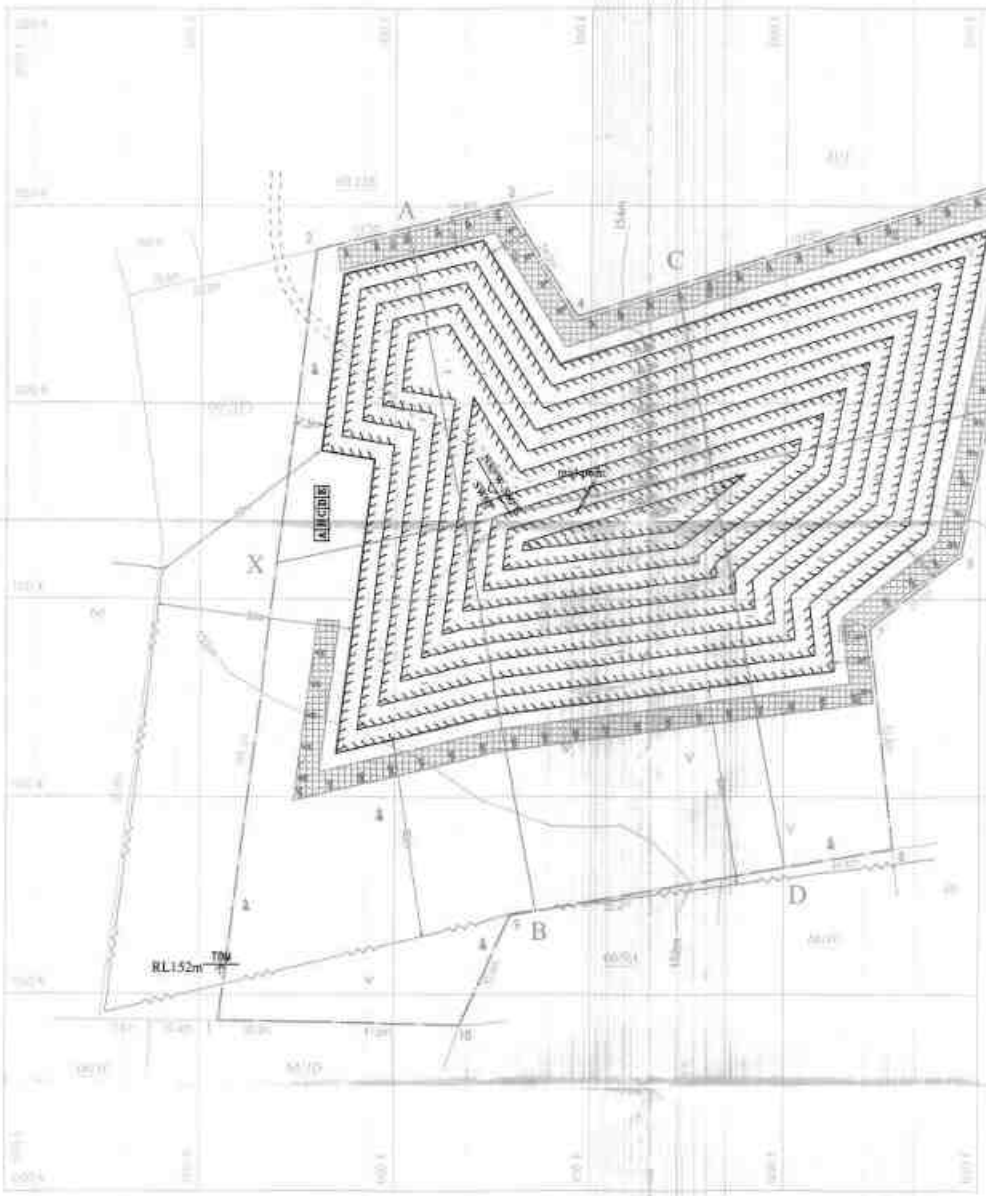
PLATE NO - IV
DATE OF SURVEY : 19.02.2021

PROGRESSIVE QUARRY CLOSURE PLAN & SECTIONS
SCALE. 1:1000

PREPARED BY :
THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT

QUALIFIED PERSON

97 A



BOUNDARY CO-ORDINATES

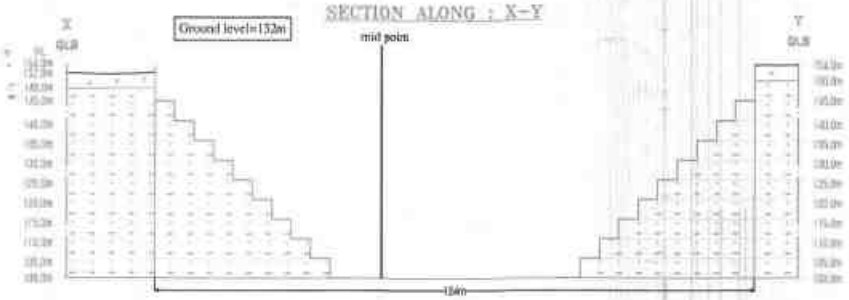
S.N.	LATITUDE	LONGITUDE
1	13°08'15.84"N	79°28'24.72"E
2	13°08'22.22"N	79°28'25.51"E
3	13°08'22.60"N	79°28'27.12"E
4	13°08'21.67"N	79°28'27.23"E
5	13°08'22.88"N	79°28'35.68"E
6	13°08'19.20"N	79°28'35.02"E
7	13°08'18.18"N	79°28'30.23"E
8	13°08'17.28"N	79°28'30.44"E
9	13°08'16.72"N	79°28'27.21"E
10	13°08'13.82"N	79°28'26.78"E

DATUM : UTM-WGS84

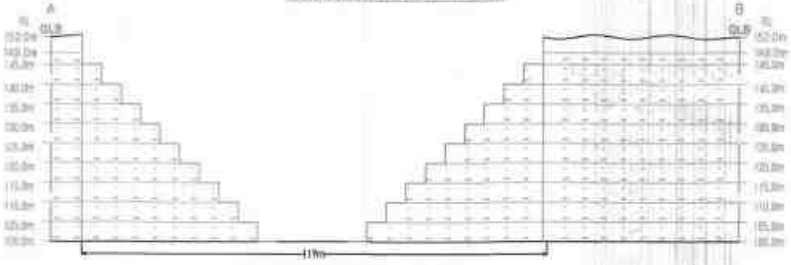
SITE SERVICES

A - OFFICE
B - STORE ROOM
C - FIRST AID ROOM
D - REST SHELTER
E - TOILET
M - MAGAZINE

SECTION ALONG : X-Y



SECTION ALONG : A-B



SECTION ALONG : C-D

Ground level=152m

Ultimate Pit Dimension (max)
= 154mX119mX54m(d)
Depth: AGL=2m ; BGL=52m

INDEX

- Q.L. APPLIED AREA BOUNDARY
- 50m,10m&7.5m SAFETY DISTANCE
- TBM TEMPORARY BENCH MARK
- GRAVEL
- ROUGHSTONE
- STRIKE & DIP
- QUARRY PIT
- CONTOUR
- SHRUBS
- QUARRY HAUL ROAD
- APPROACH ROAD
- L.T. LINE
- I-V Yr PLANTATION
- VI-X Yr PLANTATION

APPLICANT :

Thiru. P. ARULDOSS,
S/o. PONNUSAMY,
No. 180/4, AMBEDKAR STREET,
ANNA NAGAR, KOLAPAKKAM,
CHENGALPATTU, CHENNAI - 600 048.

LOCATION OF Q.L.A AREA:

S.F.No : 41/2, 66/1A(P), 66/1B & 66/8,
EXTENT : 2.94.5 Ha.
VILLAGE : T.C. KANDIGAI,
TALUK : THIRUTTANI,
DISTRICT : TIRUVALLUR,
STATE : TAMIL NADU.

PLATE NO - V

DATE OF SURVEY : 19.02.2021

CONCEPTUAL PLAN & SECTIONS

SCALE. 1:1000

PREPARED BY :

THIS IS TO CERTIFY THAT THE INFORMATION IN THIS PLATE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE BASED UPON THE LEASE MAP AUTHENTICATED BY STATE GOVERNMENT

Assistant Director (Geology & Mining)
Tiruvallur
Tiruvallur District

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62550 Test Certificate Date : 22.12.2022
Sample Description : Ambient Air Monitoring
Location of Sampling : AAQ1 Core Zone 13°9'20.87"N 79°28'30.14"E
Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07
Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/10 & 25.01.2023
Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/10 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	123	59.4	23.7	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	106	66.9	32.6	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	112	52.6	36.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	135	59.3	25.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	104	55.5	32.4	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	122	68.9	21.6	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	103	54.6	22.5	8.4	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	111	65.4	34.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	102	56.3	35.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	125	65.9	26.9	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	139	62.8	33.2	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	108	64.5	39.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	126	51.2	35.8	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	113	52.1	24.2	8.4	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	105	65.0	32.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	122	69.2	31.9	8.4	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	101	66.1	36.3	7.5	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	135	63.5	33.6	10.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	128	65.4	25.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	105	69.7	22.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	114	68.8	38.8	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	107	65.5	35.7	7.5	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	125	52.2	34.5	10.3	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	107	64.0	26.2	7.5	23.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	135	56.1	23.1	10.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	122	68.2	38.4	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	104	55.4	35.9	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	117	62.9	29.7	10.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)
Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By

P. KAVITHA
Technical Manager

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62551 Test Certificate Date : 22.12.2022

Sample Description : Ambient Air Monitoring

Location of Sampling : AAQ 2 Core Zone 13°9'27.22"N 79°28'31.75"E

Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07

Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/11 & 25.01.2023

Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/11 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	102	52.6	21.3	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	126	56.2	25.2	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	109	59.3	22.8	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	118	57.9	24.9	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	105	66.5	32.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	123	63.4	21.1	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	118	52.2	25.0	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	105	61.1	34.2	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	122	54.0	35.6	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	101	55.2	32.8	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	114	58.3	23.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	127	55.5	26.3	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	105	62.9	29.0	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	118	69.5	28.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	109	56.1	25.9	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	126	59.5	20.8	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	113	53.9	31.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	105	58.6	24.2	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	122	52.3	35.0	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	101	51.5	22.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	122	54.8	24.7	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	125	67.4	25.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	108	65.5	28.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	107	58.2	27.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	114	59.1	35.6	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	101	56.4	26.3	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	105	53.5	22.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	128	62.9	20.9	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)

Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
P. KAVITHA
Technical Manager
Authorised Signatory

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62552 Test Certificate Date : 22.12.2022
Sample Description : Ambient Air Monitoring
Location of Sampling : AAQ3 Kondapuram 13°8'45.29"N 79°28'3.67"E
Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07
Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/12 & 25.01.2023
Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/12 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	ng/m³	ng/m³	µg/m³	ng/m³
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	107	53.3	21.7	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	112	57.6	35.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	105	52.9	39.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	104	54.5	26.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	121	56.4	23.9	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	103	59.2	26.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	126	62.5	22.1	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	119	50.8	30.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	108	62.4	22.4	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	122	61.2	33.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	105	54.3	25.3	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	118	58.6	24.9	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	107	56.9	28.6	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	104	53.5	22.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	101	69.2	37.2	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	122	57.3	25.0	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	125	60.6	23.4	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	109	51.5	26.8	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	116	62.4	38.7	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	103	54.0	25.2	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	122	52.2	24.3	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	115	55.1	20.0	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	104	54.5	22.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	128	59.8	39.1	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	109	55.9	24.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	113	53.8	22.4	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	102	66.4	25.9	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	120	52.5	27.6	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)
Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
P. KAVITHA
Technical Manager

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62553 Test Certificate Date : 22.12.2022
Sample Description : Ambient Air Monitoring
Location of Sampling : AAQ4 Beerakuppam 13°10'25.99"N 79°30'46.47"E
Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07
Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/13 & 25.01.2023
Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/13 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	126	56.1	37.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	102	51.6	22.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	125	59.9	25.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	114	65.2	39.2	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	102	53.8	24.1	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	101	52.4	38.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	123	54.3	26.4	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	122	69.6	22.9	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	119	56.9	27.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	115	52.5	25.6	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	108	55.6	21.3	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	127	68.3	20.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	108	64.2	22.2	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	119	53.5	31.1	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	101	56.4	35.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	124	59.1	34.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	115	55.5	28.8	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	102	56.8	25.6	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	123	62.4	26.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	116	64.5	23.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	105	62.6	20.4	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	124	51.8	22.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	101	56.5	25.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	100	58.2	38.9	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	112	55.4	24.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	101	54.8	27.0	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	125	67.5	31.3	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	104	59.3	20.4	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)
Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

P. KAVITHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By

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CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62554 Test Certificate Date : 22.12.2022
Sample Description : Ambient Air Monitoring
Location of Sampling : AAQ5 Vengapattu 13°7'29.97"N 79°30'10.42"E
Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07
Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/14 & 25.01.2023
Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/14 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	123	53.2	26.9	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	107	50.0	37.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	122	51.5	25.6	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	115	65.8	29.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	114	54.4	24.5	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	101	58.5	27.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	125	69.0	26.0	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	109	56.1	38.2	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	105	55.2	35.3	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	114	52.6	24.7	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	123	60.5	22.0	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	102	63.1	27.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	100	65.9	25.7	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	101	54.5	24.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	115	55.4	29.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	108	59.3	31.1	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	105	51.5	25.0	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	126	55.2	26.2	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	108	54.9	23.3	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	104	57.0	27.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	105	65.2	21.4	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	122	63.1	25.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	101	69.4	22.9	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	120	55.7	34.8	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	102	52.6	32.7	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	123	54.3	31.0	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	125	63.5	29.1	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	114	52.4	22.5	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)
Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

P. KAVITHA Reviewed & Authorized By
Technical Manager
Authorised Signatory

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62555
Test Certificate Date : 22.12.2022
Sample Description : Ambient Air Monitoring
Location of Sampling : AAQ6 Krishnakuppam 13°9'56.76"N 79°27'2.98"E
Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07
Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/15 & 25.01.2023
Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/15 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	107	54.3	28.3	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	125	59.1	24.5	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	122	56.9	26.8	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	106	53.5	23.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	119	68.3	32.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	118	65.2	29.9	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	105	50.5	38.8	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	110	64.8	24.2	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	101	58.4	35.0	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	114	65.6	38.1	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	128	51.0	32.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	105	50.2	21.8	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	126	53.1	26.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	100	55.5	25.7	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	114	68.8	24.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	100	52.5	22.3	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	122	50.4	26.5	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	105	55.5	29.9	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	118	68.0	38.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	107	64.3	35.1	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	122	51.6	22.0	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	110	56.2	34.3	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	104	52.9	27.6	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	125	53.5	28.2	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	106	67.1	25.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	115	55.4	30.4	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	104	50.7	21.5	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	127	61.9	32.8	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)
Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

P. KAVITHA Reviewed & Authorized By
Technical Manager
Authorised Signatory

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

Jothi Complex, 83, M.K.N. Road, Guindy, Chennai - 600 032, Tamil Nadu, INDIA
Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62556 Test Certificate Date : 22.12.2022
Sample Description : Ambient Air Monitoring
Location of Sampling : AAQ7 Cherukkanur 13°9'20.29"N 79°30'53.14"E
Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07
Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/16 & 25.01.2023
Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/16 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	116	53.7	26.5	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	103	65.3	22.0	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	128	52.5	25.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	105	50.2	24.0	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	112	58.4	29.4	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	111	55.9	38.0	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	124	54.0	25.2	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	107	61.8	22.8	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	115	50.2	36.3	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	103	52.4	23.7	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	115	56.3	25.1	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	127	69.8	22.9	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	114	68.0	34.5	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	105	65.1	21.3	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	116	52.6	25.9	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	120	50.5	24.6	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	121	56.2	39.3	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	103	59.8	36.0	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	116	58.1	28.2	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	115	57.4	27.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	108	55.7	21.8	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	125	58.5	20.1	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	128	57.6	22.0	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	127	65.9	25.2	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	126	51.8	34.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	105	52.6	36.8	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	110	64.4	23.5	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	102	55.0	25.6	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)
Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

P. KAVITHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62557 Test Certificate Date : 22.12.2022
Sample Description : Ambient Air Monitoring
Location of Sampling : AAQ8 Adhivaragapuram 13°8'8.55"N 79°26'18.77"E
Sampling Plan & Procedure: IS 5182 Part 14:2000 & CML/LAB/ENV/SOP/07
Sampling Instrument ID & Calibration Due Date: CML/ENV/RDS/17 & 25.01.2023
Sampling Instrument ID & Calibration Due Date: CML/ENV/FDS/17 & 25.01.2023

Ambient Air Monitoring Details		Particulate Pollutant			Gaseous Pollutant					Metals Pollutant			Organic Pollutant	
Parameters		SPM	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	O_3	CO	Pb	Ni	As	C_6H_6	BaP
NAAQ Norms		200	100	60	80	80	400	180	4	1	20	6	5	1
Unit		$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	ng/m^3	ng/m^3	$\mu g/m^3$	ng/m^3
Date	Period.hrs	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
03.10.2022	7:00-7:00	122	53.7	29.5	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
04.10.2022	7:15-7:15	104	57.4	25.3	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.10.2022	7:00-7:00	119	51.1	22.7	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.10.2022	7:15-7:15	125	65.5	21.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
10.10.2022	7:00-7:00	133	52.8	24.6	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.10.2022	7:15-7:15	128	54.6	23.8	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.10.2022	7:00-7:00	122	53.3	28.2	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.10.2022	7:15-7:15	120	59.2	25.4	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.10.2022	7:00-7:00	114	55.5	26.0	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.10.2022	7:15-7:15	121	52.8	22.5	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.10.2022	7:00-7:00	106	56.0	30.3	9.3	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.10.2022	7:15-7:15	123	50.5	34.4	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
31.10.2022	7:00-7:00	100	68.9	20.8	7.5	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
01.11.2022	7:15-7:15	122	55.6	25.6	8.4	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
07.11.2022	7:00-7:00	105	50.5	20.2	7.5	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
08.11.2022	7:15-7:15	124	54.2	28.0	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
14.11.2022	7:00-7:00	109	56.0	20.7	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
15.11.2022	7:15-7:15	118	55.4	36.5	8.4	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.11.2022	7:00-7:00	103	52.0	21.4	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22.11.2022	7:15-7:15	127	50.2	36.6	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.11.2022	7:00-7:00	106	63.8	25.9	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.11.2022	7:15-7:15	112	51.4	33.1	8.4	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
05.12.2022	7:00-7:00	101	55.7	27.4	9.3	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
06.12.2022	7:15-7:15	125	56.5	38.5	9.3	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.12.2022	7:00-7:00	107	59.3	22.3	7.5	21.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.12.2022	7:15-7:15	114	50.7	24.6	7.5	20.7	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.12.2022	7:00-7:00	106	62.5	29.4	8.4	22.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.12.2022	7:15-7:15	122	54.0	34.0	9.3	19.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL: Below Detection Limit ;**DL**: Detection Limit ; **NH_3**: BDL (DL:20); **O_3**: BDL (DL:20); **CO**: BDL (DL:1.0); **Pb**: BDL (DL:0.1); **Ni**: BDL (DL:1.0); **As**: BDL (DL:1.0); **C_6H_6**: BDL (DL:1.0); **BaP**: BDL (DL:0.1)
Remarks: The values observed for the pollutants given above are within the CPCB standards.

End of Report

For Chennai Mettex Lab Private Limited

P. KAVITHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62558 Test Certificate Date : 22.12.2022

Sample Description : Ambient Noise Monitoring
Location of Sampling : N1 - Core Zone - 13°9'21.80"N 79°28'30.67"E
Location of Sampling : N2 - Core Zone - 13°9'27.26"N 79°28'32.18"E
Sampling Plan & Procedure: IS 9989:1981 & CML/LAB/ENV/SOP/10
Sampling Instrument : CML/ENV/SLM/001 & CML/ENV/SLM/002

Sampling Date : 17.11.2022						
Loction	N1-Core Zone			N2-Core Zone		
Parameter	Min	Max	Result	Min	Max	Result
Time	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
06:00-07:00	52.7	60.2	57.5	40.6	49.2	43.9
07:00-08:00	55.2	64.9	60.2	48.3	51.7	50.1
08:00-09:00	56.9	70.5	65.8	50.7	55.1	53.8
09:00-10:00	68.6	76.1	69.1	53.2	58.5	54.2
10:00-11:00	63.4	73.8	68.5	52.8	60.3	53.1
11:00-12:00	52.2	68.3	63.3	51.2	54.4	52.8
12:00-13:00	57.8	62.4	59.7	52.1	59.8	54.2
13:00-14:00	65.5	74.9	67.2	50.4	58.5	51.5
14:00-15:00	64.1	79.8	72.8	52.6	57.2	53.4
15:00-16:00	60.7	76.4	70.3	49.5	54.7	52.3
16:00-17:00	58.3	70.5	65.4	48.2	56.2	53.1
17:00-18:00	52.0	65.4	62.2	50.2	58.5	54.6
18:00-19:00	51.5	63.8	56.5	52.5	56.1	53.9
19:00-20:00	58.3	62.2	59.8	49.6	53.2	51.2
20:00-21:00	55.6	61.2	57.3	45.6	50.6	48.5
21:00-22:00	52.3	60.7	56.9	43.2	46.8	42.3
22:00-23:00	51.6	62.8	55.2	40.1	45.4	41.5
23:00-00:00	53.8	59.5	56.1	40.4	42.2	41.2
00:00-01:00	48.2	55.6	50.5	39.8	43.3	42.3
01:00-02:00	50.1	56.2	52.7	38.2	44.6	41.5
02:00-03:00	48.2	53.1	50.3	36.7	43.6	40.2
03:00-04:00	50.4	55.2	53.1	36.2	45.1	39.5
04:00-05:00	51.7	56.4	52.6	38.2	46.2	41.2
05:00-06:00	53.2	59.6	55.5	40.1	43.9	43.3
Result	Day Means		63.3	Day Means		51.4
	Night Means		53.7	Night Means		41.4

Note: CPCB Norms Industrial Area Day Time:75 dB(A); Night Time:70 dB(A)
The Noise level in the above location exists within the permissible limits of CPCB.

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By

P. KAVITHA
Technical Manager
Authorised Signatory

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TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62559 Test Certificate Date : 22.12.2022

Sample Description : Ambient Noise Monitoring
Location of Sampling : N7 – Cherukkanur - 13°9'20.10"N 79°30'52.81"E
Location of Sampling : N8 – Adhivaragapuram - 13°8'8.44"N 79°26'19.09"E
Sampling Plan & Procedure: IS 9989:1981 & CML/LAB/ENV/SOP/10
Sampling Instrument ID : CML/ENV/SLM/003 & CML/ENV/SLM/004

Sampling Date : 17.11.2022						
Loction	N7-Cherukkanur			N8-Adhivaragapuram		
Parameter	Min	Max	Result	Min	Max	Result
Time	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
06:00-07:00	42.1	45.9	43.3	43.6	48.9	46.1
07:00-08:00	48.1	65.1	52.5	41.1	60.1	54.0
08:00-09:00	52.2	57.3	55.1	52.8	59.5	53.1
09:00-10:00	51.4	56.2	53.2	52.8	53.5	53.1
10:00-11:00	53.1	55.6	54.1	50.2	56.3	52.7
11:00-12:00	51.6	59.8	52.5	52.1	59.6	51.6
12:00-13:00	53.3	58.3	54.4	51.5	55.0	54.3
13:00-14:00	55.3	68.8	59.3	51.6	63.2	55.9
14:00-15:00	56.2	65.5	58.3	51.9	56.1	53.6
15:00-16:00	51.8	58.1	53.6	53.6	59.5	54.4
16:00-17:00	50.7	52.8	51.3	51.9	58.2	53.0
17:00-18:00	51.0	55.5	53.5	52.2	55.9	53.2
18:00-19:00	42.2	54.2	49.4	50.1	58.8	53.5
19:00-20:00	43.5	59.2	50.1	49.5	52.4	51.8
20:00-21:00	40.5	59.9	48.9	44.9	50.4	48.4
21:00-22:00	46.9	53.8	49.8	47.6	61.8	48.7
22:00-23:00	43.6	47.8	42.2	43.3	47.5	43.8
23:00-00:00	40.1	45.6	43.6	41.2	49.1	42.2
00:00-01:00	41.4	46.3	43.6	40.5	48.5	41.3
01:00-02:00	40.1	48.8	43.9	40.8	49.5	42.6
02:00-03:00	35.4	42.4	39.2	39.8	50.0	40.2
03:00-04:00	36.8	55.8	38.2	40.5	56.2	41.0
04:00-05:00	40.0	46.9	42.2	41.7	46.5	44.2
05:00-06:00	41.0	48.3	43.3	43.8	48.2	43.9
Result	Day Means		52.5	Day Means		52.3
	Night Means		42.9	Night Means		43.1

Note: CPCB Norms Residential Area Day Time:55 dB(A); Night Time:45 dB(A)
The Noise level in the above location exists within the permissible limits of CPCB.

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
P. KAVITHA
Technical Manager
Authorised Signatory

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62560 Test Certificate Date : 22.12.2022

Sample Description : Ambient Noise Monitoring
Location of Sampling : N3 - Kondapuram - 13°8'45.46"N 79°28'3.56"E
Location of Sampling : N4 - Beerakuppam - 13°10'26.36"N 79°30'46.61"E
Sampling Plan & Procedure: IS 9989:1981 & CML/LAB/ENV/SOP/10
Sampling Instrument : CML/ENV/SLM/001 & CML/ENV/SLM/002

Sampling Date : 24.11.2022						
Loction	N3-Kondapuram			N4-Beerakuppam		
Parameter	Min	*Max*	*Result*	Min	Max	Result
Time	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
06:00-07:00	44.3	49.6	45.5	41.6	46.3	43.9
07:00-08:00	41.1	61.1	48.4	42.1	62.1	52.4
08:00-09:00	45.6	52.9	50.1	49.0	55.5	51.1
09:00-10:00	49.1	55.5	51.6	50.8	58.9	54.5
10:00-11:00	51.7	53.6	52.7	52.5	58.5	53.7
11:00-12:00	53.5	62.4	54.1	50.2	53.8	52.4
12:00-13:00	50.2	53.8	52.5	50.1	59.1	54.6
13:00-14:00	44.0	61.4	52.1	51.0	65.8	54.5
14:00-15:00	51.1	55.8	51.7	52.3	61.4	53.1
15:00-16:00	51.3	55.8	54.6	49.4	53.4	50.9
16:00-17:00	49.2	53.2	52.2	50.6	52.6	52.1
17:00-18:00	52.8	59.1	54.8	52.9	58.3	54.5
18:00-19:00	50.1	55.5	53.1	50.5	54.2	52.8
19:00-20:00	44.7	54.1	48.0	45.6	56.4	51.5
20:00-21:00	41.8	41.3	49.2	44.2	50.1	45.4
21:00-22:00	50.5	53.6	51.6	48.9	52.1	50.4
22:00-23:00	42.7	49.3	44.3	41.8	48.4	43.8
23:00-00:00	40.2	47.2	43.2	40.7	46.5	42.2
00:00-01:00	43.1	44.5	43.8	41.4	45.2	43.2
01:00-02:00	38.3	48.7	40.5	38.5	47.9	40.1
02:00-03:00	39.0	42.1	41.2	39.2	49.8	42.5
03:00-04:00	32.5	49.8	35.0	33.5	42.3	40.1
04:00-05:00	36.1	46.5	39.1	35.2	41.6	38.2
05:00-06:00	42.6	47.5	43.5	41.9	45.0	43.8
Result	Day Means		51.4	Day Means		51.7
	Night Means		42.5	Night Means		42.7

Note: CPCB Norms Residential Area Day Time:55 dB(A); Night Time:45 dB(A)
The Noise level in the above location exists within the permissible limits of CPCB.

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By

P. KAVITHA
Technical Manager
Authorised Signatory

CHENNAI METTEX LAB PRIVATE LIMITED®

(Approved by AAI, AGMARK, APEDA, BIS, EIC, FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD)

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Phone : +91 44 22323163, 22311034, 42179490, 42179491 | CIN: U74999TN2008PTC069459
Email : test@mettexlab.com | Web : www.mettexlab.com

TEST REPORT

ISSUED TO: Thiru. P.Aruldoss Extent : 2.94.5 Ha
S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Test Certificate No : CML/22-23/62561 Test Certificate Date : 22.12.2022
Sample Description : Ambient Noise Monitoring
Location of Sampling : N5 - Vengapattu - 13°7'29.88"N 79°30'10.21"E
Location of Sampling : N6 - Krishnakuppam - 13°9'56.47"N 79°27'2.88"E
Sampling Plan & Procedure: IS 9989:1981 & CML/LAB/ENV/SOP/10
Sampling Instrument ID : CML/ENV/SLM/003 & CML/ENV/SLM/004

Sampling Date : 24.11.2022						
Loction	N5-Vengapattu			N6-Krishnakuppam		
Parameter	Min	Max	Result	Min	Max	Result
Time	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
06:00-07:00	42.2	63.5	58.5	41.0	47.6	45.7
07:00-08:00	45.4	66.4	50.1	42.1	68.4	50.9
08:00-09:00	49.1	53.5	51.9	45.5	54.1	52.8
09:00-10:00	50.7	68.3	55.5	52.3	56.5	54.2
10:00-11:00	45.5	70.7	58.4	53.2	52.8	52.8
11:00-12:00	49.9	61.2	53.4	50.4	52.5	51.5
12:00-13:00	50.5	59.9	55.2	48.3	65.1	52.3
13:00-14:00	43.1	54.5	52.5	45.2	58.2	54.2
14:00-15:00	45.4	70.4	55.2	53.0	59.9	54.7
15:00-16:00	45.8	71.7	57.1	52.0	56.5	52.4
16:00-17:00	51.6	70.2	54.5	49.0	53.1	50.9
17:00-18:00	44.3	61.0	49.8	51.9	55.2	53.2
18:00-19:00	45.5	51.2	48.3	45.0	55.4	49.5
19:00-20:00	41.8	52.2	45.6	41.2	51.8	44.2
20:00-21:00	48.9	50.6	55.5	42.1	51.6	50.4
21:00-22:00	42.0	48.3	45.6	50.4	58.3	53.2
22:00-23:00	39.4	47.5	41.3	42.8	45.2	43.5
23:00-00:00	37.2	48.2	45.2	40.5	42.1	41.8
00:00-01:00	35.5	44.7	42.1	39.0	41.5	40.5
01:00-02:00	36.8	42.5	39.4	38.7	44.8	43.0
02:00-03:00	35.5	44.2	38.4	38.0	44.3	43.1
03:00-04:00	38.8	47.2	39.1	36.1	48.8	41.3
04:00-05:00	37.4	46.8	40.1	40.0	43.6	41.5
05:00-06:00	39.0	50.2	42.2	42.9	46.4	44.0
Result	Day Means		52.9	Day Means		51.7
	Night Means		41.5	Night Means		43.5

Note: CPCB Norms Residential Area Day Time:55 dB(A); Night Time:45 dB(A)
The Noise level in the above location exists within the permissible limits of CPCB.

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By

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CHENNAI METTEX LAB PRIVATE LIMITED®

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66461
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.
Lab No : 2373039

Sample Description : Surface Water (SW-1) – Tank Near Cherukkanur.
(as stated by customer)

TEST	PROTOCOL	RESULTS
Discipline: Chemical		**Group:** Water
Colour	IS 3025 Part 4:1983 (Reaff:2017)	5 Hazen
Odour	IS 3025 Part 5:2018	Agreeable
pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.91
Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	830 µmhos/cm
Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	4.6 NTU
Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	465 mg/l
Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	168 mg/l
Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	31.2 mg/l
Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	21.9 mg/l
Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	168 mg/l
Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	110 mg/l
Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	34 mg/l
Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.26 mg/l
Residual Free Chlorine	IS 3025 Part 26:2021	BDL (DL:0.1 mg/l)
Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.46 mg/l
Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	11.2 mg/l
Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)
Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)
Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)
Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)

...Contd....2

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

Lab No: 2373039 T.C No: CML/22-23/66461 Dated : 02.01.2023

TEST	PROTOCOL	RESULTS
Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)
Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Mineral Oil	IS 3025 Part 39-2021	BDL(DL : 0.01 mg/l)
Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)
Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)
Cyanide as CN	IS 3025 Part 27/Sec 1-2021	BDL (DL:0.01 mg/l)
BOD @ 27°C for 3 days	IS 3025 Part 44:1993 (Reaff:2019)	6 mg/l
Chemical Oxygen Demand	IS 3025 Part 58:2006 (Reaff:2017)	24 mg/l
Dissolved Oxygen	IS 3025 Part 38:1989 (Reaff:2019)	5.8 mg/l
Barium as Ba	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL:0.05 mg/l)
Ammonia (as total ammonia-N)	IS 3025 Part 34-1988 (Reaff. 2019)	BDL (DL:0.01 mg/l)
Sulphide as H_2S	IS 3025 Part 29-1986 (Reaff. 2019)	BDL (DL:0.01 mg/l)
Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Total Arsenic as As	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Total Suspended Solids	IS 3025 Part 17 -1984 (Reaff:2017)	11 mg/l
Discipline: Biological		**Group:** Water
Total Coliform	APHA 23rd Edn. 2017:9221B	1600 MPN/100ml
Escherichia coli	APHA 23rd Edn. 2017:9221F	300 MPN/100ml
Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number.		

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By

G.S. RADHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By

P. KAVITHA
Technical Manager
Authorised Signatory

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66462
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.
Lab No : 2373040
Sample Description : Surface Water (SW-2) – Veeranathur.
(as stated by customer)

TEST	PROTOCOL	RESULTS
Discipline: Chemical		**Group:** Water
Colour	IS 3025 Part 4:1983 (Reaff:2017)	5 Hazen
Odour	IS 3025 Part 5:2018	Agreeable
pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	8.31
Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	788 µmhos/cm
Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	5.9 NTU
Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	441 mg/l
Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	172 mg/l
Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	32.7 mg/l
Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	22 mg/l
Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	182 mg/l
Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	106 mg/l
Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	37 mg/l
Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.22 mg/l
Residual Free Chlorine	IS 3025 Part 26:2021	BDL (DL:0.1 mg/l)
Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.42 mg/l
Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	9.6 mg/l
Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)
Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)
Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)
Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)

...Contd....2

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Lab No: 2373040 T.C No: CML/22-23/66462 **Dated : 02.01.2023**

TEST	PROTOCOL	RESULTS
Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)
Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Mineral Oil	IS 3025 Part 39-2021	BDL(DL : 0.01 mg/l)
Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)
Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)
Cyanide as CN	IS 3025 Part 27/Sec 1-2021	BDL (DL:0.01 mg/l)
BOD @ 27°C for 3 days	IS 3025 Part 44:1993 (Reaff:2019)	5 mg/l
Chemical Oxygen Demand	IS 3025 Part 58:2006 (Reaff:2017)	27 mg/l
Dissolved Oxygen	IS 3025 Part 38:1989 (Reaff:2019)	5.8 mg/l
Barium as Ba	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL:0.05 mg/l)
Ammonia (as total ammonia-N)	IS 3025 Part 34-1988 (Reaff. 2019)	BDL (DL:0.01 mg/l)
Sulphide as H_2S	IS 3025 Part 29-1986 (Reaff: 2019)	BDL (DL:0.01 mg/l)
Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Total Arsenic as As	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Total Suspended Solids	IS 3025 Part 17 -1984 (Reaff:2017)	8 mg/l
Discipline: Biological		**Group:** Water
Total Coliform	APHA 23rd Edn. 2017:9221B	1600 MPN/100ml
Escherichia coli	APHA 23rd Edn. 2017:9221F	240 MPN/100ml
Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number.		

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By

G.S. RADHA
Technical Manager
Authorised Signatory

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TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023

T.C No : CML/22-23/66463

Date Of Receipt : 23.12.2022

Cust. Ref : SRF Dated : 22.12.2022.

Lab No : 2373041

Analysis Commenced On: 23.12.2022

Analysis Completed On : 02.01.2023

Sample Description : **Ground Water (WW-1) – Core Zone.**
(as stated by customer)

TEST	PROTOCOL	RESULTS
Discipline: Chemical		**Group:** Water
Colour	IS 3025 Part 4:1983 (Reaff:2017)	10 Hazen
Odour	IS 3025 Part 5:2018	Agreeable
pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.36
Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	838 µmhos/cm
Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	2.9 NTU
Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	470 mg/l
Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	164 mg/l
Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	39.4 mg/l
Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	16 mg/l
Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	192 mg/l
Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	114 mg/l
Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	31 mg/l
Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.23 mg/l
Residual Free Chlorine	IS 3025 Part 26:2021	BDL (DL:0.1 mg/l)
Fluoride as F	APHA 23rd Edn. 2017:4500 F D	0.36 mg/l
Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	9.2 mg/l
Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)
Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)
Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)
Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)

...Contd....2

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

Lab No: 2373041 T.C No: CML/22-23/66463 **Dated : 02.01.2023**

TEST	PROTOCOL	RESULTS
Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)
Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Mineral Oil	IS 3025 Part 39-2021	BDL(DL : 0.01 mg/l)
Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)
Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)
Cyanide as CN	IS 3025 Part 27/Sec 1-2021	BDL (DL:0.01 mg/l)
Barium as Ba	IS 3025 Part 44:1993 (Reaff:2019)	BDL(DL:0.05 mg/l)
Ammonia (as total ammonia-N)	IS 3025 Part 58:2006 (Reaff:2017)	BDL (DL:0.01 mg/l)
Sulphide as H_2S	IS 3025 Part 38:1989 (Reaff:2019)	BDL (DL:0.01 mg/l)
Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Total Arsenic as As	IS 3025 Part 34-1988 (Reaff. 2019)	BDL (DL:0.005 mg/l)
Total Suspended Solids	IS 3025 Part 29-1986 (Reaff. 2019)	6.0 mg/l
Discipline: Biological		**Group:** Water
Total Coliform	APHA 23rd Edn. 2017:9221B	< 1.8 MPN/100ml
Escherichia coli	APHA 23rd Edn. 2017:9221F	< 1.8 MPN/100ml
Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number, < 1.8 MPN/100ml can be taken as "No Microbial Growth".		

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
G.S. RADHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By
P. KAVITHA
Technical Manager
Authorised Signatory

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CHENNAI METTEX LAB PRIVATE LIMITED®

Jothi Complex, 83, M.K.N. Road, Guindy, Chennai - 600 032.

(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66464
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.
Lab No : 2373042

Sample Description : **Ground Water (WW-2) – Adhivaragapuram.**
(as stated by customer)

TEST	PROTOCOL	RESULTS
Discipline: Chemical		**Group:** Water
Colour	IS 3025 Part 4:1983 (Reaff:2017)	10 Hazen
Odour	IS 3025 Part 5:2018	Agreeable
pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.62
Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	910 µmhos/cm
Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	2.8 NTU
Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	518 mg/l
Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	194 mg/l
Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	41 mg/l
Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	22.3 mg/l
Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	192 mg/l
Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	114 mg/l
Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	32 mg/l
Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.24 mg/l
Residual Free Chlorine	IS 3025 Part 26:2021	BDL (DL:0.1 mg/l)
Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.40 mg/l
Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	9.6 mg/l
Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)
Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)
Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)
Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)

...Contd....2

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

Lab No: 2373042 T.C No: CML/22-23/66464 Dated : 02.01.2023

TEST	PROTOCOL	RESULTS
Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)
Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Mineral Oil	IS 3025 Part 39-2021	BDL(DL : 0.01 mg/l)
Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)
Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)
Cyanide as CN	IS 3025 Part 27/Sec 1-2021	BDL (DL:0.01 mg/l)
Barium as Ba	IS 3025 Part 44:1993 (Reaff:2019)	BDL(DL:0.05 mg/l)
Ammonia (as total ammonia-N)	IS 3025 Part 58:2006 (Reaff:2017)	BDL (DL:0.01 mg/l)
Sulphide as H_2S	IS 3025 Part 38:1989 (Reaff:2019)	BDL (DL:0.01 mg/l)
Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Total Arsenic as As	IS 3025 Part 34-1988 (Reaff. 2019)	BDL (DL:0.005 mg/l)
Total Suspended Solids	IS 3025 Part 29-1986 (Reaff. 2019)	6.0 mg/l
Discipline: Biological		**Group:** Water
Total Coliform	APHA 23rd Edn. 2017:9221B	< 1.8 MPN/100ml
Escherichia coli	APHA 23rd Edn. 2017:9221F	< 1.8 MPN/100ml
Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number, < 1.8 MPN/100ml can be taken as "No Microbial Growth".		

End of Report

For Chennai Mettex Lab Private Limited

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G.S. RADHA
Technical Manager
Authorised Signatory

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P. KAVITHA
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TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Cust. Ref : SRF Dated : 22.12.2022.

Lab No : 2373043

Sample Description : **Ground Water (BW-1) – Kondapuram.**
(as stated by customer)

T.C Date : 02.01.2023
T.C No : CML/22-23/66465
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

TEST	PROTOCOL	RESULTS
Discipline: Chemical		**Group:** Water
Colour	IS 3025 Part 4:1983 (Reaff:2017)	10 Hazen
Odour	IS 3025 Part 5:2018	Agreeable
pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.92
Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	784 µmhos/cm
Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	2.3 NTU
Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	440 mg/l
Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	172 mg/l
Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	38.4 mg/l
Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	18.5 mg/l
Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	169 mg/l
Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	98 mg/l
Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	32 mg/l
Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	BDL(DL : 0.01 mg/l)
Residual Free Chlorine	IS 3025 Part 26:2021	BDL (DL:0.1 mg/l)
Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.25 mg/l
Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	8.6 mg/l
Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)
Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)
Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)
Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)

...Contd....2

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Lab No: 2373043 T.C No: CML/22-23/66465 Dated : 02.01.2023

TEST	PROTOCOL	RESULTS
Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)
Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Mineral Oil	IS 3025 Part 39-2021	BDL(DL : 0.01 mg/l)
Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)
Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)
Cyanide as CN	IS 3025 Part 27/Sec 1-2021	BDL (DL:0.01 mg/l)
Barium as Ba	IS 3025 Part 44:1993 (Reaff:2019)	BDL(DL:0.05 mg/l)
Ammonia (as total ammonia-N)	IS 3025 Part 58:2006 (Reaff:2017)	BDL (DL:0.01 mg/l)
Sulphide as H_2S	IS 3025 Part 38:1989 (Reaff:2019)	BDL (DL:0.01 mg/l)
Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Total Arsenic as As	IS 3025 Part 34-1988 (Reaff. 2019)	BDL (DL:0.005 mg/l)
Total Suspended Solids	IS 3025 Part 29-1986 (Reaff: 2019)	8 mg/l
Discipline: Biological		**Group:** Water
Total Coliform	APHA 23rd Edn. 2017:9221B	< 1.8 MPN/100ml
Escherichia coli	APHA 23rd Edn. 2017:9221F	< 1.8 MPN/100ml
Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number,< 1.8 MPN/100ml can be taken as "No Microbial Growth".		

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
G.S. RADHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By
P. KAVITHA
Technical Manager
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TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66466
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.
Lab No : 2373044
Sample Description : **Ground Water (BW-2) – Vengapattu.**
(as stated by customer)

TEST	PROTOCOL	RESULTS
Discipline: Chemical		**Group:** Water
Colour	IS 3025 Part 4:1983 (Reaff:2017)	10 Hazen
Odour	IS 3025 Part 5:2018	Agreeable
pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.44
Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	760 µmhos/cm
Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	3.2 NTU
Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	426 mg/l
Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	137 mg/l
Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	21.7 mg/l
Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	20.1 mg/l
Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	133 mg/l
Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	94 mg/l
Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	26 mg/l
Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.31 mg/l
Residual Free Chlorine	IS 3025 Part 26:2021	BDL (DL:0.1 mg/l)
Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.52 mg/l
Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	13.6 mg/l
Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)
Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)
Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)
Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

Lab No: 2373044 T.C No: CML/22-23/66466 Dated : 02.01.2023

TEST	PROTOCOL	RESULTS
Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)
Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)
Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)
Mineral Oil	IS 3025 Part 39-2021	BDL(DL : 0.01 mg/l)
Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)
Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)
Cyanide as CN	IS 3025 Part 27/Sec 1-2021	BDL (DL:0.01 mg/l)
Barium as Ba	IS 3025 Part 44:1993 (Reaff:2019)	BDL(DL:0.05 mg/l)
Ammonia (as total ammonia-N)	IS 3025 Part 58:2006 (Reaff:2017)	BDL (DL:0.01 mg/l)
Sulphide as H_2S	IS 3025 Part 38:1989 (Reaff:2019)	BDL (DL:0.01 mg/l)
Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)
Total Arsenic as As	IS 3025 Part 34-1988 (Reaff. 2019)	BDL (DL:0.005 mg/l)
Total Suspended Solids	IS 3025 Part 29-1986 (Reaff. 2019)	6.0 mg/l
Discipline: Biological		**Group:** Water
Total Coliform	APHA 23rd Edn. 2017:9221B	< 1.8 MPN/100ml
Escherichia coli	APHA 23rd Edn. 2017:9221F	< 1.8 MPN/100ml
Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number,< 1.8 MPN/100ml can be taken as "No Microbial Growth".		

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
G.S. RADHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By
P. KAVITHA
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TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66467
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.

Lab No : 2373045

Sample Description : Soil – 1 – Core Zone
(as stated by customer)

S. No	Test Parameters	Protocols	Results
01	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.73
02	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	360 µmhos/cm
03	**Texture :**		
	Clay	Gravimetric Method	35.2 %
	Sand		49.6 %
	Silt		15.2 %
04	Water Holding Capacity	By Gravimetric Method	32.7 %
05	Bulk Density	By Cylindrical Method	1.13 g/cm^3
06	Porosity	By Gravimetric Method	29.7 %
07	Calcium as Ca	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	318 mg/kg
08	Magnesium as Mg		410 mg/kg
09	Manganese as Mn		32 mg/kg
10	Zinc as Zn		1.6 mg/kg
11	Boron as B		0.82 mg/kg
12	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	210 mg/kg
13	Total Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.036 %
14	Potassium as K	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	160 mg/kg
15	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	1.82 mg/kg
16	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	372 mg/kg
17	Cadmium as Cd	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	BDL (DL : 1.0 mg/kg)
18	Total Chromium as Cr		1.02 mg/kg
19	Copper as Cu		BDL (DL : 1.0 mg/kg)
20	Lead as Pb		0.66 mg/kg
21	Iron as Fe		3.21 mg/kg
22	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.71 %
23	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	0.99 %
24	Cation Exchange Capacity	USEPA 9080 – 1986	24.8 meq/100g of soil

End of Report

For Chennai Mettex Lab Private Limited

P. VAITHA
Technical Manager
Authorised Signatory

Reviewed & Authorized By

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Cust. Ref : SRF Dated : 22.12.2022.

Lab No : 2373046

Sample Description : **Soil – 2 – Kondapuram.**
(as stated by customer)

T.C Date : 02.01.2023

T.C No : CML/22-23/66468

Date Of Receipt : 23.12.2022

Analysis Commenced On: 23.12.2022

Analysis Completed On : 02.01.2023

S. No	Test Parameters	Protocols	Results
01	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.74
02	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	362 µmhos/cm
03	**Texture :**		
	Clay	Gravimetric Method	34.2 %
	Sand		47.6 %
	Silt		18.2 %
04	Water Holding Capacity	By Gravimetric Method	31.6 %
05	Bulk Density	By Cylindrical Method	1.16 g/cm^3
06	Porosity	By Gravimetric Method	24.2 %
07	Calcium as Ca	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	284 mg/kg
08	Magnesium as Mg		202 mg/kg
09	Manganese as Mn		17.2 mg/kg
10	Zinc as Zn		0.91 mg/kg
11	Boron as B		0.41 mg/kg
12	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	208 mg/kg
13	Total Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.046 %
14	Potassium as K	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	86.4 mg/kg
15	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	1.82 mg/kg
16	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	360 mg/kg
17	Cadmium as Cd	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	BDL (DL : 1.0 mg/kg)
18	Total Chromium as Cr		BDL (DL : 1.0 mg/kg)
19	Copper as Cu		BDL (DL : 1.0 mg/kg)
20	Lead as Pb		0.71 mg/kg
21	Iron as Fe		1.46 mg/kg
22	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	3.01 %
23	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.75 %
24	Cation Exchange Capacity	USEPA 9080 – 1986	26.2 meq/100g of soil

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
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Authorised Signatory

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Jothi Complex, 83, M.K.N. Road, Guindy, Chennai - 600 032.

(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66469
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.
Lab No : 2373047
Sample Description : **Soil – 3 – Beerakuppam.**
(as stated by customer)

S. No	Test Parameters	Protocols	Results
01	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.72
02	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	438 µmhos/cm
03	**Texture :**		
	Clay	Gravimetric Method	34.8 %
	Sand		42.6 %
	Silt		22.6 %
04	Water Holding Capacity	By Gravimetric Method	34.6 %
05	Bulk Density	By Cylindrical Method	1.12 g/cm^3
06	Porosity	By Gravimetric Method	27.6 %
07	Calcium as Ca	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	382 mg/kg
08	Magnesium as Mg		48 mg/kg
09	Manganese as Mn		74 mg/kg
10	Zinc as Zn		3.21 mg/kg
11	Boron as B		0.88 mg/kg
12	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	310 mg/kg
13	Total Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.034 %
14	Potassium as K	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	162 mg/kg
15	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	1.80 mg/kg
16	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	460 mg/kg
17	Cadmium as Cd	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	BDL (DL : 1.0 mg/kg)
18	Total Chromium as Cr		BDL (DL : 1.0 mg/kg)
19	Copper as Cu		BDL (DL : 1.0 mg/kg)
20	Lead as Pb		0.82 mg/kg
21	Iron as Fe		2.61 mg/kg
22	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	3.52 %
23	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	2.05 %
24	Cation Exchange Capacity	USEPA 9080 – 1986	3.7 meq/100g of soil

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
P. KAVITHA
Technical Manager
Authorised Signatory

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66470
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.

Lab No : 2373048

Sample Description : Soil – 4 – Krishnakuppam.
(as stated by customer)

S. No	Test Parameters	Protocols	Results
01	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.06
02	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	360 µmhos/cm
03	**Texture :**		
	Clay	Gravimetric Method	31.7 %
	Sand		46.6 %
	Silt		21.7 %
04	Water Holding Capacity	By Gravimetric Method	33.6 %
05	Bulk Density	By Cylindrical Method	1.18 g/cm^3
06	Porosity	By Gravimetric Method	27.4 %
07	Calcium as Ca	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	380 mg/kg
08	Magnesium as Mg		234 mg/kg
09	Manganese as Mn		32 mg/kg
10	Zinc as Zn		1.62 mg/kg
11	Boron as B		1.11 mg/kg
12	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	320 mg/kg
13	Total Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.026 %
14	Potassium as K	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	280 mg/kg
15	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	2.62 mg/kg
16	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	310 mg/kg
17	Cadmium as Cd	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	BDL (DL : 1.0 mg/kg)
18	Total Chromium as Cr		BDL (DL : 1.0 mg/kg)
19	Copper as Cu		BDL (DL : 1.0 mg/kg)
20	Lead as Pb		1.06 mg/kg
21	Iron as Fe		1.36 mg/kg
22	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	3.11 %
23	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.81 %
24	Cation Exchange Capacity	USEPA 9080 – 1986	26.4 meq/100g of soil

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
P. KAVITHA
Technical Manager
Authorised Signatory

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(Approved/Recognized by APEDA, AGMARK, GAFTA, EIC, FSSAI, BIS & MoEF)

TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

T.C Date : 02.01.2023
T.C No : CML/22-23/66471
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

Cust. Ref : SRF Dated : 22.12.2022.

Lab No : 2373049

Sample Description : Soil – 5 – Cherukkanur.
(as stated by customer)

S. No	Test Parameters	Protocols	Results
01	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.62
02	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	464 µmhos/cm
03	**Texture :**		
	Clay	Gravimetric Method	24.7 %
	Sand		46.4 %
	Silt		28.9 %
04	Water Holding Capacity	By Gravimetric Method	33.6 %
05	Bulk Density	By Cylindrical Method	1.27 g/cm^3
06	Porosity	By Gravimetric Method	31.2 %
07	Calcium as Ca	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	460 mg/kg
08	Magnesium as Mg		280 mg/kg
09	Manganese as Mn		41.6 mg/kg
10	Zinc as Zn		3.62 mg/kg
11	Boron as B		1.71 mg/kg
12	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	360 mg/kg
13	Total Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.036 %
14	Potassium as K	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	282 mg/kg
15	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	3.66 mg/kg
16	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	430 mg/kg
17	Cadmium as Cd	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	BDL (DL : 1.0 mg/kg)
18	Total Chromium as Cr		BDL (DL : 1.0 mg/kg)
19	Copper as Cu		BDL (DL : 1.0 mg/kg)
20	Lead as Pb		1.82 mg/kg
21	Iron as Fe		1.38 mg/kg
22	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	2.94 %
23	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.71 %
24	Cation Exchange Capacity	USEPA 9080 – 1986	36.2 meq/100g of soil

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By

P. KAVITHA
Technical Manager
Authorised Signatory

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TEST REPORT

ISSUED TO : Thiru. P.Aruldoss Extent : 2.94.5 Ha

S.F.No : 41/2,66/1A(P), 66/1B and 66/8,
T.C. Kandikai Village, Thiruttani Taluk,
Tiruvallur District.

Cust. Ref : SRF Dated : 22.12.2022.

Lab No : 2373050

Sample Description : Soil – 6 – Adhivaragapuram.
(as stated by customer)

T.C Date : 02.01.2023
T.C No : CML/22-23/66472
Date Of Receipt : 23.12.2022
Analysis Commenced On: 23.12.2022
Analysis Completed On : 02.01.2023

S. No	Test Parameters	Protocols	Results
01	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.33
02	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	434 µmhos/cm
03	**Texture :**		
	Clay	Gravimetric Method	33.6 %
	Sand		47.2 %
	Silt		19.2 %
04	Water Holding Capacity	By Gravimetric Method	32.7 %
05	Bulk Density	By Cylindrical Method	1.16 g/cm^3
06	Porosity	By Gravimetric Method	27.6 %
07	Calcium as Ca	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	370 mg/kg
08	Magnesium as Mg		210 mg/kg
09	Manganese as Mn		31.6 mg/kg
10	Zinc as Zn		0.46 mg/kg
11	Boron as B		1.82 mg/kg
12	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	192 mg/kg
13	Total Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.042 %
14	Potassium as K	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	260 mg/kg
15	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	0.96 mg/kg
16	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	306 mg/kg
17	Cadmium as Cd	USEPA 3050 B – 1996 & USEPA 6010 C - 2000	BDL (DL : 1.0 mg/kg)
18	Total Chromium as Cr		BDL (DL : 1.0 mg/kg)
19	Copper as Cu		BDL (DL : 1.0 mg/kg)
20	Lead as Pb		0.94 mg/kg
21	Iron as Fe		1.31 mg/kg
22	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	2.02 %
23	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.17 %
24	Cation Exchange Capacity	USEPA 9080 – 1986	32.4 meq/100g of soil

End of Report

For Chennai Mettex Lab Private Limited

Reviewed & Authorized By
P. KAVITHA
Technical Manager
Authorised Signatory

QUALITY COUNCIL® OF INDIA
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National Accreditation Board for Education and Training

Certificate of Accreditation

Geo Exploration & Mining Solutions, Salem

95/1, Brindavan Road, 4th Cross East, Fairlands, Salem – 636 016 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 opencast only	1	1 (a) (i)	A
2	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	B
3	Building and construction projects	38	8(a)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Jan 06, 2023 and 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/23/2684 dated Feb 20, 2023. The accreditation needs to be renewed before the expiry date by Geo Exploration & Mining Solutions, Salem following due process of assessment.

Sr. Director, NABET
Dated: Feb 20, 2023

Certificate No.
NABET/EIA/2225/RA 0276

Valid up to
August 06, 2025

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to the QCI-NABET website.