DRAFT OF ENVIRONMENTAL IMPACT ASSESSMENT
AND
ENVIRONMENT MANAGEMENT PLAN

FOR OBTAINING

Environmental Clearance under EIA Notification – 2006

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

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

CLUSTER EXTENT = 15.99.45 hectares

ROUGHSTONE AND GRAVEL QUARRY

At

Thollamur & Nemili Village, Vanur Taluk, Villupuram District,

Tamil Nadu State

ToR Letter No. SEIAA-TN/F.No.10275/ToR-1587/2023 Dated 06.10.2023.

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and Address	Extent & S.F.No.
Mr.A.Shanmugam S/o.Arumugam, No.176/2, Main Road, Thalavanar Village and Post, Villupuram Taluk and District – 636118.	3.66.45 & S.F.No. 19/7 A, 19/7 B, 19/12, 19/13, 19/14 A, 19/14 B 119/ 1A

ENVIRONMENTAL CONSULTANT

GEO TECHNICAL MINING SOLUTIONS

No: 1/213-B, Ground Floor, Natesan Complex
Oddapatti, Collectorate Post office,
Dharmapuri-636705. Tamil Nadu.
E-mail: info.gtmsdpi@gmail.com,
Website: www.gtmsind.com
NABET ACC. NO: NABET/EIA/2124/SA 0184
Valid till: Dec 31, 2023

ENVIRONMENTAL LAB

Ekdant Enviro Services (p) Limited

March through May, 2023

BASELINE MONITORING PERIOD	**MARCH 2023 - MAY 2023**
NAME AND ADDRESS OF THE LABORATORY	**EKDANT ENVIRO SERVICES (P) LIMITED** NABL Accredited & MoEF Recognised Laboratory No. R7/1, AVK Tower, North Main Road, Anna Nagar West Extn, Chennai-600 101
STATUS OF NABL ACCREDITATION	Active
MONTH & YEAR OF SUBMISSION FOR PUBLIC HEARING	November 2023

Declaration by Experts Contributing to the EIA for Mr.A.Shanmugam.

I, hearby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA Coordinator

Name : Dr. S. Karuppannan

Signature and Date :

Period of involvement : Till date

Contact information : info.gtmsdpi@gmail.com

Functional area experts:

S. No	Functional areas	Name of the experts	Involvement	Signature
1	AP	P. Venkatesh	Identification of different sources of air pollution due to the proposed mine activity, prediction of air pollution and propose mitigation measures / control measures.	
2	WP	Dr.S. Malar	Suggesting water treatment systems, drainage facilities, evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	
3	SHW	J.N. Manikandan	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.	

4	SE	Dr.G. Prabakaran	Revision in secondary data as per Census of India, 2011, impact Assessment & Preventive Management Plan, Corporate Environment Responsibility.	
5	EB	Dr.J. Rajarajeswari	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.	
6	HG	Dr.M. Vijayprabhu	Interpretation of ground water table and predict impact and propose mitigation measures, analysis and description of aquifer Characteristics	
7	GEO	S. Gopalakrishnan	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.	
8	SC	Dr.D.Kalaimurugan	Assessing the impact on soil environment and proposed mitigation measures for soil conservation	
9	AQ	Dr.R. Arunbalaji	Identifying different source of emissions and propose predictions of incremental GLC	

			using AERMOD, recommending mitigations measures for EMP	
10	NV	Dr.R. Arunbalaji	Identify impacts due to noise and vibrations, suggesting appropriate mitigation measures for EMP.	
11	LU	G. Umamaheswaran	Construction of Land use Map, impact of project on surrounding land use, suggesting post closure sustainable land use and mitigative measures.	
12	RH	J.N. Manikandan	Identification of hazards and hazardous substances, risks and consequences analysis, vulnerability assessment, preparation of Emergency Preparedness Plan, management plan for safety.	

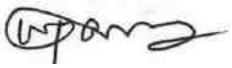
Functional Area Associate:

S. No	Functional areas	Name of the experts	Involvement	Signature
1	SHW	V.Malavika	Site visit along with FAE, assistance in report preparation.	
2	HG	G. Prithiviraj	Field visits along with FAE, assistance to FAE in both primary and secondary data collection.	
3	GEO	P. Vellaiyan	Field visits along with FAE, assistance to FAE in both	

			primary and secondary data collection.	
4	AQ	P.Dhatchayini	Site visit with FAE, assistance to FAE in collection of both primary and secondary data.	
5	NV	C. Kumaresan	Assistance to FAE in both primary and secondary data collection, assistance in noise prediction modelling.	
6	LU	G. Prithiviraj	Site visit with FAE, provide inputs & Assisting FAE for LU	

Declaration by the Head of the accredited consultant organization/Authorized person

I, **Dr. S. KARUPPANNAN**, hearby, confirm that the above-mentioned experts prepared the EIA for **Thiru.A.Shanmugam**. I also confirm that the consultant organization shall be fully accountable for any mis-leading information mentioned this statement.

Signature : 

Name : **Dr. S. Karuppannan**

Designation : EIA Coordinator

Name of the EIA consultant organization : Geo Technical Mining Solutions

NABET Certificate No. & Issue date : NABET/QCI/ SA 0184 /2124 & 31.12.2023

TERMS OF REFERENCE (ToR) COMPLIANCE

ToR issued vide Lr No. SEIAA-TN/F.No.10275/ToR-1587/2023 dated 06.10.2023 for

Mr. A. Shanmugam, Rough stone & gravel Quarry

REMARKS FROM SEAC		
1	During the presentation, SEAC noted that from the KML file uploaded by the proponent in PARIVESH portal, it is construed that the proposed site has been quarried. Further, the Precise area communication letter and mine plan approval letter have not mentioned about the quarrying activity carried out. Hence, AD/Mines shall inspect the quarry site and give his comments on the existing site condition.	It is a fresh quarry, the conditions are not applicable.
2	The structures within the radius of (i) 50m. (ii) 100rn. (iii) 200m and (iv) 300 m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not. Places of worship, industries, factories. sheds, etc.	All the details will be given in the final EIA report.
3	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc located within 1 km of the proposed quarry.	Detailed hydrogeological study was carried out. The results have been discussed Section 3.2 under Chapter III, pp.42-54.
4	The Proponent shall develop greenbelt, fencing and garland drain around the boundary of the proposed quarry and the photographs indicating the same shall be shown during the EIA appraisal.	The greenbelt development photographs will be submitted in the final EIA report.

<table>
<tr><th colspan="4">ANNEXURE-I</th></tr>
<tr><td>1</td><td colspan="3">In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following:</td></tr>
<tr><td rowspan="9"></td><td>i</td><td>Original pit dimension</td><td rowspan="9">It is a fresh quarry, the conditions are not applicable.</td></tr>
<tr><td>ii</td><td>Quantity achieved Vs EC Approved Quantity</td></tr>
<tr><td>iii</td><td>Balance Quantity as per Mineable Reserve calculated.</td></tr>
<tr><td>iv</td><td>Mined out Depth as on date Vs EC Permitted depth</td></tr>
<tr><td>v</td><td>Details of illegal/illicit mining</td></tr>
<tr><td>vi</td><td>Violation in the quarry during the past working.</td></tr>
<tr><td>vii</td><td>Quantity of material mined out outside the mine lease area</td></tr>
<tr><td>viii</td><td>Condition of Safety zone, benches</td></tr>
<tr><td>ix</td><td>Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.</td></tr>
<tr><td>2</td><td colspan="2">Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery site.</td><td>The VAO certificate of 300 m radius have been attached in the attached in the Annexure IV.</td></tr>
<tr><td>3</td><td colspan="2">The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50m, (ii) 100m, (iii) 200m and (iv) 300m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the</td><td>The details will be given in the final EIA report.</td></tr>
</table>

	owner (or) not, places of worship, industries, factories, sheds. etc with indicating the owner of the building. nature of construction, age of the building. number of residents. Their profession and income. etc.	
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake. Water tanks, etc are located within 1 km of the proposed quarry.	The hydrological conditions of the study area have been discussed in Section 3.2 under Chapter III, pp. 42-54.
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	The details of Bio diversity have been provided in Section 3.5 under Chapter III, pp.70-89.
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Page 4 of 25 Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	The details regarding DFO letter will be submitted in the final EIA report.
7	ln the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic institutions - CSIR-Central institute of Mining & Fuel Research / Dhanbad,	The details regarding will be given in the final EIA report.

	NlRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	
8	However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30m below ground level.	The details regarding Slope Stability Plan will be given in the final EIA report.
9	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR l96l such as blaster, mining mate, mine foreman, II/l Class mines manager appointed by the proponent.	The affidavit for blasting has been enclosed in the Annexure III
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	A conceptual design of blasting has been given in Section 2.6 under Chapter II, pp.20-28.
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries	The document containing video and photographic evidences will be submitted in

	operated by the proponent in the past, either in the same location or elsewhere in the state with video and photographic evidences.	the final EIA report.
12	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines.	It is a fresh quarry, the conditions are not applicable.
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	It is a fresh quarry, the conditions are not applicable.
14	Quantity of minerals mined out.	
	• Highest production achieved in any one year	It is a fresh quarry, the conditions are not applicable.
	• Detail of approved depth of mining.	
	• Actual depth of the mining achieved earlier.	
	• Name of the person already mined in that leases area.	
	• If EC and CTO already obtained, the copy of the same shall be submitted.	
	• Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	
15	All corner coordinates of the mine lease area. superimposed on a High-Resolution Imagery/Toposheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area	All corner coordinates of the mine lease area have been superimposed on a high-resolution Google Earth Image, as shown in Figure 2.4, under Chapter II, p-13.

	should clearly show the land use and other ecological features of the study area (core and buffer zone).	
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	Drone video coverage will be submitted in the final EIA report.
17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Photographs of adequate fencing, green belt of the project area and the photographs will be included in final EIA report.
18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedy al measures for the same.	The mineral reserves of the project have been discussed in Section 2.5 under Chapter II, pp.17-19. The anticipated impact of mining on land, air, noise, water, soil, biology, and socio economy is discussed under Chapter IV, pp.102-130.
19	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act, 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Employment details of the proposed project are provided in Table 2.14 under Chapter II, p.29.
20	The Project Proponent shall conduct the hydro-geological study considering the	Detailed hydrogeological study was carried out. The results have been discussed

	contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD/ TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly – be shown whether working will intersect groundwater, Necessary data and documentation in this regard may be provided.	Section 3.2 under Chapter III, pp. 42-54.
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.	The baseline data were collected for the environmental components including land, soil, water, air, noise, biology, socio-economy, and traffic and the results have been discussed under Chapter III, pp. 30-101.
22	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	Results of cumulative impact study due to mining operations are given in Section 7.4 under Chapter VII, pp.144-148.
23	Rain water harvesting management with	Water for dust suppression, greenbelt

	recharging details along with water balance (both monsoon & non-monsoon) be submitted.	development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved water vendors.
24	Land use of the study area delineating forest area, agricultural land, gazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features has been discussed in Section 3.1, pp.31-41 under Chapter III. The details of surrounding sensitive ecological features are provided in Table 3.41 under Chapter III, p.99. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Table 2.8 under Chapter II, p.23.
25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease. such as extent of land area, distance from mine lease' its land use, R&R issues. If any, should be provided.	Not Applicable. No dumps have been proposed outside the lease area.
26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required' clearance certifications from the prescribed	Not Applicable. This project area is involved in the production of rough stone and gravel materials as per the approved mine plan.

	Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	
27	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved water vendors.
28	Impact on local transport infrastructure due to the Project should be indicated.	Impact on local traffic due to the project is within the permissible limit. Details are provided in Section 3.7, pp.96-99.
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	A detailed tree survey was caried out within 300 m radius and the results have been discussed in Section 3.5 under Chapter III, pp.70-89.
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	A progressive mine closure plan has been attached with the approved mining plan report in Annexure III. The budget details for the progressive mine closure plan are shown in Table 2.9 under Chapter II, p.23.
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	The EIA coordinator and the FAE for ecology and biodiversity visited the study area and educated the local students about the importance of protecting the biological environment.

32	The purpose of green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-l in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	A detailed Greenbelt Development Plan dealing with carbon sequestration has been provided in Section 4.6 under Chapter IV, pp.120-126.
33	Taller/one year old saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted as per the advice of local forest authorities/ botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.	The FAE of ecology and biodiversity has advised the project proponent that saplings of one year old raised in the eco-friendly bags should be purchased and planted with the spacing of 3 m between each plant around the proposed project area as per the advice of local forest authorities/botanist. Saplings used for greenbelt development have been shown in Section 4.6 under Chapter IV, pp. 120-126.
34	A Disaster management plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	The details about disaster management Plan have been provided in Section 7.3 under Chapter VII, pp.140-144.
35	A Risk Assessment and management plan shall be prepared and included in the EIA/EMP Report for the complete life of	The details about risk assessment and management plan have been provided in Section 7.2 under Chapter VII, pp.137-140.

	the proposed quarry (or) till the end of the lease period.	
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health impacts of the project and preventive measures have been discussed in detail in Section 4.8 under Chapter IV, pp.127 & 128.
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No public health implications are anticipated due to this project. Details of CSR and CER activities have been discussed in Sections 8.6 and 8.7 under Chapter VIII, pp.152 & 153.
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	No negative impact on socio-economic environment of the study area is anticipated and this project shall benefit the Socio-Economic environment by offering employment for 24 people directly and 10 people indirectly as discussed in Section 8.1 and 8.2 under Chapter VIII, p.151.
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.

40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Benefits of the project details have been given under Chapter VIII, pp.151-153.
41	If any quarrying operation were carried out in the proposed quarrying sile 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.	CCR will be submitted during appraisal of final EIA report.
42	The PP shall prepare the EMP for entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	A detailed EMP is provided in Table 10.9 & 10.10 under Chapter X, pp.166-172. The sworn affidavit stating to abide the EMP for the entire life of mine will be submitted during final EIA Report.
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act' 1986.	The EIA report has been prepared keeping in mind the fact that concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may lead to withdrawal of this terms of reference besides attracting penal provisions in the Environment (Protection) Act, 1986.
	Discussion by SEIAA and the Remarks:	
	The subject was placed in the 660th Authority meeting held on 06.10.2023. The Authority noted that the subject was appraised in the 409th Meeting of SEAC held on 21.09.2023. 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 conditions and conditions in Annexure 'B' of this minutes.	
1	Restricting the ultimate depth of mining upto 45m for mining over a period of five years considering the environmental impacts due to the mining, safety precautionary ensures of the working personnel and following the principle of the sustainable mining.	The modified mining plan plates is attached in the Annexure III.
Annexure 'B'		
	Cluster Management Committee	
1	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	A cluster management committee including all the proponents of the rough stone quarrying projects within the cluster of 500 m radius will be constituted for the effective implementation of green belt development plan, water sprinkling, blasting, etc.
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development Water sprinkling, tree plantation, blasting etc.,	The members of the cluster management committee will be instructed to carry out EMP in coordination.
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	The list of members of the committee formed will be submitted to AD/Mines before the execution of mining lease.
4	Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the	All the information has been discussed in Section 2.6 & 2.7 under Chapter II, pp.20-29.

	nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	
5	The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.	It will be informed to the committee.
6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	The cluster management will be advised to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised will be given in detail.
7	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	A proper action plan regarding the restoration will be followed by the committee.
8	The committee shall furnish the Emergency Management plan within the cluster.	The committee will submit the emergency management plan to the respective authority in the stipulated time period.
9	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.	The information on the health of the workers and the local people will be updated periodically.
10	The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.	A proper action plan with reference to water, sanitation & safety will be devised and submitted by the committee to the respective authority.

11	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.		The committee will submit the fire safety and evacuation plan as discussed in Section 7.3 under Chapter VII, pp.137-144.
	Impact Study of mining		
12	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following		
	a)	Soil health & soil biological, physical land chemical features.	Soil health and biodiversity have been discussed in Sections 3.1 and 3.5 respectively under Chapter III, pp.31-41 & pp.70-89.
	b)	Climate change leading to Droughts, Floods etc.	Climatic condition of the proposed project area has been discussed in the Section 3.3.1.1, Chapter III, pp.54-56
	c)	Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local People.	The information about CO2 emission has been added to Section 4.6 under Chapter IV, pp.120-126.
	d)	Possibi1ities of water contamination and impact on aquatic ecosystem health.	Possibilities of both surface and ground water contamination have been discussed in Section 4.3 under Chapter IV, pp.104 & 105. The impact on aquatic species has been discussed in Section 4.6 under Chapter IV, pp.120-126.
	e)	Agriculture, Forestry, & Traditional practices.	Sorgum, millet, groundnut, and coconut are the primary crops that are cultivated in the study area.
	f)	Hydrothermal/Geothermal effect due to destruction in the Environment.	The average geothermal gradient of earth is 25^0C/km. As the proposed depth of mining is 45 m below the local ground level, the temperature will increase by 1.12^0C at the depth of mining.
	g)	Bio-geochemical processes and its	Data is not included.

		foot prints including environmental stress.	
	h)	Sediment geochemistry in the surface streams.	The details will be given in the final EIA report.
Agriculture & Agro-Biodiversity			
13	Impact on surrounding agricultural fields around the proposed mining area.		As the proposed lease area is dominantly surrounded by mining land, barren land, and fallow land, the impact on the surrounding agricultural fields if present will be low. With proper mitigation measures, the project will be carried out to reduce the impact further to the level of negligence.
14	Impact on soil flora & vegetation around the project site.		Impact of the project on the ecology and biodiversity has been discussed in Section 4.2 and Section 4.6 under Chapter IV, pp.103-104 and pp.120 - 126
15	Details of type of vegetations including no. of trees & shrubs within the proposed mining area shall be given and if so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.		Details of vegetation in the lease area have been provided in Section 3.5 under Chapter III, pp.70-89. Details about transplantation of plants have been provided in Section 4.6 under Chapter IV, pp.120-126.
16	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.		The ecological details have been provided in Section 3.5 under Chapter III, pp.70-89and measures have been provided in Section 4.6 under Chapter IV, pp.120-126.
17	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of		The FAE of ecology and biodiversity has advised the project proponent that replantation work, particularly for the

	goods and services.	project area where plants of 4 years old exist should be carried out in the vacant areas available.
18	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.	The impact of project on the land environment has been discussed in Section 4.1 under Chapter IV, pp.102 & 103.
Forests		
19	The project proponent shall study on impact of mining on Reserve forests free ranging wildlife.	The impacts of the proposed project on the surrounding environment have discussed in Chapter IV, pp.102-130.
20	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	The impacts of the project on ecology and biodiversity have been discussed in Section 4.6 under Chapter IV, pp.120-126.
21	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	The impacts of the project on standing trees and the existing trees have been discussed in Section 4.6 under Chapter IV, pp. 120-126.
22	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National parks, corridors and wildlife pathways, near project site.	There are no protected areas, National Parks, Corridors and Wildlife pathways near project site within 10km radius. The details are provided in Table 3.41 under Chapter III, p.99.
Water Environment		
23	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining	A detailed hydrogeological study was carried out. The results have been discussed in Section 3.2 under Chapter III, pp.42-54.

	activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	
24	Erosion Control Measures.	Garland drainage structures will be constructed around the lease area to control the erosion, as discussed in Section 4.3 under Chapter IV, pp.104 & 105.
25	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby villages, waterbodies/rivers & any ecological fragile areas.	A detailed study was carried out regarding the impact of mining on the environment. The results have been included in Chapter IV, pp. 102-130.
26	The project proponent shall study impact on fish habitats and the food WEB/food chain in the water body and Reservoir.	As there are no water bodies near to the proposed project site during study period, a study about the impact of mining on fish habitats is discussed in the Section 3.5 under Chapter III, pp.84-85.
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	The impacts of the proposed project on the surrounding environment have discussed in Chapter IV, pp.102-130.
28	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sits possible land form changes visual and aesthetic impacts.	The impact of the proposed project on aquatic plants and animals in water bodies has been discussed in Section 4.6 under Chapter IV, pp.120-126.
29.	The Terms of Reference should specifically study impact on soil health,	The impact of mining on soil environment has been discussed in Section 4.2 under

	soil erosion, the soil physical, chemical components.	Chapter IV, pp. 103-104.
30	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	The impacts on water bodies, streams, lakes have been discussed in Section 4.3 under Chapter IV, pp.104 & 105.
Energy		
31	The measures taken to control Noise, Air, water, Dust control and steps adopted to efficiently utilise the Energy shall be furnished.	The measures taken to control Noise, Air, water, and dust have been given under Chapter IV, pp. 102-130.
Climate Change		
32	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.	Greenbelt development plan as discussed in Section 4.6 under Chapter IV, pp.120-126, has been designed to reduce the impact of carbon emission on the environment.
33	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The matter has been discussed in Chapter IV, pp.102-130.
Mine Closure Plan		
34	Detailed Mine closure plan covering the entire mine lease period as per precise area communication order issued.	A progressive mine closure plan has been attached with the approved mining plan report in Annexure III. The budget details for the mine closure are shown in Table 2.9 under Chapter II, p.23.
EMP		
35	Detailed Environment Management plan along with adaptation, mitigation & remedial strategies covering the entire	A detailed Environment Management plan has been given under Chapter X, pp.155-162.

	mine lease period as per precise area communication order issued.	
36	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	A detailed Environment Management plan has been given in Tables 10.9 & 10.10 under Chapter X, pp.166-172.
Risk Assessment		
37	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	The risk assessment and management plan for this project has been provided in Section 7.2 under Chapter VII, pp.137-140.
Disaster Management Plan		
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	A detailed Environment Management Plan has been given under Chapter X, pp.155-162.
Others		
39	The project proponent shall furnish VAO certificate with reference to 300 m radius regard to approved habitations, schools, Archaeological sites, structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, river, lake pond, tank etc.	The VAO certificate of 300 m radius is provided in the Annexure IV.
40	As per the MoEF & CC office memorandum F.No.22-65/2017-IA.III	The response to comments will be given in the final EIA report.

	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 pan.	
41	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	The matter on plastic waste management has been given in Section 7.5 under Chapter VII, pp.148 – 149.
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 proposed site for quarrying is a patta land. A copy of the ownership document has been enclosed along with the approved mining plan in Annexure III
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,	All the documents are in the name of the lessee.

	mining technology etc. and should be in the name of the lessee.	
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All corner coordinates of the mine lease area have been superimposed on a high-resolution Google Earth Image, as shown in Figure 2.4, under Chapter II, p-13.
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.	The baseline data sampling locations for all the environmental components are shown in Survey of India Toposheet under Chapter III
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The lease 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	The proponent has framed Environmental Policy and the same has been discussed in Section 10.1 under Chapter X, pp.155 & 156.

	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.	It is an opencast quarrying operation proposed to operate in Manual method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 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.	All the 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	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

	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.	has been discussed in Section 3.1 under Chapter III, pp.31-41. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Table 2.8 under Chapter II, p.23.
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 need customers. Hence, no dumps are proposed outside the lease area.
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.	Not Applicable. There is no forest land involved within the proposed project area and the proposed project area is a patta land.
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)	Not Applicable. There are neither forests nor forest dwellers/forest dependent communities in the mine lease area. There is no forest impacted families (PF) or people (PP).

	should be indicated. A copy of the forestry clearance should also be furnished.	Thus, the rights of Traditional Forest Dwellers will not be compromised on account of the project.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006 as there are neither forests nor forest dwellers / forest dependent communities in the mine lease area. There shall be no forest impacted families (PF) or people (PP). Thus, the rights of Traditional Forest Dwellers will not be compromised on account of the project.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	There is no reserved forest in 10km radius.
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.	A study was done on wildlife within the study area, as shown in Section 3.5 under Chapter III, pp.70-89. The impact on wild life has been discussed in Section 4.6 under Chapter IV, pp.120-126
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	Information regarding the same has been given in Table 3.41 under Chapter III, p.99.

	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.	A detailed biological study was carried out in both core and buffer zones and the results have been discussed in Section 3.5 under Chapter III, pp.70-89. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
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	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.

	and furnished to the effect that the proposed mining activities could be considered.	
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable The project doesn't attract the C.R.Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic 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.

22	One season (non-monsoon) [i.e., March-May (Summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline data were collected for the period of March-May 2023, as per CPCB notification and MoEF & CC Guidelines. Primary baseline data and the results have been included in Sections 3.1-3.7 under Chapter III, pp. 31-98.
23	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the	Air quality modelling for prediction of incremental GLCs of pollutants was carried out using AERMOD view. The model results have been given in Section 4.4 under the Chapter IV, pp.106-115.

	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.	The water requirement for the project, its availability and source have been provided in Table 2.11 under Chapter II, p.27.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the project should be provided.	Not Applicable. Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved water vendors.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Part of the working pit will be allowed to collect rain water during the spell of rain. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan will be prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for the project village during draught season.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary	Impact studies and mitigation measures of water environment including surface water and ground water were conducted and the

	safeguard measures, if any required, should be provided.	results have been discussed in Section 4.3, under the Chapter IV, pp. 104 & 105.
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.	Not Applicable. The ground water table is found at the depth of 60 m below ground level. The ultimate depth of quarry is 45 m BGL. Therefore, the mining activity will not intersect the ground water table. Data regarding the occurrence of groundwater table have been provided in Section 3.2 under Chapter III, pp.42-54.
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Not Applicable. There are no streams, seasonal or other water bodies passing within the project area. Therefore, no modification or diversion of water bodies is anticipated.
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	The highest elevation of the project area is 76.5 m AMSL. Ultimate depth of the mine is 45 m BGL. Depth to the water level in the area is 60 m BGL.
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and	A detailed Greenbelt Development Plan has been provided in Tables 4.14 and 4.15 in Section 4.6 under Chapter IV, pp.122-123.

	time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	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 significant impact due to the proposed transportation from the project area. Details have been provided in Section 3.7 under Chapter III, pp.96-99.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities will be provided to the mine workers after the grant of quarry lease and the same has been

		discussed in Section 2.6 under Chapter II, p.20-28.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Progressive mine closure plan has been prepared for this project and is given in Section 2.6 under Chapter II, p.20-28.
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health impacts of the project and preventive measures have been explained in detail in Section 4.8 under Chapter IV, pp.127 & 128.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No public health implications are anticipated due to this project. Details of CSR and CER activities have been discussed in Sections 8.6 and 8.7 under Chapter VIII, pp.152 & 153.
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.	No negative impact on socio-economic environment of the study area is anticipated and this project shall benefit the Socio-Economic environment by offering employment for 24 people directly and 10 people indirectly, as discussed in Section 8.1 under Chapter VIII, p.151.
38	Detailed environmental management plan (EMP) to mitigate the environmental	Detailed environment management plan for the project to mitigate the anticipated

	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.	impacts has been provided under Chapter X, pp.155-172.
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The details will be updated in the final EIA report after public hearing meeting.
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost is Rs.92,68,000/- In order to implement the environmental protection measures, an amount of Rs.7830470 as capital cost and recurring cost as Rs.2750347 as recurring cost/annum is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per year, the overall EMP cost for 5 years will be Rs.23152469, as shown in Tables 10.9 &10.10 under Chapter X, pp.166-171.
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	The details have been provided in Section 7.3 under Chapter VII, pp.140-144.
43	Benefits of the Project if the Project is implemented should be spelt out. The	Benefits of the project have been discussed under Chapter VIII, pp.151-153.

	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	Executive summary has been enclosed as a separate booklet.
b)	All documents to be properly referenced with index and continuous page numbering.	All the documents have been properly referenced with index and continuous page numbering.
c)	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of tables and source of the data collected have been mentioned.
d)	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Original Baseline monitoring reports will be submitted in the final EIA report.
e)	Where the documents provided are in a language other than English, an English translation should be provided.	All the documents provided here are in English language.
f)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	The questionnaire will be enclosed along with final EIA/EMP report.
g)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF & CC vide O.M. No. J-11013/41/2006-IA. II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF & CC, O.M. No. J-11013/41/2006-IA. II (I) dated 4th August, 2009 have been followed while preparing the EIA report.

h)	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF & CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	No changes are made in the basic scope and the project parameters.
i)	As per the circular no. J-11011/618/2010-IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	The certified compliance report will be provided in the final EIA report.
j)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	All the plans related to mining have been included along with the approved mining plan report in Annexure III.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURES

CHAPTER I

INTRODUCTION

1.0 PREAMBLE

Environmental Impact Assessment (EIA) study is a process used to identify the environmental, social and economic impacts of a project prior to decision-making. EIA systematically examines both beneficial and adverse consequences of the proposed project and ensure that these impacts are considered during the project designing. According to the Ministry of Environment and Forests, Govt. of India, EIA notification S.O. 1533 (E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14th August 2018, all the mining projects are broadly classified into two categories, i.e., category A and category B, based on the spatial extent of the projects. The category B projects are further divided in to B1 and B2 on the basis of the guidelines issued of the Ministry of Environment and Forests. All mining projects included in category B1 require an EIA report for obtaining environmental clearance from the State Environment Impact Assessment Authority (SEIAA). As the proposed project falls within the cluster of quarries of overall extent of greater than 5 ha and less than 50 ha in the case of non-coal mine lease, the proposed project falls under the category B1 and the project requires preparation and submission of an EIA report after public consultation to SEIAA for obtaining environmental clearance 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.

In compliance with ToR obtained vide Letter No. SEIAA-TN/F.No.10275/ToR-1587/2023 Dated 06.10.2023 this EIA report has been prepared for the project proponent, Mr. A. Shanmugam applied for rough stone and gravel quarry lease in the Patta land falling in S.F.No.19/7 A, 19/7 B, 19/12, 19/13,19/14 A, 19/14 B and 19/ 1A over an extent of 3.66.45 ha in Thollamur & Nemili Village, Vanur Taluk, Villuppuram District and Tamil Nadu. This EIA report takes into account the rough stone quarries within the cluster of 500 m radius from the periphery of the proposed project site. The cluster contains two proposed projects, known as P1, P2 and three Existing Quarries E1, E2 and E3. All the projects mentioned above have been taken for cluster extent calculation as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016. The total extent of all the quarries is **15.99.45 ha**, also known as the cluster extent. The quarries involved in the calculation of cluster extent are shown in Figure 1.1.

Table 1.1 Details of Quarries within the Cluster Area of 500 m Radius

Proposed Quarries					
Code	**Name of the Owner**	**S.F. No**	**Village**	**Extent (ha)**	**Status**
P1	Thiru.A.Shanmugam	19/7 A, 19/7 B, 19/12, 19/13, 19/14 A, 19/14 B 119/ 1A	Thollamur & Nemlil	3.66.45	Proposed Area
P2	G.Arjunan	16/6, 16/7, 16/9, 16/10	Thollamur	2.10.5	Proposed Area
Existing Quarries					
E1	K.Balamurugan	11/4 A2, 15/2, 15/3A, 15/3B 15/4	Thollamur	2.12.0	27.08.2018 to 26.08.2023
E2	V.Ramesh	16/11, 16/12 17/1, 18/3B	Thollamur	3.53.0	07.03.2022 to 06.03.2027
E3	Tvl. Sree Thiruchendhur Murugan Blue Metals	20/1, 20/2A, 20/2B, 20/3, 21/4, 21/6, 99/2, 99/3B, 99/6	Thollamur	4.57.5	04.01.2022 to 03.01.2027
Expired Quarries					

Total Cluster Extent				**15.99.45**	---

Source:

DD Letter - Rc.

No. A/G&M/389/2022, Dated:20.07.2023.

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

1.1 PURPOSE OF THE REPORT

The purpose of the report is to study baseline environmental conditions in and around the proposed project area for the period of **March-May 2023** according to the provisions of MoEF & CC Office Memorandum dated 29.08.2017 and MoEF & CC Notification, S.O. 996 (E) dated 10.04.2015, to analyse impacts and provide mitigation measures.

1.2 ENVIRONMENTAL CLEARANCE

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

Screening

Screening is the first stage of the EIA process. In this stage, the State level Expert Appraisal Committee (SEAC) examined the application of EC made by the proponent in Form 1 through online Proposal No. SIA/TN/ MIN/ 437688/2023, dated 22.07.2023 and decided that the project requires detailed environmental studies for the preparation of EIA report. Therefore, the proponent submitted application for Terms of Reference (ToR) 02.08.2023.

Scoping

The proposal was placed in the 409th meeting of SEAC on 21.09.2023. Based on the presentation and documents furnished by the project proponent, SEAC decided to recommend the proposal for the grant of Terms of Reference (ToR) and the recommendation for ToR is subjected to the outcome of the Honourable NGT, Principal Bench, New Delhi (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).

Public Consultation

In this stage, an application along with the draft of EIA and EMP report will be made to the Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing ensuring public participation at the project site or in its close proximity in the district. During public hearing, an opportunity will be given to the people living nearby the project site to express their opinions about the impact of the proposed project on the environment. The outcome of the public hearing meeting will be updated in the final EIA report for appraisal.

Appraisal

In this stage, an application along with final EIA report including the outcome of the public consultations will be made to the SEIAA. The application thus made will be scrutinized by the SEAC. Then, the SEAC will make recommendations to grant EC or reject the application to the SEIAA.

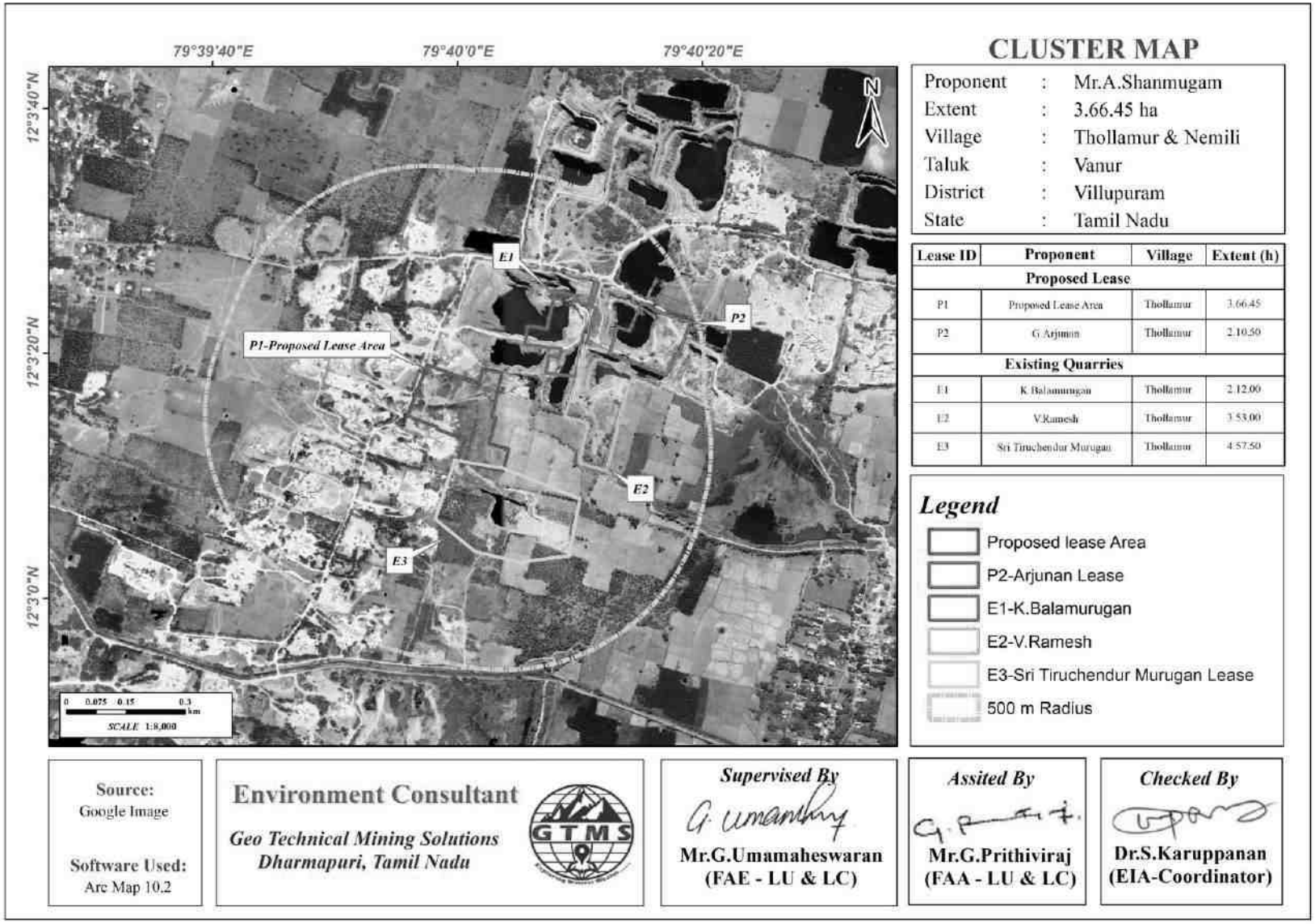


Figure 1.1 Location of the Proposed and Existing Rough Stone and Gravel Quarries in the Cluster of 500 m Radius

1.3 TERMS OF REFERENCE (ToR)

The SEAC framed a comprehensive Terms of Reference (ToR) based on the information provided in the Form 1 and information collected from the proposed project site visit and issued ToR to the proponent vide **Letter No: SEIAA-TN/F.No.10275/ToR-1587/2023 Dated :06.10.2023** for the preparation of an EIA report.

1.4 POST ENVIRONMENT CLEARANCE MONITORING

For category B projects, irrespective of its clearance by MoEF/SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and the details of MoEF website where it is displayed.

After obtaining EC, the project proponent will submit a half-yearly compliance report of stipulated environmental clearance terms and conditions to MoEF & CC Regional office & SEIAA on 1st June and 1st December of every year.

1.5 TRANSFERABILITY OF ENVIRONMENTAL CLEARANCE

A prior environmental clearance granted for a specific project or activity to an applicant may be transferred during its validity to another legal person entitled to undertake the project or activity on application by the transferor or the transferee with a written "no objection" by the transferor, to, and by the regulatory authority concerned, on the same terms and conditions under which the prior environmental clearance was initially granted, and for the same validity period (EIA Guidance Manual for Mining of Minerals, 2010).

1.6 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. The generic structure of the EIA document should be as under:

- Introduction
- Project Description
- Description of the Environment
- Anticipated Environmental Impact & Mitigation Measures
- Analysis of Alternatives (Technology & Site)
- Environmental Monitoring Program
- Additional Studies
- Project Benefits
- Environmental Cost Benefit Analysis
- Environmental Management Plan (EMP)
- Summary & Conclusion
- Disclosure of Consultants engaged.

1.7 IDENTIFICATION OF THE PROJECT PROPONENT

The profile of the project proponent who has involved in this quarrying project has been given in Table 1.2.

1.2 Details of Project Proponent

Name of the Project Proponent	**Mr.A. Shanmugam**
Address	S/o.Arumugam, No.176/2, Main Road, Thalavanur Village and Post, Villuppuram Taluk and District – 605 103.
Status	Proprietor

1.8 BRIEF DESCRIPTION OF THE PROJECT

The proposed project deals with excavation of rough stone and gravel which is primarily used in construction projects. The method adopted for rough stone and gravel excavation is Open Cast Semi-Mechanized mining method involving formation of benches with 5 m height and 5 m width. The proposed project site is located in Thollamur & Nemili Village, Vanur Taluk, Villuppuram District, and Tamil Nadu State. Some of the important features of the proposed project have been provided in Table 1.3.

1.3 Salient Features of the Proposed Project

Name of the Quarry	Mr.K.Shanmugam Rough Stone and Gravel Quarry		
Toposheet No	57-P/12		
Latitude	12°3'10.41"N to 12°3'19.07"N		
Longitude	79°40'12.36"E to 79°40'19.01"E		
Highest Elevation	76.5 m AMSL		
Proposed Depth as per ToR	45 m BGL		
Ultimate Pit Dimension	Length (m)	Width (m)	Depth (m)
	178	128	45
Geological Resources	Rough Stone in m^3	Gravel in m^3	
	1715895	109947	
Mineable Reserves	Rough Stone in m^3	Gravel in m^3	
	545368	84114	
Proposed reserves for five years	Rough Stone in m^3	Gravel in m^3	
	521848	84114	
Method of Mining	Open-Cast Semi Mechanized Method		
Topography	Flat Terrain		
Machinery proposed	Jack Hammer	3	
	Compressor	2	

	Hydraulic Excavator	1
	Tippers	10
Blasting Method	Quarrying Operation is proposed to done with conjunction with conventional method using jack hammer drilling and blasting for shattering effect and loosen the rough stone.	
Proposed Manpower Deployment	23 Nos	
Project Cost	Rs.92,68,000 /-	
CER Cost	Rs. 5,00,000/-	
Proposed Water Requirement	5.0 KLD	

1.9 SCOPE OF THE STUDY

The main scope of the EIA study is to quantify the cumulative impact of the quarries in the cluster on the study area and formulate the effective mitigation measures for each individual lease. 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, and dust generation has been provided in this report. The baseline monitoring study has been carried out during the period of **March-May 2023** for various environmental components such as land, soil, air, water, noise, ecology, etc. 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. The sampling methodologies for the various environmental parameters required for the study, frequency of sampling, method of sample analysis, etc., are given in Table 3.1 in chapter III.

1.10 REFERENCES

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, 14th September, 2006
- Terms of Reference (ToR) issued by SEIAA.
- Approved Mining Plan of this Project.
- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Environment (Protection) Act, 1986
- The Forest (Conservation) Act, 1988
- The Wildlife (Protection) Act, 1972.

Note: *As per the OM vide F.No.IA3-22/10/22-IA.III(E177258), the baseline monitoring data were collected during the period of* ***March -May 2023*** *and utilized for preparation of this EIA report.*

CHAPTER II

PROJECT DESCRIPTION

2.0 GENERAL INTRODUCTION

The open cast mining method, also known as open-pit mining has been proposed to extract the mineral deposit. It is the most commonly used surface mining method all over the world and is generally suitable for mining low-grade mineral deposits that are found close to the surface of the earth and distributed uniformly over a large area. Open pits are also termed quarries when the pits are used for the extraction of building materials and dimension stones.

Opencast mining starts with the development of benches, the widths of which will be determined in such a way to accommodate the use of heavy machinery. The walls of open pits will be dug at an angle that will be decided based on well-established industry standards to provide safety. In some cases where the walls are composed of weak material such as soil and highly weathered rocks, dewatering holes will be drilled horizontally to relieve the water pressure to avoid wall collapse inside the mine site.

The required mine-related infrastructures will be established close to the open pit. The mining infrastructures may include an administration building, a maintenance garage, and a warehouse. The materials mined from open pits will be brought to the surface using trucks. The waste rocks will be piled up in a suitable location, usually close to the open pit. The structure produced by the waste rock pile is known as a waste dump. The dimension of the waste dump will be determined based on industrial safety standards to prevent the rocks from falling into the surrounding area.

2.1 DECSCRIPTION OF THE PROJECT

The proponent Mr.A.Shanmugam is involved in the undertaking of establishment, construction, development, and closure of opencast mines. He, through the exploration phase, identified the proposed project site as the one that has a great potential of producing an economically viable quantity of rough stone. Therefore, the proponent had applied for quarry lease on 23.12.2022 to extract rough stone and gravel. The precise area communication letter was issued by Department of Geology and Mining, Villupuram vide Rc.No. A/G&M/389/2022, dated:18.07.2023. Based on the precise area communication letter, mining plan was prepared. The mining plan thus prepared was approved by Deputy Director Department of Geology and Mining, Villupuram Rc.No. A/G&M/389/2022, dated:20.07.2023. The overall view of the project site is shown in Figure 2.1.

Figure 2.1 Overall View of Proposed Project Site

2.2 LOCATION AND ACCESSIBILITY

The proposed quarry project is located in Thollamur & Nemili Village, Vanur Taluk, Villupuram District, as shown in Figure 2.2 & 2.3. The area lies between Latitudes from 12°3'10.41"N to 12°3'19.07"N and Longitudes from 79°39'55.90"E to 79°40'4.16"E. The maximum altitude of the project area is 76.5 m AMSL. Accessibility details to the proposed project site have been given in Table 2.1.

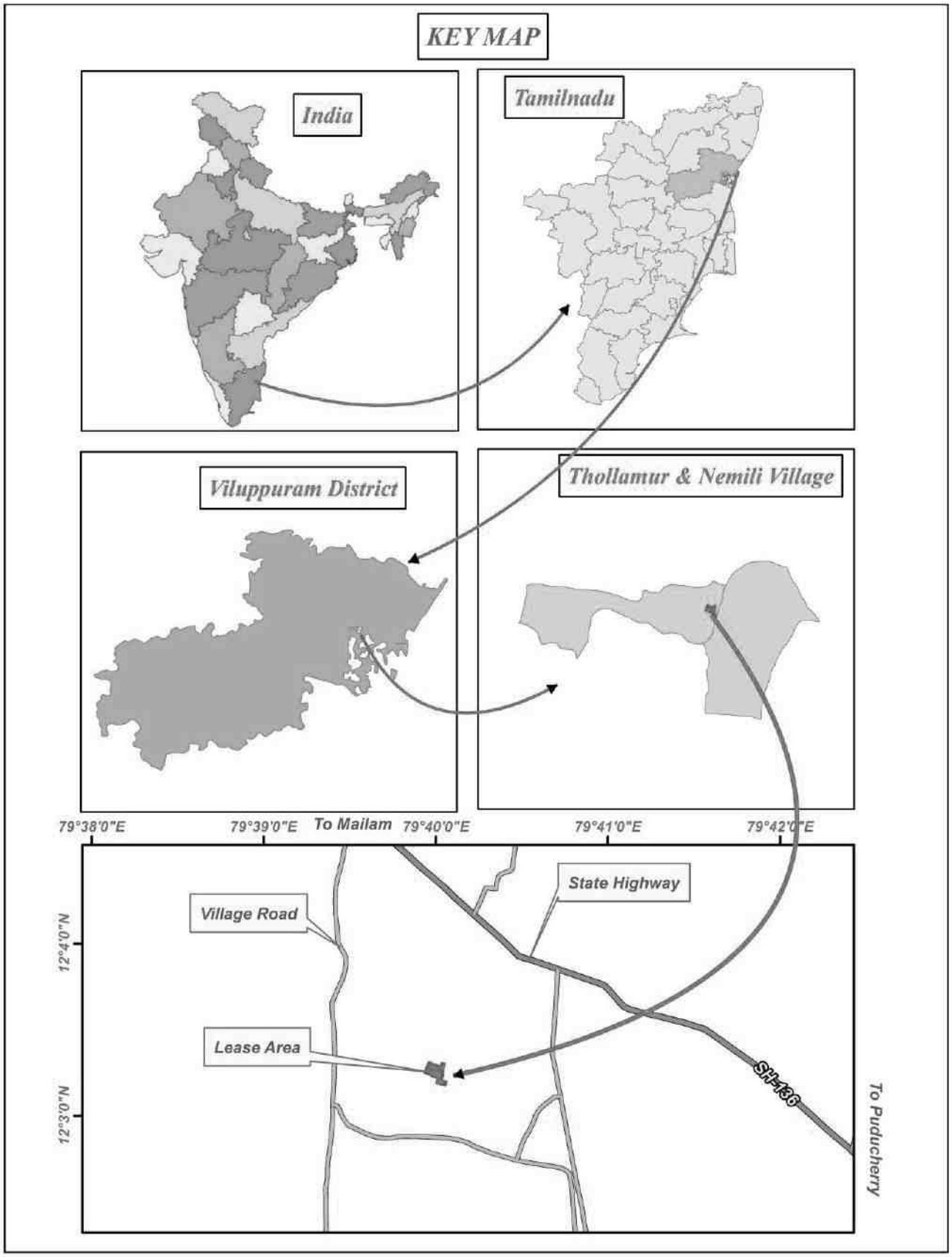


Figure 2.2 Key Map Showing Location of the Project Site

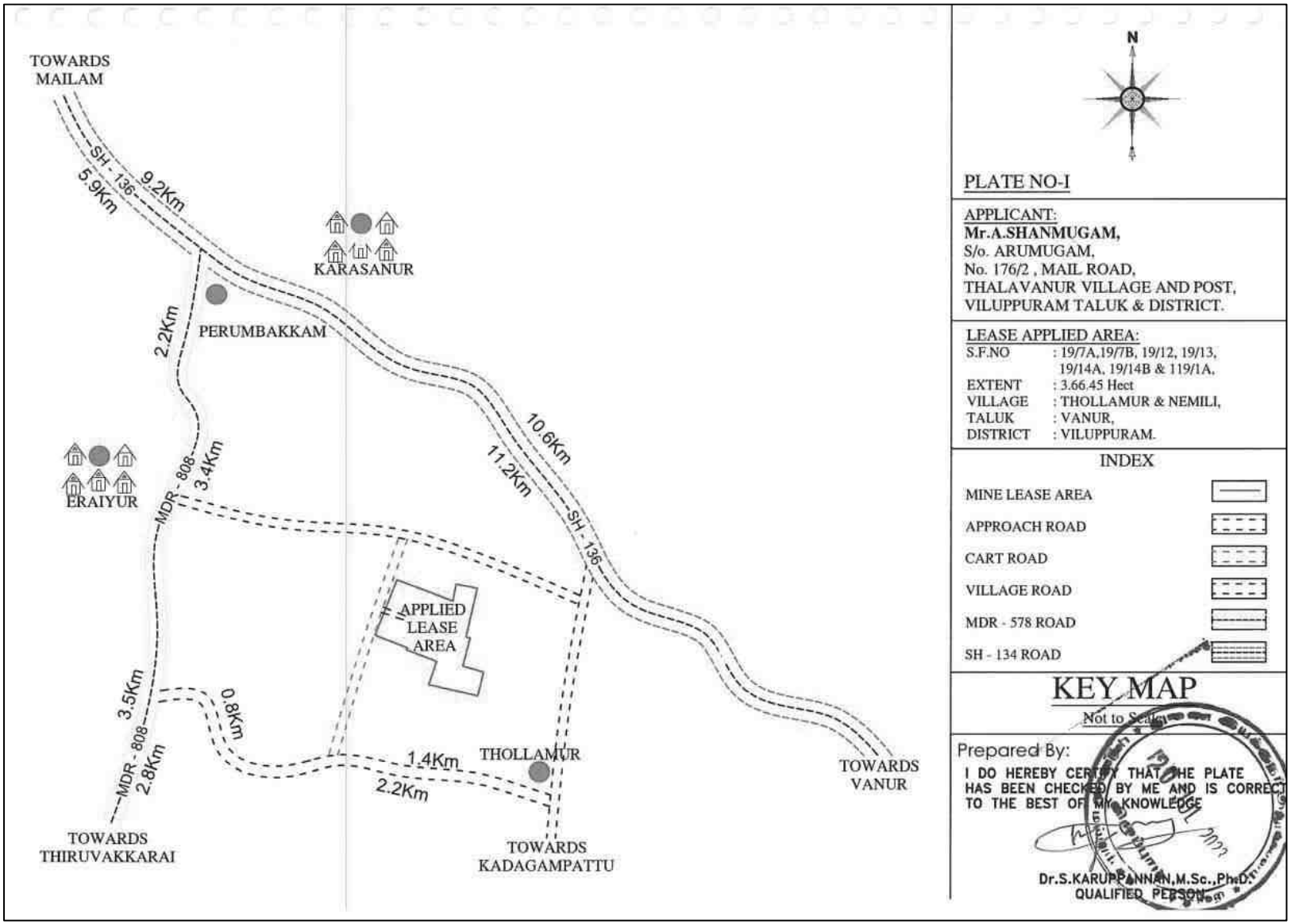


Figure 2.3 Site Connectivity to the Lease Area

Table 2.1 Site Connectivity to the Project Area

Nearest Roadways	SH-136 Mailam - Vanur	1.45 km N
Nearest Town	V.Parangani	3.1 km NE
Nearest Railway Station	Perani	13.3 km W
Nearest Airport	Chennai	117.2 km NE
Nearest Seaport	Chennai	130.2 km NE
Nearest Villages	Karasanur	1.6 km N
	Thollamur	0.95 km E
	Tiruvakkarai	2.95 km S
	Eraiyur	0.83 km W

2.3 LEASEHOLD AREA

- The extent of the proposed project site is 3.66.45 ha.
- The proposed project is site specific.
- There is no mineral beneficiation or processing proposed inside the project area.
- There is no forest land involved in the proposed area and is devoid of major vegetation and trees.

2.3.1 Corner Coordinates

The boundary corner geographic coordinates are given in Table 2.2 and the proposed project site with boundary coordinates has been shown in Figure 2.4.

Table 2.2 Corner Coordinates of Proposed Project

Pillar ID	Latitude	Longitude	Pillar ID	Latitude	Longitude
1	12° 3'18.46"N	79°40'3.63"E	8	12° 3'12.96"N	79°40'0.59"E
2	12° 3'14.82"N	79°40'2.80"E	9	12° 3'13.81"N	79°39'58.30"E
3	12° 3'14.74"N	79°40'3.11"E	10	12° 3'13.96"N	79°39'58.36"E
4	12° 3'12.62"N	79°40'2.58"E	11	12° 3'14.90"N	79°39'55.90"E
5	12° 3'12.17"N	79°40'4.16"E	12	12° 3'19.07"N	79°39'57.54"E
6	12° 3'10.41"N	79°40'3.71"E	13	12° 3'17.48"N	79°40'1.78"E
7	12° 3'11.21"N	79°40'0.00"E	14	12° 3'18.76"N	79°40'2.02"E

2.4 GEOLOGY AND GEOMORPHOLOGY

The lease area geologically occurs in Charnockite terrain. The Charnockite, commercially called as Roughstone. In addition, the lease area geomorphologically occurs over pediment pediplain complex.

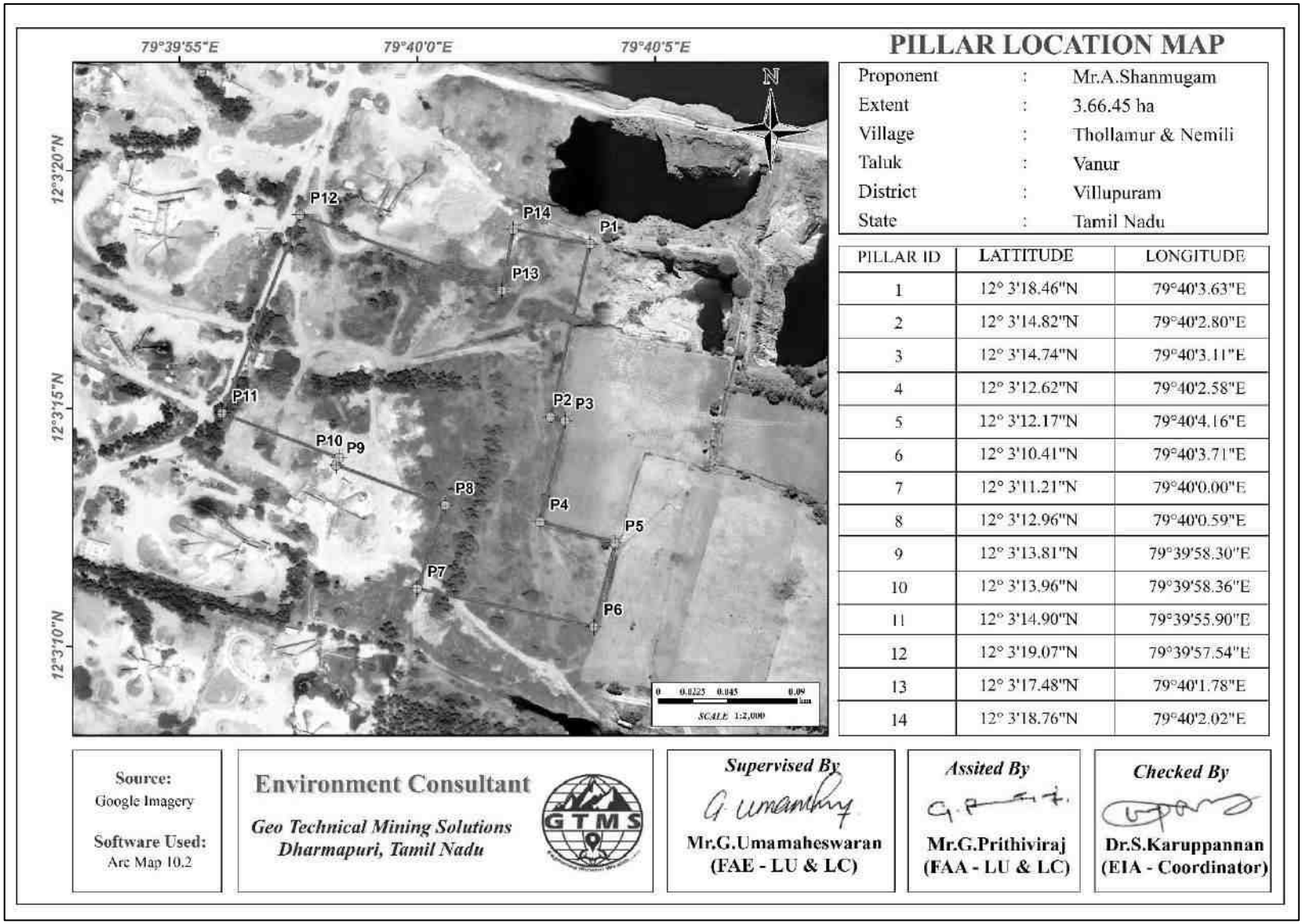


Figure 2.4 Google Earth Image Showing Lease Area with Pillars

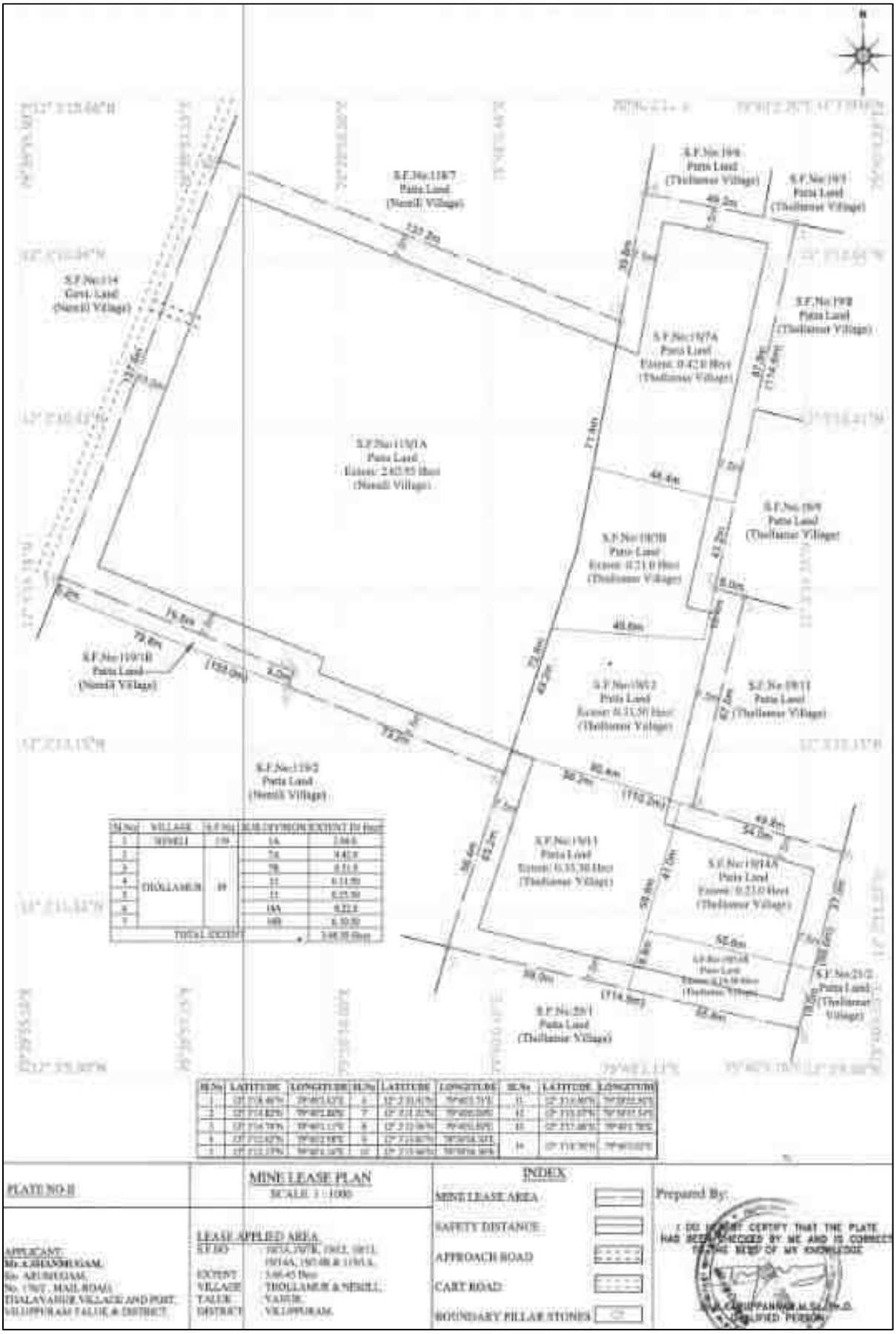


Figure 2.5 Mine Lease Plan

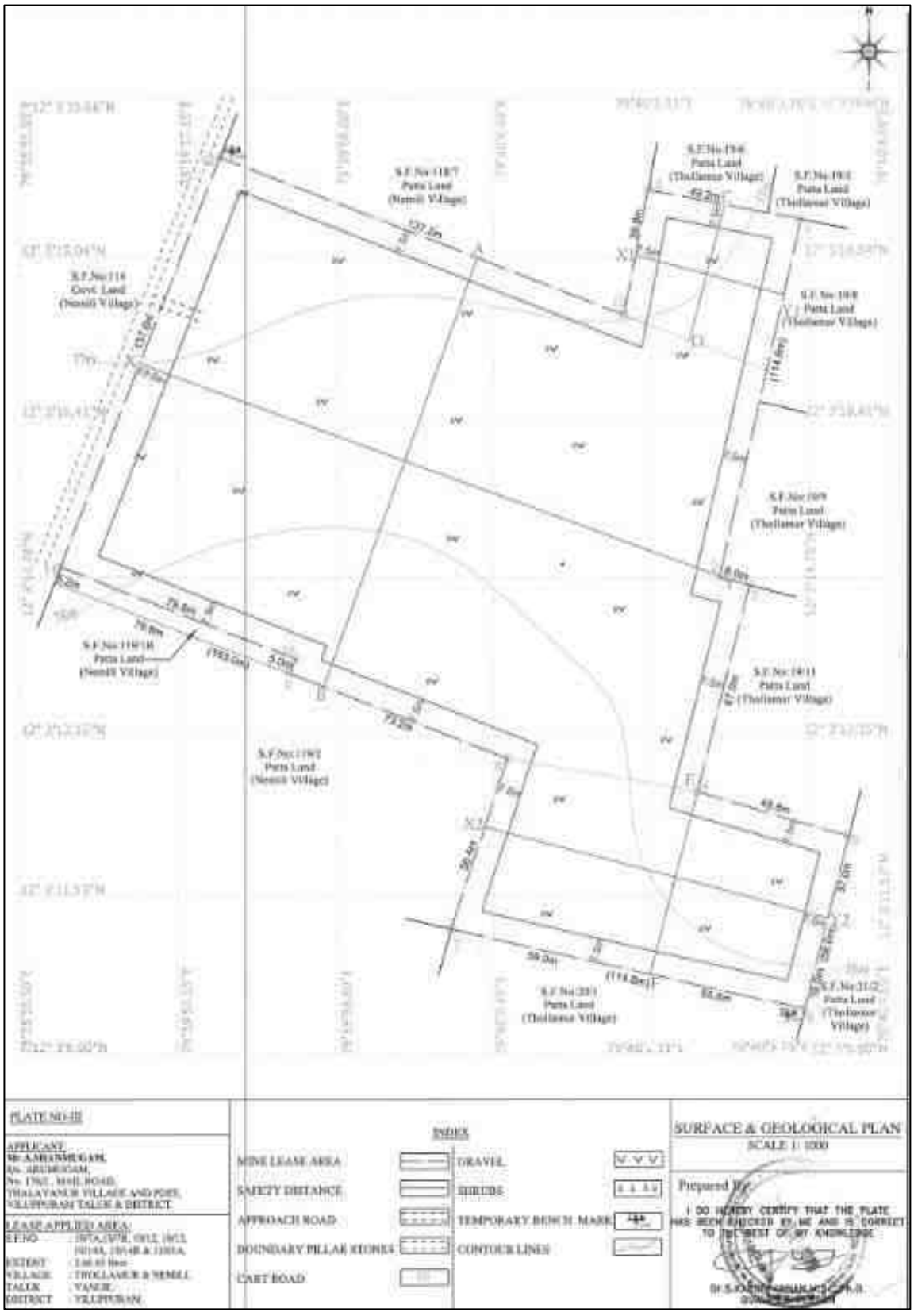


Figure 2.6 Surface and Geological Plan

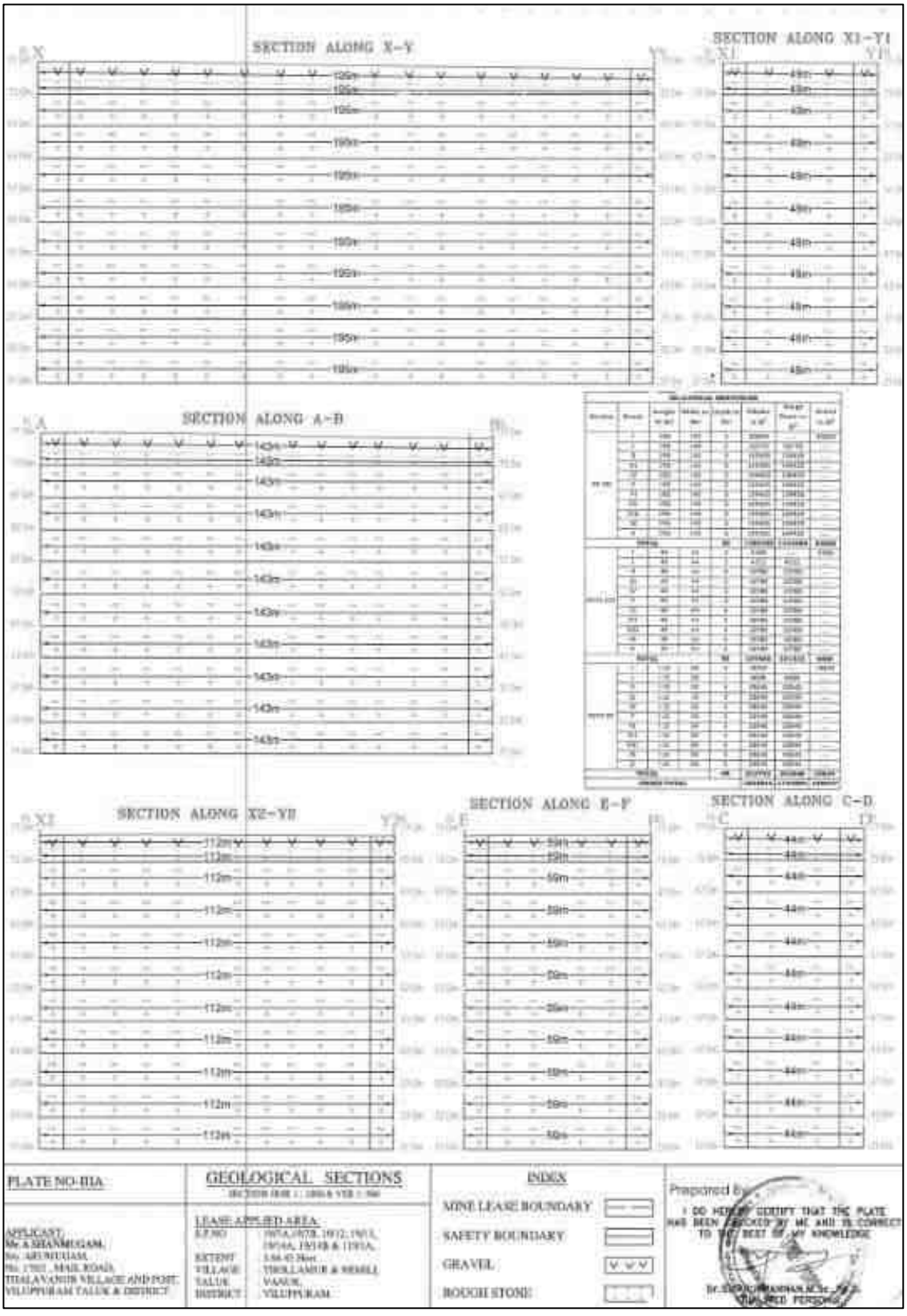


Figure 2.7 Geological Sections

2.5 QUANTITY OF RESERVES

The resources and reserves of rough stone were calculated based on cross-section method by plotting sections to cover the maximum lease area for the proposed project. 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 and 10 m safety distance as per precise area communication letter and deducting the locked-up reserves during bench formation (also called as Bench Loss). The mineable reserves are calculated up to the depth of 45 m considering there is no waste / overburden / side burden (100% Recovery anticipated) for the proposed project. The plate used for reserve estimation has been shown in Figure 2.7 and results of geological resources and reserves have been shown in Table 2.3.

Table 2.3 Estimated Resources and Reserves of the Project

Resource Type	Rough stone in m^3	Gravel in m^3
Geological Resource in m^3	1715895	109947
Mineable Reserves as per ToR in m^3	545368	84114
Proposed production as per ToR for 5 years m^3	521848	84114

Based on the year wise development and production plan and sections, the year wise production results have been given in Table 2.4 & Figure 2.8 and Figure 2.8a.

Table 2.4 Year-Wise Production Details

Year	Rough stone in (m^3) / 5 years	Gravel in (m^3) / 3 years
I	104172	29838
II	103180	21120
III	132416	33156
IV	110640	---
V	71440	---
Total	**521848**	**84114**

Source: Approved Mining Plan & ToR

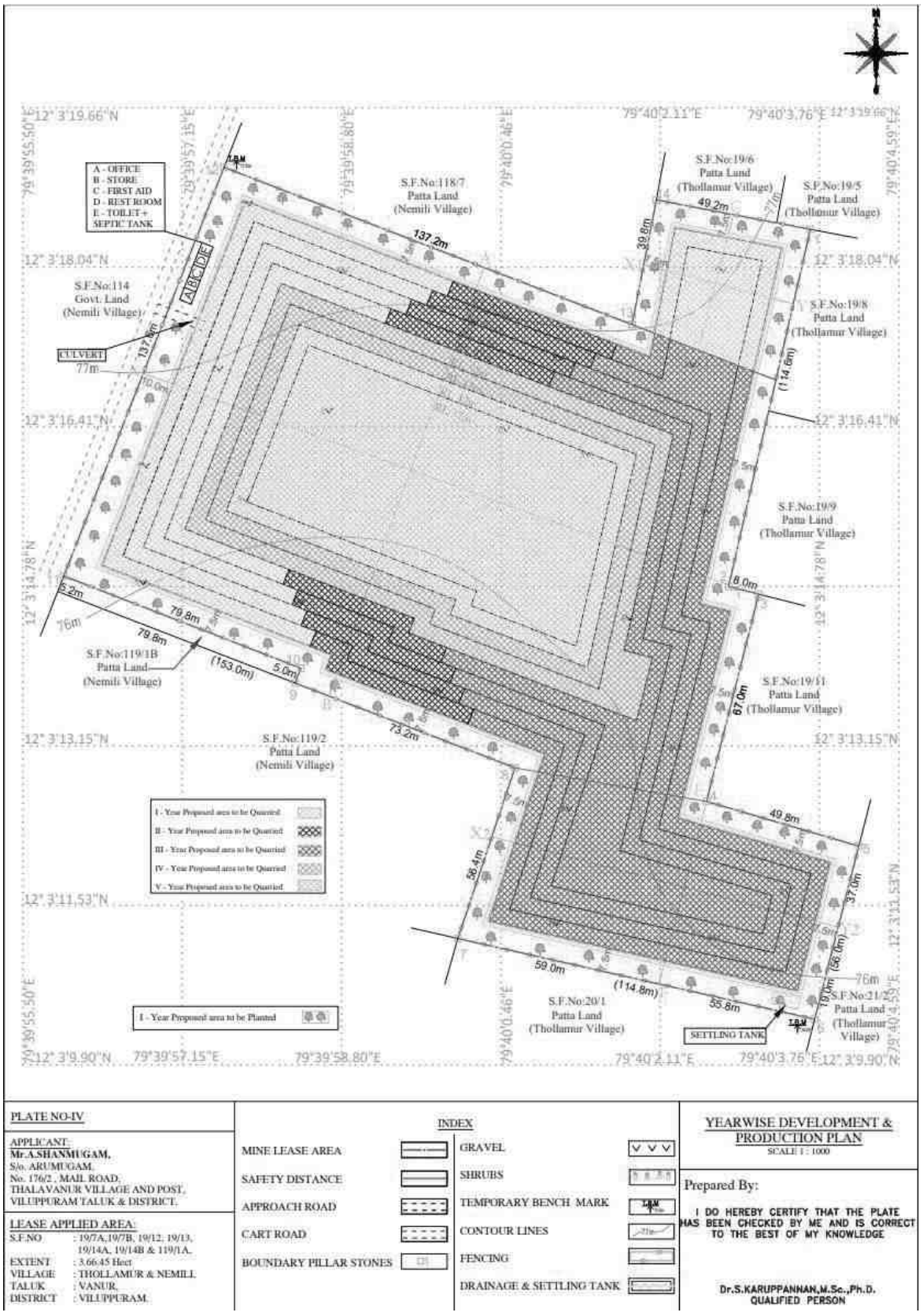


PLATE NO-IV

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A.
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA		GRAVEL	
SAFETY DISTANCE		SHRUBS	
APPROACH ROAD		TEMPORARY BENCH MARK	TBM
CART ROAD		CONTOUR LINES	
BOUNDARY PILLAR STONES		FENCING	
		DRAINAGE & SETTLING TANK	

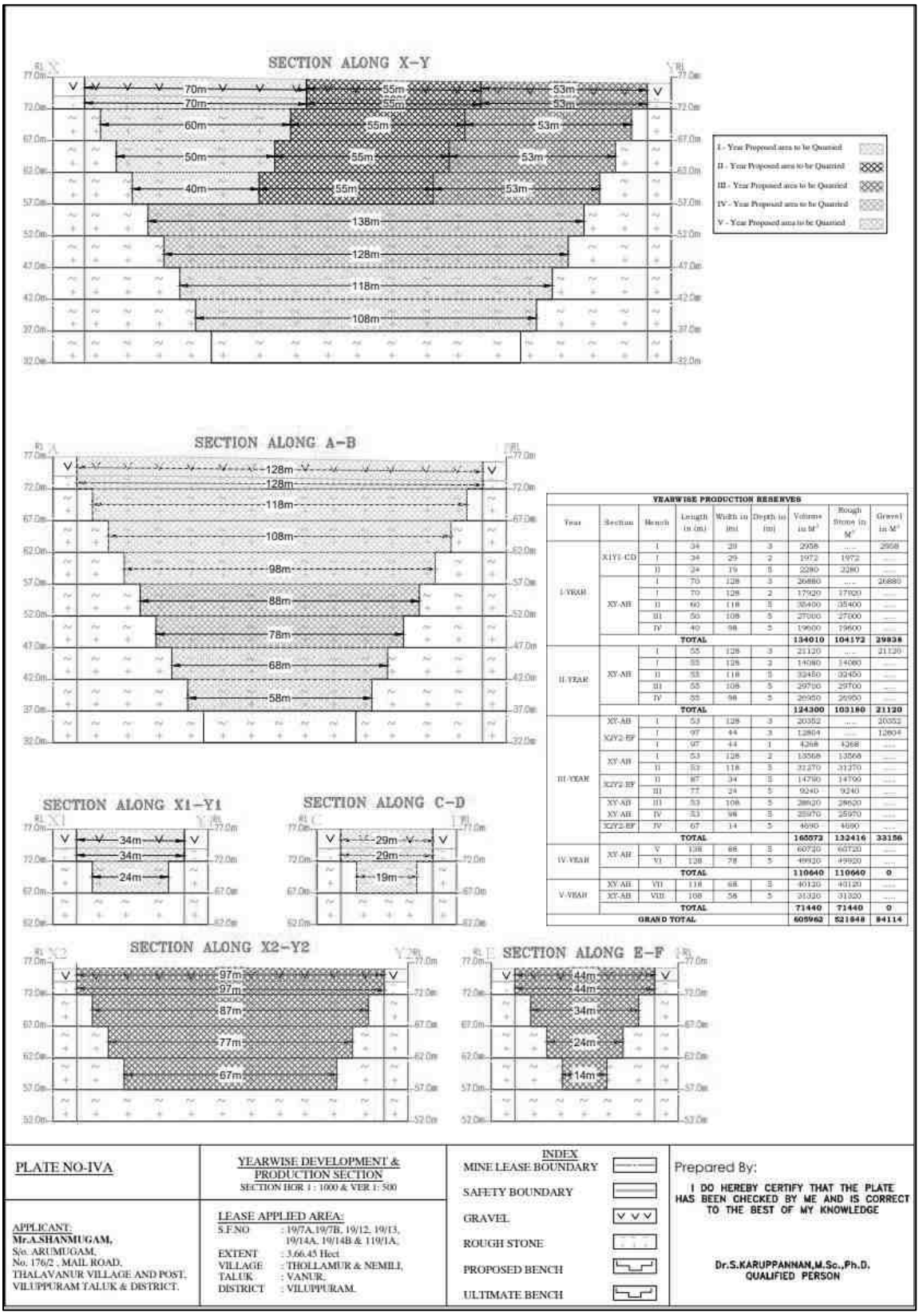
YEARWISE DEVELOPMENT & PRODUCTION PLAN
SCALE 1 : 1000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

Figure 2.8 Yearwise Development and Production Plan



Year	Section	Bench	Length (in m)	Width in (m)	Depth in (m)	Volume in M³	Rough Stone in M³	Gravel in M³
I-YEAR	X1Y1-CD	I	34	20	3	2958	....	2958
		I	34	29	2	1972	1972	....
		II	24	19	5	2280	2280	....
	XY-AB	I	70	128	3	26880	....	26880
		I	70	128	2	17920	17920	....
		II	60	118	5	35400	35400	....
		III	50	108	5	27000	27000	....
		IV	40	98	5	19600	19600	....
		TOTAL				134010	104172	29838
II-YEAR	XY-AB	I	55	128	3	21120	....	21120
		I	55	128	2	14080	14080	....
		II	53	118	5	32450	32450	....
		III	55	108	5	29700	29700	....
		IV	55	98	5	26950	26950	....
		TOTAL				124300	103180	21120
III-YEAR	XY-AB	I	53	128	3	20352	....	20352
	X2Y2-EF	I	97	44	3	12804	....	12804
		I	97	44	1	4268	4268	....
	XY-AB	I	53	128	2	13568	13568	....
		II	53	118	5	31270	31270	....
	X2Y2-EF	II	87	34	5	14790	14790	....
		III	77	24	5	9240	9240	....
	XY-AB	III	53	108	5	28620	28620	....
	XY-AB	IV	53	98	5	25970	25970	....
	X2Y2-EF	IV	67	14	5	4690	4690	....
		TOTAL				165072	132416	33156
IV-YEAR	XY-AB	V	138	88	5	60720	60720	....
		VI	138	78	5	49920	49920	....
		TOTAL				110640	110640	0
V-YEAR	XY-AB	VII	118	68	5	40120	40120	....
	XY-AB	VIII	108	58	5	31320	31320	....
		TOTAL				71440	71440	0
GRAND TOTAL						605962	521848	84114

Figure 2.8a Year wise Development and Production Sections

2.6 MINING METHOD

The Quarrying operation is proposed to be carried out by Open Cast Semi-Mechanized mining method with the bench height and width of 5 m each. The open cast semi-mechanized method involving drilling and blasting is proposed to extract rough stone and gravel. The extracted rough stone will be loaded manually to the trucks for dispatch to the customers. In this project, NONEL blasting will be adopted to extract rough stone.

Conceptual Blasting Design

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

Rules of Thumb for Blast Design

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

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

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

Rule 2: Generally, select the densest explosive possible.

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

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

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

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

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

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

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

Rule 6: Stemming should be equal to the burden.

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

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

Subdrill should be equal to 0.3 of burden. It will work when there is row-for-row delay. In blasts where the delay system is both row-for-row and hole-for-hole, the subdrill should be determined by the largest dimension, which can be the spacing or the burden. An average subdrill of 0.4 of spacing is best to use for planning purposes. Based on the above-mentioned rules, blasting design has been conceptualized and has been provided in Table 2.5.

Table 2.5 Conceptual Blasting Design

Blasthole Diameter (D) in mm	32
Burden (B) in m	1.5
Spacing (S) in m	1.30
Subdrill in m	0.45
Charge length (C) in m	0.64
Stemming	1.5
Hole Length (L) in m	2.6
Bench Height (BH) in m	2.1
Mass of explosive/hole in g	400
Stemming material size in mm	3.2
Burden stiffness ratio	1.43

Blast volume/hole in m^3	4.16
Production of rough stone/day in m^3	387
Number of blastholes/day	93
Blasthole pattern	Staggered / Rectangular
Mass of explosive /day in kg	37.20
Powder factor in kg/m^3	0.10
Loading density	0.63
Type of explosives	Slurry
Diameter of packaging in mm	25
Initiation system	NONEL
Fly rock distance in m	19

2.6.1 Magnitude of Operation

Based on the results of estimated production for the 5 years, details about the size of operation have been provided in Table 2.6.

Table 2.6 Operational Details for Proposed Project

	Rough Stone / 5 years	**Gravel / 3 years**
Proposed production for 5 years	521848	84114
Number of Working Days /Annum	270	270
Production of /Day (m^3)	387	104
No. of Lorry Loads	64	17

2.6.2 Extent of Mechanization

List of machineries proposed for the quarrying operation is given in Table 2.7.

Table 2.7 Machinery Details

S. No.	**Type**	**No of Unit**	**Capacity**	**Make**	**Motive Power**
1	Jack Hammers	3	Hand held	-	Diesel Drive
2	Compressor	2	Air	-	Diesel Drive
3	Excavator	1	-	-	Diesel Drive
Haulage & Transport Equipment					
4	Tipper	10	-	-	Diesel Drive

2.6.3 Progressive Quarry Closure Plan

The progressive quarry closure plan (Figure 2.8) of the proposed project shows past, present, and future land use statistics. According to the land use results, as shown in Table 2.8 whereas, at the end of the mine life, about 2.90.7 ha of land will have been quarried; about 0.03.0 ha of land will be used for infrastructure, about 0.12.0 ha of land will be used for roads, about 0.54.05 ha of land will be used for green belt & dump, about 0.06.7 ha of land will be used for drainage & settling tank.

Table 2.8 Land use Data at resent, during scheme of mining, and at the end of mine life

Description	Present Area (ha)	Area at the end of life of quarry (ha)
Area under quarry	Nil	2.90.7
Infrastructure	Nil	0.03.0
Roads	Nil	0.12.0
Green Belt & Dump	Nil	0.54.05
Drainage & Settling Tank	Nil	0.06.7
Unutilized area	3.66.45	Nil
Total	**3.66.45**	**3.66.45**

2.6.4 Quarry Closure Budget

As the proposed project has the enormous potential for continuous operations even after the expiry of lease period, mine closure plan is not proposed for now. Based on the progressive mine closure plan for the scheme period, the mine closure cost is given in Table 2.9.

Table 2.9 Mine Closure Budget

Activity	Capital Cost	Recurring Cost/Annum
733 plants inside the lease area	146580	21987
1099 plants outside the lease area	329805	32980.5
Wire Fencing	732900	36645
Renovation of Garland Drain	36645	18322.5
Total	**1245930**	**109935**

Source: Environment Management Plan

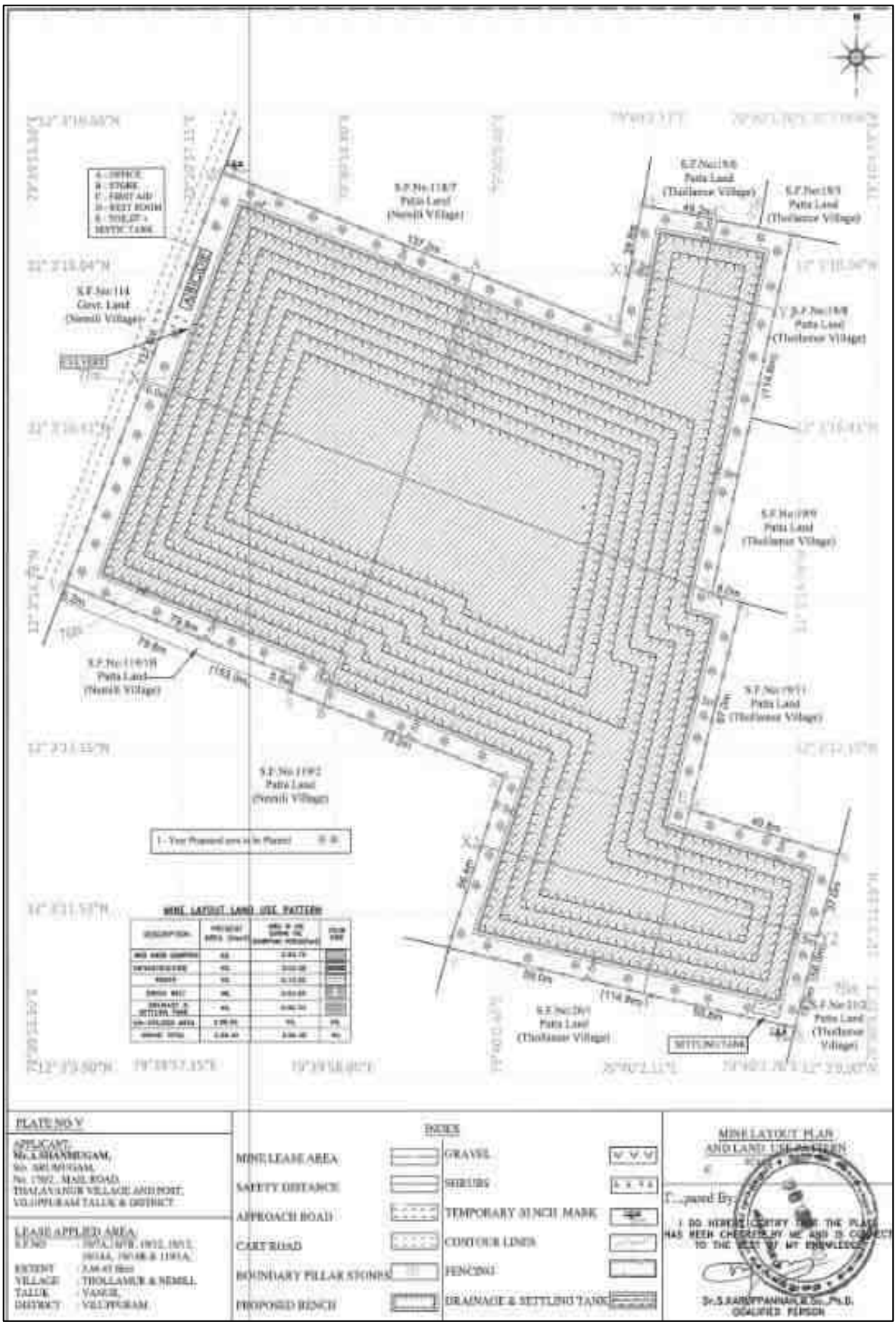


Figure 2.9 Mine Layout Plan and Land Use Pattern

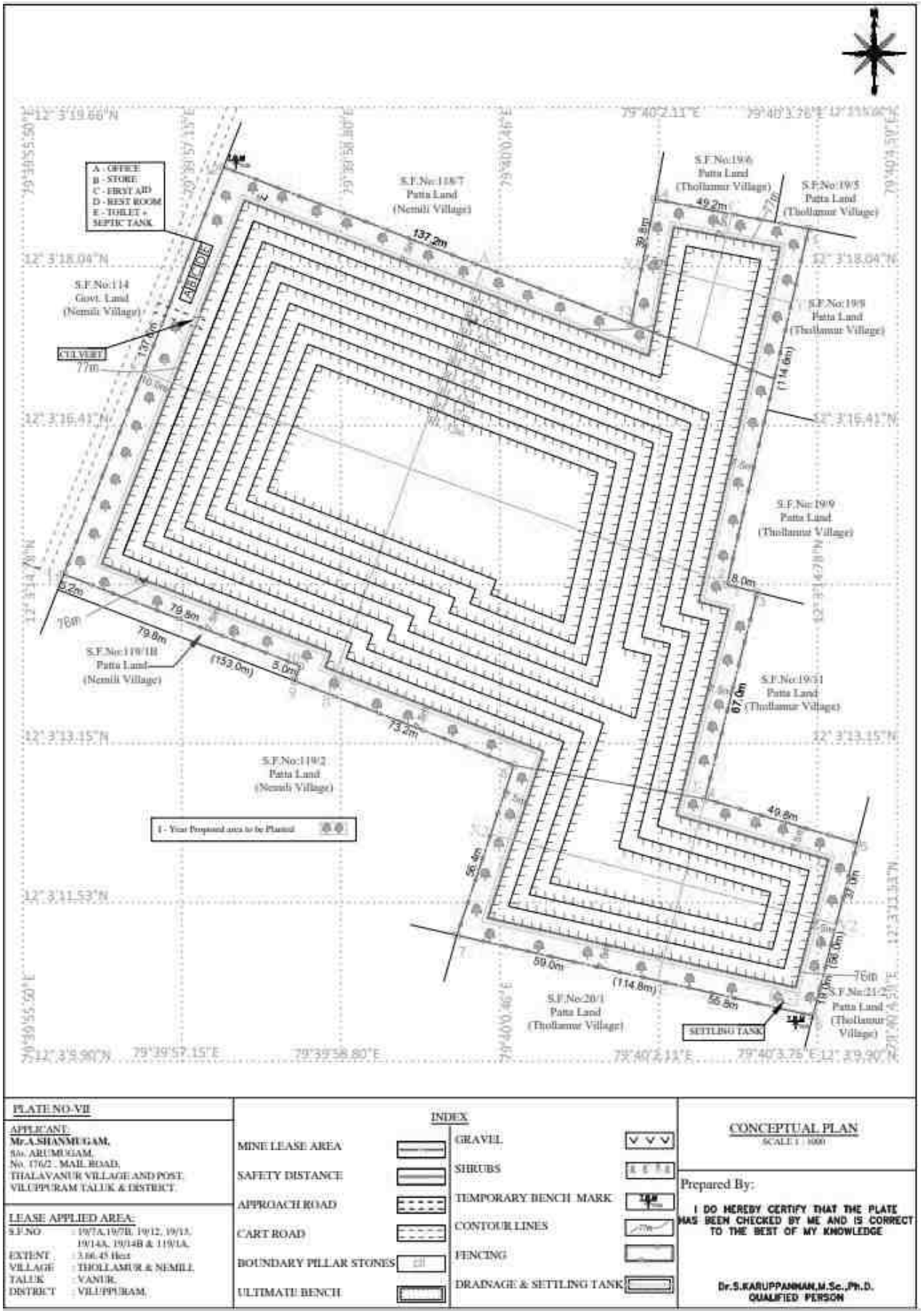
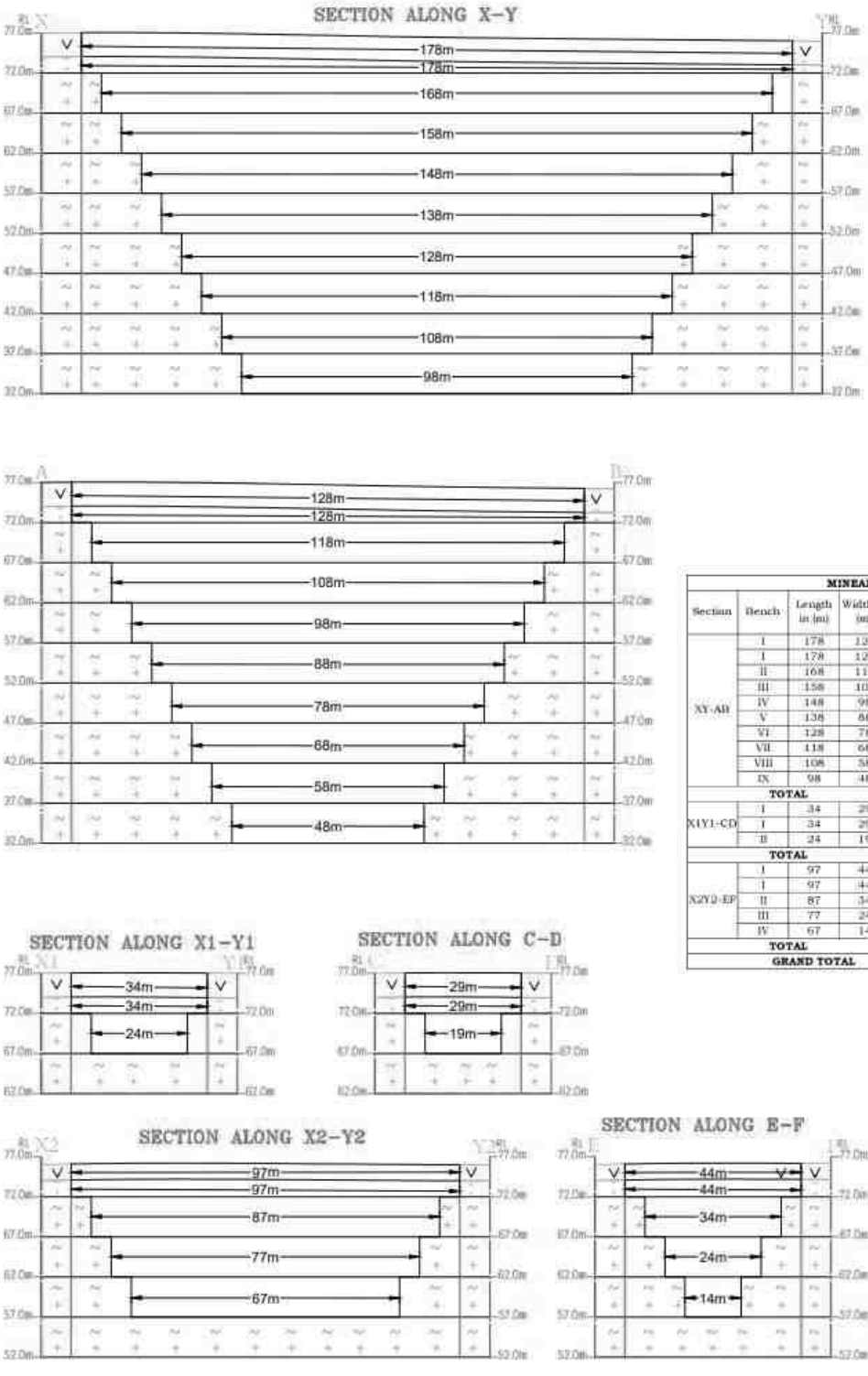


Figure 2.10 Conceptual Plan



MINEABLE RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
XY-AB	I	178	128	3	68352	.....	68352
	I	178	128	2	45568	45568	.....
	II	168	118	5	99120	99120	.....
	III	158	108	5	85320	85320	.....
	IV	148	98	5	72520	72520	.....
	V	138	88	5	60720	60720	.....
	VI	128	78	5	49920	49920	.....
	VII	118	68	5	40120	40120	.....
	VIII	108	58	5	31320	31320	.....
	IX	98	48	5	23520	23520	.....
TOTAL				45	576480	508128	68352
X1Y1-CD	I	34	29	3	2958	.....	2958
	I	34	29	2	1972	1972	.....
	II	24	19	5	2280	2280	.....
TOTAL				10	7210	4252	2958
X2Y2-EF	I	97	44	3	12804	.....	12804
	I	97	44	1	4268	4268	.....
	II	87	34	5	14790	14790	.....
	III	77	24	5	9240	9240	.....
	IV	67	14	5	4690	4690	.....
TOTAL				19	45792	32988	12804
GRAND TOTAL					629482	548368	84114

PLATE NO-VIIA

CONCEPTUAL SECTIONS
SECTION HOR 1 : 1000 & VER 1: 1000

INDEX
MINE LEASE BOUNDARY
SAFETY BOUNDARY
GRAVEL
ROUGH STONE
ULTIMATE BENCH

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:
S.F.NO : 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT : 3.66.45 Hect
VILLAGE : THOLLAMUR & NEMILI,
TALUK : VANUR,
DISTRICT : VILUPPURAM.

Figure 2.11 Conceptual Sections

2.6.5 Conceptual Mining Plan

The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc. Details of ultimate pit dimensions have been derived from given in Table 2.10.

Table 2.10 Ultimate Pit Dimension

Pit	Length (m)	Width (m) (Max)	Depth (m)
I	178	128	45

Source: Approved Mining Plan & ToR

2.6.6 Infrastructures

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

2.6.6.1 Other Infrastructure Requirement

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

2.6.7 Water Requirement

Detail of water requirement in 5.0 KLD is given in Table 2.11.

Table 2.11 Water Requirement for the Project

Purpose	Quantity	Source
Dust Suppression	1.5 KLD	Existing bore wells nearby the lease area
Green Belt development	1.5 KLD	Existing bore wells nearby the lease area
Drinking & Domestic	2.0 KLD	Existing bore wells and approved water vendors
Total	**5.0 KLD**	

Source: Prefeasibility Report

2.6.8 Energy Requirement

High speed Diesel (HSD) will be used for quarrying machineries. As per the data shown in Table 2.12, Around 2501590 litres of HSD will be used for rough stone and gravel extraction during this 5 years plan period. The diesel will be brought to the site from nearby diesel pumps.

Table 2.12 Fuel Requirement Details

Fuel Requirement for Excavator			
Details	**Rough Stone (521848 m^3)**	**Gravel (84114 m^3)**	**Total Diesel (litre)**
Average Rate of Fuel Consumption (l/hr)	16	10	---
Working Capacity (m^3/hr)	20	60	---
Time Required (hours)	26092	1402	---
Total Diesel Consumption for 5 years (litre)	417478	14019	431497
Fuel Requirement for Compressor			
Average Rate of Fuel Consumption/hole (litre)	0.4	---	---
Number of Drillholes/day	93	---	---
Total Diesel Consumption for 5 years (litre)	50220	---	50220
Fuel Requirement for Tipper			
Average Rate of Fuel Consumption/Trip (litre)	20	20	---
Carrying Capacity in m^3	6	6	---
Number of Trips / days	64	10*	---
Number of Trips / 5 years	86975	14019	---
Total Diesel Consumption for 5 years (litre)	1739493	280380	2019873
Total Diesel Consumption by Excavator, Compressor and Tipper			**2501590**

**** Number of truck loads for gravel has been normalized for 5 Years.***

2.6.9 Capital Requirement

The project proponent will invest Rs.92,68,000/- to the project. The breakup summary of the investment has been given in Table 2.13.

Table 2.13 Capital Requirement Details

S. No.	**Description**	**Cost (R.)**
1	Fixed Asset Cost	24,50,000
2	Machinery cost	30,00,000
3	EMP Cost	38,18,000
Total Project Cost		**92,68,000**

Source: Approved Mining Plan

2.7 MANPOWER REQUIREMENT

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

Table 2.14 Employment Potential for the proposed project

S. No.	Category	Role	Nos.
1.	Highly Skilled	IInd Mines Manager	1
		Mine Geologist	1
		Blaster	1
2	Semi - Skilled	Driver	10
		Hitachi Operator	1
3	Unskilled	Musdoor / Labours	9
Total			**23**

Source: Prefeasibility Report

2.8 PROJECT IMPLEMENTATION SCHEDULE

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

Table 2.15 Expected Time Schedule

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

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

CHAPTER III

DESCRIPTION OF THE ENVIRONMENT

3.0 GENERAL

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as land, water, air, noise, biological and socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering **March through May, 2023** with CPCB guidelines. Environmental baseline data were collected by an NABL accredited and MoEF notified **Ekdant Enviro Services (P) Ltd** for the environmental attributes including soil, water, air, and noise and by FAEs for ecology and biodiversity, traffic, and socio-economy.

Study Area

The study area has been divided into two zones: core zone and buffer zone. Core zone is considered as lease area and buffer zone as 5 km radius from the periphery of the cluster, except for ecological study, which considers 10 km as buffer zone. Both core and buffer zones are taken as the study area. The data was collected from the study area to understand the existing environment conditions of the above-mentioned environmental components. Sampling methodologies for the various environmental parameters, including frequency of sampling, method of sample analysis, etc., are briefly given in Table 3.1.

Table 3.1 Monitoring Attributes and Frequency of Monitoring

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land Use/ Land Cover	Land-use Pattern within 5 km radius of the study area	Once during the study period	Study Area	Satellite Imagery & Primary Survey
*Soil	Physico-Chemical characteristics	Once during the study period	8 (1 nearby core & 7 in buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and	Once during the study period	6 (2 surface water & 4	IS 10500& CPCB Standards

	Bacteriological Parameters		ground water)	
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 hours, twice a week	9 (1 core & 8 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient noise	Hourly observation for 24 hours per location	10 (1 core & 9 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing flora and fauna	Through field visit during the study period	Study area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio-economic characteristics, Population statistics and existing infrastructure in the study area	Site visit & Census Handbook, 2011	Study area	Primary Survey, census handbook & need based assessments.

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

3.1 LAND ENVIRONMENT

Study area is mainly composed of Charnockite, Panamparai Formation, Fluvial Deposits, and rocks of Pondicherry Group, as shown in Figure 3.1. Among the geomorphic units, Pediment and Pediplain Complex and Flood Plain dominate the study area, as shown in Figure 3.2.

3.1.1 Land Use/ Land Cover

Land Use and Land Cover (LULC) map, as shown in Figure 3.3 was prepared using Sentinel II image for the study area of 5 km radius. Totally, 8 LULC were mapped. The areal extent of each LULC is provided in Table 3.2. Of the total area, mining area covers only 113.19 ha accounting for 1.46%, of which cluster area of 3.66.45 ha contributes only about 0.047%. This small percentage of mining activities shall not have any significant impact on the land environment.

Table 3.2 LULC Statistics of the Study Area

S. No.	Classification	Area (ha)	Area (%)
1	Barren Rocky / stony waste	250.52	3.24
2	Crop land	4091.39	52.88
3	Dense Forest	755.49	9.76
4	Mining / Industrial wastelands	113.19	1.46
5	Plantations	1935.52	25.01
6	Settlement	159.50	2.06
7	Water bodies	432.02	5.58
Total		**7737.62**	**100**

Source: Sentinel II Satellite Imagery

3.1.2 Topography

The proposed lease area is located in a flat terrain with an altitude range of 73-76 m AMSL, showing relief of 3 m.

3.1.3 Drainage Pattern

Drainage pattern is the pattern formed by the streams, rivers, and lakes in a particular drainage basin over time that reveals characteristics of the kind of rocks and geological structures in a landscape. The proposed area shows a portion of dendritic drainage pattern indicating uniform lithology beneath the surface, as shown in Figure 3.4.

3.1.4 Seismic Sensitivity

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

3.1.5 Soil Environment

Soil is one of the important components of the land environment. Composite soil samples were collected from the study area and analysed for different parameters to determine the baseline soil characteristics of the study area.

3.1.5.1 Methodology

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

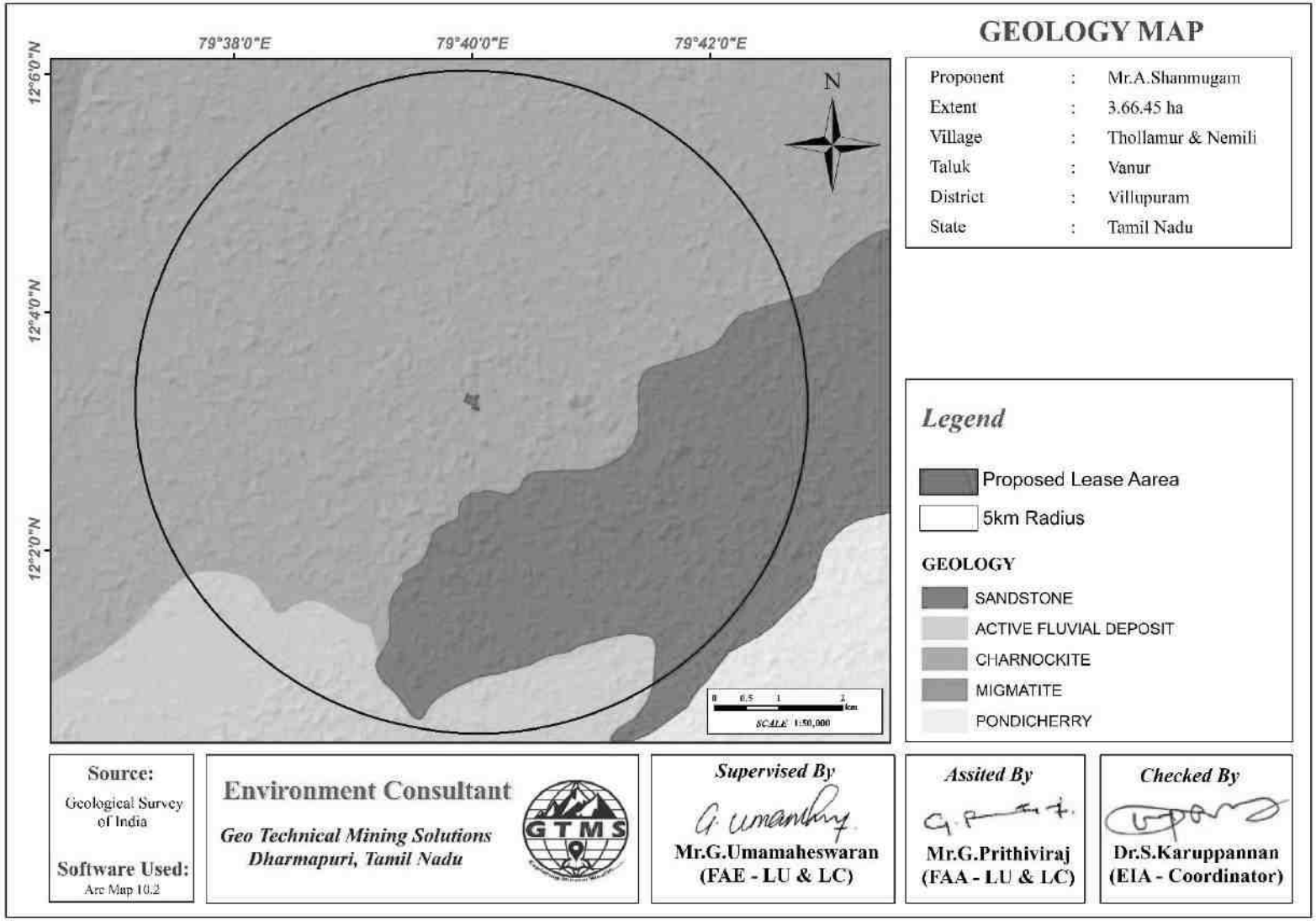


Figure 3.1 Geology Map of the Proposed Project Site

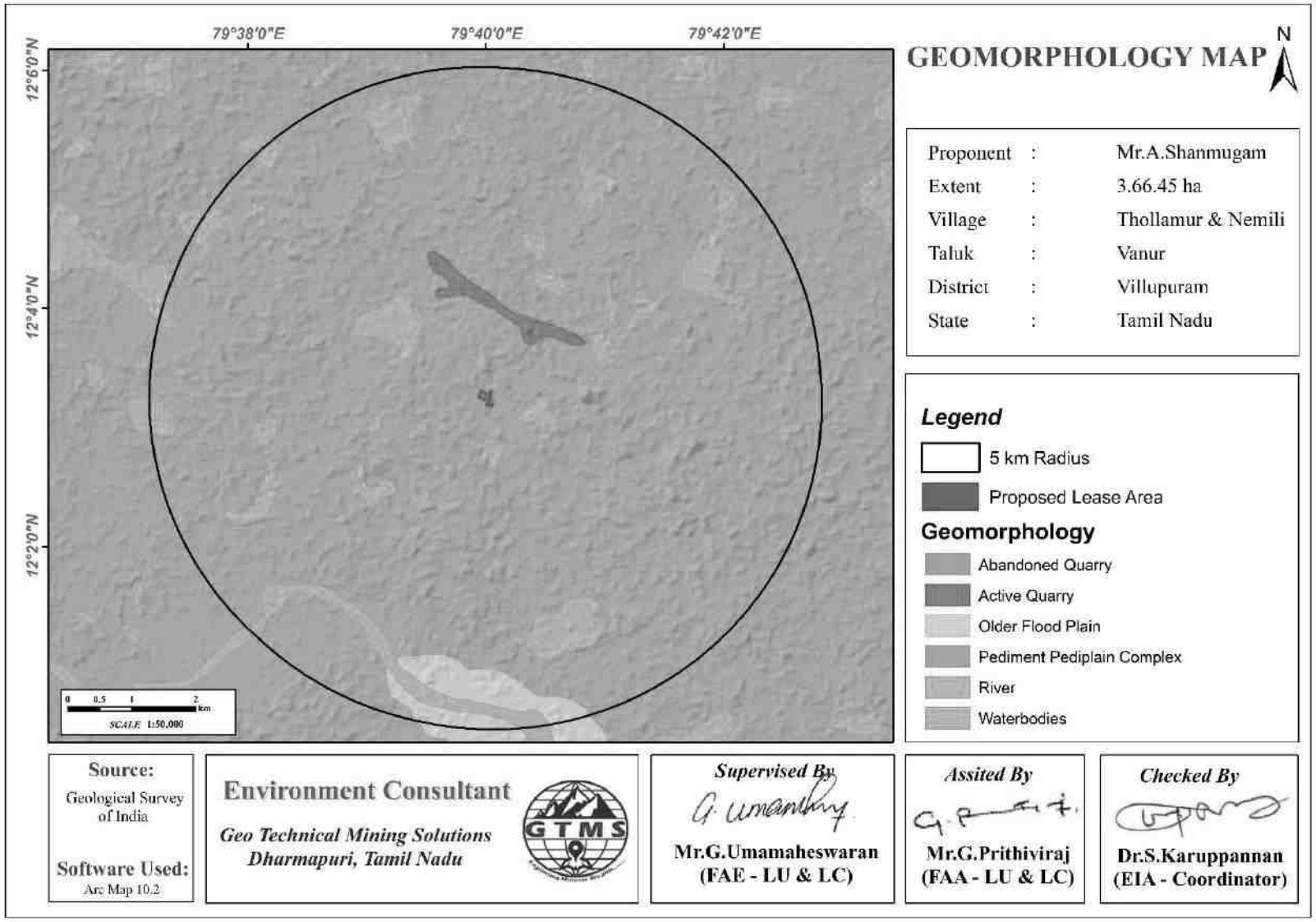


Figure 3.2 Geomorphology Map of the Proposed Project Site

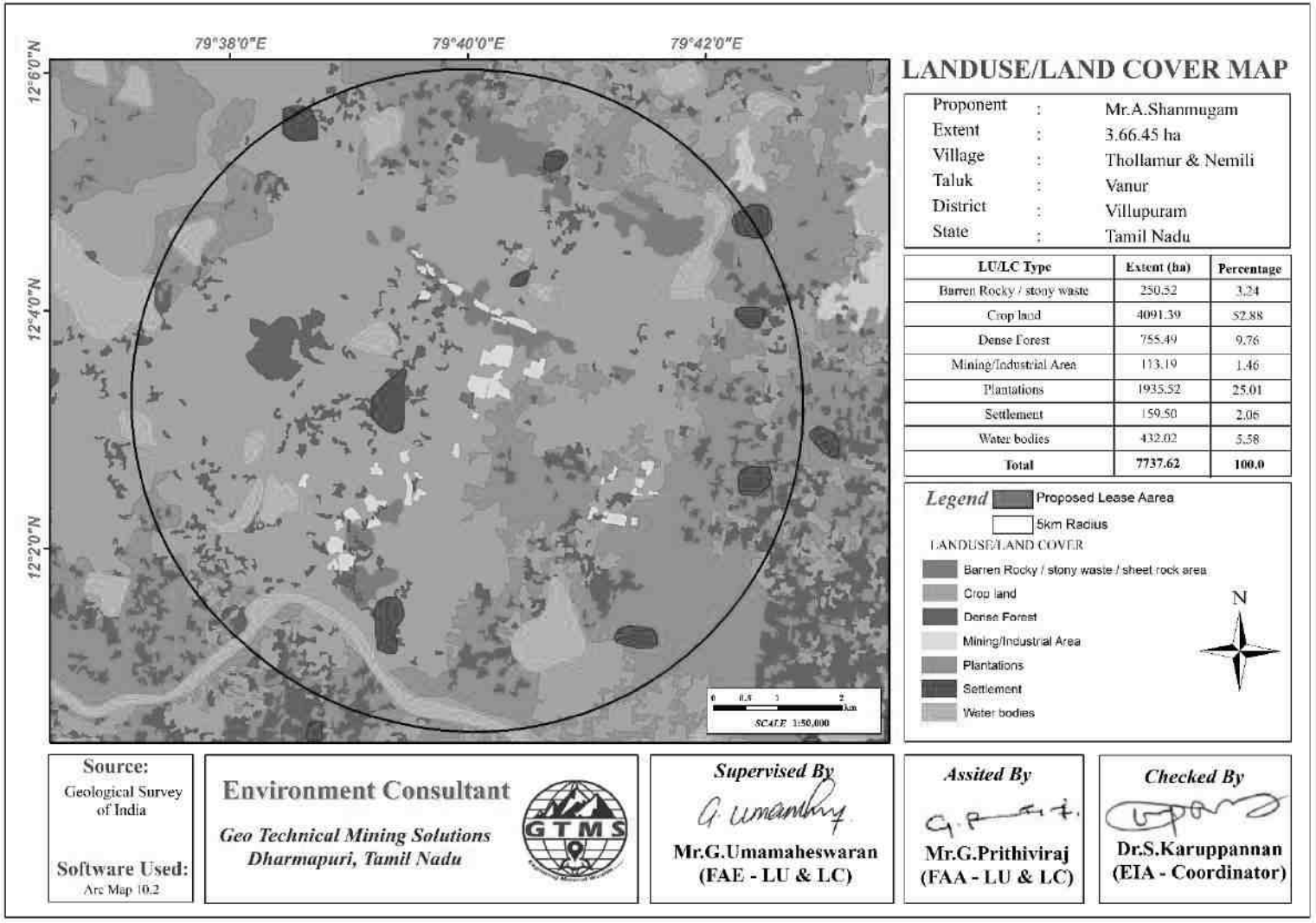


Figure 3.3 LULC Map of 5 km Radius from the Proposed Project Site

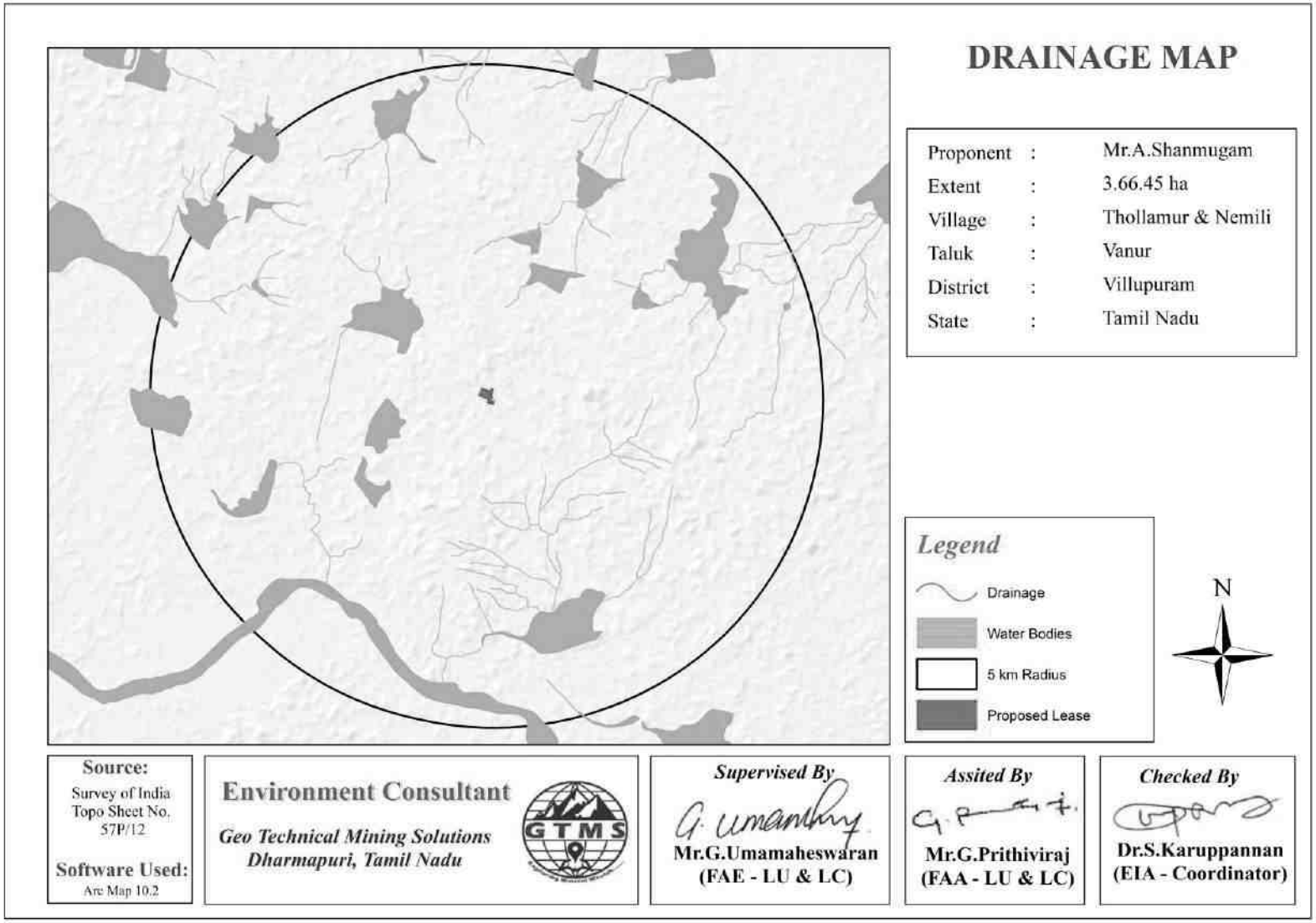


Figure 3.4 Drainage Map of 5 km Radius from the Proposed Project Site Showing a Portion of Dendritic Pattern

Table 3.3 Soil Sampling Locations

S. No.	Sampling ID	Location	Distance (km)	Direction	Coordinates
1	S01	Arjunan lease	0.40	E	12° 3'19.47"N 79°40'16.53"E
2	S02	Eraiyur	1.24	W	12° 3'11.79"N 79°39'14.58"E
3	S03	Perumbakkam	3.00	NNW	12° 4'53.31"N 79°39'30.90"E
4	S04	Ilvampatti	4.82	NE	12° 4'56.17"N 79°42'8.26"E
5	S05	Ranganathapuram	4.37	SE	12° 2'19.67"N 79°42'18.22"E
6	S06	Thiruvakkarai	3.69	SSW	12° 1'21.42"N 79°39'11.49"E
7	S07	Ponnampundi	4.23	SW	12° 2'48.64"N 79°37'38.35"E
8	S08	Core	---	---	12° 3'17.82"N 79°39'57.42"E

Source: On-site monitoring/sampling by ***Ekdant Enviro Services (P) Ltd,*** *in association with GTMS.*

3.1.5.2 Results and Discussion

Physical Characteristics

The soil samples in the study area show loamy textures varying between sandy loam, silty loam and silty clay. pH of the soil varies from 6.7 to 7.5 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 225 to 261µs/cm. Bulk density ranges between 1.11 and 1.53 g/cm^3. Figure 3.5 shows the soil composition as calculated based on the laboratory report.

Chemical Characteristics

Magnesium ranges between 22.56 and 43.22 %. Chlorides ranges between 136 and 156 %. Potassium ranges between 19.34 and 36.9 %. Calcium ranges between 110 and 166 mg/kg. Organic matter content ranges between 1.04 and 1.58 %.

Soil Erosion

There is no soil erosion in the mining lease area. The southwest part of the lease area has less moderate soil erosion as shown in the soil erosion map in Figure 3.6.

Soil Quality Assessment

Soil quality is the foundation of sustainable crop production. Soil quality assessment helps to understand soil conditions and adopt suitable production practices. It can be done using physical, chemical, and biological properties of soil. For this assessment, four soil quality parameters including PH, EC, OM, and BD were taken into account. The soil quality score for each sample has been provided in Table 3.5.

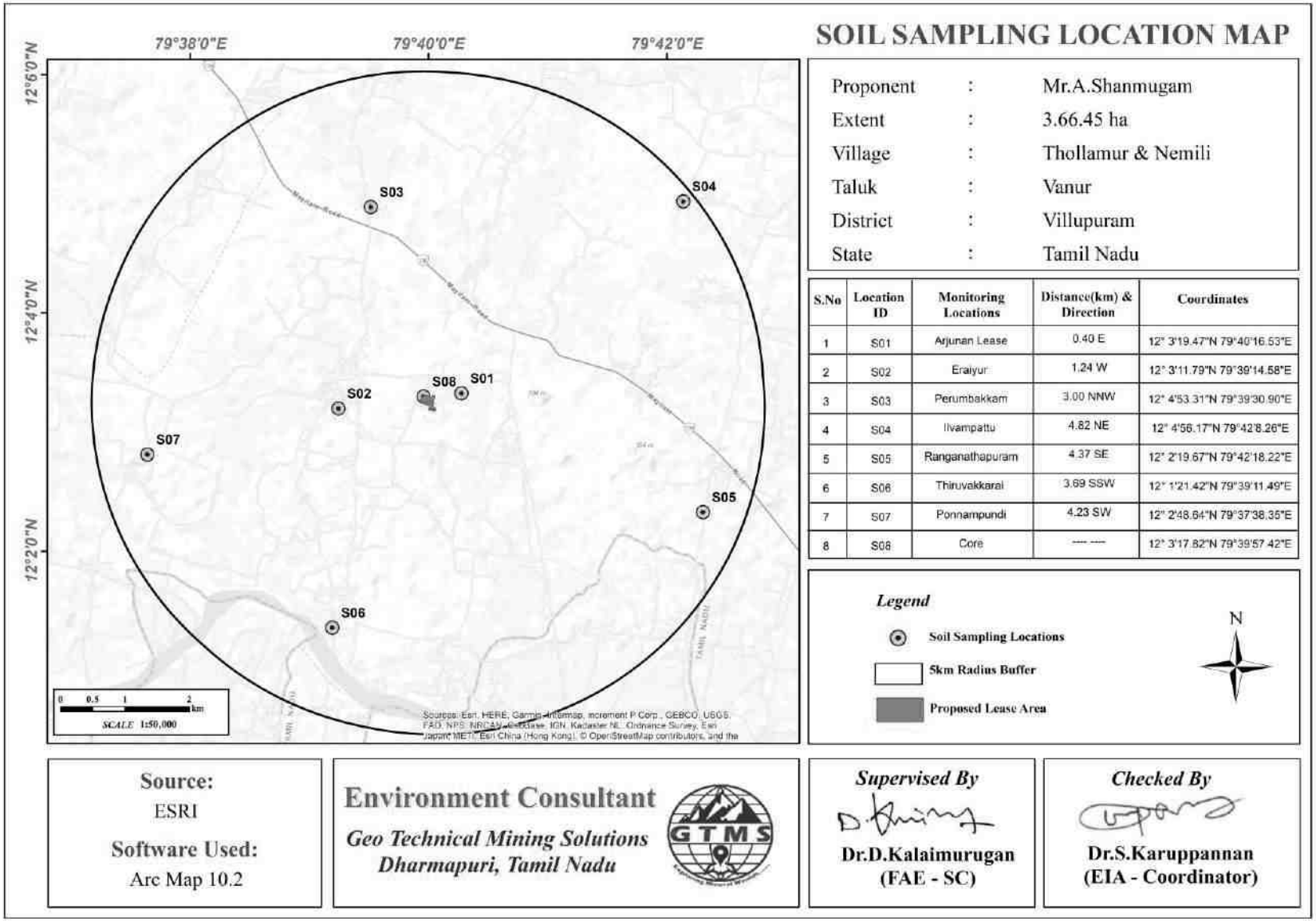


Figure 3.5 Map Showing Soil Sampling Locations within 5 km Radius around the Proposed Project Site

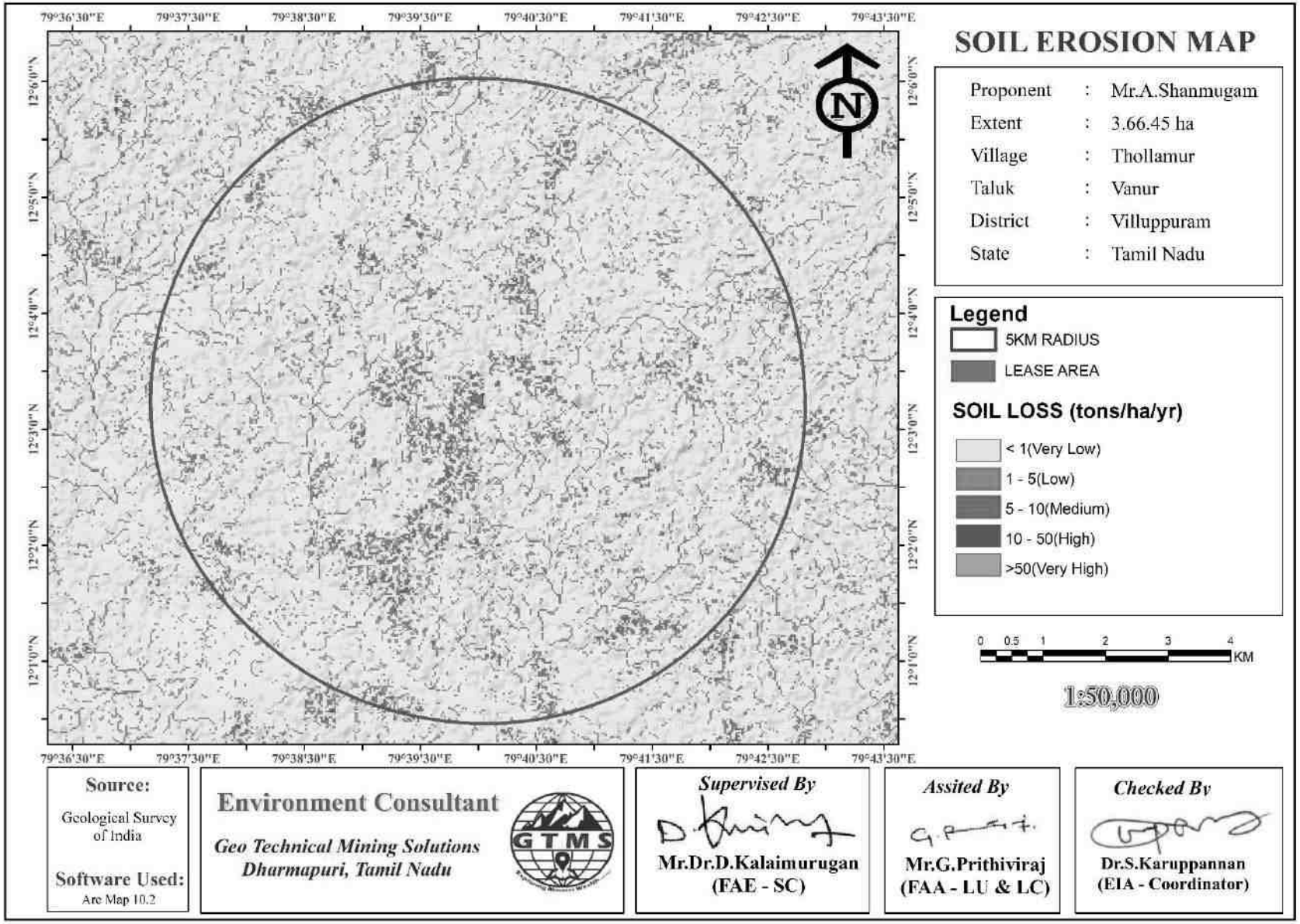


Figure 3.6 Soil Erosion map within 5 km Radius around the Proposed Project Site

Table 3.4 Soil Quality of the Study Area

S. No	Parameters	Unit	S01	Minimum	Maximum	Average
1	pH value @ 25°C	-	7.4	6.7	7.5	7.11
2	EC @ 25°C	µS /cm	245	225	261	243.43
3	Texture	-	Silt Loam	Sandy Loam, Silt Loam, Sandy Clay Loam.		
4	Sand	%	27.50	26.4	64	46.47
5	Silt	%	16.30	12.6	30.22	18.88
6	Clay	%	56.20	15.03	51.25	34.65
7	Bulk Density	g/cc	1.47	1.11	1.53	1.28
8	Water Content	%	3.38	2.56	5.38	3.85
9	Organic Matter	%	1.20	1.04	1.58	1.39
10	Alkalinity	mg/kg	65.4	63.45	80.23	72.43
11	Potassium (K)	mg/kg	35.70	19.34	36.9	27.81
12	Water Holding Capacity	%	36.2	33.6	67.55	44.64
13	Calcium (Ca)	mg/kg	135	110	166	136.00
14	Magnesium (Mg)	mg/kg	28.5	22.56	43.22	30.85
15	Sodium (Na)	mg/kg	148	133	178	154.00
16	Iron (Fe)	mg/kg	127.8	60.54	142.42	118.73
17	Copper (Cu)	mg/kg	BLQ(LOQ=0.05)	BLQ(LOQ=0.05)	BLQ(LOQ=0.05)	BLQ(LOQ=0.05)
18	Chlorides (Cl)	mg/kg	140	136	156	142.57

*Source: Sampling Results by **Ekdant Enviro Services (P) Ltd***

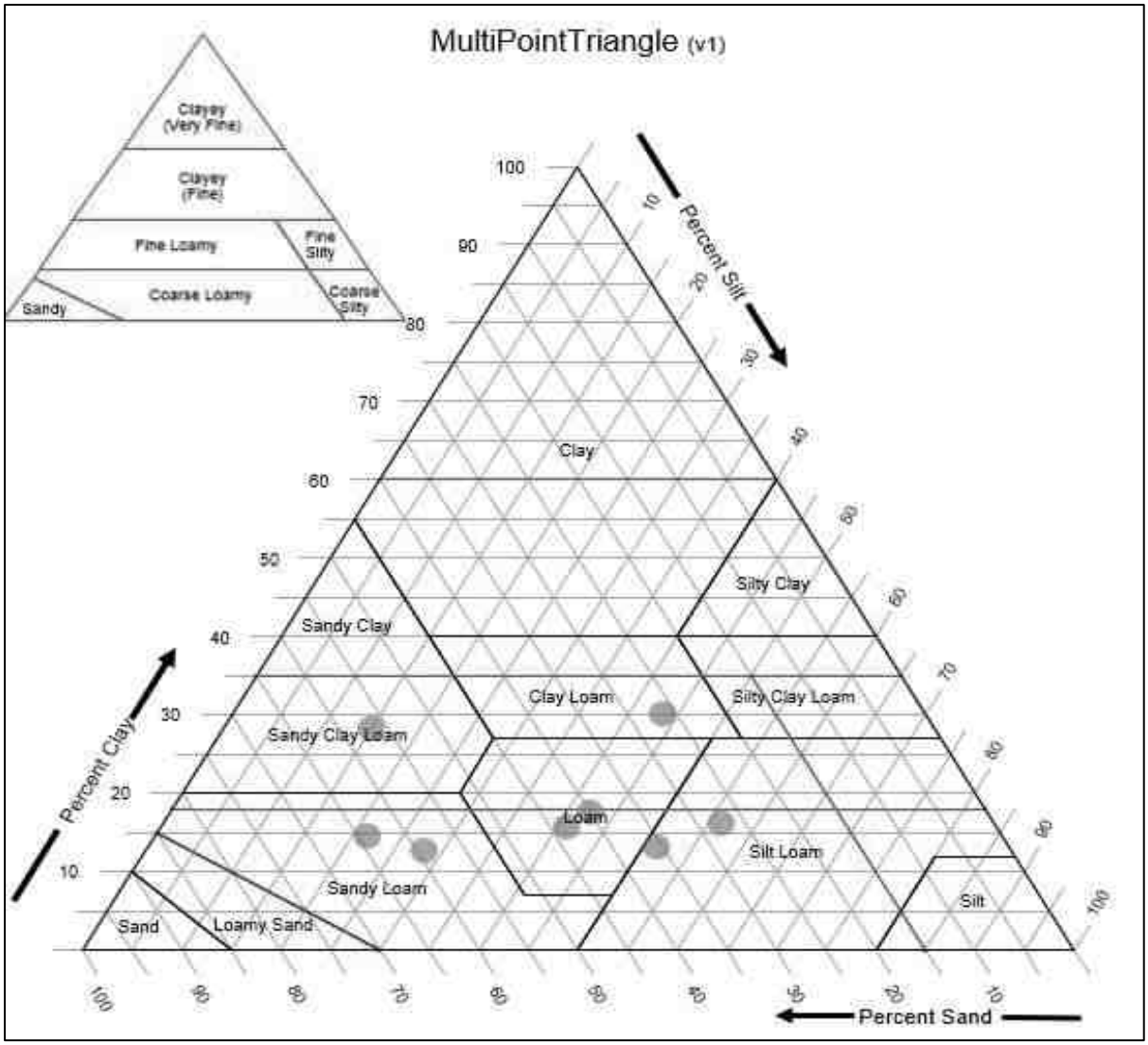


Figure 3.7 Soil Texture Calculation of Multipoint Triangle

Table 3.5 Assigning Scores to Soil Quality Indicators

Soil Quality Score						
S. No.	OM	BD	PH	EC	**Total Score**	**Recommendation**
S01	33	2	13	11	60	The soil requires major and immediate treatment
S02	33	7	13	11	64	
S03	33	7	20	11	71	
S04	33	7	13	11	64	
S05	33	2	20	11	67	
S06	33	13	20	11	78	
S07	33	13	20	11	78	
S08	33	7	13	11	64	

3.2 WATER ENVIRONMENT

The water resources, both surface and groundwater play a significant role in the development of the area. The purpose of this study is to assess the baseline quality of surface and ground water.

Table 3.6 Water Sampling Locations

S. No	Sampling ID	Location	Distance (km)	Direction	Coordinates
1	SW01	Sangarabarani River, Thiruvakkarai	3.68	SW	12°1'30.65"N, 79°38'54.25"E
2	SW02	Ilvampattu lake	4.17	NE	12°4'27.92"N, 79°42'1.52"E
3	OW01	Karasanur	2.13	N	12°4'28.30"N, 79°39'59.50"E
4	OW02	Thollamur	0.85	SE	12°3'3.30"N, 79°40'30.49"E
5	BW01	Sethanappattu	2.96	E	12°3'25.17"N, 79°41'40.94"E
6	BW02	Eraiyur	1.12	NW	12°3'39.72"N, 79°39'27.00"E

*Source: On-site monitoring/sampling by **Ekdant Enviro Services (P) Ltd,** in association with GTMS.*

3.2.1 Surface Water Resources and Quality

Sangarabarani River and Ilvampattu Lake are the two prominent surface water resources present in the study area. These are ephemeral in nature, which convey water only after rainfall events. The proposed project area is located 3.68 km SW of Sangarabarani River and 4.17 km NE of Ilvampattu lake Lake, as shown in Table 3.6 and Figure 3.8. Two surface water samples, known as SW01 and SW02 were collected from the two surface water bodies to assess the baseline water quality.

Results for surface water samples in the Table 3.8 indicate that the physical and chemical parameters, and heavy metals are within permissible limits. Of the two biological parameters, Coliform bacteria is absent in two water samples, whereas E-Coli is absent in the samples.

3.2.2 Ground Water Resources and Quality

Groundwater in the study area occurs in the crystalline rocks of Archaean age and Recent alluvium. The movement of the groundwater is controlled by the intensity of weathering and fracturing of crystalline rocks. Dug wells and bore wells are the most common ground water abstraction structures in the area. However, in dry season, people in the study area heavily rely on bore wells for their domestic and agriculture purpose. Four groundwater samples, known as

OW01, OW02, BW01 and BW02 were collected from bore wells and analyzed for physico-chemical conditions, heavy metals and bacteriological contents in order to assess baseline quality of ground water. Ground water sampling locations and their distance and direction from the lease area are provided in Table 3.6 and the spatial occurrence of water sampling locations is shown in Figure 3.8.

Results for ground water samples in the Table 3.7 indicate that the physical, chemical and biological parameters, and heavy metals are within permissible limits in comparison with standards of IS10500:2012.

3.2.3 Hydrogeological Studies

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

3.2.3.1 Groundwater Levels and Flow Direction

As the groundwater moves from the points of highest static groundwater elevation to the points of lowest static groundwater elevation under the influence of gravity, data regarding depth to groundwater levels are essential to infer the direction of groundwater movement within the study area. Knowledge of groundwater flow direction is must in choosing location for background groundwater quality monitoring well and in locating recharge and discharge areas. Therefore, data regarding groundwater elevations were collected from 9 open wells and 9 bore wells at various locations within 2 km radius around the proposed project sites for the period from October through December, 2022 (Post Monsoon Season) and from March through May, 2023 (Pre-Monsoon Season).

The open well water level data thus collected onsite are provided in Tables 3.9 and 3.10. According to the data, average depths to the static water table in open wells range from 7.97 to 8.53 m BGL in post monsoon and from 12.43 to 13.47 m BGL in pre monsoon. The bore well data thus collected onsite are provided in Tables 3.11 and 3.12. The average depths to static potentiometric surface in bore wells for the period of October through December 2022 (Post-Monsoon Season) vary from 55.87 to 58.20 m and from 61.30 to 67.17 m for the period of March through May, 2023 (Pre-Monsoon Season).

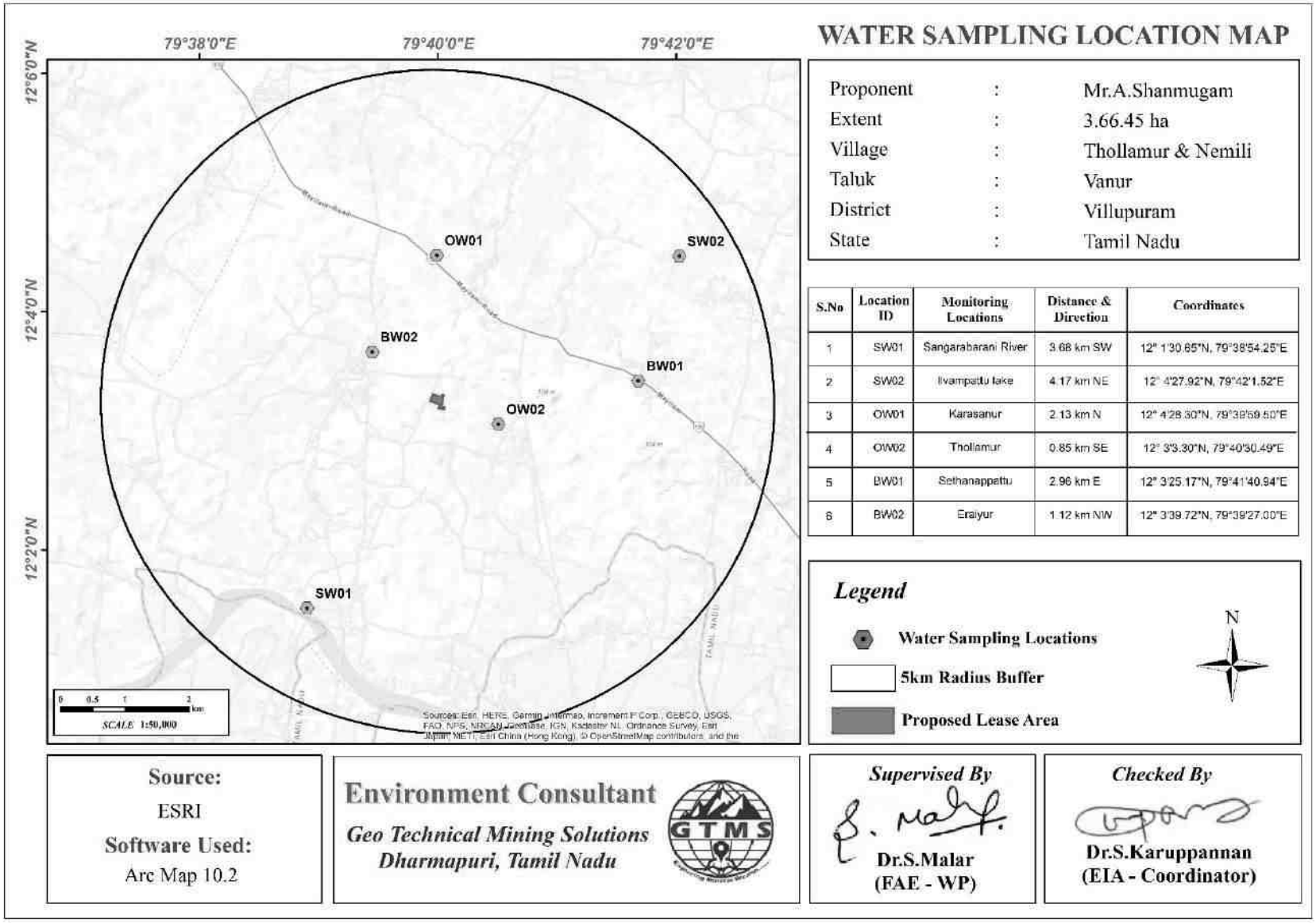


Figure 3.8 Map Showing Water Sampling Locations within 5 km Radius around the Proposed Project Site

Table 3.7 Ground Water Quality Result

S. No.	Parameters	Units	RESULT			Standards as Per IS 10500: 2012	
			Minimum Limit	Maximum Limit	Average	Acceptable Limit	Permissible Limit
1	pH@ 25°C	--	6.9	7.6	7.3	6.5-8.5	No relaxation
2	Turbidity	NTU	BLQ (LOQ=0.1)			1	5
3	Electrical Conductivity @ 25°C	µs/cm	475	1850	959.8	Not specified	Not specified
4	TSS	mg /l	BLQ (LOQ=0.1)			Not specified	Not specified
5	TDS	mg /l	432	1230	684.3	500	2000
6	Total Hardness	mg /l	218	282	242.8	200	600
7	Chloride (Cl)	mg /l	123	236	167.5	250	1000
8	Sulphate (SO_4)	mg /l	46	252	139.0	200	400
9	Iron (Fe)	mg /l	BLQ (LOQ=0.1)			0.3	No relaxation
10	Silica (SiO_2)	mg /l	-			Not specified	Not specified
11	Total Coliform	MPN/ 100ml	Absent			Shall not be detectable in any 100 ml water	Shall not be detectable in any 100 ml water
12	E-Coli	MPN/ 100ml	Absent			Shall not be detectable in any 100 ml water	Shall not be detectable in any 100 ml water

*Source: Sampling Results by **Ekdant Enviro Services (P) Ltd***

Table 3.8 Surface Water Quality Result

S. No.	Parameters	Units	RESULT			Standards as Per IS 10500: 2012	
			Minimum Limit	Maximum Limit	Average	Acceptable Limit	Permissible Limit
1	pH@ 25°C	--	7.3	7.5	7.4	6.5-8.5	No relaxation
2	Turbidity	NTU	BLQ (LOQ=0.1)			1	5
3	Electrical Conductivity @ 25°C	µs/cm	432	512	472	Not specified	Not specified
4	TSS	mg /l	BLQ (LOQ=0.1)			Not specified	Not specified
5	TDS	mg /l	252	267	259.5	500	2000
6	Total Hardness	mg /l	106	122	114	200	600
7	Chloride (Cl)	mg /l	88	152	120	250	1000
8	Sulphate (SO_4)	mg /l	14	34	24	200	400
9	Iron (Fe)	mg /l	BLQ (LOQ=0.1)			0.3	No relaxation
10	Silica (SiO_2)	mg /l	-			Not specified	Not specified
11	Total Coliform	MPN/ 100ml	Absent			Shall not be detectable in any 100 ml water	Shall not be detectable in any 100 ml water
12	E-Coli	MPN/ 100ml	Absent			Shall not be detectable in any 100 ml water	Shall not be detectable in any 100 ml water

*Source: Sampling Results by **Ekdant Enviro Services (P) Ltd***

Data on the depths to static water table and potentiometric surface were used to calculate static groundwater table and potentiometric surface elevations for open wells and borewells, respectively to draw contour lines connecting groundwater elevation (also known as equipotential hydraulic head) to determine the groundwater flow direction perpendicular to the contour lines. The maps thus produced are shown in Figures 3.9-3.10. From the maps of groundwater flow direction, it is understood that most of the open well groundwater for the post- and pre-monsoon seasons flows towards the open well number 1 located in Southern direction of the proposed project site respectively. The maps thus produced in bore wells are shown in Figures 3.11-3.12. From the groundwater flow map in fare that two monsoon seasons groundwater flows towards the bore well number 6 located in SE direction of the proposed project site. On the basis of the groundwater flow information, both open wells and bore wells mentioned above can be chosen for water quality monitoring purpose as the wells may get easily affected by the contaminants resulting from the mining activities of the sites in future.

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

Station ID	Depth to Static Water Table BGL(m)				Latitude	Longitude
	Mar-2023	Apr-2023	May- 2023	Average		
DW01	11.5	12.7	15.1	13.10	12° 3'9.64"N	79°40'16.52"E
DW02	11.7	13.1	14.4	13.07	12° 3'21.34"N	79°39'50.62"E
DW03	11.6	12.6	14.7	12.97	12° 3'41.35"N	79°39'41.52"E
DW04	11.4	12.3	13.6	12.43	12° 4'3.30"N	79°40'34.17"E
DW05	11.3	13.2	15.5	13.33	12° 3'31.51"N	79°40'56.63"E
DW06	11.7	12.9	15.8	13.47	12° 2'59.39"N	79°40'54.48"E
DW07	11.5	13.1	15.5	13.37	12° 2'37.70"N	79°40'18.97"E
DW08	11.6	13.1	15.6	13.43	12° 2'41.55"N	79°39'37.88"E
DW09	11.8	12.7	14.5	13.00	12° 3'15.77"N	79°39'15.19"E

Source: Onsite monitoring data

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

Station ID	Depth to Static Water Table BGL(m)				Latitude	Longitude
	Oct-2022	Nov-2022	Dec-2022	Average		
DW01	6.9	8.2	10.1	8.40	12° 3'9.64"N	79°40'16.52"E
DW02	6.8	8.3	9.7	8.27	12°3'21.34"N	79°39'50.62"E
DW03	6.6	7.7	9.6	7.97	12°3'41.35"N	79°39'41.52"E
DW04	7.1	7.9	9.4	8.13	12° 4'3.30"N	79°40'34.17"E
DW05	6.7	8.6	9.9	8.40	12°3'31.51"N	79°40'56.63"E

DW06	6.6	8.1	9.5	8.07	12°2'59.39"N	79°40'54.48"E
DW07	6.9	8.2	9.7	8.27	12°2'37.70"N	79°40'18.97"E
DW08	7.1	8.3	10.2	8.53	12°2'41.55"N	79°39'37.88"E
DW09	7.2	8.5	9.4	8.37	12°3'15.77"N	79°39'15.19"E

Source: Onsite monitoring data

Table 3.11 Pre-Monsoon Water Level of Bore Wells within 2 km Radius

Station ID	Depth to Static Potentiometric Surface BGL(m)				Latitude	Longitude
	Mar-2023	Apr-2023	May- 2023	Average		
BW01	61.5	61.9	63.2	62.20	2°3'34.04"N	79°39'28.38"E
BW02	60.7	63.4	66.5	63.53	2°3'14.56"N	79°39'9.55"E
BW03	60.2	61.1	62.6	61.30	2°3'16.68"N	79°39'23.02"E
BW04	62.3	65.3	69.2	65.60	12°4'22.82"N	79°40'24.25"E
BW05	62.8	66.2	69.9	66.30	12°2'59.20"N	79°40'34.30"E
BW06	63.9	66.8	69.3	66.67	12°2'53.41"N	79°40'32.29"E
BW07	64.5	67.6	69.4	67.17	2°2'49.53"N	79°40'44.38"E
BW08	64.2	67.2	69.8	67.07	2°4'10.95"N	79°40'22.84"E
BW09	63.9	66.1	67.2	65.73	12° 4'1.01"N	79°39'26.54"E

Source: Onsite monitoring data

Table 3.12 Post-Monsoon Water Level of Bore Wells within 2 km Radius

Station ID	Depth to Static Potentiometric Surface BGL(m)				Latitude	Longitude
	Oct-2022	Nov-2022	Dec-2022	Average		
BW01	56.10	55.8	56.4	56.10	12°3'34.04"N	79°39'28.38"E
BW02	56.30	55.9	57.9	56.70	12°3'14.56"N	79°39'9.55"E
BW03	56.00	56.6	58.5	57.03	2°3'16.68"N	79°39'23.02"E
BW04	55.12	56.2	56.3	55.87	12°4'22.82"N	79°40'24.25"E
BW05	55.82	56.6	59.6	57.34	2°2'59.20"N	79°40'34.30"E
BW06	55.90	57.2	59.8	57.63	2°2'53.41"N	79°40'32.29"E
BW07	56.10	57.6	59.9	57.87	2°2'49.53"N	79°40'44.38"E
BW08	56.40	57.9	60	58.10	2°4'10.95"N	79°40'22.84"E
BW09	57.00	58.2	59.4	58.20	12° 4'1.01"N	79°39'26.54"E

Source: Onsite monitoring data

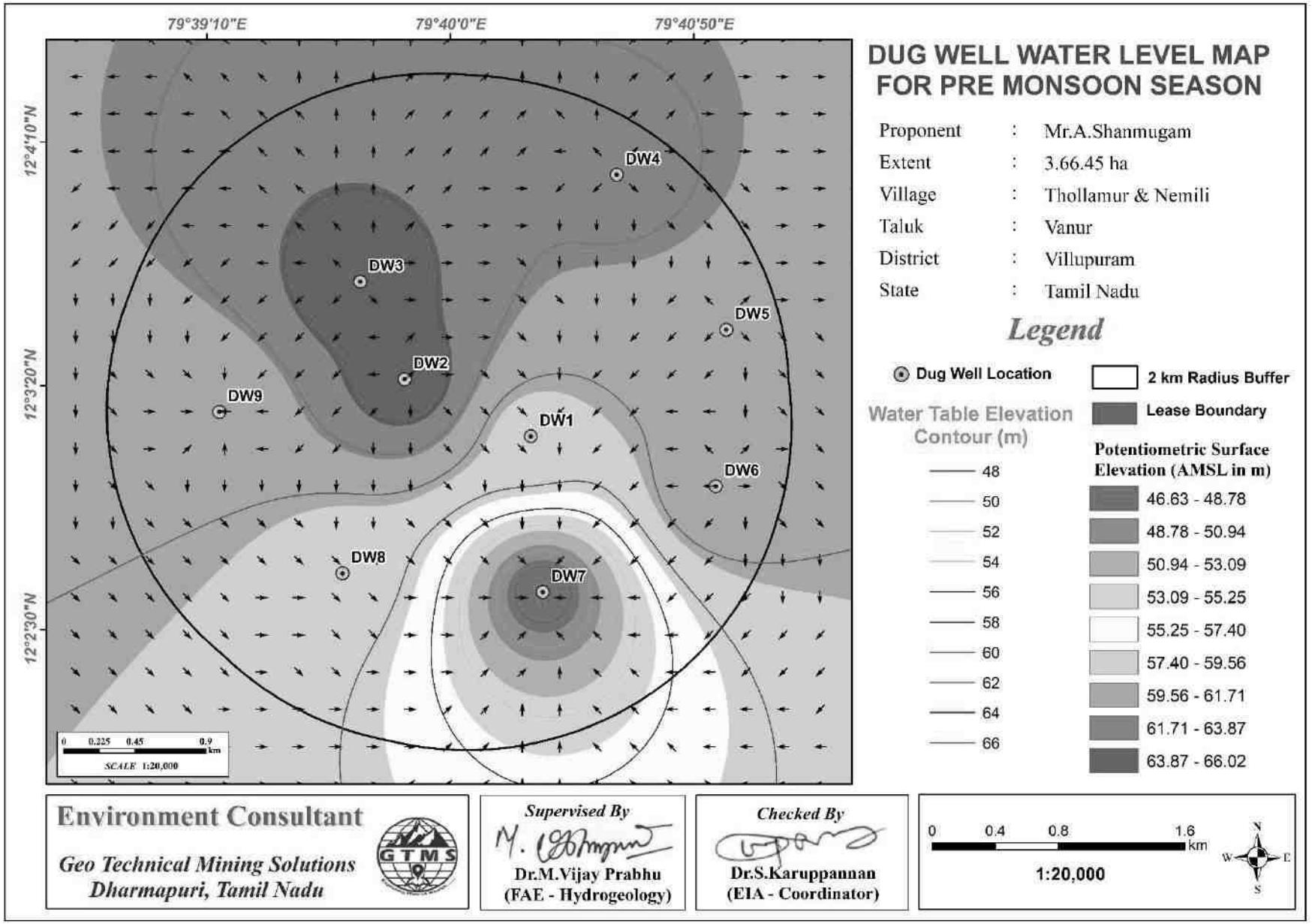


Figure 3.9 Open Well Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Pre-Monsoon Season

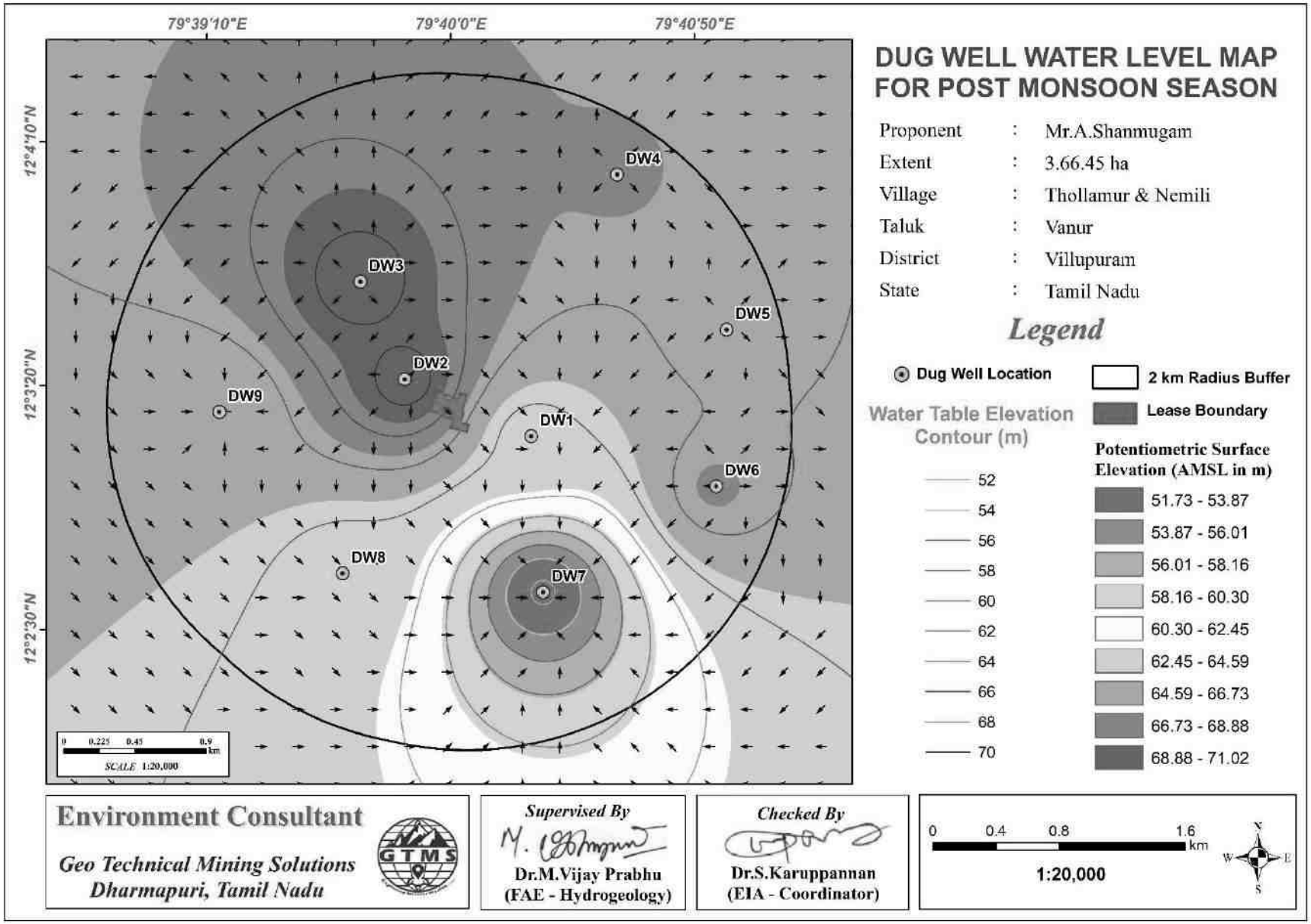


Figure 3.10 Open Well Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Post-Monsoon Season

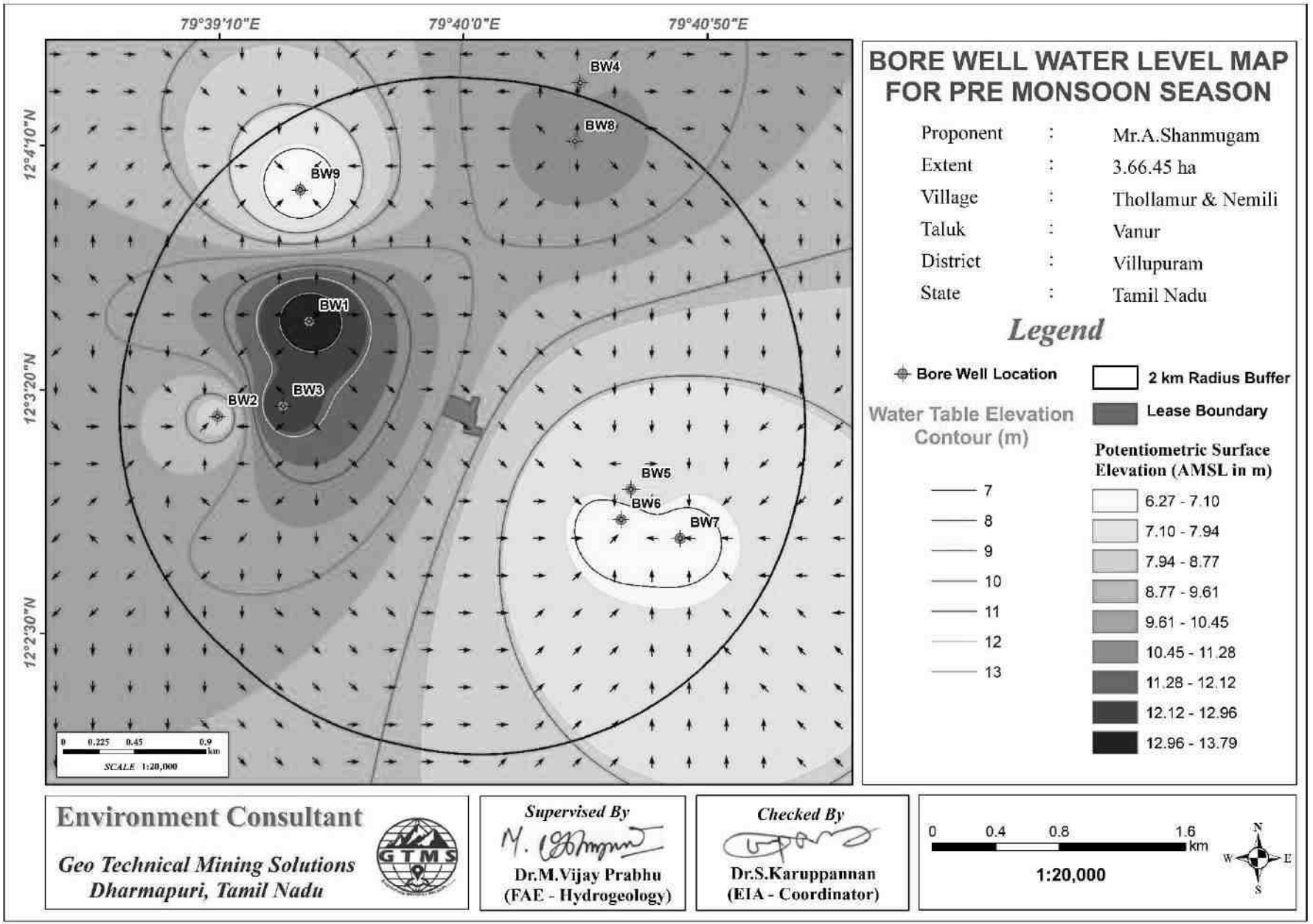


Figure 3.11 Borewell Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Pre-Monsoon Season

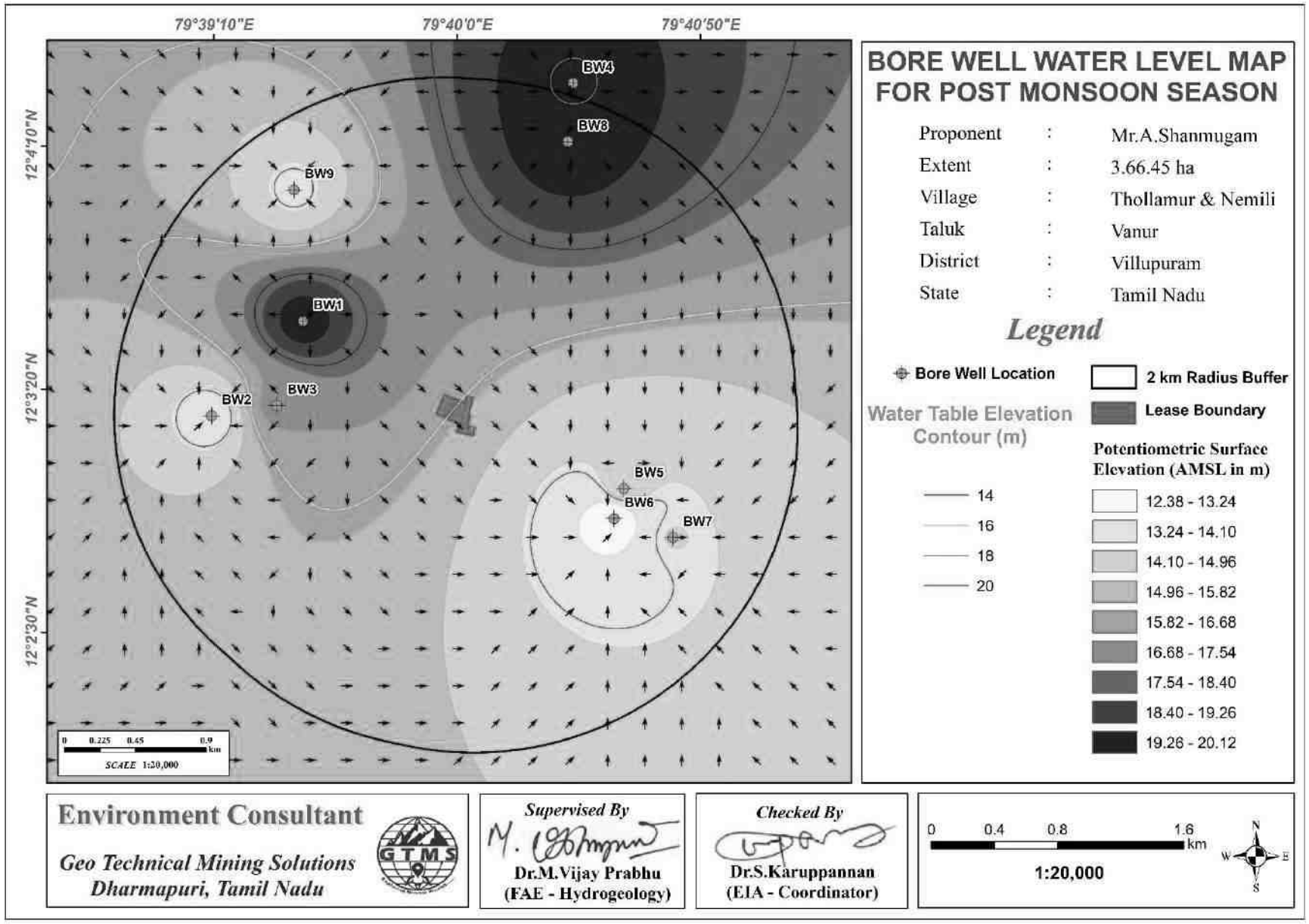


Figure 3.12 Borewell Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Post-Monsoon Season

3.2.3.2 Electrical Resistivity Investigation

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

Result

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

Table 3.13 Vertical Electrical Sounding Data

Location Coordinates – 12° 3'12.54"N 79°40'1.51"E					
S. No.	**AB/2 (m)**	**MN/2 (m)**	**Geometrical Factor (G)**	**Resistance in Ω**	**Apparent Resistivity in Ωm**
1	5	2	16.50	0.741	125.05
2	10	2	75.43	0.245	167.91
3	15	5	62.86	0.454	288.48
4	20	5	117.86	0.326	369.37
5	25	5	188.58	0.263	496.74
6	25	10	82.50	0.594	490.67
7	30	10	125.72	0.580	582.30
8	35	10	176.79	0.406	718.27
9	40	10	235.73	0.368	876.45
10	45	10	302.51	0.355	1073.17
11	50	20	165.01	0.278	1189.65
12	60	20	251.44	0.272	786.42
13	70	20	353.59	0.269	1239.90
14	80	20	471.45	0.262	1281.12
15	90	20	605.03	0.257	1546.68
16	100	20	754.32	0.251	1785.32

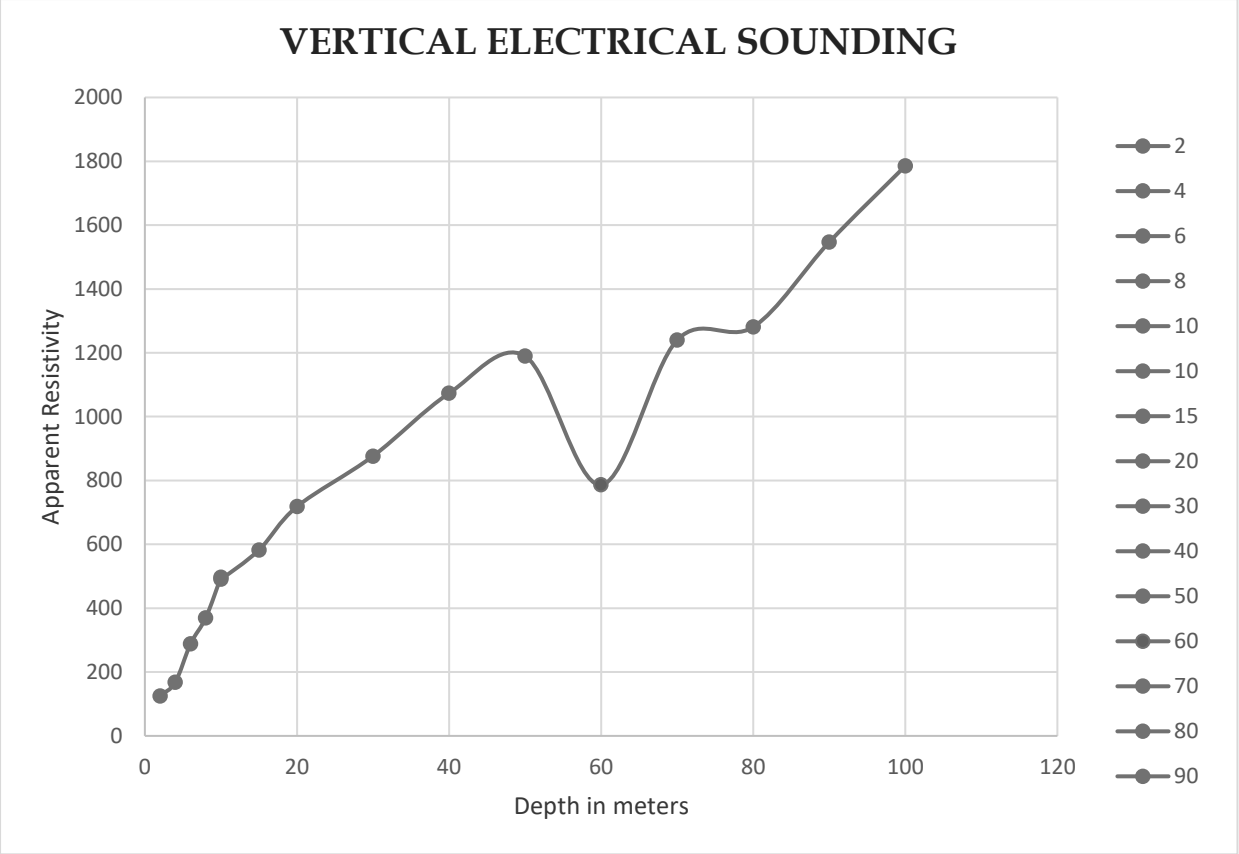


Figure 3.13 Graph Showing Occurrence of Water Bearing Fracture Zones at the Depth of 60m Below Ground Level in Proposed Project

The rock formation of low resistivity values indicates occurrence of water at the depth of about 60 m below ground level. The maximum depth proposed for the proposed project is 45 m below ground level. Therefore, the mining operation will not affect the aquifer throughout the entire mine life period.

3.3 AIR ENVIRONMENT

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

3.3.1 Meteorology

3.3.1.1 Climatic Variables

A temporary meteorological station was installed at the project sites by covering cluster quarries. The station was installed at a height of 3 m above the ground level as there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature. Meteorological data obtained from the onsite monitoring station are provided in Table 3.14.

According to the onsite data, the temperature in March, 2023 varied from 19.17 to 37.99^{0}C with the average of 28.08^{0}C; in April, 2023 from 22.97 to 40.94^{0}C with the average of 30.35^{0}C; and in May, 2023 from 24.19 to 39.53^{0}C with the average of 29.71^{0}C. In March, 2023, relative humidity ranged from 22.56 to 100 % with the average of 67.31%; in April, 2023, from 17.44 to 99.19 % with the average of 63.74 %; and in May,2023, from 33.88 to 97.25 % with the average of 74.73%. The wind speed in March, 2023 varied from 0.32 to 7.81 m/s with the average of 3.49 m/s; in April, 2023 from to 7.31 m/s with the average of 3.60 m/s; and in May, 2023 from 0.24 to 7.46 m/s with the average of 3.28 m/s. In December,2022, wind direction varied from 0.0 to 359.92^0 with the average of 110.42^0; in January, 2023, from 0.32 to 359.62^0 with the average of 65.11^0; and in February, 2023, from 0.88 to 359.83^0 with the average of 96.17^0. In December,2022, surface pressure varied from 99.21 to 100.81 kPa with the average of 100 kPa; in January, 2023, from 99.72 to 100.76 kPa with the average of 100.23 kPa; and in February, 2023, from 99.69 to 100.75 kPa with the average of 100.16kPa.

Table 3.14 Onsite Meteorological Data

S. No.	Parameters		MARCH,2023	APRIL,2023	MAY,2023
1	Temperature (^{0}C)	Min	19.17	22.97	24.19
		Max	37.99	40.94	39.53
		Avg	28.08	30.35	29.71
2	Relative Humidity (%)	Min	22.56	17.44	33.88
		Max	100.00	99.19	97.25
		Avg	67.31	63.74	74.73
3	Wind Speed (m/s)	Min	0.32	0.15	0.04
		Max	7.81	6.75	8.53
		Avg	3.49	3.12	3.20
4	Wind Direction (degree)	Min	0.17	2.10	3.56
		Max	359.84	350.13	358.89
		Avg	112.75	141.63	210.37
5	Surface Pressure(kPa)	Min	99.35	99.03	99.06
		Max	100.79	100.45	100.16
		Avg	100.00	99.77	99.64

*Source: On-site monitoring/sampling by **Ekdant Enviro Services (P) Ltd** in association with GTMS **Rainfall***

Rainfall data for the study area were collected for the period of 1981-2021. Long term monthly average rainfall was estimated from the data of 1981-2021 and compared with the monthly rainfall for the year 2021, shown in Figure 3.14. The Figure 3.14 shows that rainfall is generally high in the months of September through November in every year. Particularly, rainfall in September through November of 2021 is higher than the previous years.

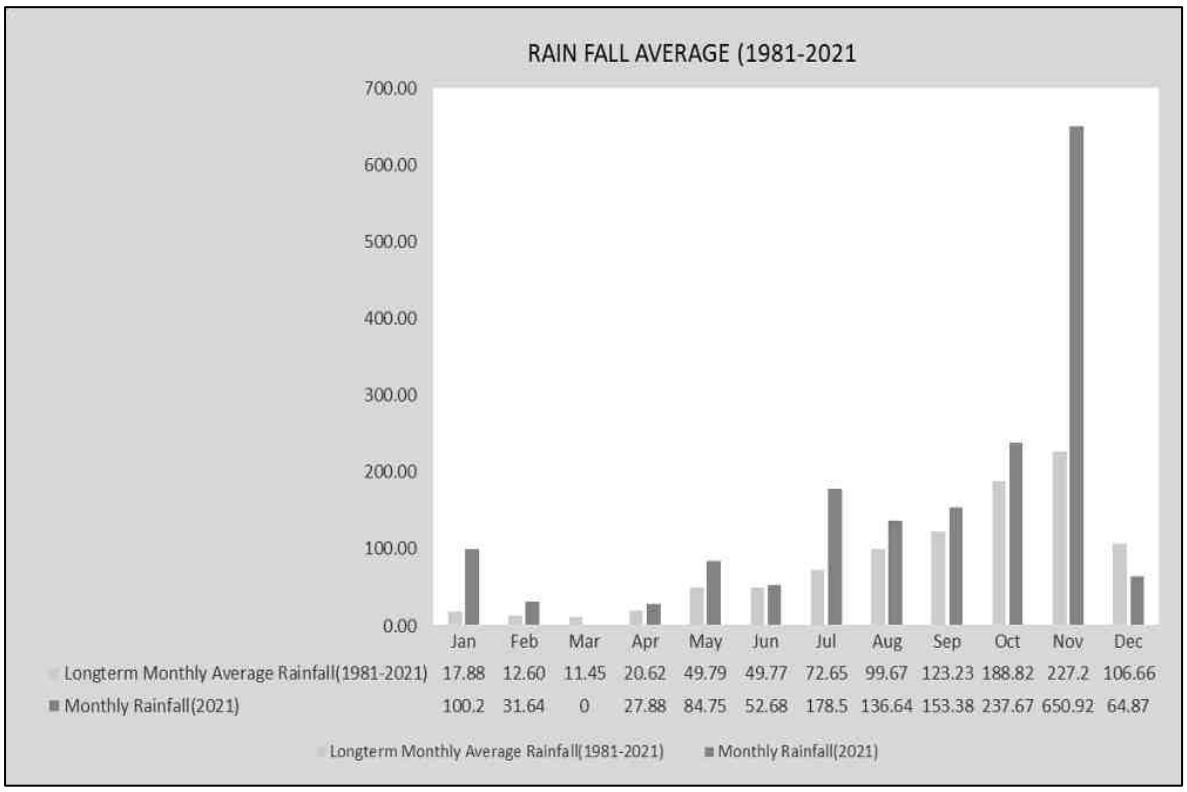
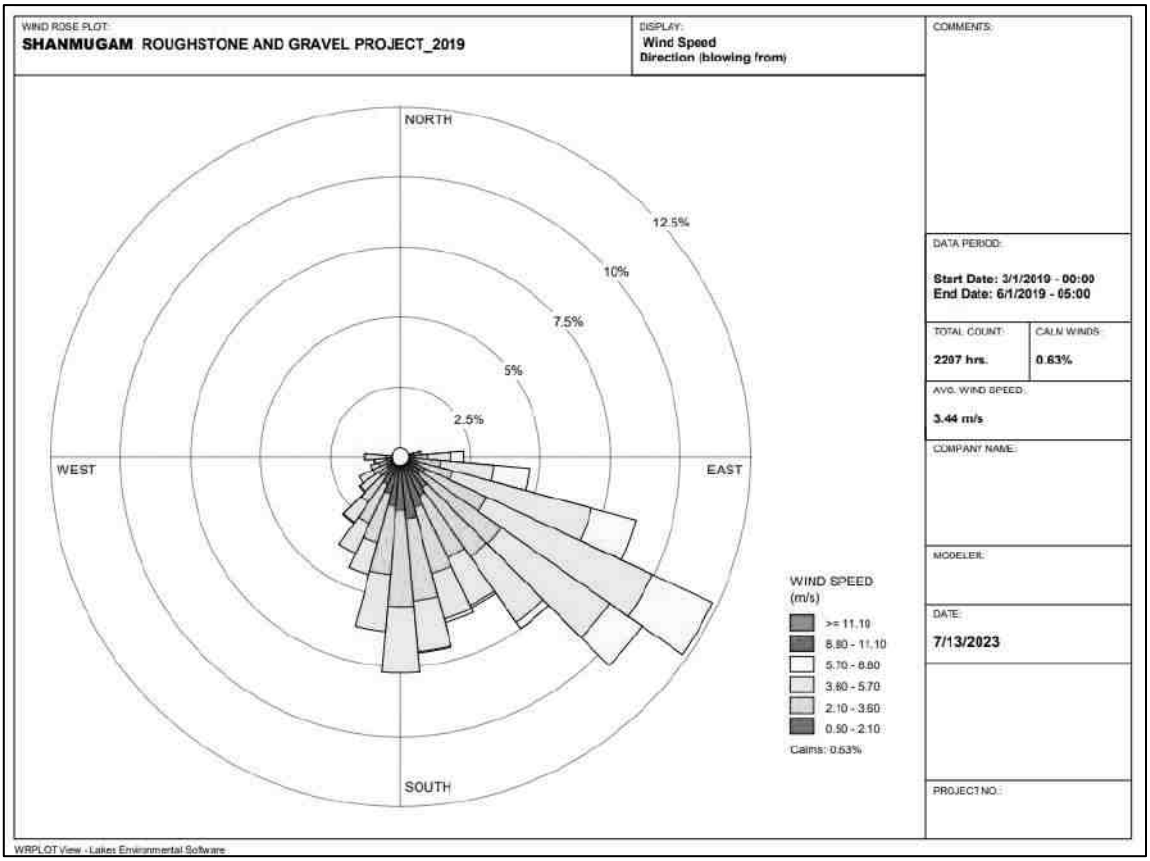


Figure 3.14 Long-Term Monthly Average Rainfall vs Monthly Rainfall

3.3.1.2 Wind Pattern

Wind pattern will largely influence the dispersion pattern of air pollutants and noise from the proposed project site. Analysis of wind pattern requires hourly site-specific data of wind speed and direction. Two types of wind rose were generated: historical seasonal wind rose for the period of March through May of the years 2019-2022 and the seasonal wind rose for the study period of March through May of the years 2023. The wind rose diagrams thus produced are shown in Figures 3.15-3.16. Figure 3.17 reveals that:

- ❖ The measured average wind velocity during the study period is 3.27m/s.
- ❖ Predominant wind was dominant in the directions ranging from Southeast to Northwest.



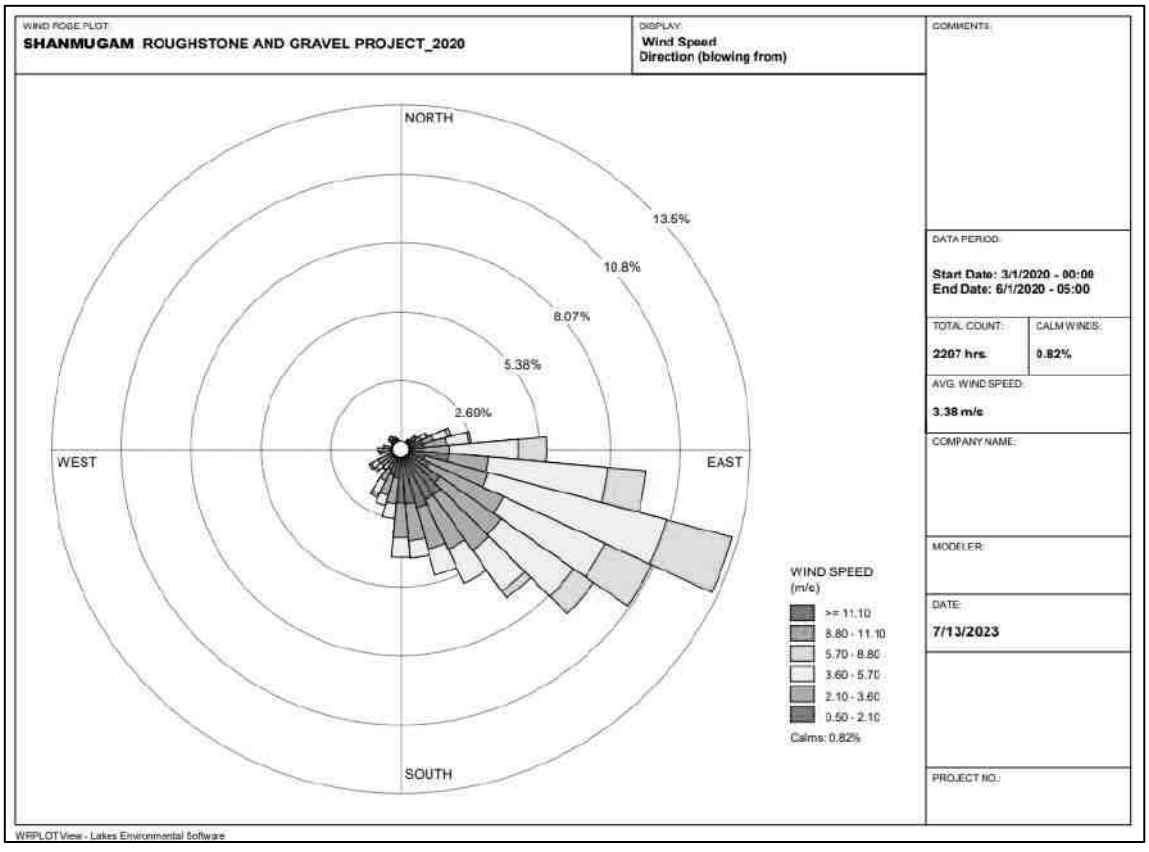
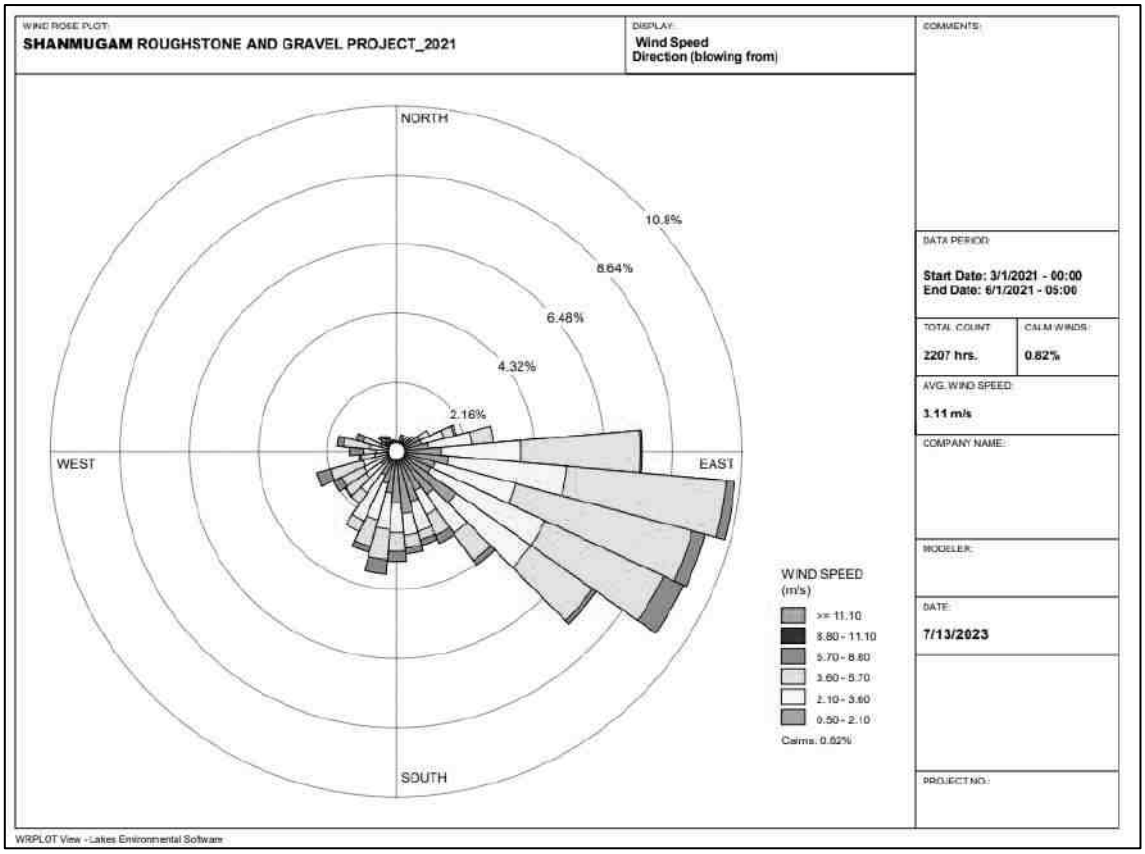


Figure 3.15 Windrose Diagram for March to May -2019-2020



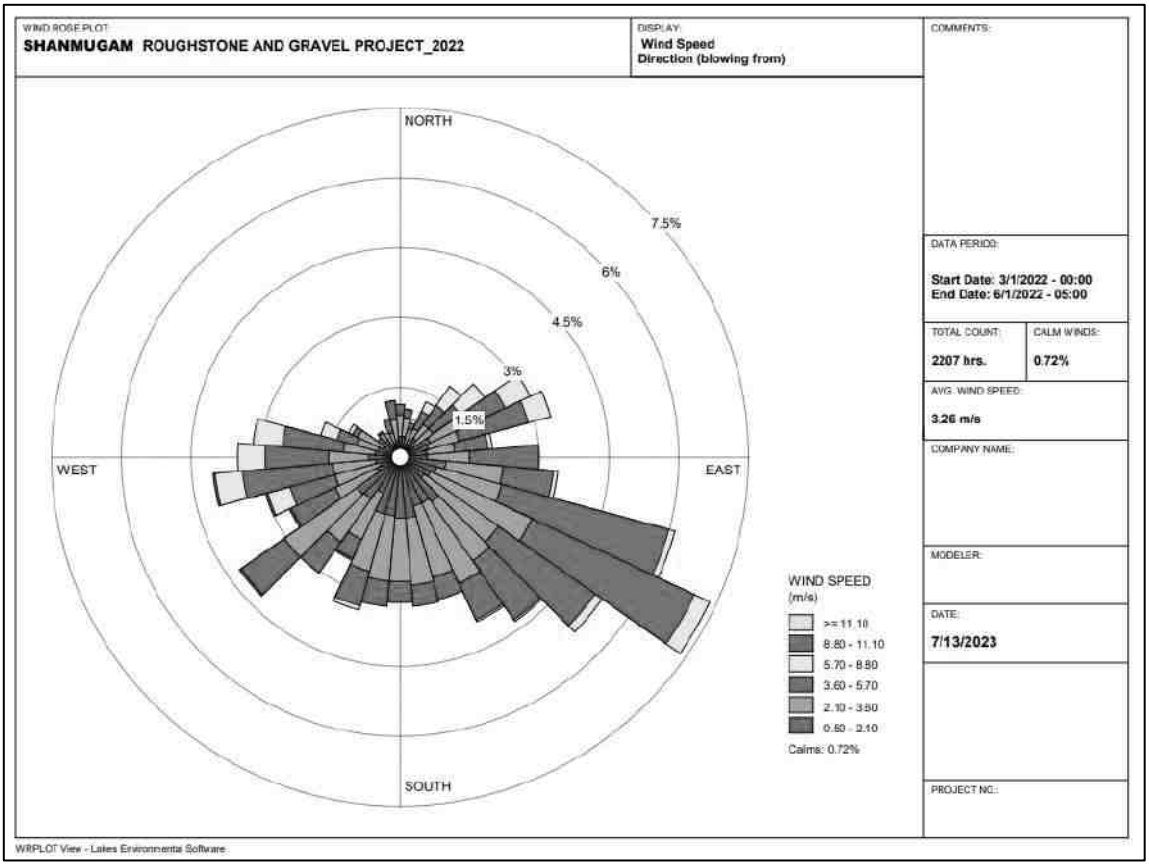


Figure 3.16 Windrose Diagram for March to May 2021-2022)

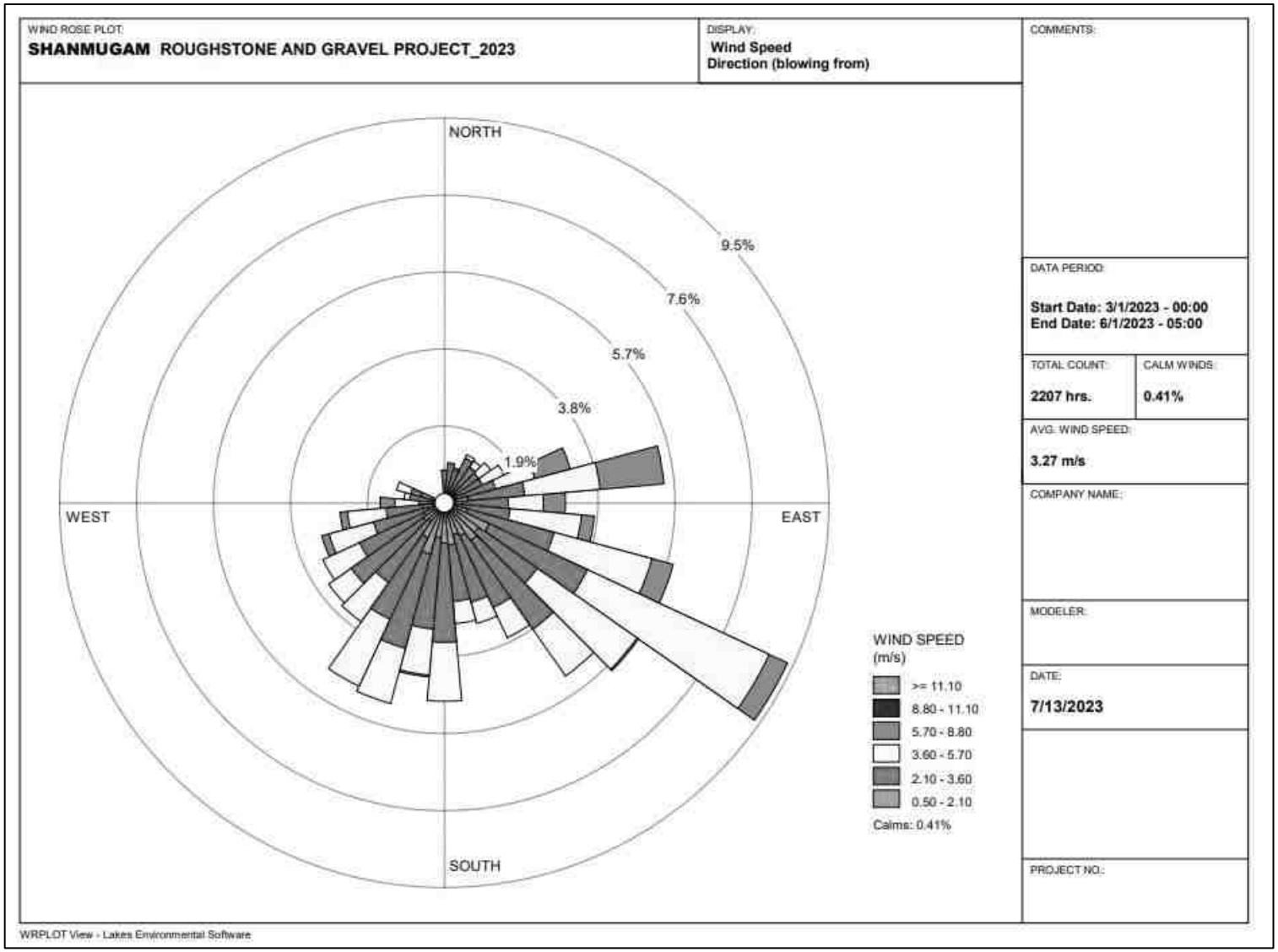


Figure 3.17 Onsite Wind Rose Diagram

3.3.2 Ambient Air Quality Study

The baseline ambient air quality is studied through a scientifically designed ambient air quality monitoring network considering the followings:

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

Table 3.15 Methodology and Instrument Used for AAQ Analysis

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

*Source: Sampling Methodology based on **Ekdant Enviro Services (P) Ltd** & CPCB Notification*

Table 3.16 National Ambient Air Quality Standards

S. No.	Pollutant	Time Weighted Average	Concentration in ambient air	
			Industrial, Residential, Rural & other areas	Ecologically Sensitive area (Notified by Central Govt.)
1	SO_2 (µg/m^3)	Annual Avg.* 24 hours**	50.0 80.0	20.0 80.0
2	NO_X (µg/m^3)	Annual Avg. 24 hours	40.0 80.0	30.0 80.0
3	PM_{10} (µg/m^3)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
4	$PM_{2.5}$ (µg/m3)	Annual Avg. 24 hours	40.0 60.0	40.0 60.0

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

Methodology

Ambient air quality monitoring was carried out with a frequency of two samples per week at Nine (09) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period March to May 2023 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 space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results. The baseline data of ambient air were generated for PM_{10}, $PM_{2.5}$, sulphur dioxide (SO_2) and nitrogen dioxide (NO_x). The sampling locations are shown in Figure 3.18 and average concentrations of air pollutants are summarized in Tables 3.17.

Table 3.17 Ambient Air Quality (AAQ) Monitoring Locations

S. No	Location Code	Monitoring Locations	Distance (km)	Direction	Coordinates
1	AAQ1	Arjunan Core	0.47	NE	12° 3'21.99"N, 79°40'18.37"E
2	AAQ2	Kadagampattu	2.78	S	12° 1'48.11"N,79°40'26.66"E
3	AAQ3	Kodukkur	5.16	SSW	12° 0'41.62"N,79°39'15.59"E
4	AAQ4	Eraiyur	1.47	W	12° 3'27.46"N,79°39'24.45"E
5	AAQ5	Konamangalam	4.83	NW	12° 4'21.59"N, 79°37'45.22"E
6	AAQ6	Ranganathapuram	3.98	SE	12° 2'41.68"N,79°42'23.40"E
7	AAQ7	Semangalam	4.17	NE	12° 4'7.86"N, 79°42'28.80"E
8	AAQ8	Kunnam	3.74	NNE	12° 5'22.51"N, 79°40'44.33"E
9	AAQ9	Core	--	--	12° 3'14.63"N, 79°39'57.47"E

*Source: On-site monitoring/sampling by **Ekdant Enviro Services (P) Ltd** in association with GTMS.*

Results

As per the monitoring data, $PM_{2.5}$ ranges from 15.1 $\mu g/m^3$ to 19.5$\mu g/m^3$; PM_{10} from 32.5$\mu g/m^3$ to 38.1$\mu g/m^3$; SO_2 from 6.5 $\mu g/m^3$ to 9.7 $\mu g/m^3$; NO_x from 11.9 $\mu g/m^3$ to 18.9$\mu g/m^3$. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

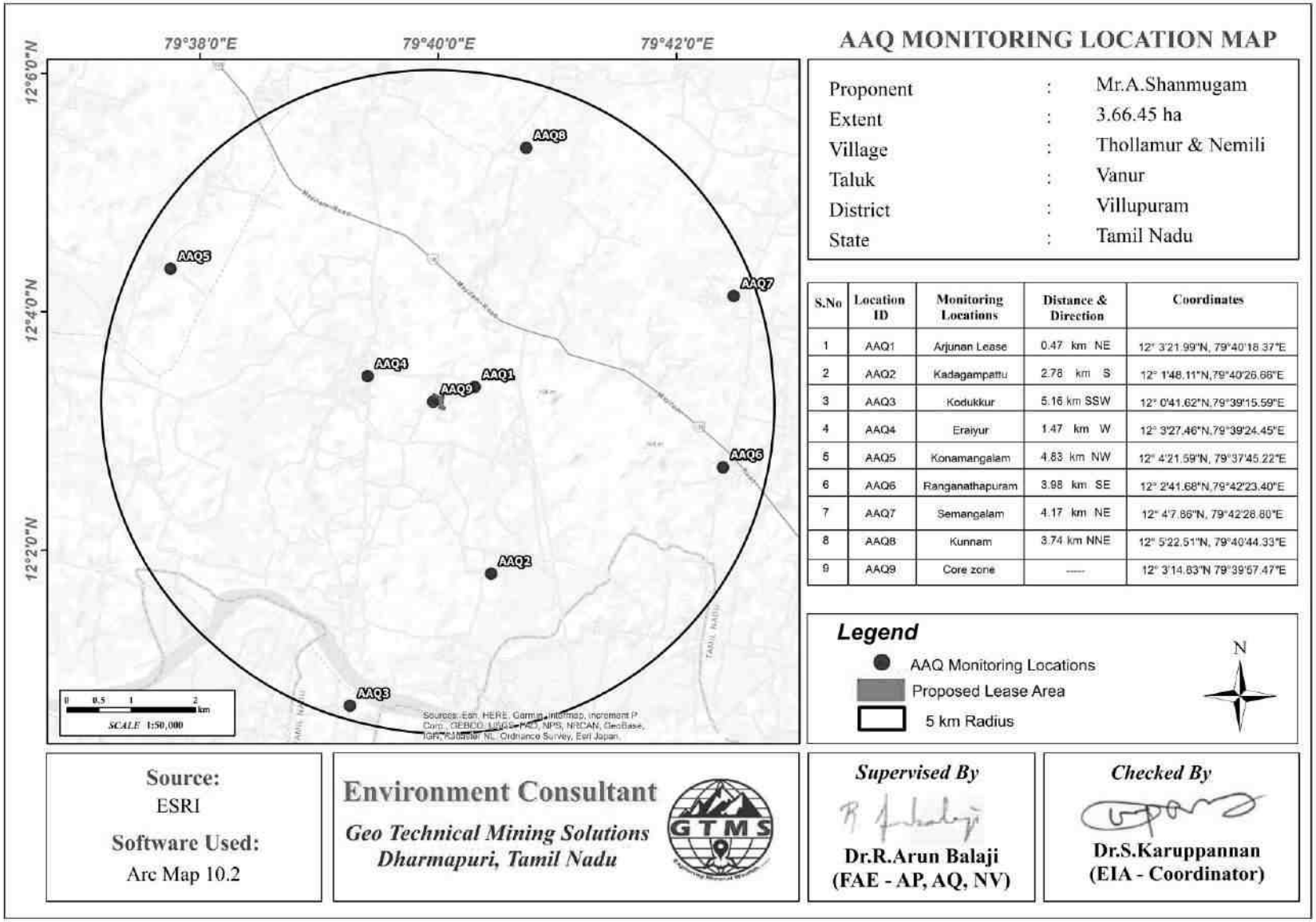
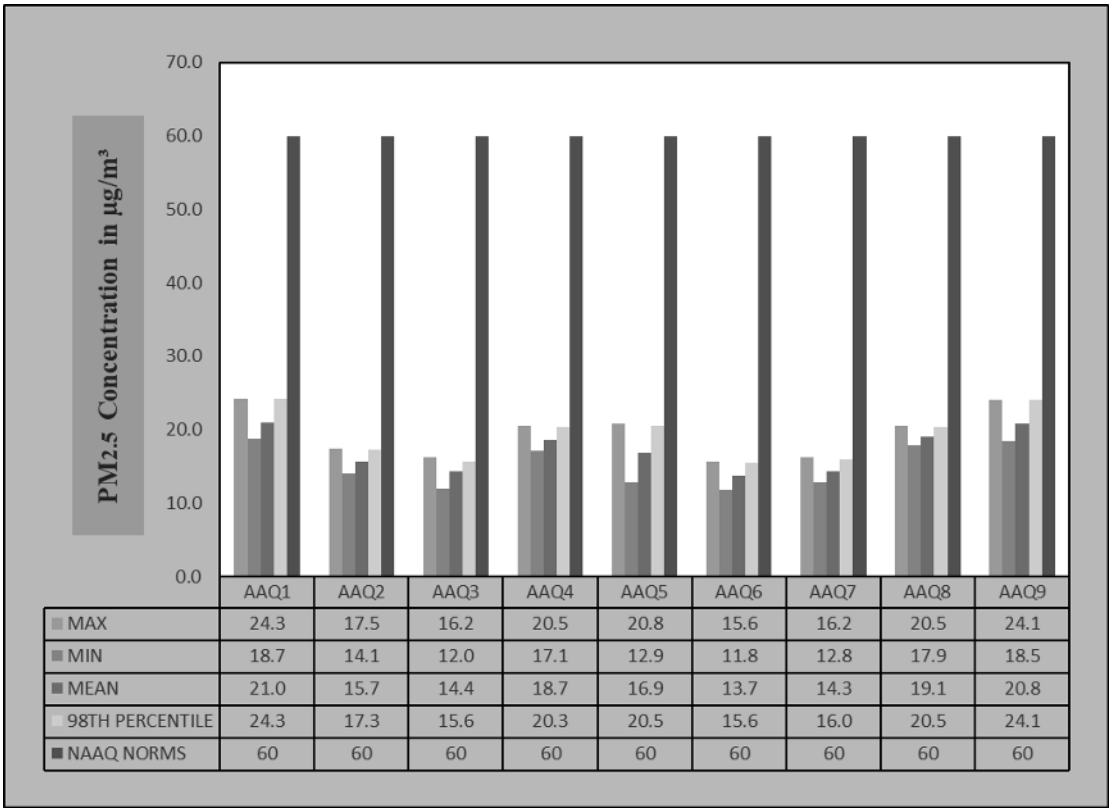


Figure 3.18 Map Showing Ambient Air Quality Monitoring Station Locations Around 5 Km Radius from the Proposed Project Site

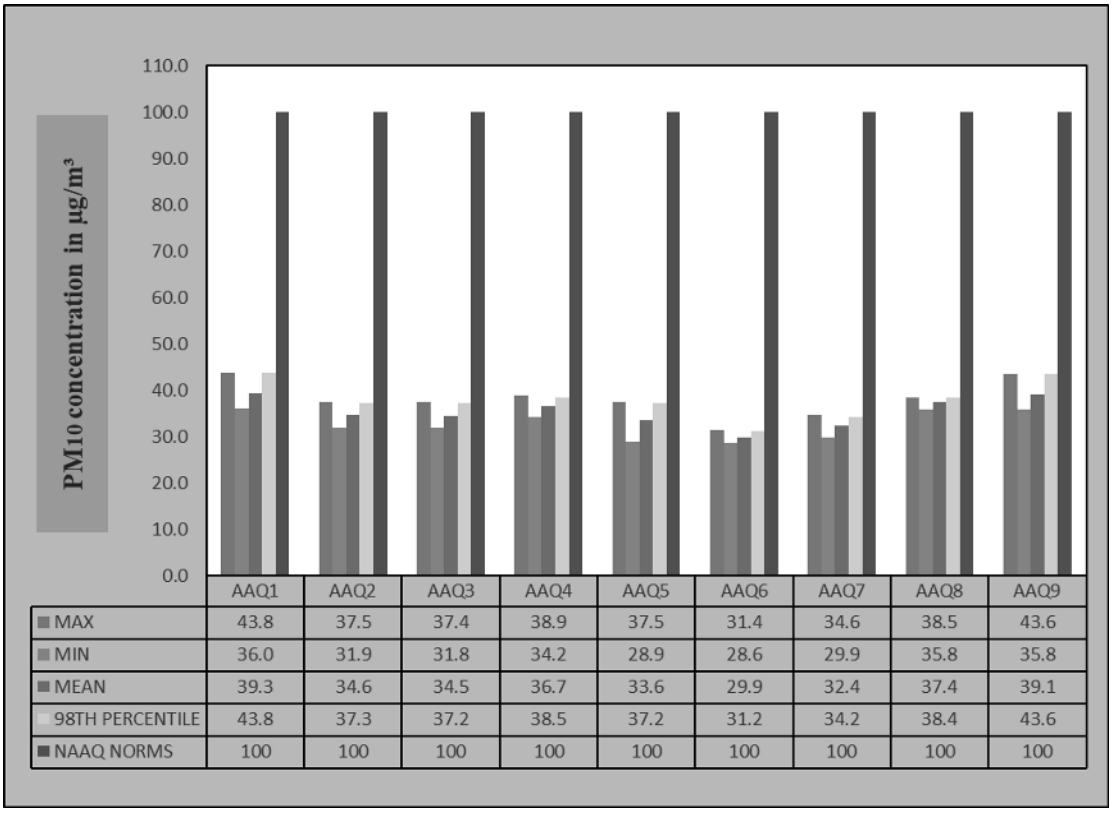
Table 3.18 Summary of AAQ Result

	$PM_{2.5}$				PM_{10}			
Station ID	**Max**	**Min**	**Mean**	**98th Percentile**	**Max**	**Min**	**Mean**	**98th Percentile**
AAQ1	24.3	18.7	21.0	24.3	43.8	36.0	39.3	43.8
AAQ2	17.5	14.1	15.7	17.3	37.5	31.9	34.6	37.3
AAQ3	16.2	12.0	14.4	15.6	37.4	31.8	34.5	37.2
AAQ4	20.5	17.1	18.7	20.3	38.9	34.2	36.7	38.5
AAQ5	20.8	12.9	16.9	20.5	37.5	28.9	33.6	37.2
AAQ6	15.6	11.8	13.7	15.6	31.4	28.6	29.9	31.2
AAQ7	16.2	12.8	14.3	16.0	34.6	29.9	32.4	34.2
AAQ8	20.5	17.9	19.1	20.5	38.5	35.8	37.4	38.4
AAQ9	24.1	18.5	20.8	24.1	43.6	35.8	39.1	43.6
	SO_2				NO_X			
AAQ1	10.9	7.7	9.2	10.9	22.1	15.0	18.2	22.1
AAQ2	9.1	6.0	7.5	9.1	18.6	7.4	15.6	18.4
AAQ3	9.2	6.1	7.6	8.5	19.0	7.8	16.0	18.8
AAQ4	10.9	7.8	9.3	10.9	19.9	14.0	17.1	19.7
AAQ5	10.5	5.3	8.1	10.4	19.8	12.0	16.2	19.7
AAQ6	8.0	4.9	6.5	8.0	15.1	11.5	13.4	14.9
AAQ7	8.9	5.8	7.4	8.9	17.1	10.2	14.2	16.5
AAQ8	8.8	7.3	8.1	8.8	16.7	14.4	15.7	16.7
AAQ9	10.7	7.5	9.0	10.7	21.9	14.8	18.0	21.9



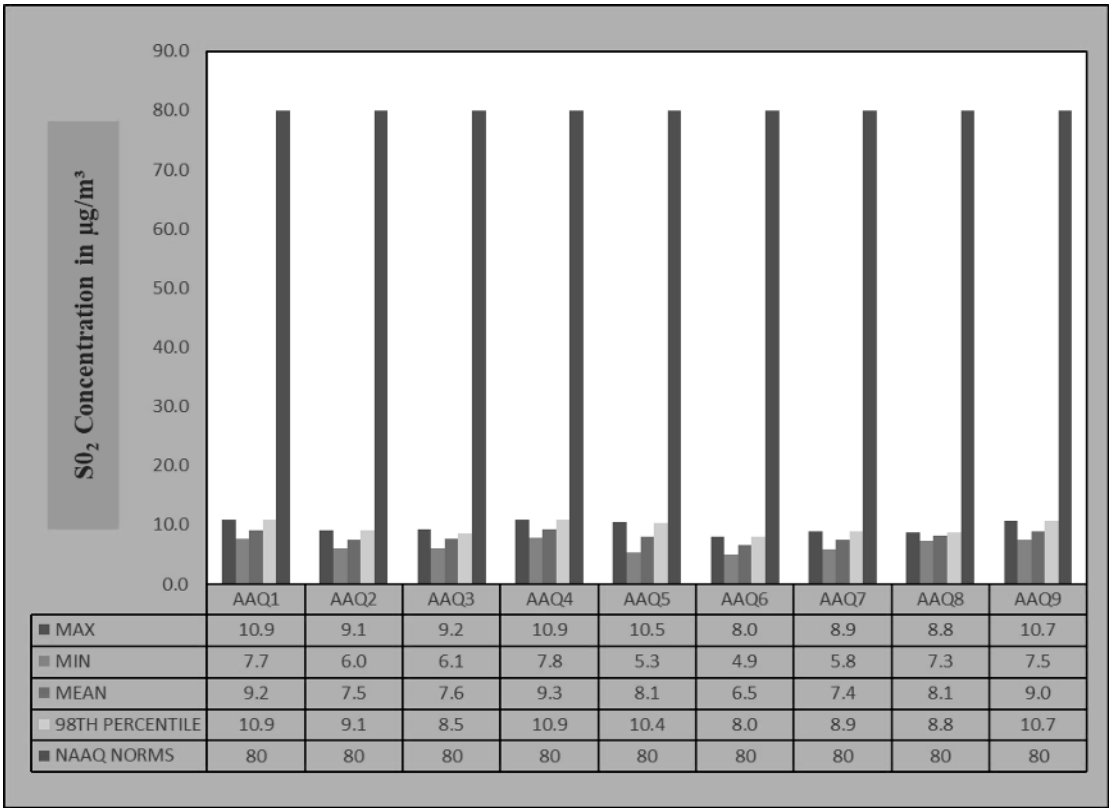
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
MAX	24.3	17.5	16.2	20.5	20.8	15.6	16.2	20.5	24.1
MIN	18.7	14.1	12.0	17.1	12.9	11.8	12.8	17.9	18.5
MEAN	21.0	15.7	14.4	18.7	16.9	13.7	14.3	19.1	20.8
98TH PERCENTILE	24.3	17.3	15.6	20.3	20.5	15.6	16.0	20.5	24.1
NAAQ NORMS	60	60	60	60	60	60	60	60	60

Figure 3.19 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of $PM_{2.5}$ Measured from the 9 Air Quality Monitoring Stations Within 5 km Radius



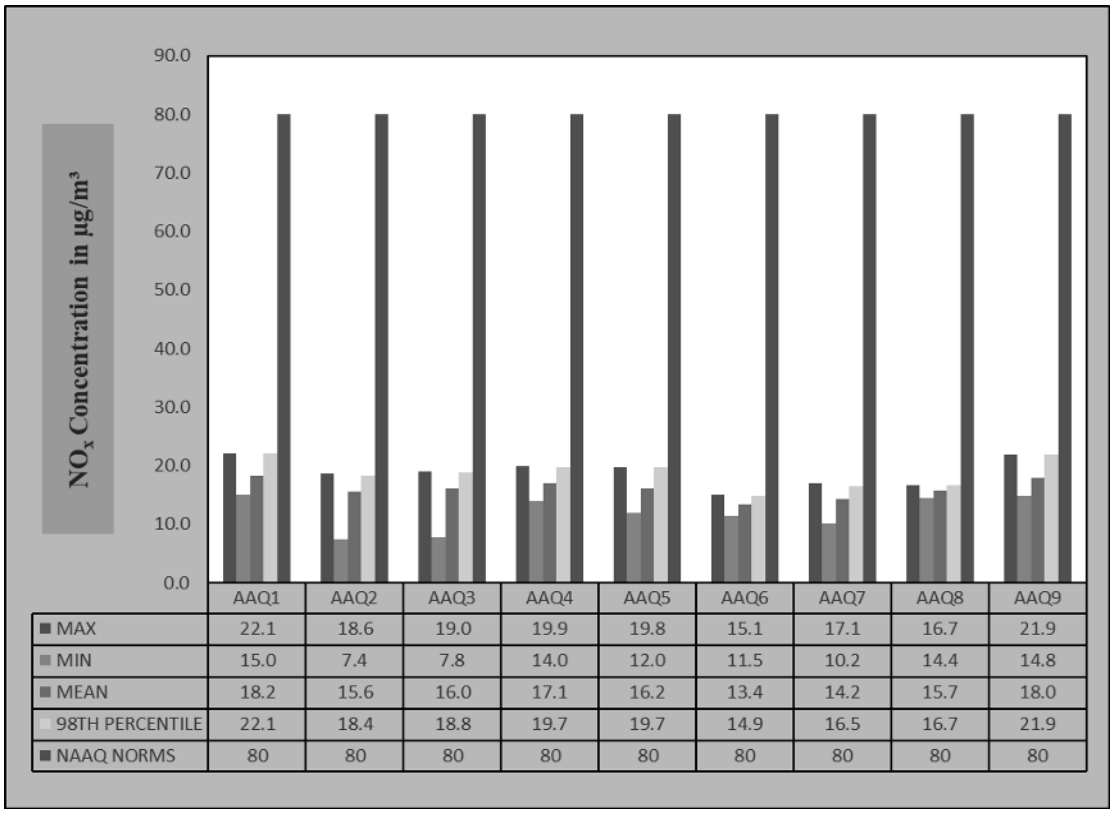
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
MAX	43.8	37.5	37.4	38.9	37.5	31.4	34.6	38.5	43.6
MIN	36.0	31.9	31.8	34.2	28.9	28.6	29.9	35.8	35.8
MEAN	39.3	34.6	34.5	36.7	33.6	29.9	32.4	37.4	39.1
98TH PERCENTILE	43.8	37.3	37.2	38.5	37.2	31.2	34.2	38.4	43.6
NAAQ NORMS	100	100	100	100	100	100	100	100	100

Figure 3.20 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of PM_{10} Measured from the 9 Air Quality Monitoring Stations Within 5km Radius



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
MAX	10.9	9.1	9.2	10.9	10.5	8.0	8.9	8.8	10.7
MIN	7.7	6.0	6.1	7.8	5.3	4.9	5.8	7.3	7.5
MEAN	9.2	7.5	7.6	9.3	8.1	6.5	7.4	8.1	9.0
98TH PERCENTILE	10.9	9.1	8.5	10.9	10.4	8.0	8.9	8.8	10.7
NAAQ NORMS	80	80	80	80	80	80	80	80	80

Figure 3.21 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of SO_2 Measured from the 9 Air Quality Monitoring Stations Within 5 km Radius



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
MAX	22.1	18.6	19.0	19.9	19.8	15.1	17.1	16.7	21.9
MIN	15.0	7.4	7.8	14.0	12.0	11.5	10.2	14.4	14.8
MEAN	18.2	15.6	16.0	17.1	16.2	13.4	14.2	15.7	18.0
98TH PERCENTILE	22.1	18.4	18.8	19.7	19.7	14.9	16.5	16.7	21.9
NAAQ NORMS	80	80	80	80	80	80	80	80	80

Figure 3.22 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of NO_x Measured from the 9 Air Quality Monitoring Stations Within 5km Radius

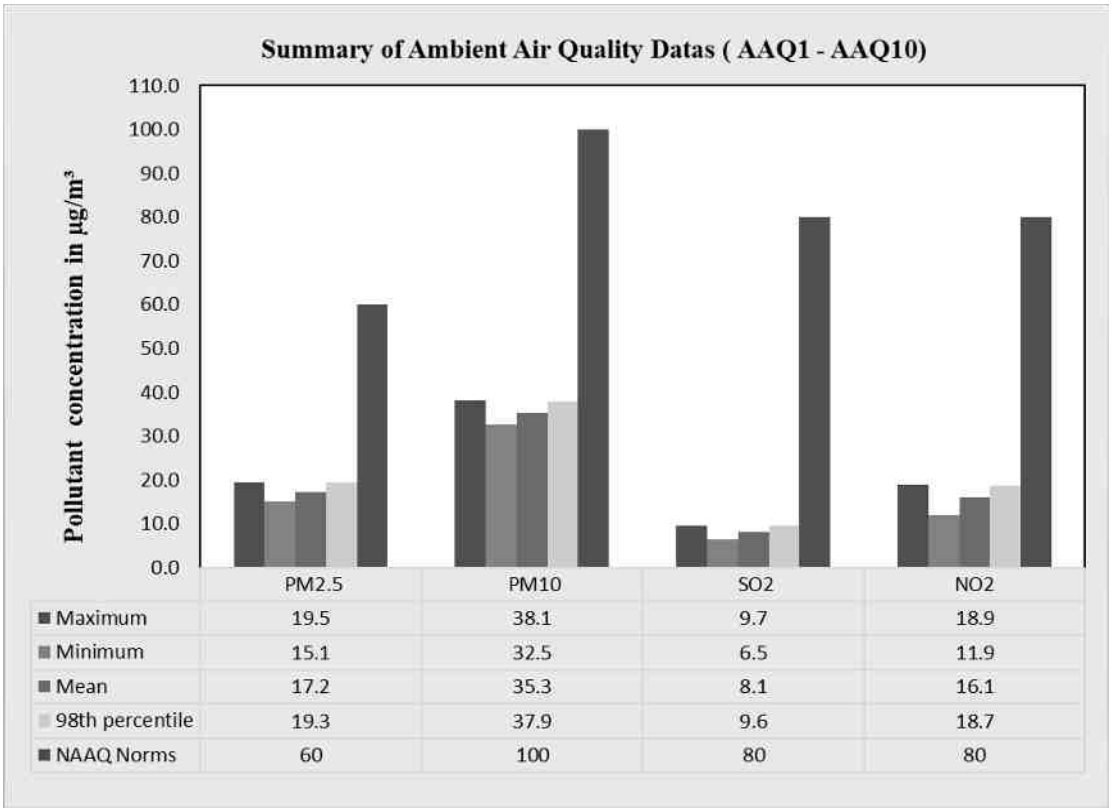


Figure 3.23 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of Pollutants in the Atmosphere Within 5 km Radius

3.4 NOISE ENVIRONMENT

The vehicular movement on road and mining activities is the major sources of noise in the study area. The main objective of noise monitoring in the study area is to establish the baseline noise level, which will in turn be used to assess the impact of the total noise expected to be generated during the project operations around the project site. In order to assess the ambient noise levels within the study area, noise monitoring was carried out at Nine (09) locations covering commercial, residential, rural areas within the radius of 5 km. Details of noise monitoring locations are provided in Table 3.19 and spatial occurrence of the locations are shown in Figure 3.26.

Table 3.19 Noise Monitoring Locations

S. No.	Location Code	Monitoring Locations	Distance in km	Direction	Coordinates
1	N1	Arjunan Lease	0.43	NE	12° 3'23.67"N, 79°40'16.57"E
2	N2	Thollamur	0.99	SE	12° 2'53.93"N, 79°40'31.53"E
3	N3	Kadagampattu	2.66	SSE	12° 1'48.11"N, 79°40'26.66"E
4	N4	Kodukkur	4.79	SW	12° 0'41.62"N, 79°39'15.59"E

5	N5	Eraiyur	1.02	NW	12° 3'27.46"N, 79°39'24.45"E
6	N6	Konamangalam	4.54	NW	12° 4'23.40"N, 79°37'42.37"E
7	N7	Ranganathapuram	4.33	SE	12° 2'41.68"N, 79°42'23.40"E
8	N8	Semangalam	4.64	NE	12° 4'7.86"N, 79°42'28.80"E
9	N9	Kunnam	3.99	NNE	12° 5'21.63"N, 79°40'44.50"E
10	N10	Core	--	--	12° 3'18.26"N, 79°39'58.06"E

*Source: On-site monitoring/sampling by **Ekdant Enviro Services (P) Ltd** in association with GTMS*

Table 3.20 Ambient Noise Quality Result

Station ID	**Location**	**Environmental setting**	**Average day noise level (dB(A))**	**Average night noise level (dB(A))**	**Day time (6.00 AM – 10.00 PM)**	**Night time (10.00 PM – 6.00 AM)**
					Standard (L_{eq} in dB(A))	
N1	Arjunan Lease	Industrial area	45.6	38.4	75	70
N2	Thollamur	Residential area	40.4	33.8	55	45
N3	Kadagampattu	Residential area	41.2	34.3	55	45
N4	Kodukkur	Residential area	41.6	35.4	55	45
N5	Eraiyur	Residential area	45.3	38.8	55	45
N6	Konamangalam	Residential area	37.8	28.4	55	45
N7	Ranganathapuram	Residential area	45.2	38.5	55	45
N8	Semangalam	Residential area	40.6	36.4	55	45
N9	Kunnam	Residential area	41.5	31.2	55	45
N10	Core	Industrial area	45.0	36.8	75	70

*Source: On-site monitoring/sampling by **Ekdant Enviro Services (P) Ltd** in association with GTMS*

The Table 3.20 shows that noise level in core zone was 45.0 dB (A) Leq during day time and 36.8dB (A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 37.8 to 45.6dB (A) Leq and during night time from 28.4 to 38.8dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB. The results are also depicted below in Figures 3.24 and 3.25.

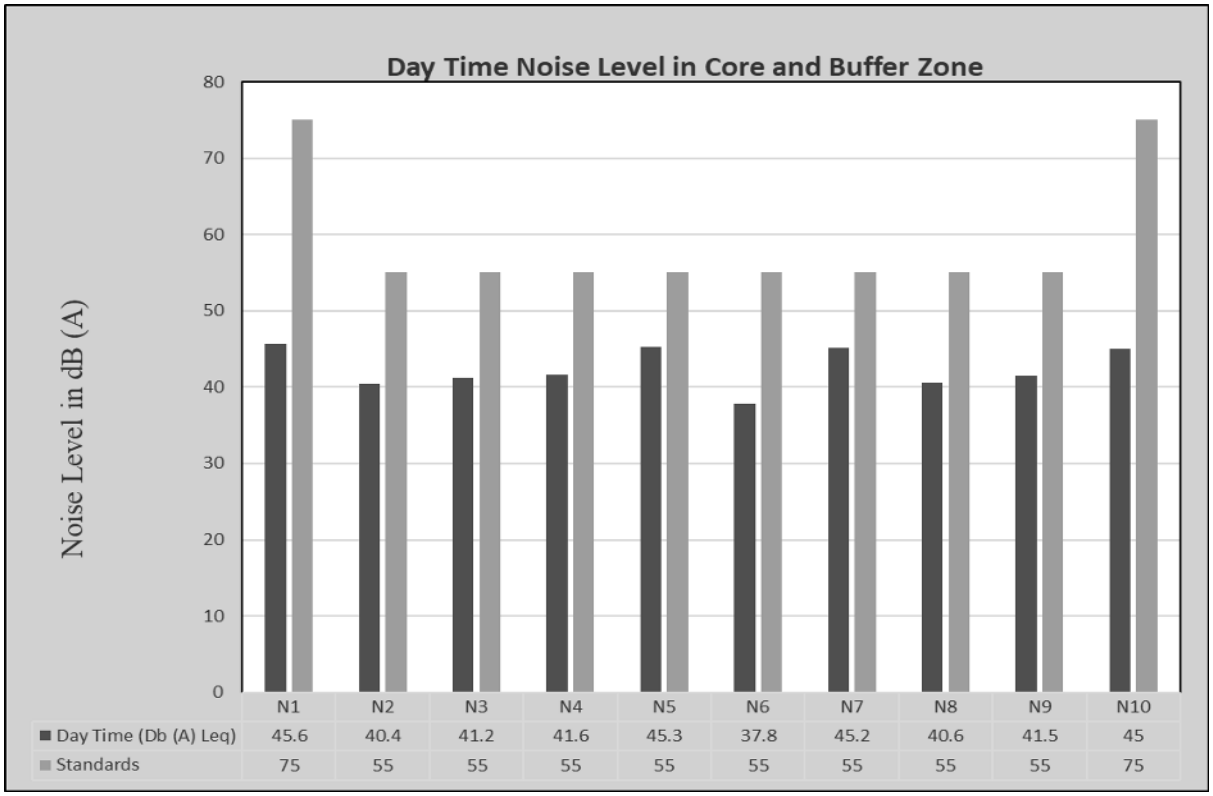


Figure 3.24 Bar Chart Showing Day Time Noise Levels Measured in Core and Buffer Zones

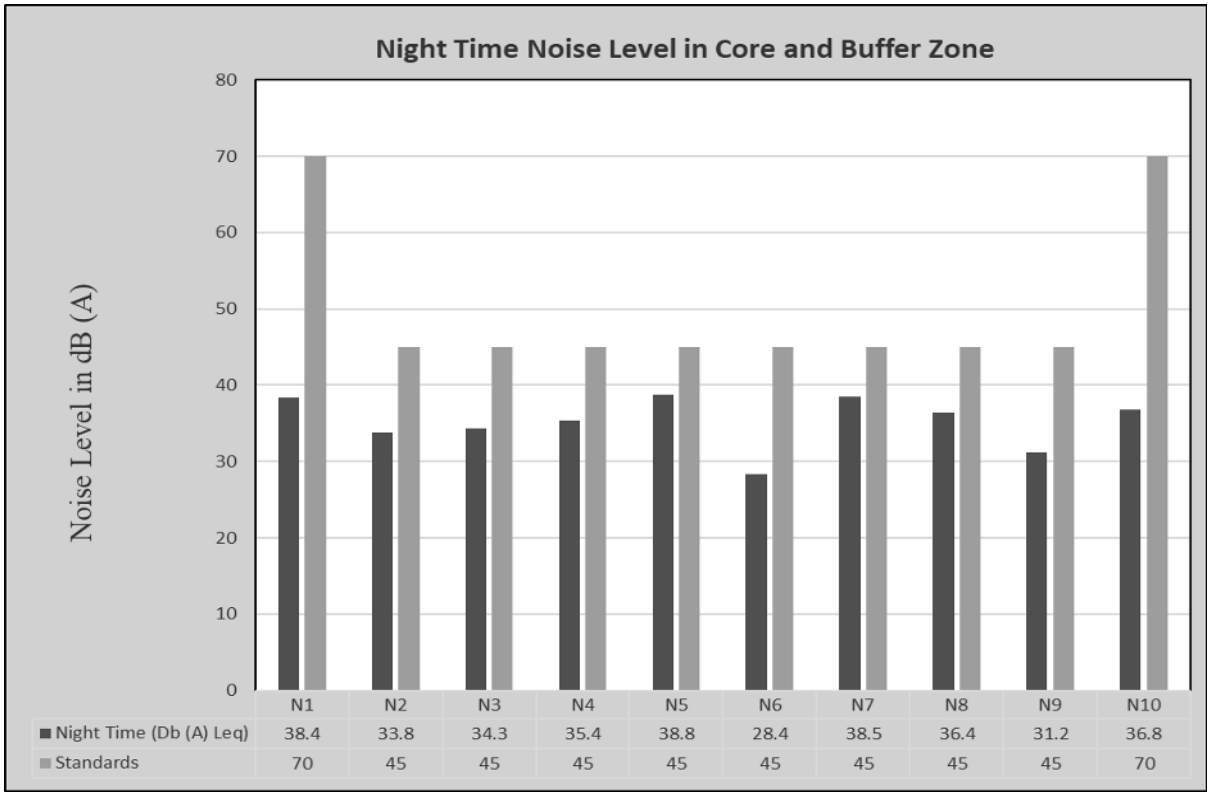


Figure 3.25 Bar Chart Showing Night Time Noise Levels Measured in Core and Buffer Zones

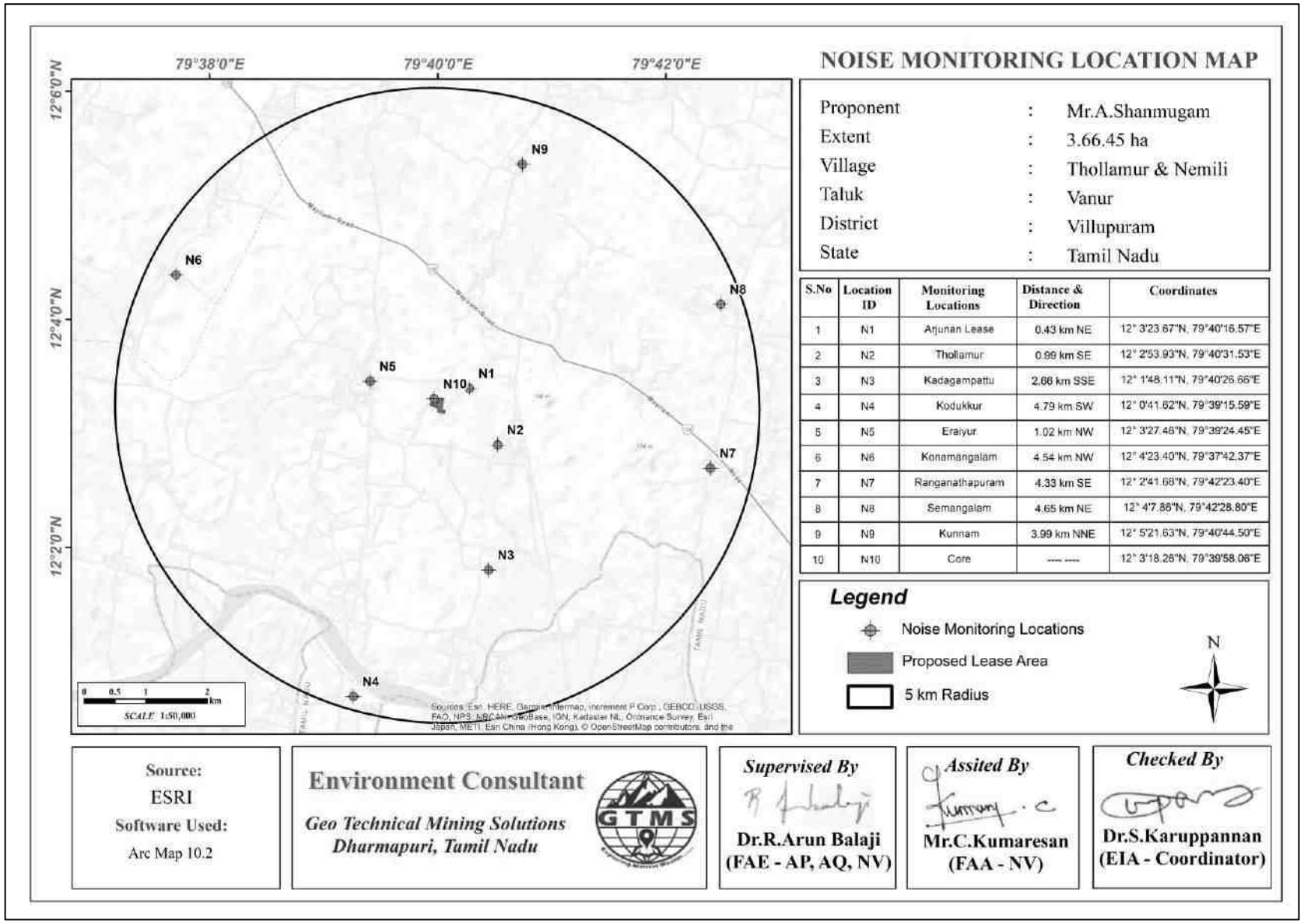


Figure 3.26 Map Showing Noise Level Monitoring Station Locations Around 5 km Radius from the Proposed Project Site

3.5 BIOLOGICAL ENVIRONMENT

An ecological survey was conducted to collect the baseline data regarding flora and fauna in the study area of 10 km radius. Data were 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.

Methodology

Sampling locations were selected with reference to topography, land use, vegetation pattern, etc. In this study**,** quadrats of 25 m × 25 m were laid down to assess trees and quadrats of 10 m × 10 m were laid down for shrubs.

Figure 3.27 Quadrates Sampling Methods of Flora

Phyto-Sociological Studies

Phyto sociological parameters, such as ***Density, Frequency, Abundance and Importance Value Index*** of individual species were determined in randomly placed quadrat of different sizes in the study area, as shown in Table 3.21. Relative frequency, and relative density were calculated and the sum of these three represented Importance Value Index (IVI) for various species. For shrubs, herbs and grasses, ***Density, Frequency, Relative Density & Relative Frequency were found***. Sample plots were selected in such a way to get maximum representation of different types of vegetation and plots were laid out in different part of the study area of 10 km radius. Analysis of the vegetation will help in determining the relative importance of each species in the study area and to reveal if any economically valuable species is threatened in the process.

Table 3.21 Calculation of Density, Frequency (%), Dominance, Relative Density, Relative Frequency, Relative Dominance & Important Value Index

Parameters	Formula
Density	Total No. of individuals of species/ Total No. of Quadrats used in sampling
Frequency (%)	(Total No. of Quadrats in which species occur/ Total No. of Quadrats studied)100
Abundance	Total No. of individuals of species/ No. of Quadrats in which they occur
Relative Density	(Total No. of individuals of species/Sum of all individuals of all species) * 100
Relative Frequency	(Total No. of Quadrats in which species occur/ Total No. of Quadrats occupied by all species) * 100
Important Value Index	Relative Density + Relative Frequency

Shannon – Wiener Index, Evenness and Richness

Biodiversity index is a quantitative measure that reflects how many different types of species, there are in a dataset, and simultaneously takes into account how evenly the basic entities (such as individuals) are distributed among those types of species. The value of biodiversity index increases both when the number of types increases and when evenness increases. For a given number of type of species, the value of a biodiversity index is maximized when all type of species is equally abundant. The corresponding formulas are given in Table 3.22.

Table 3.22 Calculation of Species Diversity by Shannon – Wiener Index, Evenness and Richness

Description	Formula
Species diversity – Shannon – Wien Index	**$H = E [(p_i)*\ln(p_i)]$** Where p_i: Proportion of total sample represented by species i: number of individuals of species i/ total number samples
Evenness	H/H max $H_{max} = \ln(s)$= maximum diversity possible S=No. of species
Species Richness by Margalef	RI = S-1/ln N Where S = Total Number of species in the community N = Total Number of individuals of all species in the Community

3.5.1 Flora

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

Flora in core zone

There are no plant species in the mining lease area. It is a kind of dry land.

Flora within 300 m radius Zone

A variety of plant species are found within a radius of 300 meters. It is an arid landscape. There is no agricultural land nearby. It contains a total of 36 species belonging to 19 families have been recorded from the buffer zone. 9 Trees (27%), 7 Shrubs (19%) and 19 Herbs and Climbers, Creeper, Grass & Cactus (52%) were identified. Details of flora with the scientific name details and of diversity species Rich ness index were mentioned in Table 3.23-25 and figure 3.28. There is no threat to the Flora species in 300-meter radius.

Flora in 10 km radius zone

Similar type of environment also in buffer area but with more flora diversity compare than core zone area. It contains a total species belonging to 39 families have been recorded from the buffer zone. The floral (79) varieties among them 35 Trees (44%), 15 Shrubs (18%) Herbs and Climbers, Creeper, Grass & Cactus, 29 (36%) were identified. Details of flora with the scientific name details of diversity species Rich ness index were mentioned in Table 3.26-3.28 and figure 3.29

Table 3.23 Flora in 300 m radius

S. No	Local Name	Scientific name	Family name	Total No. of species	Total of Quadrants with species	Total No. of Quadrants	Density	Frequency (%)	Abundance	Relative Density	Relative Frequency	IVI	IUCN Conservation Status
Trees													
1	Karuvealan	*Prosopis juliflora*	Fabaceae	5	4	5	1.0	80.0	1.3	14.7	16.0	30.7	Not Listed
2	Teak maram	*Tectona grandis*	Lamiaceae	3	2	5	0.6	40.0	1.5	8.8	8.0	16.8	Not Listed
3	Pongam oiltree	*Pongamia pinnata*	Fabaceae	4	3	5	0.8	60.0	1.3	11.8	12.0	23.8	Not Listed
4	Thennai maram	*Cocos nucifera*	Arecaceae	3	2	5	0.6	40.0	1.5	8.8	8.0	16.8	Not Listed
5	Puliyamaram	*Tamarindus indica*	Legumes	4	3	5	0.8	60.0	1.3	11.8	12.0	23.8	Not Listed
6	Palm tree	*Borassus flabellifer*	Fabaceae	3	2	5	0.6	40.0	1.5	8.8	8.0	16.8	Not Listed
7	Vembu	*Azadirachta indica*	Meliaceae	4	3	5	0.8	60.0	1.3	11.8	12.0	23.8	Not Listed
8	Unjai maram	*Albizia amara*	Fabaceae	3	2	5	0.6	40.0	1.5	8.8	8.0	16.8	Not Listed
9	Vetpalai	*Wrightia tinctoria*	Apocynaceae	5	4	5	1.0	80.0	1.3	14.7	16.0	30.7	Not Listed
Shrubs													
1	Erukku	*Calotropis gigantea*	Apocynaceae	8	7	10	0.8	70.0	1.1	15.7	15.9	31.6	Not Listed
2	Uumaththai	*Datura metel*	Solanaceae	6	5	10	0.6	50.0	1.2	11.8	11.4	23.1	Not Listed
3	Thuthi	*Abutilon indicum*	Meliaceae	7	6	10	0.7	60.0	1.2	13.7	13.6	27.4	Not Listed

4	Avarai	*Senna auriculata*	Fabaceae	9	8	10	0.9	80.0	1.1	17.6	18.2	35.8	Not Listed
5	Unichadi	*Lantana camara*	Verbenaceae	6	5	10	0.6	50.0	1.2	11.8	11.4	23.1	Not Listed
6	Suraimullu	*Zizyphus Oenoplia*	Rhamnaceae	7	6	10	0.7	60.0	1.2	13.7	13.6	27.4	Not Listed
7	Acacia	*Acacia holosecicea*	Fabaceae	8	7	10	0.8	70.0	1.1	15.7	15.9	31.6	Not Listed
Herbs													
1	Nayuruv	*Achyranthes aspera*	Amaranthaceae	6	5	15	0.4	33.3	1.2	4.3	4.2	8.5	Not Listed
2	Nearunji mull	*Tribulus zeyheri*	Zygophyllaceae	7	6	15	0.5	40.0	1.2	5.0	5.0	10.0	
3	Pill	*Cenchrus ciliaris*	Poaceae	8	7	15	0.5	46.7	1.1	5.8	5.8	11.6	Not Listed
4	Pulapoo	*Aerva lanata*	Amaranthaceae	7	6	15	0.5	40.0	1.2	5.0	5.0	10.0	Not Listed
5	kapok bush	*Aerva javani*	Amaranthaceae	6	5	15	0.4	33.3	1.2	4.3	4.2	8.5	Not Listed
6	Rail poondu	*Croton bonplandianus*	Euphorbiaceae	8	7	15	0.5	46.7	1.1	5.8	5.8	11.6	Not Listed
7	Perandai	*Cissus quadrangularis*	Vitaceae	9	8	15	0.6	53.3	1.1	6.5	6.7	13.1	Not Listed
8	Thumbai chadi	*Leucas aspera*	Lamiaceae	7	6	15	0.5	40.0	1.2	5.0	5.0	10.0	Not Listed
9	Umathai	*Datura metel*	Solanaceae	8	7	15	0.5	46.7	1.1	5.8	5.8	11.6	Not Listed
10	Sethamutti	*Sida cordata*	Malvaceae	6	5	15	0.4	33.3	1.2	4.3	4.2	8.5	Not Listed
11	Kolunji	*Tephrosia purpurea*	Fabaceae	9	8	15	0.6	53.3	1.1	6.5	6.7	13.1	Not Listed
12	Vealiparuthi	*Pergularia daemia*	Apocynaceae	7	6	15	0.5	40.0	1.2	5.0	5.0	10.0	Not Listed
13	Seppu nerinji	*Indigofera linnaei Ali*	Fabaceae	8	7	15	0.5	46.7	1.1	5.8	5.8	11.6	Not Listed
14	Sapathikalli	*Opuntia ficus-indica*	Cactaceae	7	6	15	0.5	40.0	1.2	5.0	5.0	10.0	Not Listed
15	Pal kodi	*Cynanchum viminale*	Apocynaceae	6	5	15	0.4	33.3	1.2	4.3	4.2	8.5	Not Listed
16	Ilia perandai	*Cissus rotundifolia*	Vitaceae	9	8	15	0.6	53.3	1.1	6.5	6.7	13.1	Not Listed
17	Katralai	*Aloe vera*	Asphodelaceae	8	7	15	0.5	46.7	1.1	5.8	5.8	11.6	Not Listed
18	Seammulli	*Barleria prionitis*	Acanthaceae	6	5	15	0.4	33.3	1.2	4.3	4.2	8.5	Not Listed
19	Kandakathri	*Solanum virginianum*	Solanaceae	7	6	15	0.5	40.0	1.2	5.0	5.0	10.0	Not Listed

Table 3.24 Calculation of Species Diversity in 300m radius

S. No	Common name	Scientific name	No. of Species	Pi	In (Pi)	Pi x in (Pi)
Trees						
1	Karuvealan	*Prosopis juliflora*	5	0.13	-2.05	-0.26
2	Palm tree	*Borassus flabellifer*	3	0.08	-2.56	-0.20
3	Vembu	*Azadirachta indica*	4	0.10	-2.28	-0.23
4	Unjai maram	*Albizia amara*	3	0.08	-2.56	-0.20
5	Vetpalai	*Wrightia tinctoria*	5	0.13	-2.05	-0.26
6	Teak maram	*Tectona grandis*	3	0.08	-2.56	-0.20
7	Pongam oiltree	*Pongamia pinnata*	4	0.10	-2.28	-0.23
8	Thennai maram	*Cocos nucifera*	3	0.08	-2.56	-0.20
9	Puliyamaram	*Tamarindus indica*	4	0.10	-2.28	-0.23
H (Shannon Diversity Index) =2.28						
Shrubs						
1	Erukku	*Calotropis gigantea*	8	0.16	-1.85	-0.29
2	Uumaththai	*Datura metel*	6	0.12	-2.14	-0.25
3	Thuthi	*Abutilon indicum*	7	0.14	-1.99	-0.27
4	Avarai	*Senna auriculata*	9	0.18	-1.73	-0.31
5	Unichadi	*Lantana camara*	6	0.12	-2.14	-0.25
6	Suraimullu	*Zizyphus Oenoplia*	7	0.14	-1.99	-0.27
7	Acacia	*Acacia holosecicea*	8	0.16	-1.85	-0.29
H (Shannon Diversity Index) =1.94						
Herbs						
1	Nayuruv	*Achyranthes aspera*	6	0.04	-3.14	-0.14
2	Nearunji mull	*Tribulus zeyheri*	7	0.05	-2.99	-0.15
3	Pill	*Cenchrus ciliaris*	8	0.06	-2.86	-0.16
4	Pulapoo	*Aerva lanata*	7	0.05	-2.99	-0.15
5	Kapok bush	*Aerva javani*	6	0.04	-3.14	-0.14
6	Rail poondu	*Croton bonplandianus*	8	0.06	-2.86	-0.16
7	Perandai	*Cissus quadrangularis*	9	0.06	-2.74	-0.18
8	Thumbai chadi	*Leucas aspera*	7	0.05	-2.99	-0.15
9	Umathai	*Datura metel*	8	0.06	-2.86	-0.16
10	Sethamutti	*Sida cordata*	6	0.04	-3.14	-0.14
11	Kolunji	*Tephrosia purpurea*	9	0.06	-2.74	-0.18

12	Vealiparuthi	*Pergularia daemia*	7	0.05	-2.99	-0.15
13	Seppu nerinji	*Indigofera linnaei Ali*	8	0.06	-2.86	-0.16
14	Sapathikalli	*Opuntia ficus-indica*	7	0.05	-2.99	-0.15
15	Pal kodi	*Cynanchum viminale*	6	0.04	-3.14	-0.14
16	Ilia perandai	*Cissus rotundifolia*	9	0.06	-2.74	-0.18
17	Katralai	*Aloe vera*	8	0.06	-2.86	-0.16
18	Seammulli	*Barleria prionitis*	6	0.04	-3.14	-0.14
19	Kandakathri	*Solanum virginianum*	7	0.05	-2.99	-0.15
H (Shannon Diversity Index) =2.93						

Table 3.25 Species Richness (Index) in 300-meter radius

Details	H	H max	Evenness	Species Richness
Tree	2.28	2.30	0.99	2.46
Shrubs	1.94	1.95	0.99	1.53
Herbs	2.93	2.94	1.00	3.65

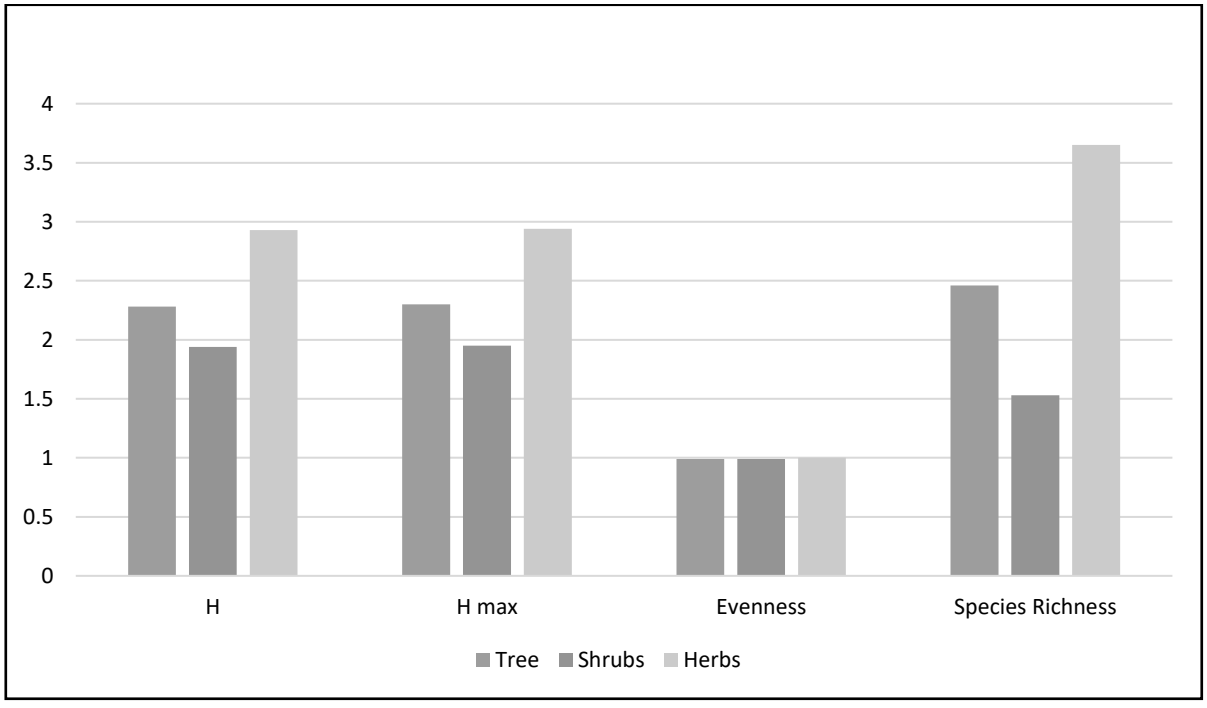


Figure 3.28 Floral diversity species Richness (Index) in 300m radius

Table 3.26 Flora in Buffer Zone

S. No	Local Name	Scientific name	Family name	Total No. of species	Total of Quadrants with species	Total No. of Quadrants	Density	Frequency (%)	Abundance	Relative Density	Relative Frequency	IVI	IUCN Conservation Status
Tree													
1	Vembu	*Azadirachta indica*	Meliaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
2	Thekku	*Tectona grandis*	Verbenaceae	4	3	10	0.4	30.0	1.3	2.3	2.1	4.4	Not Listed
3	Pongam oiltree	*Pongamia pinnata*	Fabaceae	6	5	10	0.6	50.0	1.2	3.4	3.5	6.9	Not Listed
4	Thennai maram	*Cocos nucifera*	Arecaceae	4	3	10	0.4	30.0	1.3	2.3	2.1	4.4	Not Listed
5	Manga	*Mangifera indica*	Anacardiaceae	7	6	10	0.7	60.0	1.2	4.0	4.2	8.2	Not Listed
6	Puliyamaram	*Tamarindus indica*	Legumes	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
7	Vadanarayani	*Delonix elata*	Fabaceae	3	2	10	0.3	20.0	1.5	1.7	1.4	3.1	Not Listed
8	Thenpazham	*Muntingia calabura*	Tiliaceae	6	5	10	0.6	50.0	1.2	3.4	3.5	6.9	Not Listed
9	Punnai	*Calophyllu inophyllum*	Calophyllaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
10	Ilanthai	*Ziziphus jujubha*	Rhamnaceae	7	6	10	0.7	60.0	1.2	4.0	4.2	8.2	Not Listed
11	Karuvelam	*Acacia nilotica*	Mimosaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
12	Nettilinkam	*Polylathia longifolia*	Annonaceae	4	3	10	0.4	30.0	1.3	2.3	2.1	4.4	Not Listed
13	Arai nelli	*Phyllanthus acidus*	Euphorbiaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
14	Panai maram	*Borassus flabellifer*	Arecaceae	6	5	10	0.6	50.0	1.2	3.4	3.5	6.9	Not Listed
15	Sapota	*Manilkara zapota*	Sapotaceae	7	6	10	0.7	60.0	1.2	4.0	4.2	8.2	Not Listed
16	Navalmaram	*Sygygium cumini*	Myrtaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
17	Alamaram	*Ficus benghalensis*	Moraceae	3	2	10	0.3	20.0	1.5	1.7	1.4	3.1	Not Listed
18	Vazhaimaram	*Musa Paradisiyaca*	Musaceae	4	3	10	0.4	30.0	1.3	2.3	2.1	4.4	Not Listed
19	Karuvelam maram	*Vachellia nilotica*	Fabaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
20	Nelli	*Emblica officinalis*	Phyllanthaceae	3	2	10	0.3	20.0	1.5	1.7	1.4	3.1	Not Listed
21	Eucalyptus	*Eucalyptus globules*	Myrtaceae	4	3	10	0.4	30.0	1.3	2.3	2.1	4.4	Not Listed
22	Maramalli	*Millingtonia hortensis*	Bignoniaceae	3	2	10	0.3	20.0	1.5	1.7	1.4	3.1	Not Listed

23	Koduka puli	*Pithecellobium dulce*	Mimosaceae	6	5	10	0.6	50.0	1.2	3.4	3.5	6.9	Not Listed
24	Karungali	*Acacia sundra*	Legumes	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
25	Nochi	*Vitex negundo*	Lamiaceae	6	5	10	0.6	50.0	1.2	3.4	3.5	6.9	Not Listed
26	Karimurungai	*Moringa olefera*	Moraginaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
27	Pappali maram	*Carica papaya L*	Caricaceae	7	6	10	0.7	60.0	1.2	4.0	4.2	8.2	Not Listed
28	Poovarasu	*Thespesia populnea*	Malvaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
29	Arasanmaram	*Ficus religiosa*	Moraceae	3	2	10	0.3	20.0	1.5	1.7	1.4	3.1	Not Listed
30	Vilvam	*Aegle marmelos*	Rutaceae	4	3	10	0.4	30.0	1.3	2.3	2.1	4.4	Not Listed
31	Nuna maram	*Morinda citrifolia*	Rubiaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
32	Nettilingam	*Polyalthia longifolia*	Annonaceae	6	5	10	0.6	50.0	1.2	3.4	3.5	6.9	Not Listed
33	Koyya	*Psidium guajava*	Myrtaceae	8	7	10	0.8	70.0	1.1	4.5	4.9	9.4	Not Listed
34	Seethapazham	*Annona reticulata*	Annonaceae	6	5	10	0.6	50.0	1.2	3.4	3.5	6.9	Not Listed
35	Savukku	*Casuarina L.*	Casuarinaceae	5	4	10	0.5	40.0	1.3	2.8	2.8	5.6	Not Listed
Shrubs													
1	Avarai	*Senna auriculata*	Fabaceae	8	7	15	0.5	46.7	1.1	7.0	7.1	14.1	Not Listed
2	Sundaika	*Solanum torvum*	Solanaceae	9	8	15	0.6	53.3	1.1	7.9	8.1	16.0	Not Listed
3	Puramuttai	*Chrozophora rottleri*	Euphorbiaceae	6	5	15	0.4	33.3	1.2	5.3	5.1	10.3	Not Listed
4	Arali	*Nerium indicum*	Apocynaceae	8	7	15	0.5	46.7	1.1	7.0	7.1	14.1	Not Listed
5	Seemaiagaththi	*Cassia alata*	Caesalpinaceae	7	6	15	0.5	40.0	1.2	6.1	6.1	12.2	Not Listed
6	Chemparuthi	*Hibiscu rosa-sinensis*	Malvaceae	9	8	15	0.6	53.3	1.1	7.9	8.1	16.0	Not Listed
7	Kattamanakku	*Jatropha curcas*	Euphorbiaceae	6	5	15	0.4	33.3	1.2	5.3	5.1	10.3	Not Listed
8	Chaturakalli	*Euphorbia antiquorum*	Euphorbiaceae	7	6	15	0.5	40.0	1.2	6.1	6.1	12.2	Not Listed
9	Idlipoo	*xoracoc cinea*	Rubiaceae	9	8	15	0.6	53.3	1.1	7.9	8.1	16.0	Not Listed
10	Thuthi	*Abutilon indicum*	Meliaceae	7	6	15	0.5	40.0	1.2	6.1	6.1	12.2	Not Listed
11	Nithyakalyani	*Cathranthus roseus*	Apocynaceae	8	7	15	0.5	46.7	1.1	7.0	7.1	14.1	Not Listed
12	Uumaththai	*Datura metel*	Solanaceae	9	8	15	0.6	53.3	1.1	7.9	8.1	16.0	Not Listed
13	Kundumani	*Abrus precatorius*	Fabaceae	6	5	15	0.4	33.3	1.2	5.3	5.1	10.3	Not Listed
14	Erukku	*Calotropis gigantea*	Apocynaceae	7	6	15	0.5	40.0	1.2	6.1	6.1	12.2	Not Listed
15	Neermulli	*Hydrophila auriculata*	Acanthaceae	8	7	15	0.5	46.7	1.1	7.0	7.1	14.1	Not Listed
Herbs, Climber, Creeper & Grasses													
1	Nayuruv	*Achyranthes aspera*	Amaranthaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
2	Veetukaayapoondu	*Tridax procumbens*	Asteraceae	8	7	25	0.3	28.0	1.1	3.7	3.7	7.3	Not Listed
3	Mukkirattai	*Boerhaavia diffusa*	Nyctaginaceae	7	6	25	0.3	24.0	1.2	3.2	3.2	6.4	Not Listed

4	Kuppaimeni	*Acalypha indica*	Euphorbiaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.3	Not Listed
5	Karisilanganni	*Eclipta prostata*	Asteraceae	8	7	25	0.3	28.0	1.1	3.7	3.7	7.3	Not Listed
6	Korai	*Cyperus rotundus*	Cyperaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
7	Thumbai	*Leucas aspera*	Lamiaceae	7	6	25	0.3	24.0	1.2	3.2	3.2	6.4	Not Listed
8	Nai kadugu	*Celome viscosa*	Capparidaceae	8	7	25	0.3	28.0	1.1	3.7	3.7	7.3	Not Listed
9	Parttiniyam	*Parthenium hysterophorus*	Asteraceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
10	Thulasi	*Ocimum tenuiflorum*	Lamiaceae	10	9	25	0.4	36.0	1.1	4.6	4.7	9.3	Not Listed
11	Arugampul	*Cynodon dactylon*	Poaceae	11	10	25	0.4	40.0	1.1	5.0	5.3	10.3	Not Listed
12	Thoiya keerai	*Digeria muricata*	Amarantheceae	7	6	25	0.3	24.0	1.2	3.2	3.2	6.4	Not Listed
13	Kovai	*Coccinia grandis*	Cucurbitaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
14	Perandai	*Cissus quadrangularis*	Vitaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.3	Not Listed
15	Mudakkotan	*Cardiospermum helicacabum*	Sapindaceae	8	7	25	0.3	28.0	1.1	3.7	3.7	7.3	Not Listed
16	Karkakartum	*Clitoria ternatea*	Fabaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
17	Kovakkai	*Trichosanthes dioica*	Cucurbitaceae	8	7	25	0.3	28.0	1.1	3.7	3.7	7.3	Not Listed
18	Sangupoo	*Clitoriaternatia*	Fabaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.3	Not Listed
19	Siru puladi	*Desmodium triflorum*	Fabaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
20	Sithrapaalavi	*Euphorbia prostrata*	Euphorbiaceae	7	6	25	0.3	24.0	1.2	3.2	3.2	6.4	Not Listed
21	Thumattikai	*Cucumis callosus*	Cucurbitaceae	8	7	25	0.3	28.0	1.1	3.7	3.7	7.3	Not Listed
22	Mookuthi poondu	*Wedelia trilobata*	Asteraceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.3	Not Listed
23	Kattu kanchippul	*Apluda mutica*	Poaceae	7	6	25	0.3	24.0	1.2	3.2	3.2	6.4	Not Listed
24	Musthakasu	*Kyllinga brevifolia*	Cyperaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
25	Nagathali	*Opuntia dillenii*	Cactaceae	7	6	25	0.3	24.0	1.2	3.2	3.2	6.4	Not Listed
26	Peaiveratti	*Anisomeles malabarica*	Lamiaceae	8	7	25	0.3	28.0	1.1	3.7	3.7	7.3	Not Listed
27	Mosukkattan	*Passiflora foetida*	Passifloraceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.4	Not Listed
28	Etelepoo	*Ixora coccinea*	Rubiaceae	7	6	25	0.3	24.0	1.2	3.2	3.2	6.4	Not Listed
29	Kannadi kalli	*Euphorbia tithymaloides*	Euphorbiaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.3	Not Listed

Table 3.27 Calculation of Species Diversity in buffer Zone

S. No	Common name	Scientific name	No. of Species	Pi	In (Pi)	Pi x in (Pi)
Trees						
1	Vembu	*Azadirachta indica*	5	0.03	-3.57	-0.10
2	Thekku	*Tectona grandis*	4	0.02	-3.79	-0.09
3	Pongam oiltree	*Pongamia pinnata*	6	0.03	-3.38	-0.11
4	Thennai maram	*Cocos nucifera*	4	0.02	-3.79	-0.09
5	Manga	*Mangifera indica*	7	0.04	-3.23	-0.13
6	Puliyamaram	*Tamarindus indica*	5	0.03	-3.57	-0.10
7	Vadanarayani	*Delonix elata*	3	0.02	-4.08	-0.07
8	Thenpazham	*Muntingia calabura*	6	0.03	-3.38	-0.11
9	Punnai	*Calophyllu inophyllum*	5	0.03	-3.57	-0.10
10	Ilanthai	*Ziziphus jujubha*	7	0.04	-3.23	-0.13
11	Karuvelam	*Acacia nilotica*	5	0.03	-3.57	-0.10
12	Nettilinkam	*Polylathia longifolia*	4	0.02	-3.79	-0.09
13	Arai nelli	*Phyllanthus acidus*	5	0.03	-3.57	-0.10
14	Panai maram	*Borassus flabellifer*	6	0.03	-3.38	-0.11
15	Sapota	*Manilkara zapota*	7	0.04	-3.23	-0.13
16	Navalmaram	*Sygygium cumini*	5	0.03	-3.57	-0.10
17	Alamaram	*Ficus benghalensis*	3	0.02	-4.08	-0.07
18	Vazhaimaram	*Musa*	4	0.02	-3.79	-0.09
19	Karuvelam maram	*Vachellia nilotica*	5	0.03	-3.57	-0.10
20	Nelli	*Emblica officinalis*	3	0.02	-4.08	-0.07
21	Eucalyptus	*Eucalyptus globules*	4	0.02	-3.79	-0.09
22	Maramalli	*Millingtonia hortensis*	3	0.02	-4.08	-0.07
23	Kuduka puli	*Pithecellobium dulce*	6	0.03	-3.38	-0.11
24	Karungali	*Acacia sundra*	5	0.03	-3.57	-0.10
25	Nochi	*Vitex negundo*	6	0.03	-3.38	-0.11
26	Karimurungai	*Moringa olefera*	5	0.03	-3.57	-0.10
27	Pappali maram	*Carica papaya L*	7	0.04	-3.23	-0.13
28	Poovarasu	*Thespesia populnea*	5	0.03	-3.57	-0.10
29	Arasanmaram	*Ficus religiosa*	3	0.02	-4.08	-0.07
30	Vilvam	*Aegle marmelos*	4	0.02	-3.79	-0.09
31	Nuna maram	*Morinda citrifolia*	5	0.03	-3.57	-0.10
32	Nettilingam	*Polyalthia longifolia*	6	0.03	-3.38	-0.11
33	Koyya	*Psidium guajava*	8	0.05	-3.10	-0.14
34	Seethapazham	*Annona reticulata*	6	0.03	-3.38	-0.11
35	Savukku	*Casuarina L.*	5	0.03	-3.57	-0.10
H (Shannon Diversity Index) =3.52						
Shrubs						
1	Avarai	*Senna auriculata*	8	0.07	-2.66	-0.19
2	Sundaika	*Solanum torvum*	9	0.08	-2.54	-0.20
3	Puramuttai	*Chrozophora rottleri*	6	0.05	-2.94	-0.15
4	Arali	*Nerium indicum*	8	0.07	-2.66	-0.19
5	Seemaiagaththi	*Cassia alata*	7	0.06	-2.79	-0.17
6	Chemparuthi	*Hibiscu rosa-sinensis*	9	0.08	-2.54	-0.20

7	Kattamanakku	*Jatropha curcas*	6	0.05	-2.94	-0.15
8	Chaturakalli	*Euphorbia antiquorum*	7	0.06	-2.79	-0.17
9	Idlipoo	*xoracoc cinea*	9	0.08	-2.54	-0.20
10	Thuthi	*Abutilon indicum*	7	0.06	-2.79	-0.17
11	Nithyakalyani	*Cathranthus roseus*	8	0.07	-2.66	-0.19
12	Uumaththai	*Datura metel*	9	0.08	-2.54	-0.20
13	Kundumani	*Abrus precatorius*	6	0.05	-2.94	-0.15
14	Erukku	*Calotropis gigantea*	7	0.06	-2.79	-0.17
15	Neermulli	*Hydrophila auriculata*	8	0.07	-2.66	-0.19
H (Shannon Diversity Index) =2.70						
Herbs, Climber, Creeper & Grasses						
1	Nayuruv	*Achyranthes aspera*	6	0.03	-3.60	-0.10
2	Veetukaayapoondu	*Tridax procumbens*	8	0.04	-3.31	-0.12
3	Mukkirattai	*Boerhaavia diffusa*	7	0.03	-3.44	-0.11
4	Kuppaimeni	*Acalypha indica*	9	0.04	-3.19	-0.13
5	Karisilanganni	*Eclipta prostata*	8	0.04	-3.31	-0.12
6	Korai	*Cyperus rotundus*	6	0.03	-3.60	-0.10
7	Thumbai	*Leucas aspera*	7	0.03	-3.44	-0.11
8	Nai kadugu	*Celome viscosa*	8	0.04	-3.31	-0.12
9	Parttiniyam	*Parthenium hysterophorus*	6	0.03	-3.60	-0.10
10	Thulasi	*Ocimum tenuiflorum*	10	0.05	-3.09	-0.14
11	Arugampul	*Cynodon dactylon*	11	0.05	-2.99	-0.15
12	Thoiya keerai	*Digeria muricata*	7	0.03	-3.44	-0.11
13	Kovai	*Coccinia grandis*	6	0.03	-3.60	-0.10
14	Perandai	*Cissus quadrangularis*	9	0.04	-3.19	-0.13
15	Mudakkotan	*Cardiospermum helicacabum*	8	0.04	-3.31	-0.12
16	Karkakartum	*Clitoria ternatea*	6	0.03	-3.60	-0.10
17	Kovakkai	*Trichosanthes dioica*	8	0.04	-3.31	-0.12
18	Sangupoo	*Clitoriaternatia*	9	0.04	-3.19	-0.13
19	Siru puladi	*Desmodium triflorum*	6	0.03	-3.60	-0.10
20	Sithrapaalavi	*Euphorbia prostrata*	7	0.03	-3.44	-0.11
21	Thumattikai	*Cucumis callosus*	8	0.04	-3.31	-0.12
22	Mookuthi poondu	*Wedelia trilobata*	9	0.04	-3.19	-0.13
23	Kattu kanchippul	*Apluda mutica*	7	0.03	-3.44	-0.11
24	Musthakasu	*Kyllinga brevifolia*	6	0.03	-3.60	-0.10
25	Nagathali	*Opuntia dillenii*	7	0.03	-3.44	-0.11
26	Peaiveratti	*Anisomeles malabarica*	8	0.04	-3.31	-0.12
27	Mosukkattan	*Passiflora foetida*	6	0.03	-3.60	-0.10
28	Etelepoo	*Ixora coccinea*	7	0.03	-3.44	-0.11
29	Kannadi kalli	*Euphorbia tithymaloides*	9	0.04	-3.19	-0.13
H (Shannon Diversity Index) =3.35						

Table 3.28 Species Richness (Index) in Buffer Zone

Details	H	H max	Evenness	Species Richness
Tree	3.52	3.56	0.99	6.57
Shrubs	2.70	2.71	1.00	2.96
Herbs	3.35	3.37	1.00	5.20

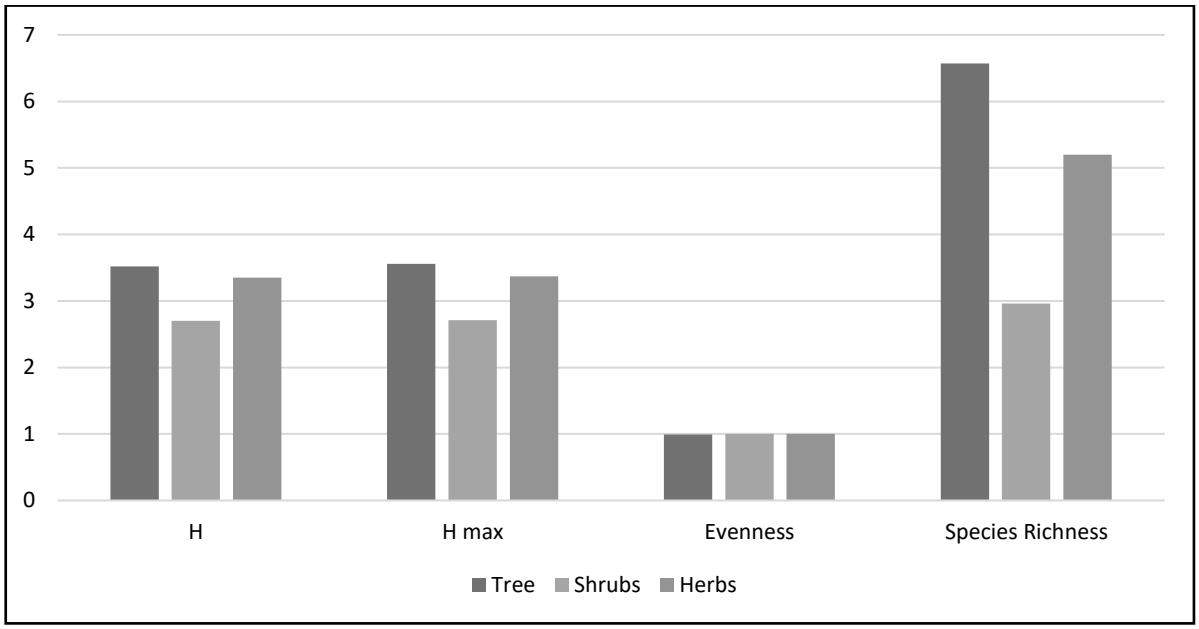


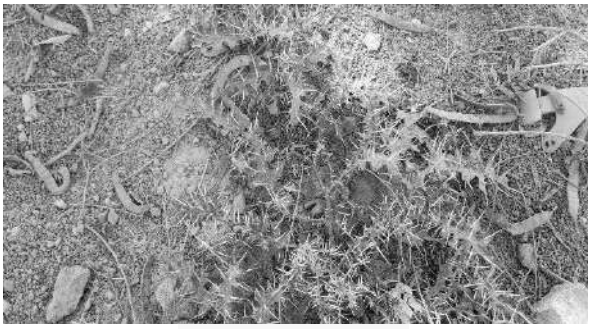
Figure 3.29 Floral Diversity Species Richness (Index) in 10km Radius

Calotropis gigantea

Jatropha gossypiifolia L

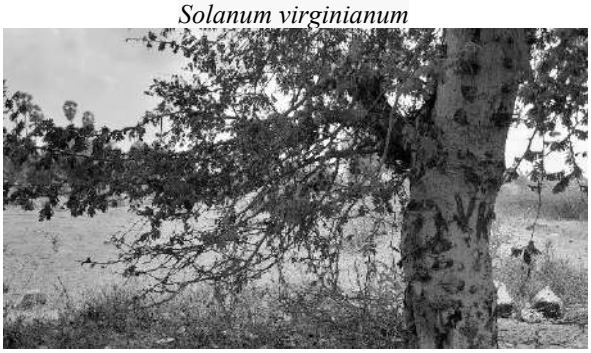
Lantana camara

Eucalyptus obliqua

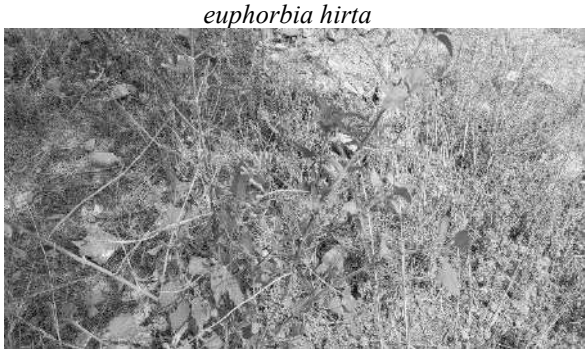


Solanum virginianum

euphorbia hirta



Acacia leucophloea

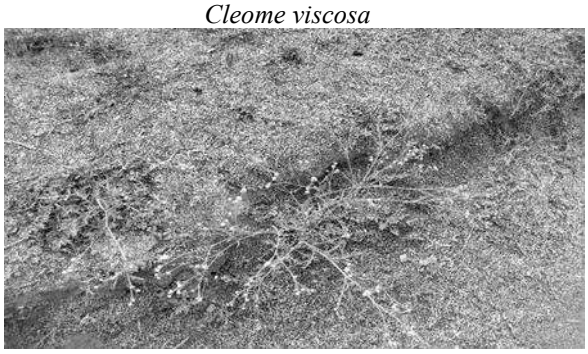


Chromolaena odorata

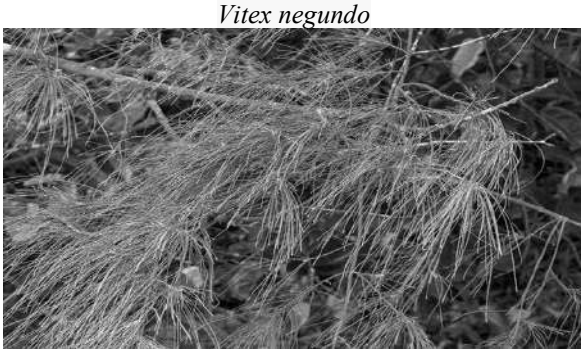
Anisomeles malabarica

Cleome viscosa

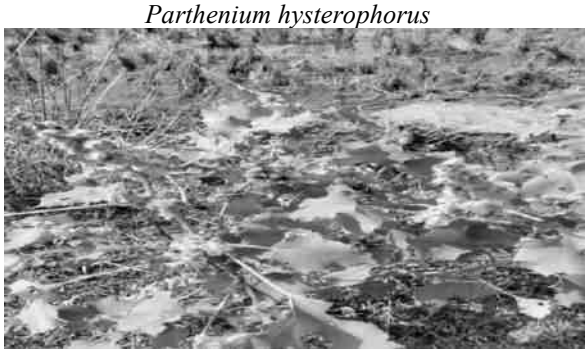
Vitex negundo



Parthenium hysterophorus



Casuarina equisetifolia



Xanthium strumarium L

Senna Auriculata

Leucasaspera

Figure 3.30 Flora in Core and buffer Area

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 3.29

Table 3.29 Aquatic Vegetation

S.No.	Scientific name	Common Name	Vernacular Name (Tamil)	IUCN Red List of Threatened Species
1	*Eichornia crassipes*	Water hyacinth	Agayatamarai	NA
2	*Aponogetonnatans*	Floating lace plant	Kottikizhnagu	NA
3	*Nymphaea nouchali*	Blue water lily	Nellambal	LC
4	*Carex cruciata*	Cross Grass	Koraipullu	NA
5	*Cynodon dactylon*	Scutch grass	Arugampul	LC
6	*Cyperus exaltatus*	Tall Flat Sedge	Koraikizhangu	LC

*LC- Least Concern, NA-Not yet assessed

Table 3.29a Aquatic Fauna

S. No.	Common Name	Scientific Name	IUCN Red List Data
1	Pale carplet	Amblyupharngodon mola	NA
2	Catla catla	Labeo Catla	LC
3	Mrigal carp	Cirrhina mrigala	NA
4	Mrigel	Cirrhina reba	NA

Food chain

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

Ex: Phytoplankton→Zooplankton→small fish→large fish

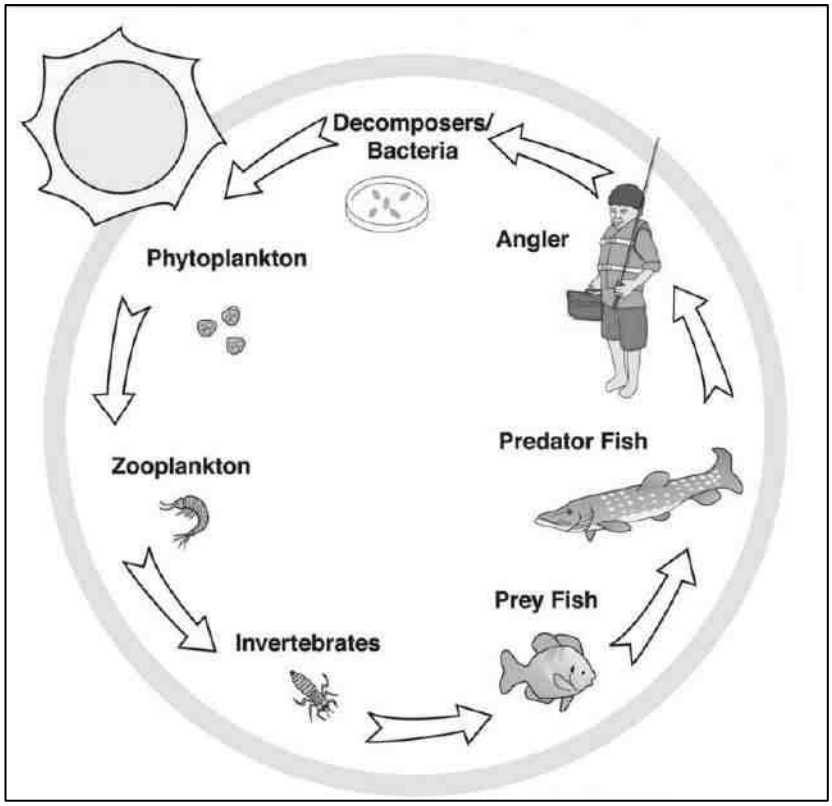


Figure 3.31 A food chain illustrates the movement of energy in an ecosystem

Forest Vegetation

There are no Reserve Forest or Biosphere Reserves or Wildlife Sanctuaries or National Parks or Important Bird Areas (IBAs), or migratory routes of fauna in 10km Radius.

Endangered and endemic species as per the IUCN Red List

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

3.5.2 Fauna

The faunal survey was carried out for Mammals, Birds, Reptiles, Amphibians and Butterflies. There are no rare, endangered, threatened (RET) and endemic species present in core area. Fauna survey Methodology Mention in Table 3.30

Table 3.30 Methodology applied during survey of fauna

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

Fauna in Core Zone

A total of 18 varieties of species belonging to 14 families were observed in the core zone. Among them are 6 Insects, 3 Reptiles, 1 Mammal and 8 Avian. Number of species decreases towards the mining area due the lack of vegetation. None of these species are threatened or endemic. There is no Schedule I species and 6 species are under schedule IV according to Indian wild life Act 1972. There are no critically endangered, endangered, vulnerable and endemic species there. Details of fauna in core zone and their scientific name were mentioned in Table. 3.31.

Table 3.31 Fauna in Core Zone

S. No	Common name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
INSECTS					
1	Common Tiger	Nymphalidae	*Danaus genutia*	NL	NL
2	Red-veined darter	Libellulidae	*Sympetrum fonscolombii*	NL	LC
3	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
4	Blue tiger	Nymphalidae	*Tirumala limniace*	Schedule IV	LC
5	Stick insect	Lonchodidae	*carausius morosus*	NL	LC
6	Mottled emigrant	Peridae	*Catopsilia pyranthe*	NL	LC
REPTILES					
7	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
8	Common house gecko	Gekkonidae	*Hemidactylus frenatus*	NL	LC
9	Fan-Throated Lizard	Agamidae	*Sitanaponticeriana*	NL	LC
MAMMALS					
10	Field Mouse	Muridae	*Mus booduga*	Schedule IV	NL
AVES					
11	Asian green bee-eater	Meropidae	*Meropsorientalis*	NL	LC
12	Koel	Cucalidae	*Eudynamys*	Schedule IV	LC

13	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
14	Cattle egret	Ardeidae	*Bubulcus ibis*	NL	LC
15	House crow	Corvidae	*Corvus splendens*	NL	LC
16	Crow Pheasant	Cucalidae	*Centropus sinensis*	Schedule IV	LC
17	Indian pond heron	Ardeidae	*Ardeola grayii*	Schedule IV	LC
18	Grey drongo	Dicruridae	*Dicrurus leucophaeus*	Schedule IV	LC

*NE- Not evaluated; LC- Least Concern, NT –Near Threatened, T-Threatened

Fauna in Buffer Zone

A total of 48 species belonging to 33 families were recorded in the buffer zone. Based on habitat classification the majority of species were 19 Birds (41%), followed by 15 Insects (31%), 7 Reptiles (15%), 4 Mammals (8%) and 3 Amphibians (6%). There are 4 schedule II species and 27 schedule IV species according to Indian wild life Act 1972. There are no critically endangered, vulnerable and endemic species observed. List of fauna in the buffer zone is provided in Table 3.32.

Table 3.32 Fauna in Buffer Zone

S.No.	Common Name/English Name	Family Name	Scientific Name	Schedule List Wildlife Protection Act 1972	IUCN Red List Data
INSECTS					
1	Blue tiger	Nymphalidae	*Tirumala limniace*	Schedule IV	LC
2	Milkweed butterfly	Nymphalidae	*Danainae*	NL	LC
3	Tawny coster	Nymphalidae	*Danaus chrysippus*	Schedule IV	LC
4	Indian honey bee	Apidae	*Apis cerana*	Schedule IV	LC
5	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
6	Red-veined darter	Libellulidae	*Sympetrum fonscolombii*	NL	LC
7	Lime butterfly	Papilionidae	*Papilio demoleus*	Schedule IV	LC
8	Ant	Formicidae	*Camponotus Vicinus*	NL	NL
9	Dragonfly	Gomphidae	*Ceratogomphus pictus*	Schedule IV	LC
10	Common Tiger	Nymphalidae	*Danaus genutia*	Schedule IV	LC

11	Common Indian crow	Nymphalidae	*Euploea core*	Schedule IV	LC
12	Praying mantis	Mantidae	*mantis religiosa*	NL	NL
13	Striped tiger	Nymphalidae	*Danaus plexippus*	Schedule IV	LC
14	Lesser grass blue	Lycaenidae	*Zizina Otis indica*	Schedule IV	LC
15	Jewel beetle	Buprestidae	*Eurythyrea austriaca*	Schedule IV	NA
REPTILES					
16	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
17	Common house gecko	Gekkonidae	*Hemidactylus frenatus*	NL	LC
18	Indian chameleon	Chamaeleonidae	*Chamaeleo zeylanicus*	Sch II (Part I)	LC
19	Olive keelback water snake	Natricidae	*Atretium schistosum*	Sch II (Part II)	LC
20	Brahminy skink	Scincidae	*Eutropis carinata*	NL	LC
21	Rat snake	Colubridae	*Ptyas mucosa*	Sch II (Part II)	LC
22	Common skink	Scincidae	*Mabuya carinatus*	NL	LC
MAMMALS					
23	Indian palm squirrel	Sciuridae	*Funambulus palmarum*	Schedule IV	LC
24	Indian hare	Leporidae	*Lepus nigricollis*	Schedule IV	LC
25	Indian Field Mouse	Muridae	*Mus booduga*	Schedule IV	LC
26	Asian Small Mongoose	Herpestidae	*Herpestes javanicus*	Schedule (Part II)	LC
AVES					
27	Indian pond heron	Ardeidae	*Ardeola grayii*	Schedule IV	LC
28	Black drongo	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
29	Asian green bee-eater	Meropidae	*Meropsorientalis*	NL	LC
30	Red-breasted parakeet	Psittaculidae	*Psittacula alexandri*	NL	LC
31	Common Coot	Rallidae	*Fulica atra*	Schedule IV	LC
32	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
33	Shikra	Accipitridae	*Accipiter badius*	NL	LC
34	Koel	Cucalidae	*Eudynamys*	Schedule IV	LC
35	Common Quail	Phasianidae	*Coturnix coturnix*	Schedule IV	LC

36	Red-vented Bulbul	Pycnonotidae	*Pycnonotuscafer*	Schedule IV	LC
37	Brahminy starling	Sturnidae	*Sturnia pagodarum*	Schedule IV	LC
38	Indian golden oriole	Oriolidae	*Oriolus kundoo*	Schedule IV	LC
39	Rose-ringed parkeet	Psittaculidae	*Psittacula krameria*	NL	LC
40	Cattle egret	Ardeidae	*Bubulcus ibis*	NL	LC
41	Common quail	Phasianidae	*Coturnix coturnix*	Schedule IV	LC
42	White-breasted waterhen	Rallidae	*Amaurornis phoenicurus*	NL	LC
43	Two-tailed Sparrow	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
44	Grey Francolin	Phasianidae	*Francolinus pondicerianus*	Schedule IV	LC
45	House crow	Corvidae	*Corvussplendens*	NL	LC
AMPHIBIANS					
46	Indian Burrowing frog	Dicroglossidae	*Sphaerotheca breviceps*	Schedule IV	LC
47	Green Pond Frog	Ranidae	*Rana hexadactyla*	Schedule IV	LC
48	Tiger Frog	Chordata	*Hoplobatrachus tigerinus (Rana tigerina)*	Schedule IV	LC

*NL-Not listed, LC-Least concern, NT-Near threatened.

Results

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

3.6 SOCIO-ECONOMIC ENVIRONMENT

Socio-economic study is an essential part of environmental study. It is a measure of an individual's or family's or group of people's economic and social position based on education, income, health, and occupation. Socio-economic most important determinant of livelihoods as levels of knowledge, skill and income conditions which mean for their living. People from one

income group to another consumption power is also differ among income groups of population This will help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project

It is expected that the socio-economic status of the area will substantially improve because of this proposed project. As the proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area, thus leading to the improvement of their standard of living.

3.6.1 Objectives of the Study

The main objectives of the study are as follows:

- To study the demographic conditions by level of income of sample population in the study area.
- To analyses the level of education among different income groups of population.
- To investigate the housing situation by level of income of the sample population in the study unit

3.6.2 Scope of Work

- To study the socio-economic environment of the area from the secondary sources
- Data Collection & Analysis
- Prediction of project impact
- Mitigation Measures

3.6.3 Socio-Economic Status of Study area

Tollamur is a medium size village located in Vanur Taluka of Viluppuram district, Tamil Nadu with total 332 families residing. The Tollamur village has population of 1419 of which 731 are males while 688 are females as per Population Census 2011. The Tollamur village papulation details mention in Table 3.33 and other details mention in table 3.34-3.36.

Table 3.33 Thollamur West Village Population Facts

Thollamur West	
Number of Households	332
Population	1419
Male Population	731
Female Population	688
Children Population	197

Sex-ratio	941
Literacy	67.59%
Male Literacy	78.36%
Female Literacy	56.03%
Scheduled Tribes (ST) %	31
Scheduled Caste (SC) %	916
Total Workers	637
Main Worker	595
Marginal Worker	42

Source: https://www.census2011.co.in/data/village/632790-tollamur-tamil-nadu.html html

3.6.4. Sex Ratio According to Census 2011

Tollamur village population of children with age 0-6 is 197 which makes up 13.88 % of total population of village. Average Sex Ratio of Tollamur village is 941 which is lower than Tamil Nadu state average of 996. Child Sex Ratio for the Tollamur as per census is 1010, higher than Tamil Nadu average of 943.

3.6.4.1. Literacy of Thollamur West village

Tollamur village has lower literacy rate compared to Tamil Nadu. In 2011, literacy rate of Tollamur village was 67.59 % compared to 80.09 % of Tamil Nadu. In Tollamur Male literacy stands at 78.36 % while female literacy rate was 56.03 %.

3.6.4.2 Worker's profile of Thollamur West village

Tollamur village out of total population, 637 were engaged in work activities. 93.41 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 6.59 % were involved in Marginal activity providing livelihood for less than 6 months. Of 637 workers engaged in Main Work, 36 were cultivators (owner or co-owner) while 367 were Agricultural labourer.

Table 3.34 Population and literacy data of study area

Village	No of Households	Total Population Person	Total Population Male	Total Population Female	Literates Population Person	Literates Population Male	Literates Population Female	Illiterate Persons	Illiterate Male	Illiterate Female
Ambuzhukkai	134	558	294	264	377	224	153	181	70	111
Eraiyur	740	3257	1656	1601	1864	1085	779	1393	571	822
Ilvampattu	179	743	384	359	476	281	195	267	103	164
Kadagampattu	144	601	315	286	462	269	193	139	46	93
Kanniyam	195	919	474	445	575	338	237	344	136	208
Karasanur	683	2862	1458	1404	1828	1084	744	1034	374	660
Kodukkur	588	2581	1272	1309	1662	920	742	919	352	567
Konamangalam	96	353	175	178	270	144	126	83	31	52
Kondalamkuppam	227	907	455	452	632	354	278	275	101	174
Korakkeni	218	906	489	417	594	362	232	312	127	185
Kunnam	401	1742	873	869	1122	630	492	620	243	377
Murukkambadi	583	2554	1276	1278	1472	844	628	1082	432	650
Nemili (Mel)	266	1238	627	611	835	471	364	403	156	247
T. Parangani	773	3393	1684	1709	2205	1203	1002	1188	481	707
Perumbakkam	501	2357	1199	1158	1540	878	662	817	321	496
Ponnampundi	132	565	289	276	375	214	161	190	75	115
Semangalam	863	3635	1859	1776	2331	1348	983	1304	511	793
Sengamedu	234	1063	521	542	719	391	328	344	130	214
Siruvai	454	1752	886	866	1079	608	471	673	278	395
Ambuzhukkai	517	2257	1153	1104	1543	879	664	714	274	440

Eraiyur	738	3220	1627	1593	1904	1052	852	1316	575	741
Ilvampattu	332	1419	731	688	826	496	330	593	235	358
Kadagampattu	596	2441	1208	1233	1710	935	775	731	273	458
Kanniyam	1405	5748	2861	2887	3288	1883	1405	2460	978	1482

Table 3.35 Educational Facilities & Water & Drainage & Health Facilities Data of Study Area

Village	Private Primary School	Govt Vocational Training School/ITI	Primary Health Centre	Tap Water Untreated	River/Canal	Is the Area Covered under Total Sanitation Campaign	Telephone	Public Bus Service	Gravel (kutcha) Roads	Commercial Bank	Agricultural Credit Societies	Self - Help Group	Nutritional Centres-Anganwadi Centre	Community Centre with/without TV	Power Supply for Domestic Use
Ambuzhukkai	2	2	0	2	2	2	2	2	1	2	2	1	2	2	1
Eraiyur	2	2	0	1	2	2	1	1	1	2	2	1	1	2	1
Ilvampattu	2	2	0	2	2	1	2	2	1	2	2	1	1	2	1
Kadagampattu	2	2	0	2	2	2	2	2	1	2	2	1	1	2	1
Kanniyam	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
Karasanur	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
Kodukkur	2	2	0	1	2	2	1	1	1	2	2	1	1	2	1
Kondalamkuppam	1	2	0	2	2	2	1	1	1	2	2	1	1	2	1
Konamangalam	2	2	0	1	2	2	1	1	1	2	2	1	2	2	1
Korakkeni	2	2	0	2	1	2	1	1	1	2	2	1	1	2	1
Kunnam	2	2	0	2	2	1	2	2	1	2	2	2	1	1	1
Murukkambadi	2	2	0	2	2	1	1	1	2	2	2	1	1	1	1

Nemili (V)	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
Parangani	2	2	0	1	2	2	1	1	1	2	2	1	1	2	1
Perumbakkam	1	2	0	2	2	2	1	1	1	1	2	1	1	2	1
Ponnampundi	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
Semangalam	2	2	0	1	2	2	1	2	1	2	2	1	1	2	1
Sengamedu	2	2	0	2	2	2	2	2	1	2	2	1	1	2	1
Siruvai	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
Taludali	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
Tiruvaikkarai	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
Tollamur	1	2	0	2	2	1	2	2	1	2	1	1	1	1	1
V. Pudupakkam	2	2	0	2	2	2	2	2	1	2	2	1	1	2	1
Vidur	2	2	0	1	2	2	1	1	1	1	1	1	1	1	1

Table 3.36 Workers Profile of Study Area

Village	Total Worker Population Person	Total Worker Population Male	Total Worker Population Female	Main Working Population Person	Main Working Population Male	Main Working Population Female	Main Cultivator Population Person	Main Agricultural Labourers Population Person	Main Other Workers Population Person	Non-Working Population Person
Ambuzhukkai	247	164	83	183	145	38	60	68	53	311
Eraiyur	1596	873	723	957	610	347	176	407	356	1661
Ilvampattu	396	223	173	281	215	66	74	53	154	347

Kadagampattu	443	238	205	53	30	23	36	7	10	158
Kanniyam	419	262	157	220	176	44	82	30	107	500
Karasanur	1575	901	674	753	530	223	163	99	474	1287
Kodukkur	1455	758	697	947	514	433	35	701	204	1126
Kondalamkuppam	184	112	72	177	110	67	30	106	40	169
Konamangalam	527	287	240	523	285	238	218	234	64	380
Korakkeni	482	299	183	447	281	166	195	144	108	424
Kunnam	845	483	362	554	392	162	29	65	458	897
Murukkambadi	1308	719	589	1208	676	532	212	801	186	1246
Nemili (V)	677	397	280	456	313	143	28	134	264	561
Parangani	1708	997	711	1057	755	302	124	452	466	1685
Perumbakkam	1004	668	336	997	666	331	56	542	366	1353
Ponnampundi	298	167	131	43	40	3	15	4	24	267
Semangalam	1936	1110	826	1354	818	536	63	982	286	1699
Sengamedu	511	298	213	291	184	107	33	171	84	552
Siruvai	912	522	390	188	111	77	2	131	52	840
Taludali	1158	718	440	634	569	65	286	63	262	1099
Tiruvaikkarai	1496	877	619	992	775	217	84	122	751	1724
Tollamur	637	397	240	595	380	215	36	367	188	782
V. Pudupakkam	1303	757	546	1210	715	495	276	612	302	1138
Vidur	2790	1763	1027	2557	1722	835	103	2122	302	2958

3.6.5 Recommendation and Suggestion

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

3.6.6 Summary & Conclusion

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

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

3.7 TRAFFIC DENSITY

The traffic survey conducted based on the transportation route of material, the rough stone is proposed to be transported mainly through village Road to Mailam to Pondicherry (SH-136) Road as shown in Table 3.37 and in Figure 3.32. Traffic density measurements were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., Heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station. During each shift one person on either direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken.

Table 3.37 Traffic Survey Locations

Station Code	Road Name	Distance and Direction	Type of Road
TS1	Village road	1.01 km-SE	Village road
TS2	Mailam to Pondicherry (SH-136)	1.5 km-NE	Mailam to Pondicherry (SH-136)

Source: On-site monitoring by GTMS FAE & TM

Table 3.38 Existing Traffic Volume

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	65	195	44	44	110	55	294
TS2	127	381	54	54	145	73	508

Source: On-site monitoring by GTMS FAE& TM

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

Table 3.39 Rough Stone Transportation Requirement

Transportation of Rough Stone & Gravel per day		
Capacity of trucks	No. of Trips per day	Volume in PCU
15 tonnes	72	216

Source: Approved Mining Plan

Table 3.40 Summary of Traffic Volume

Station Code	Existing traffic volume in PCU	Incremental traffic due to the project	Total traffic volume	Hourly Capacity in PCU as per IRC – 1960 guidelines
TS1	294	216	510	1200
TS2	508	216	724	1200

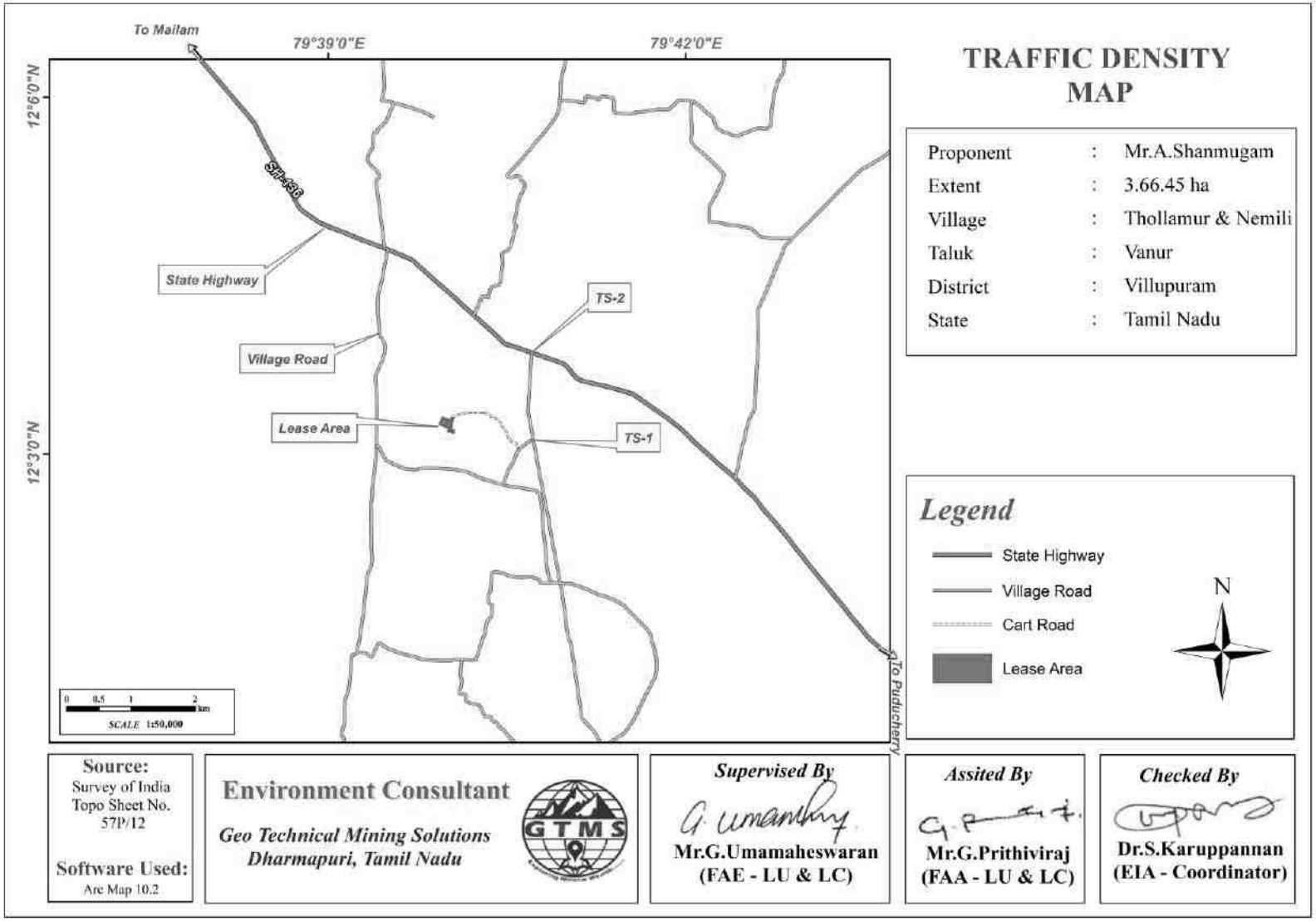


Figure 3.32 Traffic Density Map

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

3.8 SITE SPECIFIC FEATURES

There are no Wildlife Sanctuaries, National Park within the project area. There is no Protected area is found within 10 km radius from the proposed project area. Therefore, there will be no need of acquisition/diversion of forest land. The details related to the environment sensitivity around the proposed mine lease area i.e., 10 km radius and the nearby water bodies are given in the Table 3.41.

Table 3.41 Details of Environmentally Sensitive Ecological Features in the Study Area

SI. No	Sensitive Ecological Features	Name	Areal Distance in km from cluster
1	National Park / Wild life Sanctuaries	None	Nil within 10 km radius
		None	Nil within 10 km radius
2	Reserve Forest	Melkondai R.F	12.87 km W
		Sevur R.F	20.64 km NE
		Kumalampattu R.F	16.60 km NE
		Karai R.F	28.58 km W
3	Lakes/Reservoirs/ Dams/Streams/Rivers	Sangarabarani River	3.85 km SW
4	Tiger Reserve/Elephant Reserve/ Biosphere Reserve	None	Nil within 10 km radius
5	Critically Polluted Areas	None	Nil within 10 km radius
6	Mangroves	None	Nil within 10 km radius
7	Mountains/Hills	None	Nil within 10 km radius
8	Notified Archaeological Sites	National fossil wood park Thiruvakkarai	3.74km SSW
9	Industries/ Thermal Power Plants	None	Nil within 10 km radius
10	Defence Installation	None	Nil within 10 km radius

Source: Survey of India Toposheet







CADE

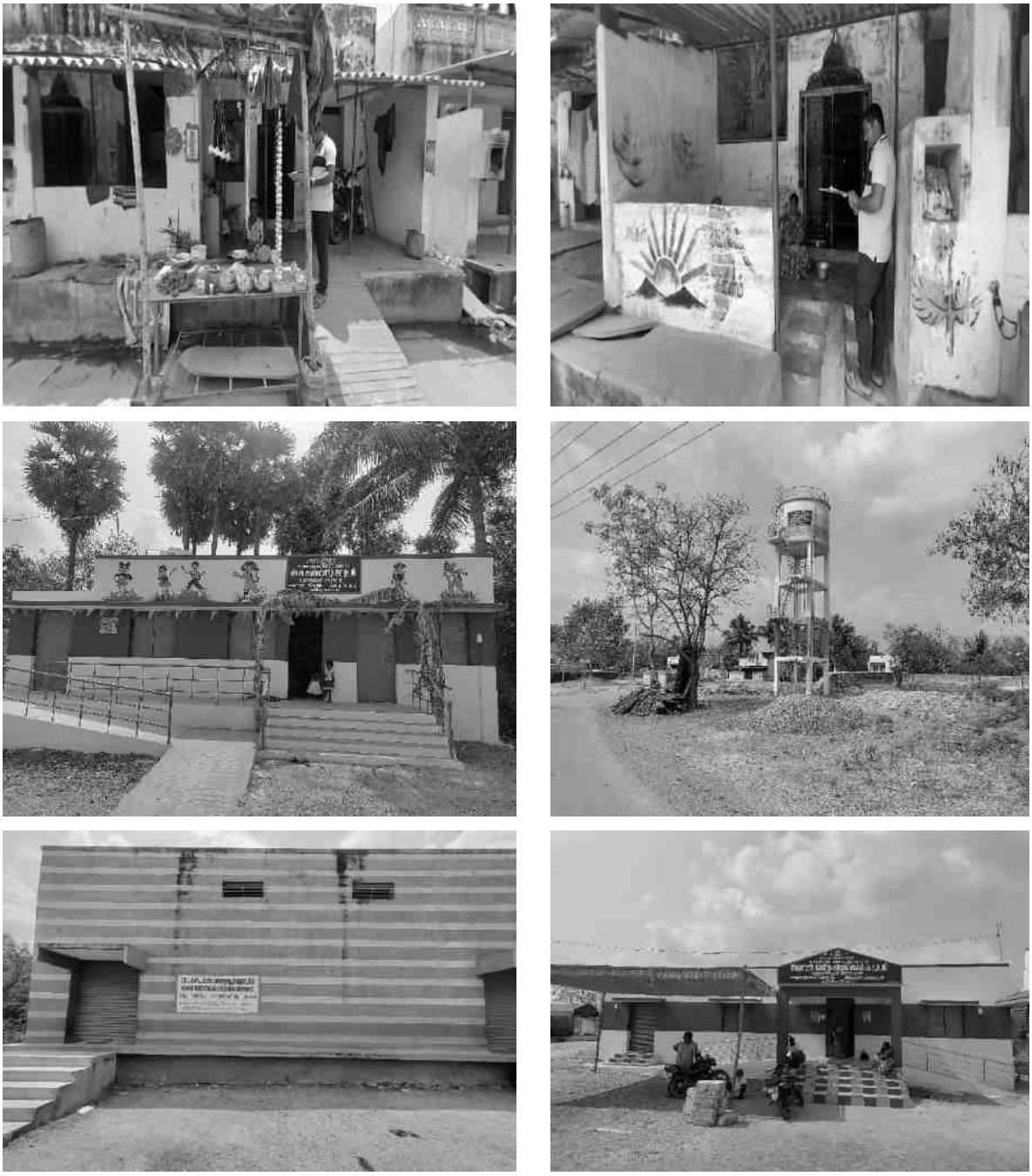


Figure 3.33 Field Study & Socio-Economic Study Photographs

CHAPTER IV

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

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

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

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

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

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

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

4.1 LAND ENVIRONMENT

Land use pattern study carried out through remote sensing satellite data around the 5 km buffer zone shows that of the total area of 7737.62 ha, cropland occurs predominantly in the study area, accounting for 113.19%. Mining area covers only 1.49 %, of which lease area contributes only about 0.047%.

4.1.1 Anticipated Impact

- ❖ Permanent or temporary change on land use and land cover.
- ❖ Change in topography of the mine lease area will change at the end of the life of the mine.
- ❖ Problems to agricultural land and human habitations due to dust, and noise caused by movement of heavy vehicles
- ❖ Degradation of the aesthetic environment of the core zone due to quarrying
- ❖ Soil erosion and sediment deposition in the nearby water bodies due to earthworks during the rainy season
- ❖ Siltation of water course due to wash off from the exposed working area

4.1.2 Common Mitigation Measures from Proposed Project

- ❖ The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigate 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 minimize 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.

4.2 SOIL ENVIRONMENT

No top soil will be removed in this project. However, some of the common mitigation measures is discussed in the following sections.

4.2.1 Anticipated Impact on Soil Environment

Following impacts are anticipated due to mining operations:

- Removal of protective vegetation cover
- Exposure of subsurface materials which are unsuitable for vegetation establishment

4.2.2 Common Mitigation Measures from proposed project

- Run-off diversion – Garland drains will be constructed 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.

4.3 WATER ENVIRONMENT

The total water requirement for this project will be 4.0 KLD. The water will be sourced initially from outside agencies. Later the rainwater collected in the mine pit sump will be used for this purpose. The domestic effluent to be generated from the project will be collected in septic tank with soak pits arrangements. There are no waste dumps in this quarry. Based on the available information and the geophysical investigations the study concluded that the project area is considered to have poor groundwater potential. Besides, the mining area consists of hard compact rock, no major water seepage within the mine is expected.

4.3.1 Anticipated Impact

The major sources of water pollution normally associated due to mining and allied operations are:

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

- As the proposed project acquires 4.0 KLD of water from water vendors, it will not extract water by developing abstraction structures in the lease area. Therefore, the project will not deplete aquifer beneath the lease area.

4.3.2 Common Mitigation Measures for the Proposed Project

- Garland drainage system and settling tank will be constructed along the proposed mining lease area. The garland drainage will be connected to settling tank and sediments will be trapped in the settling tanks and only clear water will be discharged to the natural drainage
- Rainwater from the mining pits will be collected in sump and will be allowed to store and pumped out to surface settling tank of 15 m x 10 m x 3 m 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
- Benches will be provided with inner slopes and through a system of drains and channels, rain water will be allowed to descent into surrounding drains to minimize the effects of erosion and water logging arising out of uncontrolled descent of water
- The water collected will be reused during storm for dust suppression and greenbelt development within the mines
- Interceptor traps/oil separators will be installed to remove oils and greases. Water from the tipper wash-down facility and machinery maintenance yard will be passed through interceptor traps/oil separators prior to its reuse
- Flocculating or coagulating agents will be used to assist in the settling of suspended solids during monsoon seasons
- Periodic (every 6 month once) analysis of ground water quality of quarry pit water and ground water of nearby villages will be conducted.
- Domestic sewage from site office and 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 (once every 6 months) and analysing the quality of water in open well, bore wells and surface water

4.4 AIR ENVIRONMENT

The air borne particulate matter is the main air pollutant by opencast mining. The mining operation will be carried out by jack hammer drilling, excavation, loading and transportation.

4.4.1 Anticipated Impact from proposed project

- During mining at various stages of activities such as excavation, drilling 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

4.4.2 Emission Estimation

Emission resulting from different mining activities is estimated using relevant empirical formulae developed by Chaulya et al.,2001. The equations used for SPM, SO_2, and NO_X emission estimation have been given in Table 4.1.

Table 4.1 Empirical Formula for Emission Rate from Overall Mine

	Pollutant	Source Type	Empirical Equation	Parameters
Overall Mine	SPM	Area	E= [u0.4a0.2{9.7+ 0.01p+b/(4+0.3b)}]	u = Wind speed(m/s); p = Mineral production (Mt/yr); b = Overburden handling (Mm^3/yr); a = Lease area(km^2); E = Emission rate(g/s).
Overall Mine	SO_2	Area	E=a0.14{u/(1.83+0. 93u)} [{p/(0.48+0.57p)} +{b/(14.37+1.15b)}]	u = Wind speed(m/s); p = Mineral production (Mt/yr); b = Overburden handling (Mm^3/yr); a = Lease area(km^2); E = Emission rate(g/s).
Overall Mine	NO_X	Area	E=a0.25{u/(4.3+32. 5u)} [1.5p+{b/(0.06+0.08 b)}]	u = Wind speed(m/s); p = Mineral production (Mt/yr); b= Overburden handling (Mm^3/yr); a = Lease area(km^2); E = Emission rate(g/s).

The emission rate thus calculated using the empirical formula is used as one of the inputs in the AERMOD modelling. As the SPM emission calculation for overall mine is not considering pollution control measures, one-third of the SPM value is taken for derivation of PM_{10} keeping

in mind that proper control measures are followed. It is important to note that PM_{10} emission rate is derived from the SPM estimation in the background that PM_{10} constitutes 52% of SPM emission. The $PM_{2.5}$, PM_{10}, SO_2 and NO_X emission results have been given in Table 4.2.

Table 4.2 Estimated Emission Rate

Activity	Pollutant	Calculated Value (g/s)	Lease Area in m^2	Calculated Value ($g/s/m^2$)
Overall Mine	$PM_{2.5}$	0.024832595270	36645	6.77653E-07
Overall Mine	PM_{10}	0.039683912976	36645	1.08293E-06
Overall Mine	SO_2	0.017880806447	36645	4.87947E-07
Overall Mine	NO_X	0.023129363113	36645	6.31174E-07

4.4.2.1 Frame work of Computation and Model Details

By using the above-mentioned inputs, Ground Level Concentrations (GLC) 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 includes the impacts of excavation, drilling, loading and movement of vehicles during transportation and meteorological parameters such as wind speed, wind direction, temperature, rainfall, humidity and cloud cover.

The model was used to predict the impact on the ambient air environment at each receptor at various localities within 10km radius around the project site and the maximum incremental GLC at the project site. All the prediction models in Figures 4.1- 4.4 shows the maximum concentrations of $PM_{2.5}$, PM_{10}, SO_2 and NO_X close to the proposed project site due to low to moderate wind speeds.

4.4.2.2 Modelling of Incremental Concentration

The air borne particulate matter such as PM_{10} and $PM_{2.5}$ generated by quarrying operation, transportation, and wind erosion of the exposed areas and emissions of sulphur dioxide (SO_2) and oxides of nitrogen (NOx) due to excavation and loading equipment's and vehicles plying on haul roads are the significant air pollutants arising from mining operation, leading to an adverse impact on the ambient air environment in and around the project area. Anticipated incremental concentration and net increase in emissions due to quarrying activities within 500 m around the project area is predicted by open pit source modelling using AERMOD Software and the

incremental values of the air pollutants were added to the base line data monitored at the proposed site to predict total GLC of the pollutants, as shown in Tables 4.3-4.6.

4.4.2.3 Model Results

The post project resultant concentrations of PM_{10}, $PM_{2.5}$, SO_2 & NO_X (GLC) is given in Tables 4.3-4.6.

Table 4.3 Incremental & Resultant GLC of $PM_{2.5}$

Station ID	Distance to core area(km)	Direction	PM 2.5 concentrations(µg/m³)			Comparison against air quality standard (60 µg/m³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	0.47	NE	21.0	5	26	Below standard	23.81	Not significant
AAQ2	2.78	S	15.7	1	16.7		6.37	
AAQ3	5.16	SSW	14.4	0	14.4		0.00	
AAQ4	1.47	W	18.7	1	19.7		5.35	
AAQ5	4.83	NW	16.9	0.1	17		0.59	
AAQ6	3.98	SE	13.7	0.5	14.2		3.65	
AAQ7	4.17	NE	14.3	0.5	14.8		3.50	
AAQ8	3.74	NNE	19.1	0.5	19.6		2.62	
AAQ9	--	--	20.8	8.57	29.37		41.20	

Table 4.4 Incremental & Resultant GLC of PM_{10}

Station ID	Distance to core area(km)	Direction	PM 10 Concentrations(µg/m³)			Comparison against air quality standard (100 µg/m³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	0.47	NE	39.3	5	44.3	Below standard	12.72	Not significant
AAQ2	2.78	S	34.6	0.1	34.7		0.29	
AAQ3	5.16	SSW	34.5	0	34.5		0.00	
AAQ4	1.47	W	36.7	1	37.7		2.72	
AAQ5	4.83	NW	33.6	0.5	34.1		1.49	
AAQ6	3.98	SE	29.9	1	30.9		3.34	
AAQ7	4.17	NE	32.4	0.5	32.9		1.54	
AAQ8	3.74	NNE	37.4	0.5	37.9		1.34	
AAQ9	--	--	39.1	13.7	52.8		35.04	

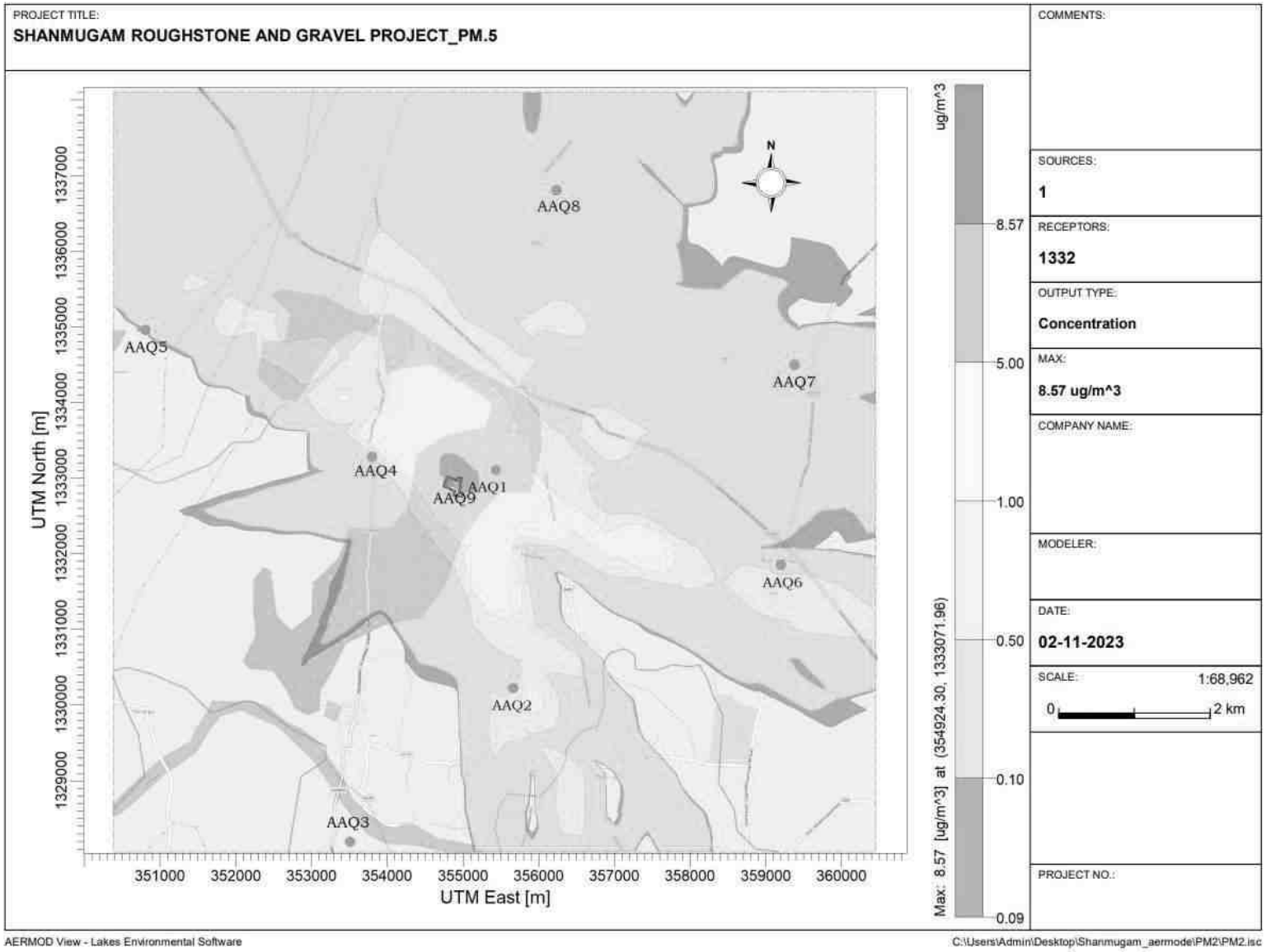


Figure 4.1 Predicted Incremental Concentration of $PM_{2.5}$

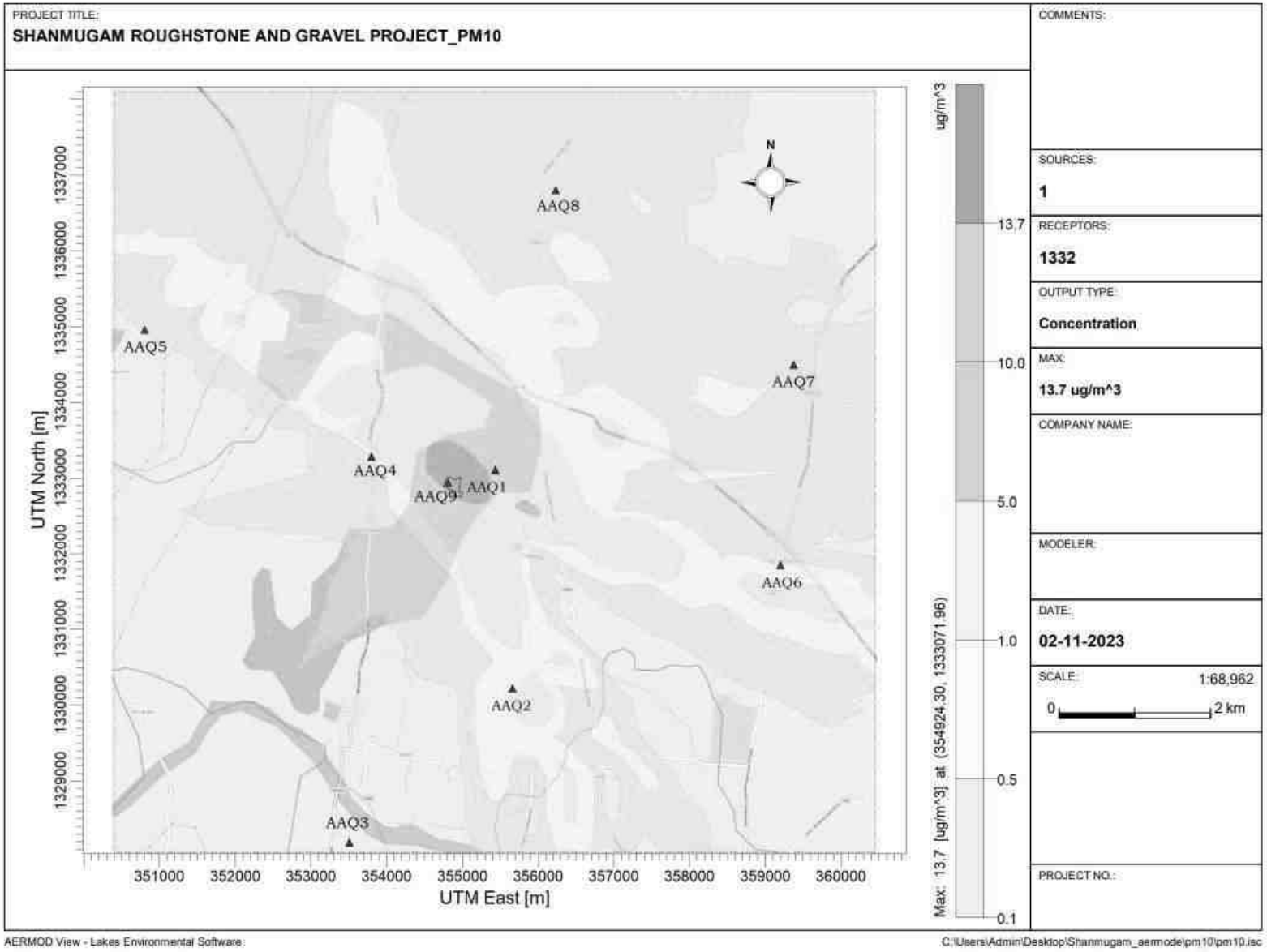


Figure 4.2 Predicted Incremental Concentration of PM_{10}

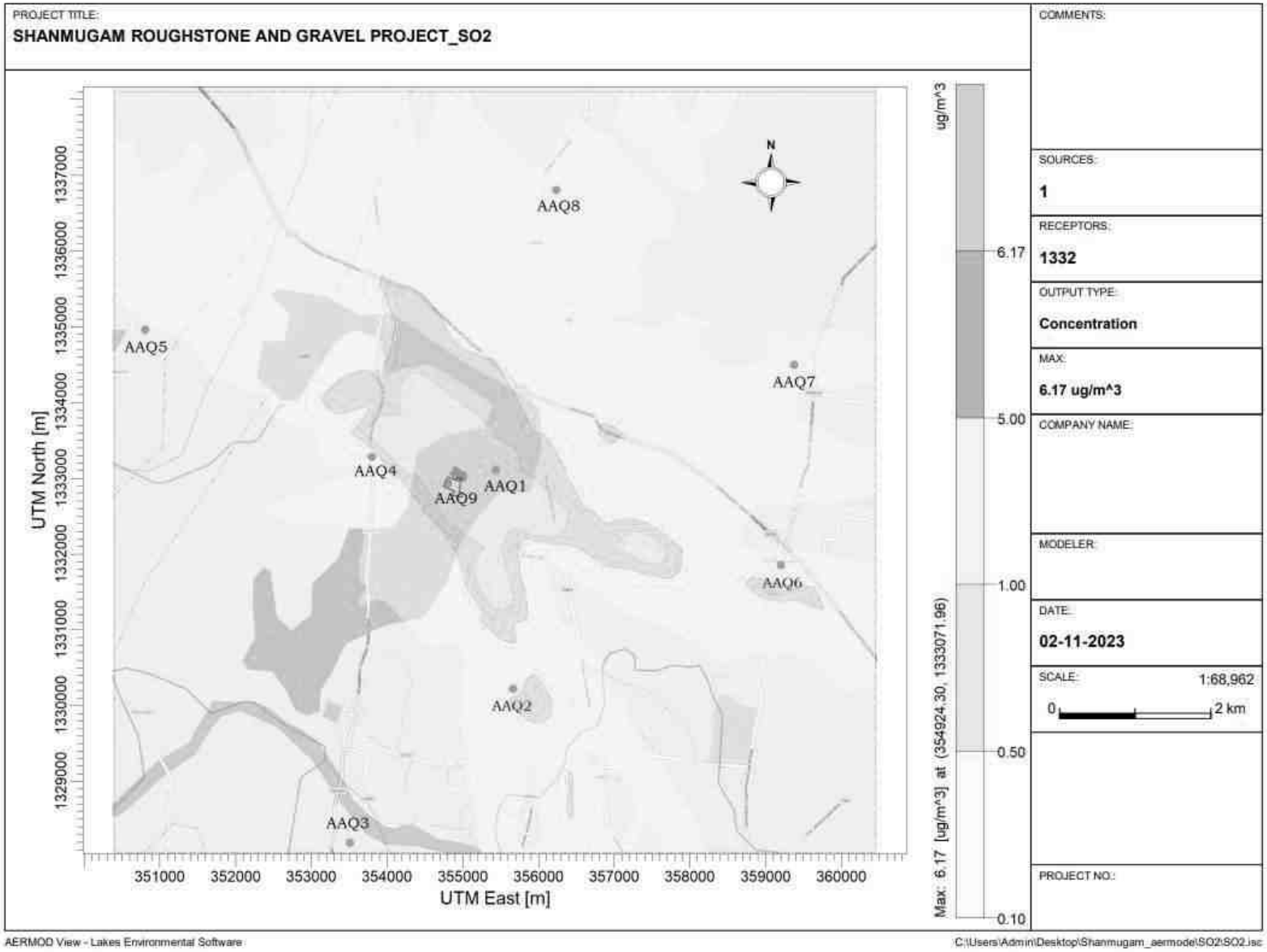


Figure 4.3 Predicted Incremental Concentration of SO_2

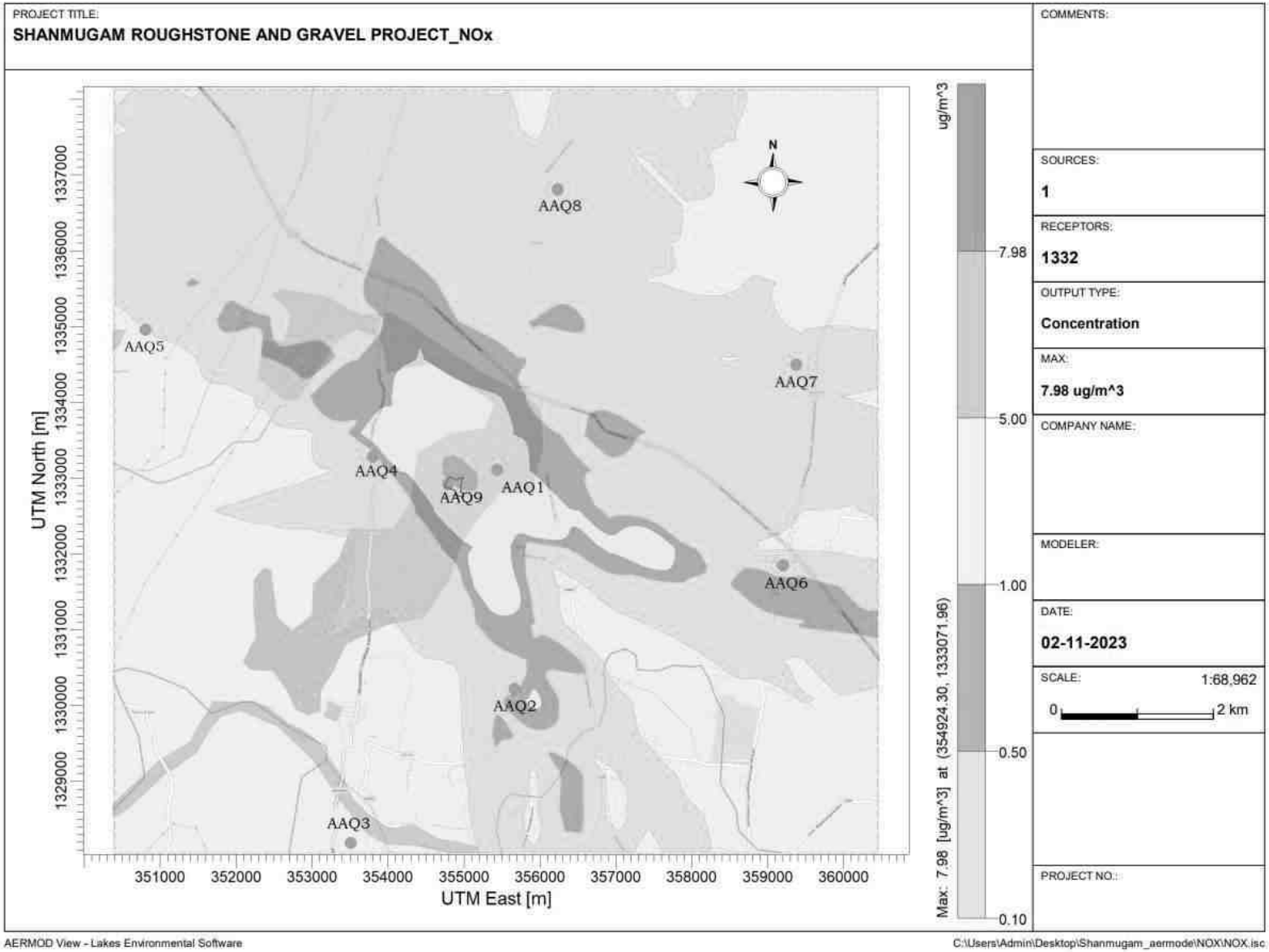


Figure 4.4 Predicted Incremental Concentration of NO_X

Table 4.5 Incremental & Resultant GLC of SO_2

Station ID	Distance to core area (km)	Direction	SO_2 concentrations(µg/m³)			Comparison against air quality standard (80 µg/m³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	0.47	NE	9.2	5	14.2	Below standard	54.35	Not significant
AAQ2	2.78	S	7.5	0.5	8		6.67	
AAQ3	5.16	SSW	7.6	0	7.6		0.00	
AAQ4	1.47	W	9.3	0.5	9.8		5.38	
AAQ5	4.83	NW	8.1	0	8.1		0.00	
AAQ6	3.98	SE	6.5	0.5	7		7.69	
AAQ7	4.17	NE	7.4	0.5	7.9		6.76	
AAQ8	3.74	NNE	8.1	0.5	8.6		6.17	
AAQ9	--	--	9.0	6.17	15.17		68.56	

Table 4.6 Incremental & Resultant GLC of NO_X

Station ID	Distance to core area (km)	Direction	NO_x concentrations(µg/m³)			Comparison against Air quality standard (80 µg/m³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	0.47	NE	18.2	5	23.2	Below standard	27.47	Not significant
AAQ2	2.78	S	15.6	1	16.6		6.41	
AAQ3	5.16	SSW	16.0	0	16		0.00	
AAQ4	1.47	W	17.1	0.5	17.6		2.92	
AAQ5	4.83	NW	16.2	0	16.2		0.00	
AAQ6	3.98	SE	13.4	0.5	13.9		3.73	
AAQ7	4.17	NE	14.2	0.5	14.7		3.52	
AAQ8	3.74	NNE	15.7	0.5	16.2		3.18	
AAQ9	--	--	18.0	7.98	25.98		44.33	

The values of cumulative concentration i.e., background + incremental concentration of pollutant in all the receptor locations are still within the prescribed NAAQ limits without effective

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

4.4.3 Common Mitigation Measures

Drilling

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

Advantages of Wet Drilling

- In this system dust gets suppressed close to its formation. Dust suppression becomes very effective and the work environment will be improved from the point of view 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

- Suitable time of blasting will be chosen according to the local conditions and water will be sprinkled on blasting face.
- Blasting will be avoided when temperature inversion is likely to occur and strong wind blows towards residential areas.
- Controlled blasting will be carried out using suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone.
- Blasting will be restricted to a particular time of the day i.e., at the time of lunch hours.
- 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 and Transportation

- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with tarpaulin
- The speed of tippers plying on the haul road will be limited to < 20 km/hr to avoid generation of dust
- Water sprinkling on haul roads and 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 and reduces pollution
- The un-metaled haul roads will be compacted weekly before being put into use
- Overloading of tippers will be avoided to prevent spillage
- It will be ensured that all transportation vehicles carry a valid PUC certificate
- Haul roads and service roads will be graded 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 tractors/tippers
- Green belt of adequate width will be developed around the project site

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 and tipper drivers
- Ambient air quality monitoring will be conducted every six months to assess effectiveness of mitigation measures proposed

4.5 NOISE ENVIRONMENT

Noise pollution is mainly due to operation like drilling, 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 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 a mathematical model based on first principle.

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

Where,

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

$Ae_{1,2}$ is the excess attenuation due to environmental conditions.

Combined effect of all sources can be determined at various locations by logarithmic addition.

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

4.5.1 Anticipated Impact

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

- Source data
- Receptor data
- Attenuation factor

Source data has been computed taking into account of all the machinery and activities used in the mining process. Same has been listed in Table 4.7.

Table 4.7 Activity and Noise Level Produced by Machinery

S. 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			**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 noise prediction modelling.

Table 4.8 Predicted Noise Incremental Values

Noise Monitoring Location	Distance From Project Site(m)	Baseline Noise Level (dBA)m During Day Time	Predicted Noise Level(dBA)	Total(dBA)
Arjunan Core	430	45.6	44.49	48.09
Thollamur	990	40.4	37.25	42.11
Kadagampattu	2660	41.2	28.66	41.44
Kodukkur	4790	41.6	23.55	41.67
Eraiyur	1020	45.3	36.99	45.90
Konamangalam	4540	37.8	24.02	37.98
Ranganathapuram	4330	45.2	24.43	45.24
Semangalam	4640	40.6	23.83	40.69
Kunnam	3990	41.5	25.14	41.60
Core	100	45.0	57.16	57.42
NAAQ Standards	Industrial Day Time - 75dB (A) & Night Time- 70 dB (A) Residential Day Time -55 dB (A) & Night Time- 45 dB (A)			

The incremental noise level is found to be 57.16 dB (A) in core zone and ranges between 23.55 and 44.49 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 several factors including ground reflection, atmosphere, wind speed, temperature, trees, and buildings as 35.5 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.).

4.5.2 Common Mitigation Measures

The following noise mitigation measures are proposed for control of noise:

- Usage of sharp drill bits while drilling which will help in reducing noise
- Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained

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

4.5.3 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 given below:

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

Where,

V = peak particle velocity (mm/s)

K = site and rock factor constant (500)

Q = maximum instantaneous charge (kg)

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

R = distance from charge (m)

Table 4.9 Predicted PPV Values due to Blasting

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s	Fly rock distance in m	Air Blast	
					Pressure (kPa)	Sound Level (dB)
P1	37.20	990	0.15	19	0.06	130

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

Location ID	Maximum Charge in kgs	Radial Distance in m	PPV in mm/s	Fly rock distance in m	Air Blast	
					Pressure (kPa)	Sound Level (dB)
P1	37.20	100	5.69	19	1.01	154
		200	1.88		0.44	147
		300	0.98		0.27	143
		400	0.62		0.62	140
		500	0.43		0.15	137

The peak particle velocity produced by the charge of 37.20 kg is well below that of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. But the project proponent ensures that the charge per blast shall be less than 37.20 kg and that the proponent shall 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.

4.5.3.1 Common Mitigation Measures

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

- ❖ A set of shot firing rules will be drawn up and blasting shall commence outlining the detailed operating procedures that will be followed to ensure that shot firing operations on site take place without endangering the workforce or public
- ❖ 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 in such a way that the predicted peak particle velocity shall not exceed 0.251mm/s
- ❖ Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices.

4.6 ECOLOGY AND BIODIVERSITY

4.6.1 Impact on Ecology and Biodiversity

- 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 crop lands, grass patches and small shrubs. Hence, there will be no effect on flora of the region.
- Carbon released from quarrying machineries and tippers during quarrying would be 4966 kg per day, 1340853 kg per year and 6704263 kg over five years, as provided in Table 4.11.

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

	Per day	Per year	Per five years
Fuel consumption of excavator	320	86299	431497
Fuel consumption of compressor	37.2	10044	50220
Fuel consumption of tipper	1496	403975	2019873
Total fuel consumption in liters	1853	500318	2501591
Co_2 emission in kg	4966	1340853	6704263

4.6.2 Impact on agriculture and horticulture crops

- ❖ Problems to agricultural and horticulture land due to dust caused by movement of heavy vehicles.

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

4.6.3 Mitigation measures on flora and near agriculture Vegetations.

- ❖ During conceptual stage, the top bench will be re-vegetated by planting local /native species and lower benches will be converted into rainwater harvesting structure following completion of mining activities, which will replace habitat resources for fauna species in this locality over a longer time.
- ❖ Quarry approach roads are sprayed with water 3 times a day to control dust. Thus, the damage to the nearby farmlands is controlled.
- ❖ Existing roads will be used; new roads will not be constructed to reduce impact on flora.

Carbon Sequestration

- ❖ To mitigate carbon emission due to mining activities, we recommend planting trees around the quarry to offset the carbon emission during quarrying. A tree can sequester 43930 kg of carbon per year. Therefore, we recommend planting large number of trees around the quarry and near school campuses, government wasteland, roadsides etc.
- ❖ As per the greenbelt development plan as recommended by SEAC (Table 4.13), about 1832 trees will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 54038 kg of the total carbon, as provided in Table 4.12.

Table 4.12 CO_2 Sequestration

CO_2 sequestration in kg	163	43930	219650
Remaining CO_2 not sequestered in kg	4803	1296923	6484613
Trees required for environmental compensation	54038		
Area required for environmental compensation in hectares	108		

Greenbelt Development

The main objective of the green belt is to provide a barrier between the source of pollution and the surrounding areas. In order to compensate the loss of vegetation cover, it is suggested to carry out afforestation program mainly inside and outside of the lease area in different phases. This habitat improvement program would ensure the faunal species to re-colonize and improve the abundance status in the core zone. Greenbelt development plan and budget required for green belt

development plan are given in Tables 4.14-4.15. For greenbelt development, species are recommended, as shown in Table 4.13 on the basis of:

- ❖ Natural growth of existing species and survival rate of various species.
- ❖ Suitability of a particular plant species for a particular type of area.
- ❖ Creating of biodiversity.
- ❖ Fast growing, thick canopy copy, perennial and evergreen large leaf area.
- ❖ Efficient in absorbing pollutants without major effects of natural growth.

Table 4.13 Recommended Species for Greenbelt Development Plan

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

Table 4.14 Greenbelt Development Plan

	No. of trees proposed for plantation	No. of trees expected to survive @ 80%	Area to be covered(m^2)
Plantation in the construction phase (3 months)	Number of plants inside the mine lease area		
	733	586	6596
	Number of plants outside the mine lease area		
	1099	879	9894
Total	**1832**	**1466**	**16490**

Table 4.15 Budget for Greenbelt Development Plan

Activity	Plantation in the construction phase(3Months)	Cost	Capital Cost (Rs.)	Recuring Cost-per annum
Plantation inside the mine lease area (in safety margins)	733	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))"	146580	21987
Plantation outside the area	1099	Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	329805	32980
Total			**476385**	**54967**

Source: EMP budget

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.

4.6.4. 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.

4.6.5 Measures for Protection and Conservation of Wildlife Species

- ❖ 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.
- ❖ Undertaking Mitigation 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 proposed project
- ❖ 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.

Aquatic Biodiversity

As no wastewater discharge is proposed from the coarse stone and gravel quarry, the mining activities will not disturb the existing aquatic environment. Shankarabarani river is 3.68 km SW from Quarry Lease area. There is no natural perennial surface water body within the mining lease area. Therefore, aquatic biodiversity is not observed in the mining lease area.

Table 4.16 Ecological Impact Assessments

S. No	Attributes	Assessment
1	Activities of the project affects the breeding/nesting sites of birds and animals	No breeding and nesting sites were identified in the lease area.
2	Located near an area populated by rare or endangered species	No endangered, critically endangered, vulnerable species were sighted in core area.
3	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/ coastline/estuary/sea	There are no National Park/wildlife Sanctuary/Reserve Forest /mangroves/ coastline/estuary/sea in 10km radius.
4	Proposed project restricts access to waterholes for wildlife	No. The proposed project does not restrict access to water holes for wildlife.
5	Proposed mining project impact surface water quality that also provide water to wildlife	No scheduled or threatened wildlife animal were sighted in core area.
6	Proposed mining project increase siltation that would affect nearby biodiversity area.	Surface runoff management system will be developed properly. So, there will be no siltation in nearby mining area.

7	Risk of fall/slip or cause death to wild animals due to project activities	Barbed wire fencing will be installed around the lease area. Therefore, wild animals will not fall into the quarry pit.
8	The project release effluents into a water body that also supplies water to a wildlife	No water bodies were found close to core zone so chances of water becoming polluted will be low.
9	Mining project effect the forest-based livelihood/ any specific forest product on which local livelihood depended	No. The proposed project does not involve any forestland. Therefore, it will not affect the livelihood of people depending the forest product.
10	Project likely to affect migration routes	No migration routes were found crossing the lease area.
11	Project likely to affect flora of an area, which have medicinal value	No flora with medicinal values were found in the study area.
12	Forestland is to be diverted, has carbon high sequestration	As the proposed project does not involve any forestland, there will be no need for diversion.
13	The project likely to affect wetlands, fish breeding grounds, marine ecology	Wetland was not present in and around mining lease area. No fish breeding grounds were present in core area.

Table 4.17 Anticipated Impact of Ecology and Biodiversity

S. 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
		Site specific loss of associated faunal diversity	Site supports only common species, which use wide variety of habitats of the buffer zone reserve forest area.		

		(Partial impact)	So, there is no threat of faunal diversity.		boundary, which will improve flora and fauna diversity of the project area.
		-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 SO_2, NO_2, 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.

4.7 SOCIO ECONOMIC ENVIRONMENT

4.7.1 Anticipated Impact from Proposed and Existing Projects

- Dust generation from mining activity can have negative impact on the health of the workers and people in the nearby area.

- Approach roads can be damaged by the movement of tippers
- Increase in Employment opportunities both direct and indirect thereby increasing economic status of people of the region.

4.7.2 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

4.8 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

4.8.1 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

4.8.2 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.

4.8.3 Physical Hazards

The following measures are proposed for control of physical hazards

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

4.8.4 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.

4.9 MINE WASTE MANAGEMENT

No waste is anticipated from any of the proposed quarries.

4.10 MINE CLOSURE

Mine closure plan is the most important environmental requirement in mining project. The mine closure plan should cover technical, environmental, social, legal and financial aspects dealing

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

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

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

4.10.1 Mine Closure Criteria

The criteria involved in mine closure are discussed below:

4.10.1.1 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.,

4.10.1.2 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.

4.10.1.3 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.
- Where it is desirable to get a quick growth response from the native flora during those times when moisture is not a limiting factor. For example, development of green barriers

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

CHAPTER V
ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.0 INTRODUCTION

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

5.1 FACTORS BEHIND THE SELECTION OF PROJECT SITE

The proposed project is site specific and has the following advantages:

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

5.2 ANALYSIS OF ALTERNATIVE SITE

No alternatives are suggested as the mine site is mineral specific.

5.3 FACTORS BEHIND SELECTION OF PROPOSED TECHNOLOGY

Manual Open Cast Semi Mechanized mining method with secondary blasting will be applied to extract rough stone in the area. The proposed mining lease areas have following advantages:

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

5.4 ANALYSIS OF ALTERNATIVE TECHNOLOGY

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

CHAPTER VI

ENVIRONMENTAL MONITORING PROGRAMME

6.0 GENERAL

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

6.1 METHODOLOGY OF MONITORING MECHANISM

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

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

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

❖ Seeking expert's advice when needed.

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

The sampling and analysis report of the monitored environmental attributes will be submitted to the Tamil Nadu Pollution Control Board (TNPCB) at a frequency of half-yearly and yearly by the proposed project proponent. The half-yearly reports are submitted to Ministry of Environment and Forest, Regional Office and SEIAA-TN as well.

The sampling and analysis of the environmental attributes will be as per the guidelines of Central Pollution Control Board (CPCB)/Ministry of Environment, Forest and Climate Change (MoEF & CC). The Environmental Monitoring Cell will be formed for the proposed project. The structure of the cell will be as shown in Figure 6.1.

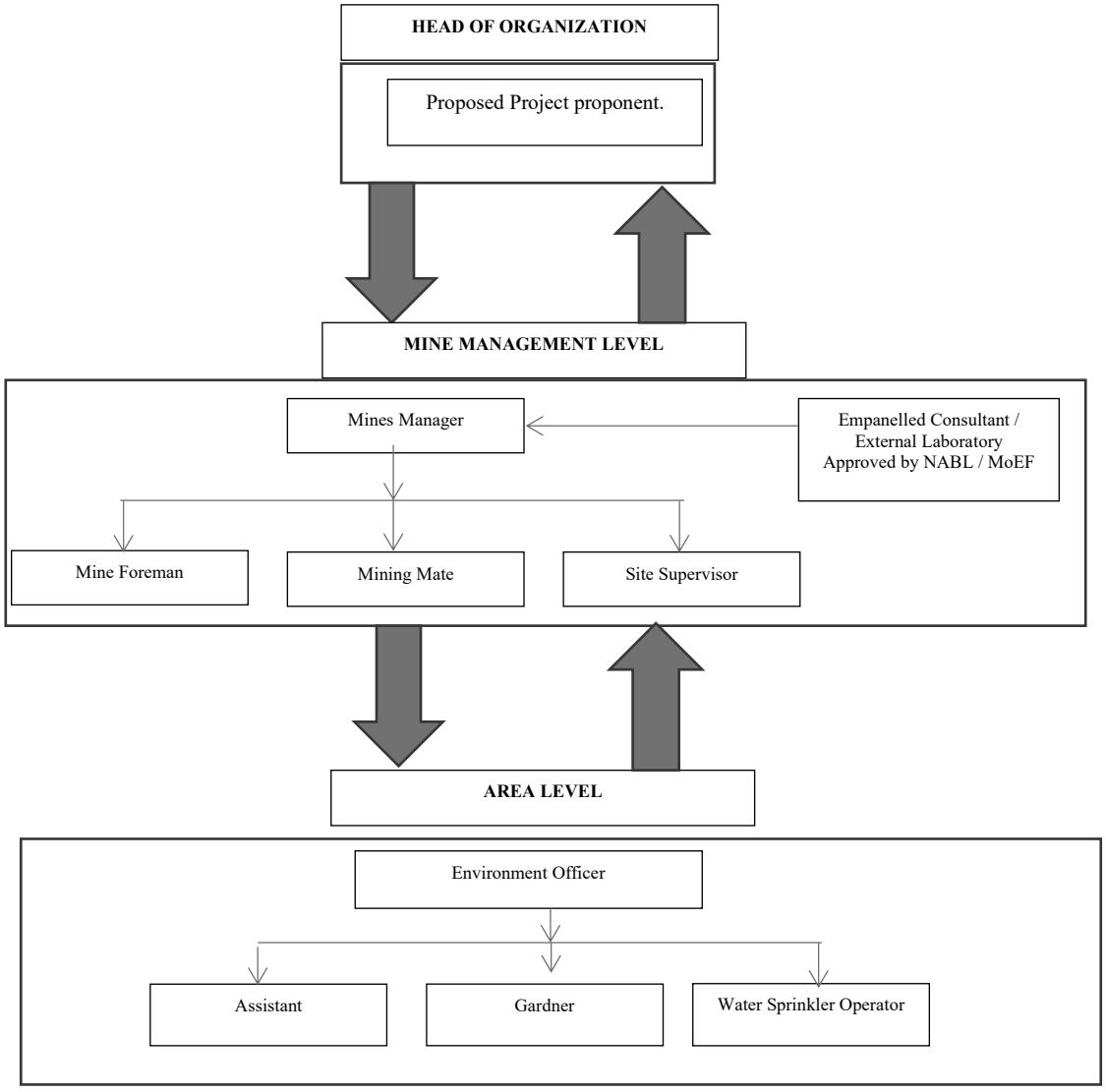


Figure 6.1 Proposed Environmental Monitoring Chart

6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

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

Table 6.1 Implementation Schedule for Proposed Project

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

6.3 MONITORING SCHEDULE AND FREQUENCY

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

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

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

The details of proposed monitoring schedule have been provided in Table 6.2.

Table 6.2 Proposed Monitoring Schedule Post EC for the Proposed Quarry

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

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

6.4 BUDGETARY PROVISION FOR ENVIRONMENT MONITORING PROGRAM

The cost in respect of monitoring of environmental attributes, parameter to be monitored, sampling/monitoring locations with frequency and cost provision against each proposal is shown in Table 6.3. Monitoring work will be outsourced to external laboratory approved by NABL / MoEF. The proposed recurring cost for Environmental Monitoring Programme is Rs **2,95,000** /- per annum for the proposed project site.

Table 6.3 Environment Monitoring Budget

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

Source: Field Data

6.5 REPORTING SCHEDULES OF MONITORED DATA

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

Periodical reports to be submitted to:

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

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

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

CHAPTER VII
ADDITIONAL STUDIES

7.0 GENERAL

Additional studies deal with:

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

7.1 PUBLIC CONSULTATION FOR PROPOSED PROJECT

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

7.2 RISK ASSESSMENT FOR PROPOSED PROJECT

Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening. The methodology for the risk assessment is based on the specific risk assessment guidance issued by the Directorate General of Mine Safety (DGMS), Dhanbad, vide circular No.13 of 2002, dated 31st December, 2002. The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards in order to prioritize those that need immediate attention. Further, mechanisms responsible for these hazards are identified and their control measures, set to timetable are recorded along with pinpointed responsibilities. The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad for proposed project.

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

Table 7.1 Risk Assessment& Control Measures for Proposed Project

S. No	Risk factors	Causes of risk	Control measures
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations; Workers will be sent to the Training in the nearby Group Vocational Training Centre Entry of unauthorized persons will be prohibited; Fire-fighting and first-aid provisions in the mine office complex and mining area; Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use Working of quarry, as per approved plans and regularly updating the mine plans; Cleaning of mine faces on daily basis shall be daily done in order to avoid any overhang or undercut; Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of a Mine Manager; Maintenance and testing of all mining equipment as per manufacturer ‘s guidelines.
2	Drilling	Improper and unsafe practices Due to high pressure of compressed air, hoses may burst	Safe operating procedure established for drilling (SOP) will be strictly followed. Only trained operators will be deployed. No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places, 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

		Drill Rod may break	compressor and drill equipment as per operator manual. All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition. Operator shall regularly use all the personal protective equipment.
4	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/ fining of blast holes Vibration due to movement of vehicles	Restrict maximum charge per delay as per regulations and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blasting can be conducted safely. SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation Shots are fired during daytime only. All holes charged on any one day shall be fired on the same day. The danger zone will be distinctly demarcated (by means of red flags)
5	Transportation	Potential hazards and unsafe workings contributing to accident and injuries Overloading of material	Before commencing work, drivers personally check the 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.

		While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	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 FOR PROPOSED PROJECT

Natural disasters like Earthquake, Landslides have not been recorded in the past history as the terrain is categorized under seismic zone II. The area is far away from the sea. Hence, the disaster due to heavy floods and tsunamis are not anticipated. The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. The objective of the Disaster Management Plan is to make use of the combined resources of the mine and the outside services to achieve the following:

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

In case a disaster takes place, despite preventive actions, disaster management will have to be done in line with the descriptions below. There is an organization proposed for dealing with the emergency situations. Structure of the team has been shown in Figure 7.1.

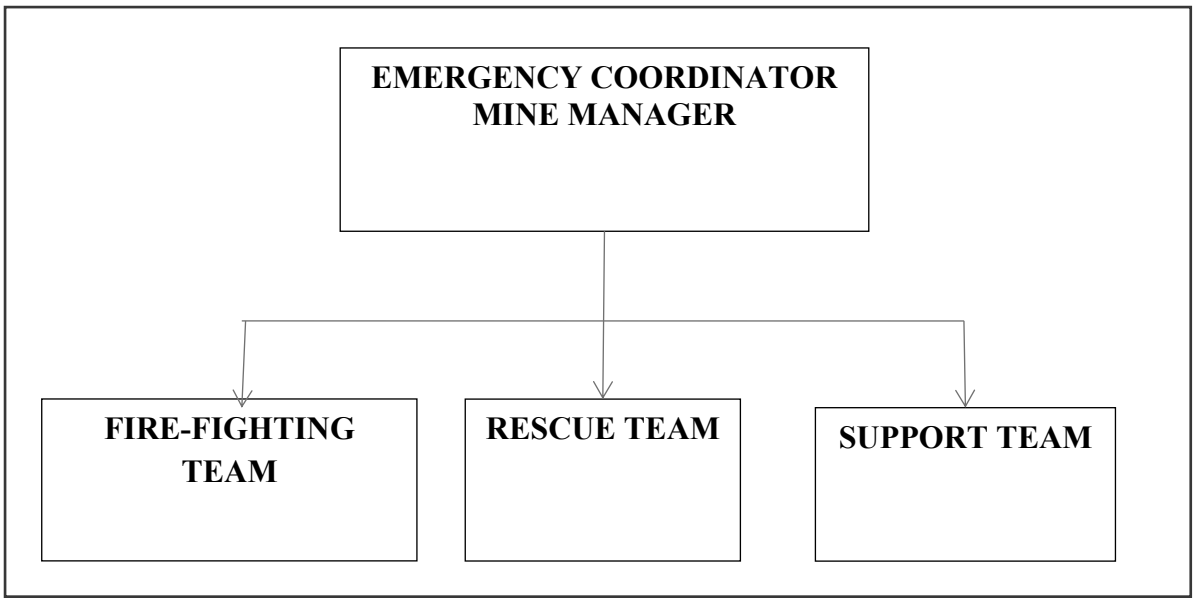


Figure 7.1 Disaster management team layout for proposed project

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

7.3.1 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.,

7.3.2 Emergency Control Procedure

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

procedure the following key activities will immediately take place to interpret and take control of emergency.

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

7.3.3 Proposed Fire Extinguishers

The following type of fire extinguishers has been proposed at strategic locations within the mine, as shown in Table 7.3.

Table 7.3 Proposed Fire Extinguishers at Different Locations in P1

Location	Type of Fire Extinguishers
Electrical Equipment	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

7.3.4 Alarm System

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.

- ❖ 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

The Cumulative Impact is mainly anticipated due to drilling & blasting and excavation and transportation activities in all the quarries within the cluster and major impact anticipated is on air & noise environment and ground vibrations due to blasting. For this cumulative study, 2 proposed projects, known as P1, P2 are taken into consideration. The details of P1 have been given in Table 1.2 and the details of P2 is given in Table 7.4.

Table 7.4 Salient Features of Proposed Project Site "P2"

Name of the Quarry	Mr. G. Arjunan Rough Stone and Gravel Quarry
Toposheet No	57-P/12
Latitude	12°3'18.23"N to 12°3'24.14"N
Longitude	79°40'12.36"E to 79°40'19.01"E
Highest Elevation	74 m AMSL
Proposed Depth as per ToR	45 m BGL

Ultimate Pit Dimension	Length (m)	Width (m)	Depth (m)
	76	125	45
Geological Resources	Rough Stone in m^3	Gravel in m^3	
	950220	163980	
Mineable Reserves	Rough Stone in m^3	Gravel in m^3	
	266415	114764	
Proposed reserves for five years	Rough Stone in m^3	Gravel in m^3	
	266415	114764	
Method of Mining	Open-Cast Semi Mechanized Method		
Topography	Flat Terrain		
Machinery proposed	Jack Hammer	4	
	Compressor	1	
	Hydraulic Excavator	1	
	Tippers	10	
Blasting Method	Quarrying Operation is proposed to done with conjunction with conventional method using jack hammer drilling and blasting for shattering effect and loosen the rough stone.		
Proposed Manpower Deployment	24 Nos		
Project Cost	Rs.62,60,000/-		
CER Cost	Rs. 5,00,000/-		
Proposed Water Requirement	4.0 KLD		

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

7.4.1 Air Environment

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

Table 7.5 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	521848	104370	387	64
P2	266415	53283	197	33
Grand Total	**788263**	**157653**	**584**	**97**

Table 7.6 Cumulative Production Load of Gravel

Proposed Production Details				
Quarry	**3 Years in m^3**	**Per Year in m^3**	**Per Day in m^3**	**Number of Lorry Load Per Day**
P1	84114	28038	104	17
P2	114764	38254	142	24
Grand Total	**198878**	**66292**	**246**	**41**

The cumulative study shows that the overall production of rough stone from the 2 quarry is 584m^3 per day with a capacity of 97 trips per day, gravel from the 2 quarry is 246 m^3 per day with a capacity of 41 trips per day.

7.4.1.1 Cumulative Impact of Air Pollutants

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

Table 7.7 Cumulative impact results from the two proposed project

Pollutants	**Baseline Data (µg/m^3)**	**Incremental Values (µg/m^3)**		**Cumulative Value (µg/m^3)**
		P1	**P2**	
$PM_{2.5}$	17.2	8.57	8.95	**34.72**
PM_{10}	35.3	13.7	12.95	**61.95**
SO_2	8.1	6.17	4.43	**18.7**
NO_x	16.1	7.98	6.18	**30.26**

7.4.2 Noise Environment

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

Table 7.8 Predicted Noise Incremental Values from Cluster

Location ID	**Distance (m)**	**Direction**	**Background Value (Day) dB(A)**	**Incremental Value dB(A)**	**Total Predicted dB(A)**	**Residential Area Standards dB(A)**
Habitation Near P1	990	SE	40.4	37.25	42.11	55

Habitation Near P2	870	SE	40.4	38.37	42.51	
Cumulative Noise (dB(A))					**45.33**	

Source: Lab Monitoring Data

The cumulative analysis of noise due to 2 proposed project shows that habitation near P1 and P2 will receive about 45.33 dB (A), as shown in Table 7.9. The cumulative results for the habitation in consideration do not exceed the limit set by CPCB for residential areas for day time.

7.4.3 Ground Vibrations

Cumulative results of ground vibrations due to mining activities in the all the 6 mines have been shown in Table 7.9.

Table 7.9 Ground Vibrations at 6 Mines

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	37.20	990	0.15
P2	19	870	0.10
E1	20	1320	0.05
E2	15	660	0.13
E3	4	1000	0.02
E4	32	770	0.19
Total			**0.64**

Source: Blasting Calculations

From the above table, the charge per blast is considered as maximum in each mine and the resultant cumulative 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.

7.4.4 Socio Economic Environment

Socio economic benefits of the three proposed projects were calculated and the results are shown in Tables 7.10. The two projects will contribute Rs. 15,00,000 towards CER fund.

Table 7.10 Socio Economic Benefits from 2 Mines

Location ID	Project Cost (Rs.)	CER as per SEAC Suggestion (Rs.)
P1	Rs.92,68,000	5,00,000
P2	Rs.62,60,000	5,00,000
Grand Total	**Rs.1,55,28,000**	**15,00,000**

Table 7.11 Employment Benefits from 2 Mines

Location ID	Employment
P1	23
P2	24
Grand Total	**47**

A total of 47 people will get employment due to 2 proposed Mine in cluster

7.4.5 Ecological Environment

Table 7.12 Greenbelt Development Benefits From 2 Mines

ID	No of Trees proposed to be planted	Area to be Covered(m^2)	Name of the Species	No. of Trees expected to be grown @ 80% survival rate
P1	1832	16490	Neem, Pongamia , Teak	1466
P2	1053	9473		842
Total	**2885**	**25963**		**2308**

Cumulative studies show that the two proposed projects will plant about 2885 native tree species like Neem, Teak, etc both inside and outside the lease area. It is expected that 80 % of trees, i.e., 2308 trees will survive in this green belt development program.

7.4.6 Traffic Density

The two proposed projects will add 138 truck load per day, accounting for addition of 414 PCU to the nearby roads.

7.5 PLASTIC WASTE MANAGEMENT PLAN FOR PROPOSED PROJECT

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

7.5.1 Objective

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

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

Table 7.13 Action Plan to Manage Plastic Waste

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

Source: Proposed by FAEs and EC

7.6 POST COVID HEALTH MANAGEMENT PLAN FOR PROPOSED PROJECT

COVID – 19 diseases caused by SARS-CoV-2 Coronavirus is relatively a new disease, with fresh information being known on a dynamic basis about the natural history of the disease, especially in terms of post-recovery events.

After acute COVID-19 illness, recovered patients may continue to report wide variety of signs and symptoms including fatigue, body ache, cough, sore throat, difficulty in breathing, etc. As of now there is limited evidence of post-COVID sequalae and further research is required and is being actively pursued. A holistic approach is required for follow up care and well-being of all post COVID recovering patients.

7.6.1 Post-COVID Follow up Protocol

- ❖ Continue COVID appropriate behaviour (use of mask, hand & respiratory hygiene, physical distancing).
- ❖ Drink adequate amount of warm water (if not contra-indicated).
- ❖ Make sure your workplaces are clean and hygienic
- ❖ Surfaces (e.g., desks and tables) and objects (e.g., telephones, helmet) need to be wiped with disinfectant regularly
- ❖ Put sanitizing hand rub dispensers in prominent places around the workplace. Make sure these dispensers are regularly refilled
- ❖ Display posters promoting hand-washing

- ❖ Make sure that staff, contractors and customers have access to places where they can wash their hands with soap and water
- ❖ Display posters promoting respiratory hygiene.
- ❖ Brief your employees, contractors and customers that if COVID-19 starts spreading in your community anyone with even a mild cough or low-grade fever (37.3°C or more) need to stay at home. They should also stay home (or work from home) if they have had to take simple medications, such as paracetamol/acetaminophen, ibuprofen or aspirin, which may mask symptoms of infection
- ❖ Keep communicating and promoting the message that people need to stay at home even if they have just mild symptoms of COVID-19.
- ❖ Consider whether a face-to-face meeting or event is needed. Could it be replaced by a teleconference or online event?
- ❖ Could the meeting or event be scaled down so that fewer people attend?
- ❖ Pre-order sufficient supplies and materials, including tissues and hand sanitizer for all employees. Have surgical masks available to offer anyone who develops respiratory symptoms.
- ❖ It is also suggested by the Ministry of AYUSH that the use of Chyawanprash in the morning (1 teaspoonful) with Luke warm water/milk is highly recommended (under the direction of Registered Ayurveda physician) as in the clinical practice Chyawanprash is believed to be effective in post-recovery period.
- ❖ If there is persistent dry cough / sore throat, do saline gargles and take steam inhalation. The addition of herbs/spices for gargling/steam inhalation. Cough medications, should be taken on advice of medical doctor or qualified practitioner of Ayush.
- ❖ Look for early warning signs like high grade fever, breathlessness, Sp 0_2 < 95%, unexplained chest pain, new onset of confusion, focal weakness.
- ❖ Avoid smoking and consumption of alcohol.
- ❖ Communicate to your employees and contractors about the plan and make sure they are aware of what they need to do – or not do – under the plan. Emphasize key points such as the importance of staying away from work even if they have only mild symptoms or have had to take simple medications (e.g., paracetamol, ibuprofen) which may mask the symptoms

The plan should address how to keep your business running even if a significant number of employees, contractors and suppliers cannot come to your place of business - either due to local restrictions on travel or due to illness.

CHAPTER VIII
PROJECT BENEFITS

8.0 GENERAL

The proposed project at Thollamur & Nemili Village aims to produce **521848 m^3** of rough stone and **84114 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 23 persons for carrying out mining operations and give preference to the local people in providing employment in this cluster. In addition, there will be an opportunity for indirect employment to 15 persons in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.2 SOCIO-ECONOMIC WELFARE MEASURES PROPOSED

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

8.3 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

The proposed quarry is located in Thollamur & Nemili Village, Vanur Taluk and Villppuram District is 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
- CSR Cost Estimation
- CSR activities will be taken up in the Thollamur & Nemili 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.

8.7 CORPORATE ENVIRONMENT RESPONSIBILITY

Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III dated

01.05.2018. As per para 6 (II) of the office memorandum, being a green field project & capital investment is ≤ 100 crores, the proposed project shall contribute 2% of capital investment towards CER as per directions of EAC/SEAC. However, the SEAC has suggested to allocate CER fund with reference to extent of the project. Therefore, Rs.5, 00,000 is allocated for CER. The proposed utilization of the budget of CER activities is given in Table 8.1.

Table 8.1 CER Action Plan

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

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

8.8 SUMMARY OF PROJECT BENEFITS

The project would pay about **Rs6,25,12,044** to the state government through various ways, as provided in Table 8.2.

Table 8.2 Project Benefits to the State Government

Particulars	Budget for Rough stone (Rs.)	Budget for Gravel (Rs.)
CER	5,00,000	-----
Seigniorage @ Rs.90/m^3 of rough stone Rs.56/m^3 of Gravel	4,69,66,320	47,10,384
District Mineral Foundation Tax @ 10% of Seigniorage	46,96,632	4,71,038
Green Tax @ 10% of Seigniorage	46,96,632	4,71,038
Total	**5,68,59,584**	**56,52,460**

CHAPTER IX
ENVIRONMENTAL COST BENEFIT ANALYSIS

Not Applicable, Since Environmental cost benefit analysis not recommended at the scoping stage.

CHAPTER X

ENVIRONMENTAL MANAGEMENT PLAN

10.0 GENERAL

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

10.1 ENVIRONMENTAL POLICY

The project proponent is committed to conduct all its operations and activities in an environmentally responsible manner and to continually improve environmental performance. The Proponent, **Mr.A.Shanmugam,** will:

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

10.1.1 Description of the Administration and Technical Setup

The environment monitoring cell discussed under chapter VI will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through mine management level of each proposed quarry. The said team will be responsible for:

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

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

10.2 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 (unutilized 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 program. A detailed land environment management plan has been provided in Table 10.1.

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 & 100m 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 FAEs & EIA Coordinator

10.3 SOIL MANAGEMENT

No top soil will be removed during the mining operation. Therefore, topsoil management plan is not provided here.

10.4 WATER MANAGEMENT

In the proposed quarrying project, no process is involved for the effluent generation, only oil & grease from the machinery wash and domestic sewage from mines office is anticipated. The quarrying operation is proposed up to a depth of 45 m. The water table in the area is at 60 m below ground level. Hence, the proposed project will not intersect the ground water table during entire quarry period. A detailed water environment management plan has been provided in Table 10.2.

Table 10.2 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 FAEs & EIA Coordinator

10.5 AIR QUALITY MANAGEMENT

The proposed quarrying activity would result in the increase of particulate matter concentrations in the ambient air. Daily water sprinkling on the haul roads, approach roads in the vicinity will 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. A detailed ambient air environment management plan is provided in Table 10.3.

Table 10.3 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 FAEs & 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. A detailed noise environment management plan has been provided in Table 10.4.

Table 10.4 Proposed Controls for Noise Environment

Control	Responsibility
Development of thick greenbelt all along the buffer zone (7.5 meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring is carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures.	Mines Manager

Additional noise control measures will be adopted if required as per the observations during monitoring	
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 FAEs & EIA Coordinator

10.7 GROUND VIBRATION AND FLY ROCK CONTROL

The rough stone quarry operation creates vibration due to the blasting and movement of heavy earth moving machineries, fly rocks due to the blasting. A detailed ground vibration management plan has been provided in Table 10.5.

Table 10.5 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 FAEs & 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 program 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 and 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

The main objectives of the greenbelt development plan are to:

- ❖ Combat the dispersal of dust in the adjoining areas.
- ❖ Protect the erosion of the soil and conserve moisture of the soil.
- ❖ Increase the rate of recharge of ground water.
- ❖ 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. The proposed green belt development plan is given in Table 10.6.

Table 10.6 Proposed Greenbelt Development Plan

	No. of trees proposed for plantation	**No. of trees expected to survive @ 80%**	**Area to be covered(m^2)**
Plantation in the construction phase (3 months)	Number of plants inside the mine lease area		
	733	586	6596
	Number of plants outside the mine lease area		
	1099	879	9894
Total	**1832**	**1466**	**16490**

Source: Proposed by FAEs & EIA Coordinator

About 1832 saplings will be planted in and around the lease area with the survival rate of 80%. A well-planned green belt of trees with long canopy leaves shall be developed with dense plantations around the boundary and along the haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

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, Sperm Count 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 (Table 10.7) keep upgrading the database of medical history of the employees.

Table 10.7 Medical Examination Schedule

S. 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 color 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 centers. 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 Program

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 Centers in the State and engage Environmental Consultants to

provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner, as shown in Table 10.8.

Table 10.8 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 and 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 on 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 FAEs & 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 10.9 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

Table 10.9 EMP Budget for Proposed Project

Attribute	Mitigation measures	Provision for Implementation	Capital Cost (Rs.)	Recurring Cost/annum (Rs.)
Air Environment	Compaction, gradation and drainage on both sides	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare and yearly maintenance @ Rs. 10,000/- per hectare (Proposed Project)	36645	36645
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed sprinkler installation and new water tanker cost for capital; and water sprinkling (thrice a day) cost for recurring	800000	50000
	Air quality will be regularly monitored as per norms within ML area & ambient area	Yearly compliance as per CPCB norms	0	50000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance	75000	7500

	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin to avoid escape of fines to the atmosphere	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governors @ Rs. 5000/- per tipper/dumper deployed	50000	0
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes	0	12500
	Regular sweeping and maintenance of roads for at least about 200 m from quarry entrance	Provision for 2 labours @ Rs.10,000/labour (Contractual)	0	73290
	Installing wheel wash system near exit gate of quarry	Installation + Maintenance + Supervision	50000	20000
Noise Environment	Source of noise will be transportation vehicles, and HEMM. For this, proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0

	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done.	Provision made in Operating Cost	0	0
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implementations that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Competent Person	0	0
	Provision for Portable blaster shed	Installation of portable blasting shelter	50000	2000

	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 tons of blasted material	0	1461174
Water Environment	Water Management	Provision for garland drain @ Rs. 10,000/- per hectare with maintenance of Rs. 5,000/- per annum	36645	18322.5
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency (capital cost, recurring cost for collection /disposal).	25000	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
Implementation of EC, Mining Plan & DGMS Condition	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed display board at the quarry entrance as permanent structure	10000	1000
	Workers will be provided with Personal Protective Equipment	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee)	92000	23000

Occupational Health and Safety	Health checkup for workers will be provisioned	IME & PME Health checkup @ Rs. 1000/- per employee	0	23000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	14658
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	732900	36645
	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	183225	36645
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1^{st} Class / 2^{nd} Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under	0	780000

		regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate		
Development of Green Belt	Green belt development - 500 trees per hectare (200 Inside Lease Area & 300 Outside Lease Area)	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @ 200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring))"	146580	21987
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	329805	32980.5
Mine Closure Activity	Closure includes Greenbelt development, wire fencing, drains	Provision made in Closure Cost	0	124593
Green fund	G.O.(Ms). No.23, Dated: 28.09.2021	Section IVA of TNMMCR 1959 (@10% of Seigniorage Fee) (Seigniorage Fee for Roughstone = Rs.90 and for Gravel= Rs.56)	5167670	0
Total EMP Budget			**7830470**	**2750347**

Table 10.10 Estimation of Overall EMP Budget after Adjusting 5% Annual Inflation

Ist Year	IInd Year	IIIrd Year	IVth Year	Vth Year (including Mine Closure Cost)	Total Recurring Cost	Total EMP Cost
2750347	2887865	3032258	3183871	3467657	15321999	23152469

In order to implement the environmental protection measures, **an amount of Rs.7830470 as capital cost and recurring cost as Rs.2750347 as recurring cost/annum** is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per year**, the overall EMP cost for 5 years will be Rs.23152469,** as shown in Table 10.10.

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.

CHAPTER XI
SUMMARY AND CONCLUSION

11.0 INTRODUCTION

This EIA report was prepared in compliance with ToR obtained vide Letter No. SEIAA-TN/F.No.10275/ToR-1587/Dated 06.10.2023 by considering 2 proposed quarries and 3 existing quarry in a cluster with the total extent of **15.99.45** hectares in Thollamur & Nemili Village, Vanur Taluk, Villupuram District and Tamil Nadu State. The cluster area was calculated as per MoEF & CC Notification S.O. 2269 (E) Dated 1st July 2016. Baseline Monitoring studies were carried out during the period of March - May 2023.

11.1 PROJECT DESCRIPTION

The proposed project deals with excavation of rough stone and gravel, which is primarily used, in construction projects. The method adopted for rough stone and gravel excavation is open cast semi mechanised mining method involving formation of benches with 5 m height and 5 m width and secondary blasting. The proposed project area is located between latitudes from 12°3'10.41"N to 12°3'19.07"N and from longitudes from 79°40'12.36"E to 79°40'19.01"E in Thollamur & Nemili Village, Vanur Taluk, Villupuram District. The project site is a Patta land with the extent of 3.66.45 ha leased for the project proponent, Mr.A.Shanmugam. The proponent had applied for quarry lease on 23.12.2022 to extract rough stone and gravel obtained the precise area communication letter issued by Department of Geology and Mining, Villupuram vide Rc.No.A/G&M/389/2022,dated:18.07.2023. Based on the precise area communication letter, mining plan was prepared. The mining plan thus prepared was approved by Deputy Director of Geology and Mining, Villupuram Rc.No.A/G&M/389/2022, dated:20.07.2023.

According to the approved mining plan, about 521848 m^3 of rough stone and 84114 m^3 gravel will be mined up to the depth of 40 m BGL in five years. To achieve the estimated production, 3 Jack Hammers, 2 compressor, 1 excavator with bucket/rock breaker, and 10 tippers will be deployed. To operate the machineries and to break the rough stone to preferred dimension, about 23 persons will be employed. At the end of the quarry life, the dimension of the ultimate pit will be 178 m*128 m*50 m. Whereas, at the end of the mine life, about 2.90.7 ha of land will have been quarried; about 0.03.0 ha of land will be used for infrastructure, about 0.12.0 ha of land will be used for roads, about 0.54.05 ha of land will be used for green belt & dump, about 0.06.7 ha of land will be used for drainage & settling tank.

The final mine closure plan shows that about **Rs**.**1245930** capital cost with the annual recurring cost of **Rs.109935** will be spent towards mine closure.

11.2 DESCRIPTION OF THE ENVIRONMENT

The baseline monitoring studies were carried out during March through May, 2023 to assess the existing environmental conditions in the study area. For the purpose of the EIA studies, project area was considered as the core zone and area outside the project area up to 5 km radius from the periphery of the project site was considered as buffer zone. Baseline Environmental data has been collected for land, water, noise, ecology, socio-economy, and traffic.

11.2.1 Land Environment

Land Use and Land Cover (LULC) map, as shown in Figure 3.1 was prepared using Sentinel II image for the study area of 5 km radius. Totally, 8 LULC were mapped. The areal extent of each LULC is provided in Table 3.2. Of the total area, mining area covers only 113.19 ha accounting for 1.46%, of which cluster area of 3.66.45 ha contributes only about 0.047%. This small percentage of mining activities shall not have any significant impact on the land environment.

11.2.2 Soil Characteristics

Physical Characteristics

The soil samples in the study area show loamy textures varying between sandy loam, silty loam and silty clay. pH of the soil varies from 6.7 to 7.5 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 225 to 261µs/cm. Bulk density ranges between 1.11 and 1.53 g/cm^3. Figure 3.5 shows the soil composition as calculated based on the laboratory report.

Chemical Characteristics

Magnesium ranges between 22.56 and 43.22 %. Chlorides ranges between 136 and 156 %. Potassium ranges between 19.34 and 36.9 %. Calcium ranges between 110 and 166 mg/kg. Organic matter content ranges between 1.04 and 1.58 %.

11.2.3 Water Environment

Surface Water

Sangarabarani River and Ilvampattu Lake are the two prominent surface water resources present in the study area. These are ephemeral in nature, which convey water only after rainfall events. The proposed project area is located 3.68 km SW of Sangarabarani River and 4.17 km NE of Ilvampattu lake Lake, Results for surface water samples indicate that the physical and chemical parameters, and heavy metals are within permissible limits. Of the two

biological parameters, Coliform bacteria are Absent in the two water samples, whereas E-Coli is absent in the samples.

Ground Water

Groundwater in the study area occurs in the crystalline rocks of Archaean age and Recent alluvium. The movement of the groundwater is controlled by the intensity of weathering and fracturing of crystalline rocks. Dug wells and bore wells are the most common ground water abstraction structures in the area. However, in dry season, people in the study area heavily rely on bore wells for their domestic and agriculture purpose. Four groundwater samples, were collected from bore wells and analyzed for physico-chemical conditions, heavy metals and bacteriological contents in order to assess baseline quality of ground water. Results for ground water samples in the Table 3.6 indicate that the physical, chemical and biological parameters, and heavy metals are within permissible limits in comparison with standards of IS10500:2012.

11.3 AIR ENVIRONMENT

Site Specific Meteorology

According to the onsite data, the temperature in March, 2023 varied from 19.17 to 37.99^{0}C with the average of 28.08^{0}C; in April, 2023 from 22.97 to 40.94^{0}C with the average of 30.35^{0}C; and in May, 2023 from 24.19 to 39.53^{0}C with the average of 29.71^{0}C. In March, 2023, relative humidity ranged from 22.56 to 100 % with the average of 67.31%; in April, 2023, from 17.44 to 99.19 % with the average of 63.74 %; and in May,2023, from 33.88 to 97.25 % with the average of 74.73%. The wind speed in March, 2023 varied from 0.32 to 7.81 m/s with the average of 3.49 m/s; in April, 2023 from to 7.31 m/s with the average of 3.60 m/s; and in May, 2023 from 0.24 to 7.46 m/s with the average of 3.28 m/s. In December,2022, wind direction varied from 0.0 to 359.92^0 with the average of 110.42^0; in January, 2023, from 0.32 to 359.62^0 with the average of 65.11^0; and in February, 2023, from 0.88 to 359.83^0 with the average of 96.17^0. In December,2022, surface pressure varied from 99.21 to 100.81 kPa with the average of 100 kPa; in January, 2023, from 99.72 to 100.76 kPa with the average of 100.23 kPa; and in February, 2023, from 99.69 to 100.75 kPa with the average of 100.16kPa.

Ambient Air Quality Results

As per the monitoring data, $PM_{2.5}$ ranges from 15.1 µg/m^3 to 19.5µg/m^3; PM_{10} from 32.5µg/m^3 to 38.1µg/m^3; SO_2 from 6.5 µg/m^3 to 9.7 µg/m^3; NO_x from 11.9 µg/m^3 to 18.9µg/m^3. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

.

11.4 NOISE ENVIRONMENT

Ambient noise levels were measured at 10 locations around the proposed project area. The core zone was 45.0 dB (A) Leq during day time and 36.8dB (A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 37.8 to 45.6dB (A) Leq and during night time from 28.4 to 38.8dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

11.5 BIOLOGICAL ENVIRONMENT

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

11.6 SOCIO-ECONOMIC ENVIRONMENT

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

11.7 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES FOR PROPOSED PROJECT

The summary of anticipated adverse environmental impacts due to the proposed project and mitigation measures are given below:

Table 11.1 Anticipated Impacts & Mitigation Measures

Impact	Mitigation Measure
Land Environment	
❖ Destruction of natural landscapes ❖ Changes in soil characteristics	❖ Mining will be carried out as per approved mine plan in scientific and systematic way

❖ Soil erosion and slope instability	❖ Safety Zone or Buffer area will be maintained and will not be mined and instead plantation will be carried out in the safety zone ❖ Barbed wire fencing will be provided all along the proposed mine boundary ❖ At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir ❖ Construction of garland ❖ Construction of garland drains all around the quarry pit and construction of settling traps at strategic location in lower elevations to prevent soil erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area
Water Environment	
❖ Decrease in aquifer recharge and increase in surface runoff; ❖ Disturbance to land drainage, overload and erosion of watercourses; ❖ Changes to the surface over which water flows; ❖ Changes to surface and groundwater resources quantity and quality due to stream blockage and contamination by particulate matter or waste; ❖ Contamination of aquifers due to removal of the natural filter medium.	❖ Construction of garland drains all around the quarry pit and construction of settling traps at strategic location in lower elevations to prevent soil erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area ❖ De-silting will be carried out before and immediately after the monsoon season and the settling tank and drains will be cleaned weekly, especially during monsoons ❖ Domestic sewage from site office & urinals/latrines provided in project area will be discharged through septic tank followed by soak pit system. ❖ Tippers & HEMM will be washed in a designated area and the washed water will be routed through drains to a settling tank, which

	has an oil & grease trap, only clear water will be reused for greenbelt development.
Air Environment	
❖ Generation of Fugitive Dust ❖ Dust will be generated mainly during excavation, loading &unloading activities. ❖ Gaseous pollutants will by generated mostly by the traffic. ❖ Reduction in visibility due to dust plumes. ❖ Coating of surfaces leading to annoyance and loss of amenity. ❖ Physical and/or chemical contamination and corrosion. ❖ Increase in the concentration of suspended particles in runoff water. ❖ Coating of vegetation leading to reduced photosynthesis, ❖ Inhibited growth, destroying of foliage, degradation of crops; ❖ Increase in health hazards due to inhalation of dust.	❖ Haul roads will be well maintained by sprinkling water twice a day ❖ The access road will be cleaned and brushed to ensure that mud and dust deposits do not accumulate. ❖ To ensure that dust and debris is minimised on the access road, all the tipper drivers will be instructed to use water spray system on all the tyres and spray water on the loaded material that is provided at the compound area before leaving the site ❖ Speed restrictions will be imposed to avoid spillage of loaded materials upon the road and to reduce wear and tear of the road. ❖ Weekly inspections of the condition of the access road by competent person employed, and immediate action will be taken to address any potholes or damage to the road surface. ❖ Dust wetting agents can be mixed with the water applied to haul roads during hot, dry weather conditions to increase the duration that the road surface remains damp. ❖ Personal Protective Equipment's will be provided to all workers ❖ All drilling rods used will have dust suppression systems fitted which injects water into the hole. ❖ Wet gunny bags will be used as a cover while drilling. ❖ The blast zone will be kept damp by the application of water from the rain gun fitted to the

	water tanker prior to each blast to control any fugitive dust emissions that could arise from the surface during detonation. ❖ A daily visual inspection shall be conducted by the site manager who will keep a daily log of all process operations and site activities and note any malfunctions which could lead to abnormal emissions from the quarry operations. ❖ A site speed limit of 20 km/h will be set to minimise the potential for dust generation ❖ Weekly maintenance programme to identify machinery due for maintenance, based on the number of hours it has been in operation. ❖ Air filters are renewed after every 10°0 hours of use, unless otherwise indicated by an on-board computer system. ❖ All site machineries & tippers will be serviced and maintained 6 months once and drivers will report any defects immediately to the site manager to enable repairs to be carried out promptly.
Noise & Vibration	
❖ Annoyance and deterioration of the quality of life; ❖ Propelling of rocks fragments by blasting. ❖ Shaking of buildings and people due to blasting;	❖ 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.
Biological Environment	
❖ Direct impacts include land clearance and excavation causing destruction of flora and fauna and loss of habitats; ❖ Indirect impacts include habitat degradation due to noise, dust, and human activity.	❖ Only some common herbs, shrubs and grass will be cleared. So, there will be no impact on the biodiversity. ❖ Green belt development with suitable species will enhance the biodiversity of the project area. ❖ The core zone or buffer zone does not encompass any threatened flora or fauna species.
Socio-Economic Environment	
❖ Health and safety of workers and the general public; ❖ Increase in traffic volumes and sizes of road vehicles;	❖ The mining activity puts negligible change in the socio-economic profile. ❖ Around 88 local workers will get employment opportunities along with periodical training to generate local skills.

❖ Economic issues, including the increase in employment opportunities;	❖ New patterns of indirect employment/ income will generate. ❖ Regular health check-up camp. ❖ Assistance to schools and scholarship to children will be provided.
Occupational Health & Safety	
❖ Exposure to Dust ❖ Noise and Vibration Exposure ❖ Physical Hazards ❖ Respiratory hazards due to Dust exposure	❖ Provision of rest shelters for mine workers with amenities like drinking water etc. ❖ All safety measures like use of safety appliances, such as dust masks, helmets, shoes, safety awareness programs, awards, posters, slogans related to safety etc. ❖ Training of employees for use of safety appliances and first aid in vocational training centre. ❖ Weekly maintenance and testing of all equipment as per manufacturers' guidelines. ❖ Pre placement and Yearly Medical Examination of all workers by a medical Officer ❖ First Aid facility will be provided at the mine site. ❖ Close surveillance of the factors in working environment and work practices which may affect environment and worker's health by the mine's manager employed. ❖ Working of mine as per approved mining plan and environmental plans

11.8 ANALYSIS OF ALTERNATIVES

There are no alternatives suggested as the proposed mining area has the following advantages:

- ❖ The mineral deposit occurs in a non-forest area.
- ❖ There is no habitation within the applied lease area; hence no R & R issues exist.

- There is no river, stream, nallas and water bodies in the or passing through 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 accessible.
- Mine connectivity through road and rail is good.
- The proposed mining operations do not intersect the ground water level. Hence, no impact on ground water environment.

11.9 ENVIRONMENTAL MONITORING PROGRAM

Environmental Monitoring program will be conducted for various environmental components such as air quality, meteorology, water quality, water level monitoring, soil quality, noise level, vibration, and greenbelt as per conditions stipulated in Environmental Clearance Letter issued by SEIAA & Consent to Operate issued by TNPCB. For this environmental monitoring program, Rs **2,95,000** /- per annum will be spent by the project proponent. 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 and 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.

11.10 ADDITIONAL STUDIES

Public Consultation for proposed project

Application to the Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the district 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.

Risk Analysis & Disaster Management Plan for proposed project

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, and 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 time table are recorded along with pinpointed responsibilities.

In the unlikely event that a consequence has occurred, disaster management kicks in. This includes instituting procedures pertaining to a number of issues such as communication, rescue, and rehabilitation. These are addressed in the disaster management plan. Both, the RA and DMP, are living documents and need to be updated whenever there are changes in operations, equipment, or procedures Assessment is all about preventing accidents and taking necessary steps to prevent it from happening.

The Disaster Management Plan (DMP) is a guide, giving general considerations, directions, and procedures for handling emergencies likely to arise from planned operations. The DMP has been prepared on the basis of the Risk Assessment and related findings covered in the report.

Cumulative Studies

- The results on the cumulative impact of the two proposed projects on air environment of the cluster do not exceed the permissible limits set by CPCB for air pollutants.
- The cumulative results of noise for the habitation in consideration do not exceed the limit set by CPCB for residential areas for day time.
- PPV resulting from two proposed projects is well below the permissible limit of Peak Particle Velocity of 8 mm/s.
- The two proposed projects will allocate Rs. 10,00,000/- towards CER as recommended by SEAC.
- The two proposed projects will directly provide jobs to 47 local people, in addition to indirect jobs.
- The two proposed project will plant 2885 about trees in and around the lease area.
- The two proposed projects will add 414 PCU per day to the nearby roads.

11.11 PROJECT BENEFITS FOR PROPOSED PROJECT

Various benefits are envisaged due to the proposed mine and benefits anticipated from the proposed project to the locality, neighbourhood, region and nation as a whole are:

- ❖ Direct employment to 24 local people and 10 indirect Employments to the people
- ❖ Rain water harvesting structures to augment the water availability for irrigation and plantation and ground water recharge.
- ❖ Creation of community assets (infrastructure) like school buildings, village roads/ linked roads, dispensary & health Centre, community Centre, market place etc.,

- Strengthening of existing community facilities through the Community Development Programme.
- Skill development & capacity building like vocational training
- Awareness program and community activities, like health camps, medical aids, sports & cultural activities, plantation etc.
- CSR activities mainly contributing to education, health, training of women self-help groups and infrastructure etc., will be taken up in the Thollamur & Nemili Village. CSR budget is allocated as 2.5% of the profit.
- Rs. 5,00,000 will be allocated for CER.

11.12 ENVIRONMENT MANAGEMENT PLAN

In order to implement the environmental protection measures, an amount of **Rs.7830470** as capital cost and recurring cost as **Rs.2750347** as recurring cost/annum is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per year, the overall EMP cost for 5 years will be **Rs.23152469.**

11.13 CONCLUSION

EIA study was performed as per the approved ToR. Various environmental attributes were studied relating with aspects of mining activities. The related impacts were identified and evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and accordingly fund was allocated. The EMP has been dynamic, flexible and subject to periodic review. CER activities were identified and for its time bound implementation, fund has been allocated.

The project will increase the revenue of the State Govt. as well as it will help in the social upliftment of the local community. The green belt development programme will help in increasing the green cover in the area. Thus, the proposed project is not likely to affect the environment or adjacent ecosystem in an adverse way.

The Mines Management will be responsible for the project 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.

THIRU.DEEPAK S.BILGI, 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.10275/SEAC/ToR-1587/2023 Dated:06.10.2023

To

Thiru. A.Shanmugam,
No.176/2, Main Road Thalavanar Village,
VillupuramTaluk,
Villupuram District- 635118.

Sir / Madam,

Sub: SEIAA, Tamil Nadu – **Terms of Reference with Public Hearing** (ToR) for the Proposed Rough Stone and Gravel Quarry over an extent of 3.66.45 Ha at S.F.No's : 19/7A, 19/7B, 19/12, 19/13, 19/14A, 19/14B and 119/1A of Thollamur & Nemili Village, Vanur Taluk, Villupuram District, Tamil Nadu by Thiru. A. Shanmugam - 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/MIN437688//2023, Dated:22.07.2023
2. Your application submitted for Terms of Reference dated:02.08.2023.
3. Minutes of the 409th Meeting of SEAC held on 21.09.2023.
4. Minutes of the 660th meeting of Authority held on 06.10.2023.

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

The proponent, Thiru. A. Shanmugam has submitted application for ToR, in Form-I, Pre- Feasibility report for the. Proposed Rough Stone and Gravel Quarry over an extent of

MEMBER SECRETARY
SEIAA-TN

3.66.45 Ha at S.F.No's : 19/7A, 19/7B, 19/12, 19/13, 19/14A, 19/14B and 119/1A of Thollamur & Nemili Village, Vanur Taluk, Villupuram District, Tamil Nadu.

Discussion by SEAC and the Remarks:-

Proposed Rough Stone and Gravel Quarry over an extent of 3.66.45 Ha at S.F.No's : 19/7A, 19/7B, 19/12, 19/13, 19/14A, 19/14B and 119/1A of Thollamur & Nemili Village, Vanur Taluk, Villupuram District, Tamil Nadu by Thiru. A. Shanmugam -For Terms of Reference. (SIA/TN/MIN/437688/2023, Dated:22.07.2023).

The proposal was placed in the 409th Meeting of SEAC held on 21.09.2023. The details of the project furnished by the proponent are available in the website (parivesh.nic.in).

The SEAC noted the following:

1. The Project Proponent, Thiru.A.Shanmugam has applied for Terms of Reference for the Proposed Rough Stone and Gravel Quarry over an extent of 3.66.45 Ha at S.F.No's : 19/7A, 19/7B, 19/12, 19/13, 19/14A, 19/14B and 119/1A of Thollamur & Nemili Village, Vanur Taluk, Villupuram District, Tamil Nadu.
2. The proposed quarry/activity is covered under Category "B1" of Item 1(a) "Mining Projects" of the Schedule to the EIA Notification, 2006.
3. As per the mining plan the lease period is 10 years. The mining plan is for the period of five years & production should not exceed 5,21,848 m^3 of Rough Stone & 84,114 m^3 of Gravel with ultimate depth of mining 50m below ground level.

Based on the presentation made by the proponent, **SEAC decided to recommend for grant of Terms of Reference (TOR) with Public Hearing,** 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. During the presentation, SEAC noted that from the KML file uploaded by the proponent in PARIVESH portal, it is construed that the proposed site has been quarried. Further, the precise area communication letter and mine plan approval letter have not mentioned about the quarrying activity carried out. Hence, AD/Mines shall inspect the quarry site and give his comments on the existing site condition.
2. The structures within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc.

MEMBER SECRETARY
SEIAA-TN

3. The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc located within 1 km of the proposed quarry.
4. The Proponent shall develop greenbelt, fencing and garland drain around the boundary of the proposed quarry and the photographs indicating the same shall be shown during the EIA appraisal.

ANNEXURE-I

1. In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following:
   (i) Original pit dimension
   (ii) Quantity achieved Vs EC Approved Quantity
   (iii) Balance Quantity as per Mineable Reserve calculated.
   (iv) Mined out Depth as on date Vs EC Permitted depth
   (v) Details of illegal/illicit mining
   (vi) Violation in the quarry during the past working.
   (vii) Quantity of material mined out outside the mine lease area
   (viii) Condition of Safety zone/benches
   (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.
2. Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.
3. The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.
4. The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.

MEMBER SECRETARY
SEIAA-TN

5. The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.
6. The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.
7. In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.
8. However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level.
9. The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.
10. The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.
11. The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.

MEMBER SECRETARY
SEIAA-TN

12. If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,
13. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?
14. Quantity of minerals mined out.
    - Highest production achieved in any one year
    - Detail of approved depth of mining.
    - Actual depth of the mining achieved earlier.
    - Name of the person already mined in that leases area.
    - If EC and CTO already obtained, the copy of the same shall be submitted.
    - Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.
15. All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
16. The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,
17. The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.
18. The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.
19. The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act'1952 and the MMR, 1961 for

MEMBER SECRETARY
SEIAA-TN

carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.

20. The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.
21. The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.
22. The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.
23. Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.
24. Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
25. Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.

MEMBER SECRETARY
SEIAA-TN

26. Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.
27. Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
28. Impact on local transport infrastructure due to the Project should be indicated.
29. A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.
30. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.
31. As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.
32. The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.
33. Taller/one year old Saplings raised in appropriate size of bags, preferably ecofriendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner
34. A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.

MEMBER SECRETARY
SEIAA-TN

35. A Risk Assessment and management Plan shall be prepared and inc ıded in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.
36. Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.
37. Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.
38. The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.
39. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
40. Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
41. If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.
42. The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.
43. Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of

MEMBER SECRETARY
SEIAA-TN

this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.

Appendix -I
List of Native Trees Suggested for Planting

No	Scientific Name	Tamil Name	Tamil Name
1	*Aegle marmelos*	Vilvam	வில்வம்
2	*Adenaanthera pavonina*	Manjadi	மஞ்சாடி, ஆனைக்குன்றிமணி
3	*Albizia lebbeck*	Vaagai	வாகை
4	*Albizia amara*	Usil	உசில்
5	*Bauhinia purpurea*	Mantharai	மந்தாரை
6	*Bauhinia racemosa*	Aathi	ஆத்தி
7	*Bauhinia tomentes*	Iruvathi	இருவாத்தி
8	*Buchanania axillaris*	Kattuma	காட்டுமா
9	*Borassus flabellifer*	Panai	பனை
10	*Butea monosperma*	Murukkamaram	முருக்கமரம்
11	*Bobax ceiba*	Ilavu, Sevvilavu	இலவு
12	*Calophyllum inophyllum*	Punnai	புன்னை
13	*Cassia fistula*	Sarakondrai	சரக்கொன்றை
14	*Cassia roxburghi*	Sengondrai	செங்கொன்றை
15	*Chloroxylon sweitenia*	Purasamaram	புரசு மரம்
16	*Cochlospermum religiosum*	Kongu, Manjalllavu	கோங்கு, மஞ்சள் இலவு
17	*Cordia dichotoma*	Naruvuli	நருவுளி
18	*Crateva adansoni*	Mavalingum	மாவிலங்கம்
19	*Dillenia indica*	Uva, Uzha	உசா
20	*Dillenia pentagyna*	SiruUva, Sitruzha	சிறு உசா
21	*Diospyro sebenum*	Karungali	கருங்காலி
22	*Diospyro schloroxylon*	Vaganai	வாகனை
23	*Ficus amplissima*	Kalltchi	கல் இச்சி
24	*Hibiscus tiliaceou*	Aatrupoovarasu	ஆற்றுப்பூவரசு
25	*Hardwickia binata*	Aacha	ஆச்சா
26	*Holoptelia integrifolia*	Aayili	ஆயா மரம், ஆயிலி
27	*Lannea coromandelica*	Odhiam	ஓதியம்
28	*Lagerstroemia speciosa*	Poo Marudhu	பூ மருது
29	*Lepisanthus tetraphylla*	Neikottaimaram	நெய் கொட்டை மரம்
30	*Limonia acidissima*	Vila maram	விலா மரம்
31	*Litsea glutinos*	Pisinpattai	அரம்பா, பிசினபட்டை
32	*Madhuca longifolia*	Illuppai	இலுப்பை
33	*Manilkara hexandra*	UlakkaiPaalai	உலக்கை பாலை
34	*Mimusops elengi*	Magizhamaram	மகிழமரம்
35	*Mitragyna parvifolia*	Kadambu	கடம்பு
36	*Morinda pubescens*	Nuna	நுணா
37	*Morinda citrifolia*	Vellai Nuna	வெள்ளை நுணா
38	*Phoenix sylvestre*	Eachai	ஈச்சமரம்
39	*Pongamia pinnat*	Pungam	புங்கம்

MEMBER SECRETARY
SEIAA-TN

40	*Premna mollissima*	Munnai	முன்னை
41	*Premna serratifolia*	Narumunnai	நறு முன்னை
42	*Premna tomentosa*	Malaipoovarasu	மலை பூவரசு
43	*Prosopis cinerea*	Vanni maram	வன்னி மரம்
44	*Pterocarpus marsupium*	Vengai	வேங்கை
45	*Pterospermum canescens*	Vennangu, Tada	வெண்ணாங்கு
46	*Pterospermum xylocarpum*	Polavu	புலவு
47	*Putranjiva roxburghi*	Karipala	கறிபாலா
48	*Salvadora persica*	Ugaa Maram	உகா மரம்
49	*Sapindus emarginatus*	Manipungan, Soapukai	மணிப்புங்கன் சோப்புக்காய்
50	*Saraca asoca*	Asoca	அசோகா
51	*Streblus asper*	Piray maram	பிராய் மரம்
52	*Strychnos nuxvomic*	Yetti	எட்டி
53	*Strychnos potatorum*	Therthang Kottai	தேத்தான் கொட்டை
54	*Syzygium cumini*	Naval	நாவல்
55	*Terminalia belleric*	Thandri	தான்றி
56	*Terminalia arjuna*	Ven marudhu	வெண் மருது
57	*Toona ciliate*	Sandhana vembu	சந்தன வேம்பு
58	*Thespesia populnea*	Puvarasu	பூவரசு
59	*Walsuratrifoliata*	valsura	வால்சுரா
60	*Wrightia tinctoria*	Veppalai	வெப்பாலை
61	*Pithecellobium dulce*	Kodukkapuli	கொடுக்காப்புளி

Discussion by SEIAA and the Remarks:-

The subject was placed in the 660th Authority meeting held on 06.10.2023. The Authority noted that the subject was appraised in the 409th Meeting of SEAC held on 21.09.2023. 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 conditions and conditions in **Annexure 'B'** of this minutes.

1. Restricting the ultimate depth of mining upto 45m for mining over a period of five years considering the environmental impacts due to the mining, safety precautionary measures of the working personnel and following the principle of the sustainable mining.

MEMBER SECRETARY
SEIAA-TN

Annexure 'B'

Cluster Management Committee

1. Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.
2. The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc.,
3. The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.
4. Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.
5. The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.
6. The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.
7. The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.
8. The committee shall furnish the Emergency Management plan within the cluster.
9. The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.
10. The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.
11. The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.

Impact study of mining

MEMBER SECRETARY
SEIAA-TN

12. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following
    a) Soil health & soil biological, physical land chemical features .
    b) Climate change leading to Droughts, Floods etc.
    c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local people.
    d) Possibilities of water contamination and impact on aquatic ecosystem health.
    e) Agriculture, Forestry & Traditional practices.
    f) Hydrothermal/Geothermal effect due to destruction in the Environment.
    g) Bio-geochemical processes and its foot prints including environmental stress.
    h) Sediment geochemistry in the surface streams.

Agriculture &Agro-Biodiversity

13. Impact on surrounding agricultural fields around the proposed mining Area.
14. Impact on soil flora & vegetation around the project site.
15. Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.
16. The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.
17. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.
18. The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.

Forests

19. The project proponent shall detailed study on impact of mining on Reserve forests free ranging wildlife.
20. The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.

MEMBER SECRETARY
SEIAA-TN

21. The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.
22. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.

Water Environment

23. Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.
24. Erosion Control measures.
25. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.
26. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.
27. The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.
28. The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.
29. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.
30. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.

Energy

31. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.

Climate Change

MEMBER SECRETARY
SEIAA-TN

32. 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.
33. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.

Mine Closure Plan

34. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.

EMP

35. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.
36. The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.

Risk Assessment

37. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.

Disaster Management Plan

38. To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.

Others

39. The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.
40. 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

MEMBER SECRETARY
SEIAA-TN

consultation and all the activities proposed shall be part of the Environment Management Plan.

41. The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.

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.
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

MEMBER SECRETARY
SEIAA-TN

focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.

8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.

9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.

10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.

11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.

12) Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.

13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.

14) Implementation status of recognition of forest rights under the Scheduled Tribes and

MEMBER SECRETARY
SEIAA-TN

other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.

15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.

17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.

18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.

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

20) Similarly, for Coastal Projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease with respect to CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining

MEMBER SECRETARY
SEIAA-TN

Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).

21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.

22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.

23) Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of Vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.

24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.

MEMBER SECRETARY
SEIAA-TN

25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.

27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.

28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.

29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.

30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.

31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.

32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of

MEMBER SECRETARY
SEIAA-TN

handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.

33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.

34) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.

35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.

36) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.

37) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.

38) Detailed Environmental Management Plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.

39) Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.

40) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

41) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

MEMBER SECRETARY
SEIAA-TN

43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.

44) Besides the above, the below mentioned general points are also to be followed:-

a) Executive Summary of the EIA/EMP Report

b) All documents to be properly referenced with index and continuous page numbering.

c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.

d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.

e) Where the documents provided are in a language other than English, an English translation should be provided.

f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.

g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.

h) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.

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

MEMBER SECRETARY
SEIAA-TN

j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

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

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

1. Project name and location (Village, District, State, Industrial Estate (if applicable).
2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
3. Measures for mitigating the impact on the environment and mode of discharge or disposal.
4. Capital cost of the project, estimated time of completion.
5. The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.
6. A detailed study of the lithology of the mining lease area shall be furnished.
7. Details of village map, "A" register and FMB sketch shall be furnished.
8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be 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.

MEMBER SECRETARY
SEIAA-TN

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)
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

MEMBER SECRETARY
SEIAA-TN

plan.

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

a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.

b. All documents may be properly referenced with index, page numbers and continuous page numbering.

c. Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.

d. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF& CC vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry should also be followed.

e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website http://www.moef.nic.in/ may be referred.

- After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent willtake 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.

MEMBER SECRETARY
SEIAA-TN

208

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, Villupuram District.
7. Stock File.

From
Tmt. N.Vijayalakshmi, M.Sc.,
Deputy Director,
Dept. of Geology and Mining,
Viluppuram.

To
Thiru A.Shanmugam,
S/o. Arumugam,
No.176/2, Main Road,
Thalavanur Village and Post,
Viluppuram Taluk & District.

Rc.No.A/G&M/389/2022 Dated 20 .07.2023

Sub: Mines & Minerals – Minor Mineral – Rough stone and Gravel - Viluppuram District – Vanur Taluk – Thollamur Village - over an extent of 3.66.45 hectares of patta lands – S.F.Nos. 19/12 (0.31.5), 19/13 (0.35.5) 19/14A (0.22.0) 19/14B (0.10.5) 19/7A) 0.42.0), 19/7B (0.21.0)– Nemili village- S.F.No. 119/1A (2.03.95)- Quarry lease application preferred by Thiru A.Shanmugam, S/o. Arumugam – Precise area communicated - Details of quarries situated within 500 meter radial distance – furnished - reg.

Ref : 1. Deputy Director, Geology and Mining, Viluppuram Letter Rc.No.A/G&M/389/2022 Dated 18.07.20223.
2. Representation from Thiru A.Shanmugam, S/o. Arumugam Dated 20.07.2023.

****

With reference to your letter in the reference 2nd cited, the details of existing, proposed and abandoned quarries located within 500 mts. radial distance from the periphery of the proposed Rough stone and Gravel quarry over an extent of 3.66.45 hectares of patta lands in S.F.Nos. 19/12 (0.31.5), 19/13 (0.35.5) 19/14A (0.22.0) 19/14B (0.10.5) 19/7A) 0.42.0), 19/7B (0.21.0) of Thollamur Village and S.F.No. 119/1A (2.03.95) of Nemili Village, Vanur Taluk, Viluppuram District are as follows.

1. Existing quarries:

Sl. No.	Name of the lessee / permit holder	Name of the Mineral	Taluk & Village	S.F. Nos.	Extent (in hects)	Lease period	Remarks
1.	K.Balamurugan, S/o.Kuppusamy, Karasanur & Post, Vanur Taluk.	Rough Stone & Gravel	Vanur Thollamur	11/4A2 15/2 15/3A 15/3B 15/4	0.16.0 0.44.0 0.50.0 0.56.0 0.46.0 **2.12.0**	27.08.2018 to 26.08.2023	-
2.	V.Ramesh, S/o.Vengatapathi, No.5, Thiyagarayar Street, HLL Colony, Pammal, Chennai – 75.	Rough Stone & Gravel	Vanur Thollamur	16/11 16/12 17/1 18/3B	0.45.0 0.74.5 1.63.5 0.70.0 **3.53.0**	07.03.2022 to 06.03.2027	-

3.	Tvl.Sree Thiruchendhur Murugan Blue Metals represented by its partner Thiru. P.Subramani, No.3-3/3-3, Main Road, Thoravi Village, Vikravandi Taluk, Viluppuram District.	Rough Stone & Gravel	Vanur Thollamur	20/1 20/2A 20/2B 20/3 21/4 21/6 99/2 99/3B 99/6	0.83.0 0.42.5 0.43.0 1.34.0 0.31.5 0.56.0 0.24.0 0.28.5 0.15.0 **4.57.5**	04.01.2022 to 03.01.2027	

II. Proposed Area :

Sl. No.	Name of the lessee / permit holder	Name of the Mineral	Taluk & Village	S.F. Nos.	Extent (in hects)	Remarks
1.	G.Arjunan, S/o.Govindasamy, No.63, Throupathi Amman Koil Street, Thiruvakkarai Village, Vanur Taluk.	Rough Stone & Gravel	Vanur, Thollamur	16/6 16/7 16/9 16/10	0.16.0 0.24.0 0.08.5 1.62.0 **2.10.5**	-
2.	Thiru A.Shanmugam, S/o. Arumugam, No.176/2, Main Road, Thalavanur Village and Post, Viluppuram Taluk & District.	Rough Stone & Gravel	Vanur, Thollamur Nemili	19/12, 19/13 19/14A 19/14B 19/7A 19/7B. 119/1A	0.31.5 0.35.5 0.22.0 0.10.5 0.42.0 0.21.0 2.03.95 **3.66.45**	-

III. Abandoned quarries :

Sl. No.	Name of the lessee / permit holder	Name of the Mineral	Taluk & Village	S.F. Nos.	Extent (in hects)	Extent (in hects)	Remarks
_____NIL_____							

20.7.2022

Deputy Director,
Geology and Mining,
Viluppuram.

20.7.22.

From

Tmt.N.Vijayalakshmi, M.Sc.,
Deputy Director,
Dept. of Geology and Mining,
Viluppuram.

To

Thiru A.Shanmugam,
S/o. Arumugam,
No.176/2, Main Road,
Thalavanur Village and Post,
Viluppuram Taluk & District.

Rc.No.A/G&M/389/2022 Dated .07.2023

Sub: Mines & Minerals – Minor Mineral – Rough stone and Gravel - Viluppuram District – Vanur Taluk – Thollamur Village - over an extent of 3.66.45 hectares of patta lands – S.F.Nos. 19/12 (0.31.5), 19/13 (0.35.5) 19/14A (0.22.0) 19/14B (0.10.5) 19/7A) 0.42.0), 19/7B (0.21.0)– Nemili village- S.F.No. 119/1A (2.03.95)- Quarry lease application preferred by Thiru Thiru A.Shanmugam, S/o. Arumugam – Precise area communicated - Submission of mining plan for approval – Approved – Regarding.

Ref:
1. Quarry lease application dated 23.12.2022 preferred by Thiru A.Shanmugam, S/o. Arumugam, No.176/2, Main Road, Thalavanur Village and Post, Viluppuram Taluk & District.
2. Deputy Director, Geology and Mining, Viluppuram Letter Rc.No.A/G&M/389/2022 Dated 18.07.20223
3. Mining Plan submitted by Thiru A.Shanmugam, S/o. Arumugam Dated 20.07.2023.
4. G.O.Ms.No.79, Industries (MMC-1) Department dated 06.04.2015.
5. G.O.(Ms).No.169, Ind. (MMC.1) Dept. dated 04.08.2020.

****

In response to the precise area communicated vide the reference 2nd cited, the applicant viz., Thiru A.Shanmugam, S/o. Arumugam vide reference 3rd cited has submitted three copies of mining plan for the area applied seeking grant of quarry lease for Rough stone over an extent of 3.66.45 hectares of patta lands in S.F.Nos. 19/12 (0.31.5), 19/13 (0.35.5) 19/14A (0.22.0) 19/14B (0.10.5) 19/7A) 0.42.0), 19/7B (0.21.0) of Thollamur Village and S.F.No. 119/1A (2.03.95) of Nemili Village, Vanur Taluk, Viluppuram District with a request to approve the same.

2. The mining plan so submitted has been verified in detail.

3. As per the guidelines / instructions issued by the Commissioner of Geology and Mining, Chennai vide letter Rc.No.3868/LC/2012, dated 19.11.2012, the mining plan is hereby approved subject to the following conditions:

(i) The mining plan is approved without prejudice to any other Law applicable to the quarry lease from time to time whether such laws are made by the Central Government, State Government or any other authority.

(ii) This approval of the mining plan does not in any way imply the approval of the Government in terms or any other provisions of the Mines and Minerals (Development and Regulation) Amended Act, 2015, or any other connected laws including Forest (Conservation) Act, 1980, Forest Conservation Rules, 1981, Environment Protection Act, 1980, Explosives Act, 1884 (Central Act IV of 1884) and the Rules made there under and the Tamil Nadu Minor Mineral Concession Rules, 1959.

(iii) The mining plan is approved without prejudice to any other order or direction from any court of competent jurisdiction.

(iv) As per the Deputy Director, Geology and Mining, Viluppuram letter Rc.No.A/G&M/389/2022 Dated 18.07.2023, the following conditions have been incorporated in the Mining Plan.

a) 7.5meter safety distance shall be provided to the adjacent patta lands and 10meter safety distance shall be provided for adjacent Government promboke lands.
b) 10meter safety distance shall be provided to adjacent cart road

(v) Quarrying shall be strictly done as per the approved Mining Plan.

Encl: Two copies of Approved Mining Plan.

20.07.2023

Deputy Director,
Dept. of Geology and Mining,
Viluppuram.

Copy to:

The Director of Geology and Mining, Chennai-32.

20.7.23

MINING PLAN

FOR

THOLLAMUR & NEMILI VILLAGE ROUGH STONE AND GRAVEL MINING LEASE

WITH PROGRESSIVE QUARRY CLOSURE PLAN

Patta- Ryotwari land/Non-forest/Captive Use –"B2' Category

Lease period 10 Years from the date of lease execution

(Mine plan prepared for first five years)

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

LOCATION OF THE LEASE AREA

STATE	:	TAMILNADU
DISTRICT	:	VILUPPURAM
TALUK	:	VANUR
VILLAGE	:	THOLLAMUR & NEMILI
S.F.NO'S	:	19/7A, 19/7B, 19/12, 19/13, 19/14A, 19/14B and 119/1A
EXTENT	:	3.66.45 Hectares

ADDRESS OF THE APPLICANT

Mr.A.Shanmugam,

S/o. Arumugam,

No.176/2, Main Road,

Thalavanur Village and Post,

Viluppuram Taluk and District – 605103

PREPARED BY

Dr.S.KARUPPANNAN.M.Sc., Ph.D.,

Qualified person

GEO TECHNICAL MINING SOLUTIONS

(A NABET Accredited & ISO Certified Company)

No: 1/213 -B, Ground Floor, Natesan Complex,
Oddapatti, Collectorate Post office,
Dharmapuri-636705. Tamil Nadu.
Mob. : +91 9443937841, +917010076633,
E-mail: info.gtmsdpi@gmail.com ,
Website: www.gtmsind.com

CONTENTS

ANNEXURES

Sl. No.	Description	Annexure No.
1.	Copy of precise area communication letter	I
2.	Copy of **FMB** (Field Measurement book)	II
3.	Copy of "A" register	III
4.	Copy of Chitta & Adangal	IV
5.	Photo copy of the applied lease area	V
6.	Copy of ID Proof of the authorized signatory	VI
7.	Copy of Qualified Person Certificate	VII

LIST OF PLATES

Sl. No.	Description	Plate No.	Scale
1	Key map	I	Not to scale
2	Location plan	I-A	Not to scale
3	Toposheet map	I-B	1:1,00,000
4.	Satellite imagery map	I-C	1: 5,000
5	Environmental plan	I-D	1: 5,000
6	Mine lease plan	II	1:1000
7	Surface & Geological plan	III	1:1000
8.	Geological sections	IIIA	**Sections** HOR 1:1000 VER 1:500
9	Year wise Development & Production plan	IV	1:1000
10.	Year wise development & Production sections	IVA	**Sections** HOR 1:1000 VER 1:500
11	Mine layout plan and Land use pattern	V	1:1000
12	Progressive Mine Closure Plan	VI	1:1000
13	Progressive Mine Closure Sections	VIA	**Sections** HOR 1:1000 VER 1:500
14	Conceptual plan	VII	1:1000
15	Conceptual sections	VIIA	**Sections** HOR 1:1000 VER 1:500

Mr.A.Shanmugam,
S/o. Arumugam,
No.176/2, Main Road,
Thalavanur Village and Post,
Viluppuram Taluk and District – 605103

CONSENT LETTER FROM THE APPLICANT

The Mining Plan in respect of rough stone and gravel quarry lease in S.F.No's: 19/7A (0.42.0Hect), 19/7B (0.21.0Hect), 19/12 (0.31.5Hect), 19/13 (0.35.5Hect), 19/14A (0.22.0Hect), 19/14B (0.10.5Hect) and 119/1A (2.03.95Hect) over an extent of 3.66.45hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State has been prepared by

Dr. S. KARUPPANNAN.M.Sc., Ph.D., (Qualified person)

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

Dr. S.KARUPPANNAN.M.Sc., Ph.D.,
Qualified person
GEO TECHNICAL MINING SOLUTIONS
(A NABET Accredited & ISO certified Company)
No: 1/213-B, Ground Floor, Natesan Complex,
Oddapatti, Collectorate Post office, Dharmapuri-636705
Ph: +91 9443937841,7010076633.
E-mail: info.gtmsdpi@gmail.com,
Website: www.gtmsind.com

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

Place: Viluppuram, TN.
Date: 18/7/23

Signature of the applicant
(A.Shanmugam)

Mr.A.Shanmugam,
S/o. Arumugam,
No.176/2, Main Road,
Thalavanur Village and Post,
Viluppuram Taluk and District – 605103

DECLARATION

The Mining Plan in respect of rough stone and gravel quarry lease in S.F.No's: 19/7A (0.42.0Hect), 19/7B (0.21.0Hect), 19/12 (0.31.5Hect), 19/13 (0.35.5Hect), 19/14A (0.22.0Hect), 19/14B (0.10.5Hect) and 119/1A (2.03.95Hect) over an extent of 3.66.45hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State have been prepared with my consultation and I have understood the contents and agree to implement the same in accordance with the Mining Laws.

Place: Viluppuram, TN.
Date: 18/7/23

Signature of the applicant
(A.Shanmugam)

CERTIFICATE

I, Dr.S.KARUPPANNAN.M.Sc.,Ph.D, Dharmapuri had the qualified person to prepare mining plan have an office at **GEO TECHNICAL MINING SOLUTIONS** (A NABET accredited & ISO certified Company) No: 1/213-B, Natesan Complex, Oddapatti, Collectorate Post office, Dharmapuri-636705, Tamil Nadu.

I, Dr.S.KARUPPANNAN.M.Sc.,Ph.D prepared this Mining plan in respect of rough stone and gravel quarry lease in S.F.No: 19/7A (0.42.0Hect), 19/7B (0.21.0Hect), 19/12 (0.31.5Hect), 19/13 (0.35.5Hect), 19/14A (0.22.0Hect), 19/14B (0.10.5Hect) and 119/1A (2.03.95Hect) over an extent of 3.66.45Hect of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State. The mining plan prepare under rule 41 of Tamil Nadu Minor Mineral Concession Rules, 1959.

Place: Dharmapuri, TN
Date: 19/7/23

Dr.S.KARUPPANNAN.M.Sc.,Ph.D.,
Qualified Person
GEO TECHNICAL MINING SOLUTIONS
(ISO 9001: 2015 Certified Company
1/213-B, Ground Floor, Natesan Complex,
Collectorate Post Office
Oddapatti, Dharmapuri-636705.

Dr. S.KARUPPANNAN.M.Sc., Ph.D.,
Qualified Person
GEO TECHNICAL MINING SOLUTIONS
(A NABET Accredited & ISO certified Company)
No: 1/213-B, Ground Floor, Natesan Complex,
Oddapatti, Collectorate Post office, Dharmapuri-636705
Ph: +91 9443937841,7010076633
E-mail: info.gtmsdpi@gmail.com,
Website: www.gtmsind.com

CERTIFICATE

This is to certify that, the provisions of 19 Tamil Nadu Minor Minerals Concession Rules, 1959 have been observed in the Mining Plan for the grant of rough stone and gravel quarry lease in S.F.No's: 19/7A (0.42.0Hect), 19/7B (0.21.0Hect), 19/12 (0.31.5Hect), 19/13 (0.35.5Hect), 19/14A (0.22.0Hect), 19/14B (0.10.5Hect) and 119/1A (2.03.95Hect) over an extent of 3.66.45hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State applied to **Mr.A.Shanmugam,** Viluppuram, Tamil Nādu State.

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

Place: Dharmapuri, TN
Date: 19/7/23

Dr.S.KARUPPANNAN.M.Sc.,Ph.D.,
Qualified Person
GEO TECHNICAL MINING SOLUTIONS
(ISO 9001: 2015 Certified Company
1/213-B, Ground Floor, Natesan Complex,
Collectorate Post Office
Oddapatti, Dharmapuri-636705

Dr. S.KARUPPANNAN.M.Sc., Ph.D.,
Qualified Person
GEO TECHNICAL MINING SOLUTIONS
(A NABET Accredited & ISO certified Company)
No: 1/213-B, Ground Floor, Natesan Complex,
Oddapatti, Collectorate Post office, Dharmapuri-636705
Ph: +91 9443937841,7010076633
E-mail: info.gtmsdpi@gmail.com
Website: www.gtmsind.com

CERTIFICATE

I certify that, in preparation of Mining Plan for rough stone and gravel quarry lease in S.F.No's: 19/7A (0.42.0Hect), 19/7B (0.21.0Hect), 19/12 (0.31.5Hect), 19/13 (0.35.5Hect), 19/14A (0.22.0Hect), 19/14B (0.10.5Hect) and 119/1A (2.03.95Hect) over an extent of 3.66.45hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State prepared to **Mr.A.Shanmugam,** Viluppuram, Tamil Nadu State covers all the provisions of Mines Act, Rules, and Regulations etc made there under and whenever specific permission are required, the applicant will approach the Director General of Mines Safety, Chennai. The standards prescribed by DGMS in respect of Mines Health will be strictly implemented.

Place: Dharmapuri, TN

Date: 19/7/23

Dr.S.KARUPPANNAN.M.Sc.,Ph.D.,
Qualified Person
GEO TECHNICAL MINING SOLUTIONS
(ISO 9001: 2015 Certified Company
1/213-B, Ground Floor, Natesan Complex,
Collectorate Post Office
Oddapatti, Dharmapuri-636705.

MINING PLAN

FOR THOLLAMUR & NEMILI VILLAGE ROUGH STONE AND GRAVEL MINING LEASE WITH PROGRESSIVE QUARRY CLOSURE PLAN

Patta- Ryotwari land/Non-forest/Captive Use –"B2' Category

Lease period 10 Years from the date of lease execution

(Mine plan prepared for first five years)

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

INTRODUCTORY NOTES:

a) **Introduction:** The applicant **Mr.A.Shanmugam,** S/o. Arumugam, No.176/2, Main Road, Thalavanur Village and Post, Viluppuram Taluk and District, Tamil Nadu State and filed with application for new proposals has submitted to the Deputy Director, Department of Geology and Mining (DDG & M), Viluppuram dated 23.12.2022 had requested to grant the quarry lease for rough stone and gravel in S.F.No's: 19/7A (0.42.0Hect), 19/7B (0.21.0Hect), 19/12 (0.31.5Hect), 19/13 (0.35.5Hect), 19/14A (0.22.0Hect), 19/14B (0.10.5Hect) and 119/1A (2.03.95Hect) over an extent of 3.66.45 hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State.

b) **The Precise area communication letter:** The Deputy Director, Department of Geology and Mining, Viluppuram has directed to the applicant **Mr.A.Shanmugam** through his precise area communication letter **Rc.No.A/G&M/389/2022 Dated: 18.07.2023** before execution of lease deed the Applicant should submit the mining plan for approval and obtain environmental clearance from the competent authority of **S**tate **L**evel **E**nvironment **I**mpact **A**ssessment **A**uthority-**T**amilNadu (SEIAA) per EIA notification S.O.1533(E) dated 14th September 2006 and its subsequent amendments S.O.3977(E), dated 14th August 2018, MoEF & CC office memorandum letter F.No.22-1/2019 -IA.III [E116917] dated 15th December, 2021 for quarrying lease of rough stone and gravel at Tamil Nadu State, Viluppuram District, Vanur Taluk, Thollamur & Nemili Village Village in S.F.No's. 19/7A (0.42.0Hect), 19/7B (0.21.0Hect), 19/12 (0.31.5Hect), 19/13 (0.35.5Hect), 19/14A (0.22.0Hect), 19/14B (0.10.5Hect) and 119/1A (2.03.95Hect) over an extent of 3.66.45hectares has recommended as following conditions for a period of ten (10) years under Rule 19 of Tamil Nadu Minor Mineral Concession Rules, 1959.

(i) Leave a safety distance of 7.5meter and 10.0meter should be provide to the adjacent patta lands and government poromboke lands.

(ii) Quarrying should be carried out leaving a safety distance of 10 meters to the cart road crossing west of the applied lease area.

(iii) While carrying out the quarry, the quarry should be carried out without any disturbance to the nearby government poromboke, cart road and patta lands.

(iv) The applicant should fence the area with barbed wire and submit the DGPS survey report before execution of lease deed.

(v) Submit the Draft Mining Plan prepared by qualified Person mentioned in rule 41 of TNMMCR 1959.

(vi) Necessary Environmental clearance should be obtained from the SEIAA Tamilnadu as required under rule 42 of TNMMCR, 1959.

c) **Preparation and Submission of Mining Plan:** The Mining Plan with progressive quarry closure plan has been prepared under rule 41 of Tamil Nadu Minor Mineral Concession Rules, 1959 for mining lease as per conditions mentioned in the precise area communication letter **Rc.No.A/G&M/389/2022 Dated: 18.07.2023.**

d) **Geological resources and Mineable reserves:** Geological resource of estimated as **1825842m^3** including the resources of safety zone, and gravel, etc. Of which, rough stone resources of about **1715895m^3** and gravel is **109947m^3**. The total mineable reserve is estimated to be **646202m^3** by deducting the reserve safety zone, block in benches from the total Geological resources. Of which, rough stone is about **562088m^3** and gravel is **84114m^3** up to a depth of 50m below the ground level (R.L.77m-27m) (Refer Plate No. IIIA & VIA).

e) **Proposed Production Schedule** Total proposed production of **605962m^3**. Of which, rough stone is about **521848m^3** and gravel is about **84114m^3** up to a depth of 40m below the ground level (R.L.77m-37m) for first five years plan period. Average production is **104369m^3** of rough stone per year and gravel is **28038m^3.** (Refer Plate No. IVA)

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

i). Interstate boundary: No interstate boundary around 10Km radius periphery of proposed lease area.

ii). **Wildlife Protection Act, 1972:** There is no wild life animal sanctuary within radius of 10Km from the project site area under the Wildlife (Protection) Act, 1972.

iii). **Indian Reserve Forest Act, 1980:** There is no reserve forest within the 1.0km radius periphery of proposed lease area. The nearest reserve forest is

1. Melkondai R.F = 12.85km- West Side

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

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

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

1.0 GENERAL:

a.	Name of the Applicant	:	**Mr.A.Shanmugam,**
	Applicant address	:	S/o. Arumugam, No.176/2, Main Road,
			Thalavanur Village and Post,
	District	:	Viluppuram
	State	:	Tamil Nadu
	Pin code	:	605103
	Phone	:	
	Fax	:	Nil
	Gram	:	Nil
	Telex	:	Nil
	E-mail	:	.....

b.	Status of the Applicant		
	Private individual	:	Private individual
	Cooperative Association	:	---
	Private company	:	---
	Public Company	:	---
	Public Sector Undertaking	:	---
	Joint Sector Undertaking	:	---
	Other (pl. specify)	:	---
c.	Mineral(s) Which are occurring in the area and which the applicant intends to mine	:	Rough stone and gravel quarry lease
d.	Period for which the mining lease granted /renewed/ proposed to be applied	:	The precise area has been communicated to the applicant for quarrying period of Ten years.
e.	Name of the Qualified Person	:	**Dr. S.KARUPPANNAN.M.Sc.,Ph.D.,**
	Address	:	**GEO TECHNICAL MINING SOLUTIONS** (A NABET Accredited & ISO certified Company) No: 1/213-B, Ground Floor, Natesan Complex, Oddapatti, Collectorate Post office, Dharmapuri-636705 Web site: www.gtmsind.com
	Phone	:	+91 9443937841, 7010076633
	Fax	:	Nil
	e-mail	:	info.gtmsdpi@gmail.com
	Telex	:	Nil
	Registration Number	:	Nil
	Date of grant/renewal	:	Nil
	Valid upto	:	Nil
g.	Reference No. and date of consent letter from the state government	:	The precise area communication letter issued by the Deputy Director, Department Geology and Mining, Viluppuram vide **Rc.No.A /G&M /389 /2022** **Dated: 18.07.2023**

2.0 LOCATION AND ACCESSIBILITY:

a.	Details of the Area:	:	Refer plate no: IA & IB
	District & State	:	Viluppuram, Tamil Nadu
	Taluk	:	Vanur
	Village	:	Thollamur & Nemili

Khasra No./ Plot No./ Block Range/ Felling Series etc.:

Survey No.	Sub division	Total Extent in Hect	Patta No.	Name of the Land Owner	Mine lease Applied S.F. No.	Mine Lease Applied Area out of total area in hect.
19	7A	0.42.0	1378	Mr.A.Shanmugam S/o.Arumugam	19/7A	0.42.0
19	7B	0.21.0			19/7B	0.21.0
19	12	0.31.5			19/12	0.31.5
19	13	0.35.5			19/13	0.35.5
19	14A	0.22.0			19/14A	0.22.0
19	14B	0.10.5			19/14B	0.10.5
119	1A	2.03.95	575		119/1A	2.03.95
Total Extent		**3.66.45**		**Applied lease area extent**		**3.66.45**

Lease area (hectares)	:	3.66.45 Hectares
Whether the area is recorded to be in forest (please specify whether protected, reserved, etc)	:	It is a patta land
Ownership / Occupancy	:	This is a patta land S.F.No's. 19/7A, 19/7B, 19/12, 19/13, 19/14A, 19/14B and 119/1A is registered on the name of Mr. A.Shanmugam S/o. Arumugam as vide patta no. 1378 & 575. (Ref. Annex. No: IV).
Existence of Public Road / Railway line if any nearby and approximate distance	:	✓ Exploited quarry materials will be transported through the cart road situated on the west side. ✓ There is a SH-136 is situated on the North side about 1.45km which is connecting Mailam – Vanur Road. ✓ There is no NH road situated around 5km radius from the lease area. ✓ There is no railway line situated around 5km radius from the lease area.
Toposheet No. with latitude and longitude	:	Toposheet No. **57 P/12** Latitude : From 12°3'10.41"N to 12°3'19.07"N longitude: From 79°39'55.90"E to 79°40'4.16"E

Geo-Coordinates of the lease boundary:

Sl.No	LATITUDE	LONGITUDE	Sl.No	LATITUDE	LONGITUDE
1	12° 3'18.46"N	79°40'3.63"E	8	12° 3'12.96"N	79°40'0.59"E
2	12° 3'14.82"N	79°40'2.80"E	9	12° 3'13.81"N	79°39'58.30"E
3	12° 3'14.74"N	79°40'3.11"E	10	12° 3'13.96"N	79°39'58.36"E
4	12° 3'12.62"N	79°40'2.58"E	11	12° 3'14.90"N	79°39'55.90"E
5	12° 3'12.17"N	79°40'4.16"E	12	12° 3'19.07"N	79°39'57.54"E
6	12° 3'10.41"N	79°40'3.71"E	13	12° 3'17.48"N	79°40'1.78"E
7	12° 3'11.21"N	79°40'0.00"E	14	12° 3'18.76"N	79°40'2.02"E

	Land use pattern (Forest, Agricultural, Grazing, Barren etc.)	:	It is an barren and virgin ground
b).	***Attach a general location and vicinity map showing area boundaries and existing and proposed access routs. It is preferred that the area to be marked on a survey of India topographical map or a cadastral map or forest map as the case may be. However if none of these are available, the area should be shown on an accurate sketch map on scale of 1 : 5000.***	:	Refer plate no-IA & IB

i) INFRASTRUCTURE AND COMMUNICATION:

S.No	Description	Place	Distance	Direction
a.	Nearest post office	V.Parangani	3.1Km	NE
b.	Nearest police station	Katterikuppam	6.36km	SE
c.	Nearest fire station	Vanur	7.0km	SE
d.	Nearest medical facility	Kunnam	3.5Km	North
e.	Nearest school	Eraiyur	1.1Km	NW
f.	Nearest railway station	Perani	13.3km	West
g.	Nearest port facility	Chennai	130.2km	NE
h.	Nearest airport	Chennai	117.2km	NE
i.	Nearest DSP office	Tindivanam	18.8km	North
j.	Nearest villages	Karasanur	1.6 Km	North
		Thollamur	0.95Km	East
		Tiruvakkarai	2.95km	South
		Eraiyur	0.83km	West

PART – A

3.0 GEOLOGY AND MINERAL RESERVES:

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

(i)	Topography	:	The proposed lease area exhibits flat topography which is an average altitude of about 76.5m AMSL. The slope is towards Southern side and falls in Toposheet no. 57-P/12.
(ii)	General Geology of the district: A greater part of the district is covered by rocks belonging to Archaean age comprising the charnockite Group, the migmatite Complex, Sathyamangalam Group and the Bhavani Group and alkali complex of Proterozoic age. West of Kallakurichi (Southwestern part of the district), the area comprises the Charnockite Group of rocks viz. Charnockite, pyroxene-granulite and garnetiferous gabbro. West of Tirukoilur (central part of the district) and east of the charnockite terrain (i.e., Kallakurichi area) the Migmatite complex is made up of Hornblende -biotite gneiss. Pink augen gneiss and pink migmatite with younger instructions of Tindivanam and Gingee Granites (2250 Ma) and basic dykes (Proterozoic). The migmatite complex forms the major country rock of the area covering more than sixty percent and extending towards east upto vikravandi, south of Gingee. Epidote-hornblende gneiss (Proterozoic age) occurs as small isolated outcrops. Dolerite dykes form the youngest basic instrusives traversing both charnockite as well as the migmatite equally. Overlying the Archaeans are the marine fossiliferous upper, cretaceous and palaeogene formations occurring in two separate sub basins separated by thick cover of alluvial sediments deposited by gadilam and pennaiyar rivers. The two sub-basins are recognized as virudhachalam sub-basin and Pondicherry sub-basin.		

The generalized Geology of the district is as follows:

Recent and sub-recent	Soil
	Alluvium
	Laterite
Mio-Pliocene	Cuddalore sandstone with intercalations of clay, shale and pebble bed
Lower Jurassic (Upper Gondwana)	Shales and sandstones
Archaean	Basic dykes, pegmatites and quartz veins
	Granites
	Norites
	Charnockite rocks
	Garnet plagioclase and pyroxene plagioclase rock (Anorthosite)
	Talc Rock (altered ultrabasic rock)
	Talc – Chlorite- Epidote Rock
	Sillimanite – Quartzite
	Magnetite Quartzite
	Hornblende granulites and amphibolites

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

Topography of the proposed lease area:

The lease area exhibits a flat topography which is an average altitude of about 76.5m AMSL.

Mode of origin:

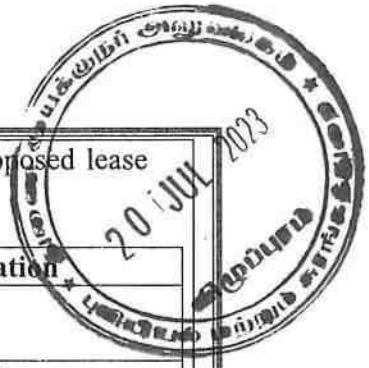
The Charnockite series originally was assumed to have developed by the fractional crystallization of silicate magma. The constituents of the rock suggest of its origin in particularly dry and high temperature conditions which is deduced to have an important bearing in explicating prehistoric crustal development of the earth.

Physiography of the rocks:

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

Chemical composition of rocks:

The compositional characteristics of co-existing orthopyroxene, garnet and biotite have established several petrographic varieties within the Charnockites– Enderbites such as the granulites and gneisses. The mineral composition shows an unvarying presence of pleochroic rhombic pyroxene. Plagioclase feldspars, alkali feldspars and quartz are the salic minerals



present in this series of rocks. Order of superposition of the proposed lease area, **Order of superposition of the proposed lease area,**

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

(iv)	Drainage Pattern	:	No major river located within 50m radius. The drainage in the area is dendritic in nature.

(b)	***The topographic plan of the lease area prepared on a scale of 1 :1000 or 1 : 2000 with contour interval of 3 to 10m depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan:***		
	a. Present status:	:	The QP examined the surface features during survey. It is a fresh quarry lease covered with gravel in this lease area. No exploration carried out.
	b. Surface Plan	:	Surface plan showing elevation contour and accessibility road was prepared at the scale of 1: 1000, as shown in Plate No. III.
(c)	Geological sections should be prepared at suitable intervals on a scale of 1: 1000 / 1: 2000:	:	Longitudinal and transverse geological cross sections were prepared at the horizontal scale of 1: 1000 and at the vertical scale of 1:500, as shown in Plate No. IIIA

(d) ***Broadly indicate the Yearwise future programme of exploration, taking into consideration the future production programme planned in next five years as in table below :-***

Year	No.of boreholes	Total meterage	No.of Pits and Dimensions	No.of Trenches and Dimensions
I	N.A	---	---	N.A
II	N.A	---	---	N.A
III	N.A	---	---	N.A
IV	N.A	---	---	N.A
V	N.A	---	---	N.A

No future programmed proposed in this area. Its massive homogeneous parent rock. Hence exploration proposal is not required to this mining project.

(e) Indicate geological and recoverable reserves and grade, duly supported by standard method of estimation and calculations along with required sections (giving split up of various categories i.e. proved, probable, possible). Indicate cut-off grade. Availability of resources should also be indicated for the entire leasehold.

The geological resources were computed by cross section method with respect to the boundaries of the lease area. In this method, the lease area was divided into two longitudinal and three transverse sections to calculate the volume of material up to the depth of 50m below ground level. The two longitudinal and three transverse cross sections were assigned XY-AB, X1Y1-CD & X2Y2-EF as respectively. Using the cross-sectional method, total reserve is estimated to be **1825842m³** including the resources of safety zone, and gravel, etc. Of which, rough stone resources of about **1715895m³** and gravel is **109947m³**.

The gravel is obtained about 0-2.0m (R.L.77m -75m) and a rough stone starts from 2 to 50m (R.L.75-27m) from the below the ground level. (Refer plate no's.IIIA).

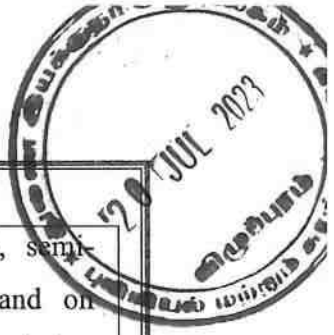
GEOLOGICAL RESOURCES							
Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m³	Rough Stone in m³	Gravel in m³
XY-AB	I	195	143	3	83655	.....	83655
	I	195	143	2	55770	55770	.....
	II	195	143	5	139425	139425	.....
	III	195	143	5	139425	139425	.....
	IV	195	143	5	139425	139425	.....
	V	195	143	5	139425	139425	.....
	VI	195	143	5	139425	139425	.....
	VII	195	143	5	139425	139425	.....
	VIII	195	143	5	139425	139425	.....
	IX	195	143	5	139425	139425	.....
	X	195	143	5	139425	139425	.....
TOTAL					**1394250**	**1310595**	**83655**
X1Y1-CD	I	49	44	3	6468	.....	6468
	I	49	44	2	4312	4312	.....
	II	49	44	5	10780	10780	.....
	III	49	44	5	10780	10780	.....
	IV	49	44	5	10780	10780	.....
	V	49	44	5	10780	10780	.....
	VI	49	44	5	10780	10780	.....
	VII	49	44	5	10780	10780	.....
	VIII	49	44	5	10780	10780	.....
	IX	49	44	5	10780	10780	.....
	X	49	44	5	10780	10780	.....
TOTAL					**107800**	**101332**	**6468**
X2Y2-EF	I	112	59	3	19824	.....	19824
	I	112	59	1	6608	6608	.....
	II	112	59	5	33040	33040	.....
	III	112	59	5	33040	33040	.....
	IV	112	59	5	33040	33040	.....
	V	112	59	5	33040	33040	.....

	VI	112	59	5	33040	33040	.....
	VII	112	59	5	33040	33040	.....
	VIII	112	59	5	33040	33040	.....
	IX	112	59	5	33040	33040	.....
	X	112	59	5	33040	33040	.....
TOTAL					**323792**	**303968**	**19824**
GRAND TOTAL					**1825842**	**1715895**	**109947**

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

The total mineable reserve is estimated to be **646202m³** by deducting the reserve safety zone, block in benches from the total Geological resources up to a depth of 50m (R.L.77-27m) below ground level. Of which, rough stone is about **562088m³** and gravel is **84114m³**. The commercially viable rough stone has been prepared on 1: 1000 scale and sections are prepared in a scale of 1:1000 in horizontal axis and 1:500 as vertical axis (Refer plate no. VIIA).

MINEABLE RESERVES							
Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m^3	Rough Stone in m^3	Gravel in m^3
XY-AB	I	178	128	3	68352	.....	68352
	I	178	128	2	45568	45568	.....
	II	168	118	5	99120	99120	.....
	III	158	108	5	85320	85320	.....
	IV	148	98	5	72520	72520	.....
	V	138	88	5	60720	60720	.....
	VI	128	78	5	49920	49920	.....
	VII	118	68	5	40120	40120	.....
	VIII	108	58	5	31320	31320	.....
	IX	98	48	5	23520	23520	.....
	X	88	38	5	16720	16720	.....
TOTAL					**593200**	**524848**	**68352**
X1Y1-CD	I	34	29	3	2958	.....	2958
	I	34	29	2	1972	1972	.....
	II	24	19	5	2280	2280	.....
TOTAL					**7210**	**4252**	**2958**
X2Y2-EF	I	97	44	3	12804	.....	12804
	I	97	44	1	4268	4268	.....
	II	87	34	5	14790	14790	.....
	III	77	24	5	9240	9240	.....
	IV	67	14	5	4690	4690	.....
TOTAL					**45792**	**32988**	**12804**
GRAND TOTAL					**646202**	**562088**	**84114**



4.0 MINING:

a.	Briefly describe the existing / proposed method for developing / working the deposit with all design parameters. (Note: In case of pocket deposits, sequence of development/working may be indicated on the same plan)	:	The mining operation is opencast, semi-mechanized method are adopted and on single shift basis only. Under the regulation 106 of the Metalliferous Mines Regulations, 1961 in all opencast workings in hard rock, the benches and sides should be properly benched and sloped. The bench height should not exceed 5m and the bench width should not less than the bench height. The slope of the benches should not exceed 45° from horizontal.

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

Total proposed production of **605962m³**. Of which, rough stone is about **521848m³** and gravel is **84114m³** up to a depth of 40m below the ground level (R.L.77-37m) from the below ground level for first five years plan period. (Refer Plate No's. IVA).

Year	Pit No.(s)	Topsoil/ Overburden (m^3)	ROM (m^3)	Saleable rough stone (m^3) @ 100%	Rough stone rejects(m^3)	Sub grade/ Weathered rock (m^3)	Saleable Gravel (m^3)	Rough stone to waste ratio
First	I	...	134010	104172	...	...	29838	...
Second	I	...	124300	103180	...	...	21120	...
Third	I	...	165572	132416	...	...	33156	...
Fourth	I	...	110640	110640	...	...	....	...
Fifth	I	...	71440	71440	...	...	....	...
Total	**---**	**...**	**605962**	**521848**	**...**	**...**	**84114**	**...**

c.	***Composite plans and Year wise sections (In case of 'A' class mines):***	:	Not applicable. It is a "B" class quarry lease

YEARWISE PRODUCTION RESERVES								
Year	Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
I-YEAR	X1Y1-CD	I	34	29	3	2958	.....	2958
		I	34	29	2	1972	1972	.....
		II	24	19	5	2280	2280	.....
	XY-AB	I	70	128	3	26880	.....	26880
		I	70	128	2	17920	17920	.....
		II	60	118	5	35400	35400	.....
		III	50	108	5	27000	27000	.....
		IV	40	98	5	19600	19600	.....
	TOTAL					**134010**	**104172**	**29838**
II-YEAR	XY-AB	I	55	128	3	21120	.....	21120
		I	55	128	2	14080	14080	.....
		II	55	118	5	32450	32450	.....
		III	55	108	5	29700	29700	.....
		IV	55	98	5	26950	26950	.....
	TOTAL					**124300**	**103180**	**21120**
III-YEAR	XY-AB	I	53	128	3	20352	.....	20352
	X2Y2-EF	I	97	44	3	12804	.....	12804
		I	97	44	1	4268	4268	.....
	XY-AB	I	53	128	2	13568	13568	.....
		II	53	118	5	31270	31270	.....
	X2Y2-EF	II	87	34	5	14790	14790	.....
		III	77	24	5	9240	9240	.....
	XY-AB	III	53	108	5	28620	28620	.....
	XY-AB	IV	53	98	5	25970	25970	.....
	X2Y2-EF	IV	67	14	5	4690	4690	.....
	TOTAL					**165572**	**132416**	**33156**
IV-YEAR	XY-AB	V	138	88	5	60720	60720	.....
		VI	128	78	5	49920	49920	.....
	TOTAL					**110640**	**110640**	**0**
V-YEAR	XY-AB	VII	118	68	5	40120	40120	.....
	XY-AB	VIII	108	58	5	31320	31320	.....
	TOTAL					**71440**	**71440**	**0**
GRAND TOTAL						**605962**	**521848**	**84114**

d.	Attach supporting composite plan and section showing pit layouts, dumps, stacks of sub-grade mineral, if any, etc.	:	Composite plan not prepared in this proposed lease area. It is "B2" category of mine.

e. ***Indicate proposed rate of production when the mine is fully developed and the expected life of the mine and the year from which effected:***

At this rate of production, the expected life of quarry is calculated as given below:

Rough stone:

Mineable reserves of rough stone 10 Years	=	**562088m^3**
First Five years Production Reserves	=	**521848m^3**
Yearly production of rough stone	=	**104369m^3**
Monthly production of rough stone	=	**8697m^3**
Remaining Reserves	=	**40240m^3**

Gravel

Production reserves of gravel = **84114m³**

Yearly production of gravel = **28038m³**

The regular working of the quarry and its production depends upon the demand from the market. The market is always fluctuating and flexible one. Accordingly, there is a possibility to increase or decrease the production. The year wise production, anticipated life of quarry etc., are only a tentative figure.

Attach a note furnishing a conceptual mining plan for the entire lease period (for "B" category mines) and upto the life of the mine (for "A" category mines) based on the geological, mining and environments considerations:

i)	Time frame of completion of mineral exploration program in leasehold area: Give broad description identified potential areas to be covered in the given time frame:	:	Considering the indefinite depth persistence of the rough stone deposit is proved beyond the workable limits about up to a depth of 50m below ground level (R.L.77m-27m) from the petrogenetic character of the charnockite rock as well as from the actual mining practice in the area and with the current trend of rough stone production.

ii) Whether ultimate pit limit has been determined and demarcated on surface and geological plan:-

The ultimate pit limit has been determined and demarcated in the conceptual plan

ULTIMATE PIT LIMIT-(XY-AB)

Bench	Bench R.L	Period	Overburden/ Mineral	L (m)	W (m)	D (m)
I	R.L.77-74m	First Five years	Gravel	178	128	3
I	R.L.74-72m		Rough stone	178	128	2
II	R.L.72-67m		Rough stone	168	118	5
III	R.L.67-62m		Rough stone	158	108	5
IV	R.L.62-57m		Rough stone	148	98	5
V	R.L.57-52m		Rough stone	138	88	5
VI	R.L.52-47m		Rough stone	128	78	5
VII	R.L.47-42m		Rough stone	118	68	5
VIII	R.L.42-37m		Rough stone	108	58	5
IX	R.L.37-32m	Remaining five years	Rough stone	98	48	5
X	R.L.32-27m		Rough stone	88	38	5
					Total	**50**

ULTIMATE PIT LIMIT-(X1Y1-CD)

Bench	Bench R.L	Period	Overburden/ Mineral	L (m)	W (m)	D (m)
I	R.L.77-74m	First Five Years	Gravel	34	29	3
II	R.L.74-72m		Rough stone	34	29	2
III	R.L.72-67m		Rough stone	24	19	5
					Total	**10**

	ULTIMATE PIT LIMIT-(X2Y2-EF)						
	Bench	**Bench R.L**	**Period**	**Overburden/ Mineral**	**L (m)**	**W (m)**	**D (m)**
	I	R.L.76-73m	First Five years	Gravel	97	44	3
	I	R.L.73-72m		Rough stone	97	44	1
	II	R.L.72-67m		Rough stone	87	34	5
	III	R.L.67-62m		Rough stone	77	24	5
	IV	R.L.62-57m		Rough stone	67	14	5
						Total	**19**
iii)	Whether the site for disposal of waste rock or an un-saleable material have/ has been examined for adequacy of land and suitability of long term use in the event of continuation of mining activity: -	:	The recovery of rough stone in this quarry is 100%. There is no waste rock will be proposed in this lease area.				
iv)	Whether back filling of pits after recovery of mineral up to techno -economically feasible depth envisaged. If so, describe the broad features of the proposal: -	:	As the depth of persistence of the deposit may likely to continue for further depth, it is proposed not to backfilled the quarry pit.				
v)	Whether post mining land use envisaged: -	:	At the end of mining activities over the quarry pit may be utilized fish culture or storage of rain water reservoir used for irrigation purposes.				
g.	***Open cast Mines:***						
	i). Describe briefly giving salient features of the mode of working (Mechanized, Semi-Mechanized, manual)	:	The mining operation is opencast, semi-mechanized methods are adopted and on single shift basis only. Under the regulation 106 of the Metalliferous Mines Regulations, 1961 in all opencast workings in hard rock, the benches and sides should be properly benched and sloped. The bench height should not exceed 5m and the bench width should not less than the bench height. The slope of the benches should not exceed 45° from horizontal.				

	ii) Describe briefly the layout of mine workings, the layout of faces and sites for disposal of overburden/waste. A reference to the plans enclosed under 4(b) and 4(d) will suffice	:	The rough stone is proposed to quarry at 5m bench height & width conventional opencast semi mechanized quarrying operation using shot hole drilling with the help of tractor mounted compressor attached with jack hammers, smooth blasting and waste and are removal using Hydraulic excavator and loaded directly to the tippers. Bench height = 5mts. Bench width = 5mts.
	a. Details of Topsoil/ Overburden	:	There is no topsoil will be removed.
	b. Rough Stone waste and side burden waste:-	:	There is no waste or side burden shall be proposed.
h.	***Underground Mines:***	:	Not applicable

i. ***Extent of mechanization:***

Describe briefly including the calculation for adequacy and type of machinery and equipment proposed to be used in different mining operations.

(1) Drilling Machines:

Drilling of shot holes will be carried out using tractor mounted compressor and jack hammer. Details of drilling equipment's are given below.

Type	Nos	Dia of hole (mm)	Size / Capacity	Make	Motive power	H.P.
Jack Hammer	3	32 mm	Hand held	--	Diesel	--
Compressor	2	---	Air	--	Diesel	--

(2) Loading Equipment:

Type	Nos	Size / Capacity	Make	Motive power	H.P.
Hydraulic Excavator	1	$3.0m^3$	--	Diesel	--

(3) Haulage and Transport Equipment

(a) Haulage within the mining leasehold:

Type	Nos	Size / Capacity	Make	Motive power	H.P.
Tipper	10	15T	--	Diesel	--

Whether the dumpers are fitted with exhaust conditioner should be indicated:

The dumpers not used in this quarry area, hence it's a small B2 category mine.

	1. Transport from mine head to the destination	:	Tipper will be used for transport rough stone from the mine head to needy customer.
	c. Describe briefly the transport system (please specify)	:	Hydraulic excavator and tippers utilized for internal transport sizeable rough stone lumps and deliver to the customer's area.
	d. Ore transported by: own trucks / hired trucks	:	Hired trucks for initially production purposes
	e. Main destination to which ore is transported (giving to and from distance)	:	The excavated stone materials road metal will be supplied to the consumers like road laying, earth filling, building construction, etc

f. Details of hauling / transport equipment:

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

(4).Miscellaneous:

Describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

	(A) Operations	:	The mining operation is opencast, semi-mechanized methods are adopted and on single shift basis only.
	(B) Machineries deployed	:	Machineries like Tractor mounted compressor attached with Jack hammers is proposed to drilling and blasting. Hydraulic Excavators and tipper combination are adapted. (Refer Part-A- 4 (i))

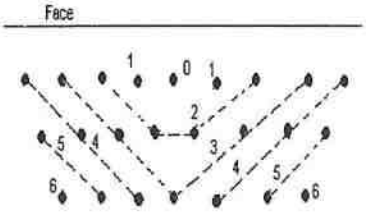
5. **BLASTING:**

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

Blasting pattern:

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

1	Diameter of the hole	32 mm
2	Spacing between hole	1.2m
3	Burden for hole	1.0m
4	Depth of each hole	1.5m
5	Output per hole = Spacing × Burden × depth 1.2 × 1.0 × 1.5 = 1.8 x 2.8	5.04MT
6	Output per hole = $1.8m^3$ x 2.8 = 5.04 MT	5.04MT
7	Production per annum $104369m^3$ * 2.8= 292233MT	292233MT
8	Total handling per day (280 working day)	1043MT
9	Nos. of holes per day (1043/5.04 = 207)	207holes
10	Meterage required per day (207× 5.5 = 1138)	1138meters
11	Charge per hole	0.375kg
12	Powder factor (207 X 0.375 kg = 77)	77 kg



Stagged method of mining

b) Type of explosives used / to be used:

Following explosives are recommended for efficient blasting with safe practice.

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

c) Measures proposed to minimize ground vibration due to blasting:

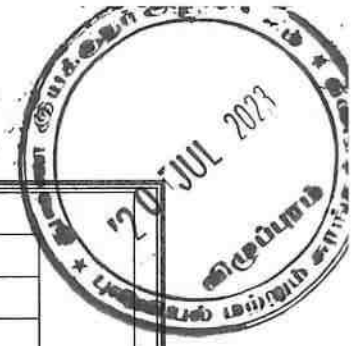
The control blasting measures is being adopted for minimizing ground vibration and fly rock.

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

Delay detonators:

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

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



	Blasting program for the production per day		
	No of holes	:	207holes
	Yield	:	1043 MT
	Total explosive required	:	77kg-Slurry explosives
	Charge per hole	:	0.375kg
	Blasting at day time only	:	12.0p.m-1.0p.m
	c) Powder factor in ore and overburden / waste / development heading / stope	:	Powder factor is proposed as 0.375kg per hole of explosives
	d) Whether secondary blasting is needed, if so describe it briefly	:	Irrespective of the method of primary blasting employed, it may be necessary to re-blast a proportion of the rock on the quarry floor so as to reduce it to a size suitable for handling by the excavators and rock breakers. by the excavators and crushers.
	e) Storage of explosives (like capacity and type of explosive magazine)	:	1. The applicant is advised to engage an authorized explosive agency to carry out blasting. 2. First Aid Box will be keeping ready at all the time. 3. Necessary precautionary announcement will be carried out before the blasting operation
6.	***MINE DRAINAGE:***		
	Likely depth of water table based on observations from nearby wells and water bodies	:	The ground water table is reported as of 65m in summer and 60m in rainy season from the general ground level observed in the adjacent bore well.
	Workings expected to be _____m. above / reach below water table by the year _____ .	:	Proposed mining depth is 40m below ground level. Now, the present Mining lease shall be proposed above the water table and hence, quarrying may not affect the ground water.
	Quantity and quality of water likely to be encountered, the	:	The ground water may not rise immediately in this type of mining.

	pumping arrangements and places where the mine water is finally proposed to be discharged		However, the rain water percolation and collection of water from the seepage shall be less than 300 Lpm and it shall be pumped out periodically by a stand diesel powered Centrifugal pump motivated with 7.5 H.P. Motor. The quality of water is potable and it is not contaminated with any hazardous things.
7.	***STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE:***		
a	Indicate briefly the nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the next five years: No separate of topsoil will be removed. There is no rough stone waste or side burden will be removed in this proposed lease area.		
b	Land chosen for disposal of waste with proposed justification	:	There is no waste are proposed.
c	Attach a note indicating the manner of disposal and configuration, sequence of buildup of dumps along with the proposals for the stacking of sub-grade ore, to be indicated Year wise.	:	There is no waste or any other mineral dumps are proposed. If rough stone may be unsold will be keep within the lease boundary.
8.	***USE OF MINERAL:***		
a	Describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)	:	The excavated stone materials will be supplied to the consumers like stone pillar, sized stone, etc. For instance, aggregates are mostly used for building, roads and footpaths., etc
b	Indicate physical and chemical specifications stipulated by buyers	:	Basically, the materials produced at this quarry are rough stone and the same are used for building stone, sized stone materials only, so there are no chemical specifications are specified. Only physical specifications are involved.

c	Give details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers.	:	Not blending process is involved after blasting the rough stone will be directly loaded to the needy customer.
9.	***OTHERS***		
(a)	**Describe briefly the following** Site services	:	Infrastructure required for such mines like office, stores, canteen, first aid station, shelter latrine and booth rooms have been provided as per the Metalliferous Mines Regulations, 1961 as a welfare amenity for our quarry laborers.
(b)	Employment potential: As per Mines safety under the provisions of Metalliferous Mines Regulations, 1961 and under the Mines Act, 1952, whenever the workers are employed more than 10, it is preferred to have a qualified mining mate to keep all the production workers directly under his control and supervision. The following man power is proposed for quarrying rough stone during the five years period the same manpower will be utilize for this plan period to achieve the proposed production and to comply the provisions of the DGMS norms.		
10.	**MINERAL PROCESSING/BENEFICIATIONS:**		
(a)	If processing / beneficiations of the ore or minerals mined is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the processing /beneficiation. This should indicate size and grade of feed material and concentrate (finished marketable product), recovery rate.	:	Excavated rough stone minerals directly will be used by the applicant in his own crusher for required size ½, ¾ and 1½ inches Jelly which are mainly used in road and building construction purpose. The recovery of rough stone in this quarry is 100%.

1.	Highly Skilled	IInd class Mines Manager	1No.
		Mine Geologist	1No.
		Blaster	1No.
2.	Semi-skilled	Driver	10No's
		Hitachi Operator	1No.
3.	Unskilled	Musdoor / Labours	9 No's
		Total =	**23 No's**

(b)	Explain the disposal method for tailings or waste from the processing plant (quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailing dam).	:	No water shall be used for quarrying or any other processing except drinking water to be drawn from public sources. Some stagnation of rain water in the pit shall be used for drilling and spraying haul roads. Therefore, need for tailing dam doesn't arise. But tailing control of rain water flow during rainy season has to be done by decanting the SPM in a pit before passing the water in to natural system.
(c)	A flow sheet or schematic diagram of the processing procedure should be attached.	:	Not applicable.
(d)	Specify quantity and type of chemicals to be used in the processing plant.	:	Not applicable
(e)	Specify quantity and type of chemicals to be stored on site / plant.	:	Not applicable
(f)	Indicate quantity (cu.m. per day) of water required for mining and processing and sources of supply of water. Disposal of water and extent of recycling.	:	Drinking is 0.5KLD, utilized water is 1.5KLD, Dust suppression is 1.5KLD and Green Belt is 1.5KLD. Minimum quantity of water 5.0KLD per day has to be maintained as per the Mines Rules, 1952. It is proposed to make an authorized water vendors for drinking water, dust suppression. The workers utilized water will be used for green belt development. The sewage water to a tune of 1.0KLD generated from the mine office toilet and mine labour toilet will be diverted to the septic tank followed by soak pit.

PART – B

11.0 ENVIRONMENTAL MANAGEMENT PLAN:

a) **Attach a note on the status of Baseline information with regard to the following :**

11.1 Existing land use pattern indicating the area already degraded due to quarrying /pitting, dumping, roads, processing plant, workshop, township etc in a tabular form. The present land use pattern is given as below.

Sl. No.	Land Use	Present area (Hect.)
1.	Area under mining	Nil
2	Infrastructure	Nil
3	Road	Nil
4	Green belt	Nil
5	Drainage & Settling Tank	Nil
6	Un-utilized area	3.66.45
	Grand total	**3.66.45**

11.2	Water Regime	:	Water table in this area is noticed at a depth of 65m in summer and 60m in rainy season from the general ground level and presently the quarrying of rough stone is Ultimate up to a depth of 50m bgl. Hence, it will not affect the ground water depletion of this area. It is proposed to make an authorized water vendors for drinking water, dust suppression. The workers utilized water will be used for green belt development.
11.3	Flora and Fauna	:	There is no major flora observed in this area and except bushes, shrubs, no other valuable trees are noticed in the lease area. Further, neither flora of botanical interest nor fauna of zoological interest is noticed in this area.
11.4	Quality of air, ambient noise level and water	:	Air or dust expected to be generated from drilling process, hauling roads, places of excavation etc.., will be suppressed by periodical wetting of land by water spraying. Quarrying of rough stone will be carried out by drilling and blasting by using low power

			explosives, and hence, noise will be very minimum. However, periodical noise level monitoring will be carried out every six months around the quarry site.
11.5	Climatic conditions: Viluppuram District climate is classified as tropical. The summers here have a good deal of rainfall, while the winters have very little. The temperature here averages 26.8 °C | 80.2 °F. The annual rainfall is 877 mm | 34.5 inch. At an average temperature of 30.1 °C | 86.2 °F, May is the hottest month of the year. December is the coldest month, with temperatures averaging 23.3 °C | 73.9 °F.		
11.6	Human Settlement: The nearest villages are found in the buffer zone with population as per 2011 census.		

S.No	Village	Direction	Distance in Kms	Population
1	Karasanur	North	1.6 Km	2862
2	Thollamur	East	0.95Km	1419
3	Tiruvakkarai	South	2.95km	3220
4	Eraiyur	West	0.83km	3257

11.7	Public buildings, places of worship and monuments	:	No infrastructure like residential building, places of special interest like archeological monuments, Sanctuaries, etc., are found around 10km radius.
11.8	Attach plans showing the locations of sampling stations	:	The proposed ambient air quality, water quality ambient noise level and vibration are periodically tested for every season (6 months once) around 5km radius as per the guidance of MoEF and EIA notification 2006 and also covering DGMS norms.
11.9	Does area (partly or fully) fall under notified area under Water (Prevention & Control of Pollution), Act, 1974	:	The proposed area not fall under notified area under Water (Prevention & Control of Pollution), Act, 1974

b) Attach an Environmental Impact Assessment Statement describing the impact of Mining and beneficiation on environment on the following over the next five years (and upto conceptual plan period for 'A' category mines)

i) ***Land area indicating the area likely to be degraded due to quarrying / pitting, dumping, roads, workshop, processing plant, township etc:***

Due to quarrying and exploitation of the rough stone, there will impact in the form i.e. change in the ground profile, pits, and dumps. The details of the land use pattern, during the ensuing plan period and till lease period is shown in the tabular form:

Sl. No.	Land Use	Area in use during the quarrying period (Hect.)
1.	Area under Mining	2.90.7
2.	Infrastructure	0.03.0
3.	Roads	0.12.0
4.	Green belt	0.54.05
5.	Drainage & Settling tank	0.06.7
6.	Un-utilized area	Nil
	Grand Total	**3.66.45**

ii).	Air Quality		Air or dust expected to be generated from drilling process, hauling roads, places of excavation etc.., will be suppressed by periodical wetting of land by water spraying.
iii).	Water quality		A water sample from the open/bore wells was tested to NABL approved lab to assess hardness, Salinity, colour, Specific gravity, etc.
iv).	Noise levels		Quarrying of rough stone will be carried out by drilling and blasting by using low power explosives, and hence, noise will be very minimum. However, periodical noise level monitoring will be carried out every six months around the quarry site.
v).	Vibration levels (due to blasting)		No deep hole blasting envisaged. Small dia shot holes are used for breaking boulders. The maximum peak particles velocity shall be recoded using mini seismograph devises as per the guidance of MoEF and EIA

			Notification 2006 and also covering DGMS norms.
vi).	Water regime		No major water bodies like rivers, pond, lake etc., located within a radius of 50m.
vii).	Socio-economics		1. To provide Employment opportunities of the nearby villagers. 2. For the cultural development of the nearby villagers.
viii).	Historical monuments etc.		There are no historical monuments, etc found around 10km radius.

c) Attach an Environmental Management Plan (supported by appropriate plans and sections) defining the time bound action proposed to be taken with sequence & timing in the following areas (or diagrams should be used):

i).	temporary storage and utilization of topsoil	:	No separate of topsoil will be removed
ii).	Yearwise proposal for reclamation of land affected by abandoned quarries and other mining activities during first five years (and upto conceptual plan period for 'A' category mines) clarifying the extent of back filling and re-contouring and / or alternative use of unfilled / partially filled excavations / road sides / slopes and mine. In case abandoned quarries/ pits are proposed to be used as reservoir, their size, water holding capacity and proposal for utilization of such water be given.	:	The present mining is proposed to an average depth of 40m below the ground level (R.L.77m-37m) has been envisaged as workable depth for safe & economic mining during the lease period. Low lying areas with water logging shall be used for fish culture. No immediate proposals for closure of pit as the rough stone persist still at deeper level.

iii). ***Programme of afforestation, Yearwise for the initial five years (and upto conceptual plan period for 'A' category mines) indicating the number of plants with name of species to be afforested under different areas in hectares.***

Green Belt Development:

Safety barrier, school and nearest panchayat roads has been identified to be utilized for Greenbelt appropriate native species of Neem, Pungan and other regional trees will be planted in a phased manner as described below

Year	Place	Area in Sq.m	No.of Plants	Rate of survival	Rate	Amount in Rs
First	Lease Boundary	5405	600	80%	@100 Rs Per sapling	60,000/-
Second	Approach road and Nearby Village Road	--	300	80%		30000/-
Third	Schools	--	300	80%		30000/-
					Total	**1,20,000/-**

iv).	Stabilization and vegetation of dumps along with waste dump management Year wise for the first five years (and upto conceptual plan period for 'A' category mines).	:	No waste or rejects removed in this lease area.
v).	Measures to control erosion / sedimentation of water courses.	:	Not applicable. There is no major dumps are stabilize in this quarry area.
vi).	Treatment and disposal of water from mine.	:	It will not be harmful and it does not require any treatment before discharging into the natural courses.
vii).	Measures for minimizing adverse effects on water regime.	:	There is no water to be pumped out will be very pure and portable and therefore, it will not affect any water regime surrounding the quarry.
viii).	Protective measures for ground vibrations / air blast caused by blasting,	:	It is a small B2 category opencast, semi mechanized mining and no heavy machinery shall be used. The only smooth blasting is proposed, therefore no change for ground vibration or noise from the quarry.

ix).	Measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity.	:	No historical monuments and for rehabilitation of human settlements doesn't to be disturbed during mining activity.
x).	Socioeconomic benefits arising out of mining.	:	The nearest villages are will get employment benefits.

d). Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only)

Not applicable. It is B2 category quarry

12.0 PROGRESSIVE QUARRY CLOSURE PLAN:

12.1	Steps proposed for phased restoration, reclamation of already mined out area.	:	The Ultimate mining is proposed to an average depth of 50m below the ground level (R.L.77m-27m). The mined-out area will be fenced on top of working bench with S1 fencing to arrest the entry of cattle's and public in to the quarry site.
12.2	Measures to be under taken on mine closure as per Act & Rules	:	Measures will be taken as per the Acts and Rules. Green belt development at the rate of 600 trees will be proposed in the quarry area. No immediate proposals for closure of pit as the rough stone persist still at deeper level.
12.3	Mitigation measures to be undertaken for safety and restoration/ reclamation of the already mined out area	:	The quarry lease is a fresh mining lease, no mitigation measures adopted.
12.4	Mine closure activity	:	The present mining plan is proposed to depth of 40m bgl has been envisaged as workable depth for safe & economic mining during the lease period. The mined-out area will be fenced on top of opencast working with S1 fencing. No immediate proposals for closure of pit as the rough stone persist still at deeper level.

12.5	Safety and security	:	Safety measures implement to the prevent access to surface opening excavations will be taken as Metalliferous Mines Regulations, 1961, it is a small opencast mining method adopted. Safety provisions like helmet, goggles, safety shoes, Dust mask, Ear muffs, etc have to be provided as per the circulars and amendments made for Mine labours under the guidance of DGMS being a mechanized operation.
12.6	Disaster management and Risk Assessment	:	Opencast mining method is adopted in this quarry. If the benches are made with proposed height and with no risk will be there. Even then if any minor or major accident happens the quarry staffs having First aid facilities with first aid box with all necessary medicine and stretches etc., to give first aid treatment at the site and will arrange immediately the vehicle to reach nearest hospital, if any disaster happens the lessee is capable to meet such eventualities. At the time of any accident during mining activity, proposal of first aid facility at quarry and one vehicle always ready at quarry site.
12.7	Care and maintenance during temporary discontinuance	:	A board of discontinuance will be changed on the main entrance of the working place. One watch man will be kept on the quarry area for security purposes also look after the survival of the plants.
12.8	Economic repercussions of closure of quarry and man power entrenchments	:	During the five years mining period the employment potential will be generated, general financial status and socio-economic conditions of approx. 23 labors will be improved.

12.9 Proposed Financial Estimate / Budget for (EMP) Environment Management:

A	**Fixed Asset Cost:**		
	1. Land Cost	:	Rs. 14,00,000/-
	2. Labour Shed		Rs. 1,00,000/-
	3. Sanitary Facility	:	Rs. 1,50,000/-
	4. Fencing	:	Rs. 4,00,000/-
	5. Other expenses (Security guard, dust bin, etc)	:	Rs. 4,00,000/-
	Total	:	**Rs. 24,50,000/-**
B	**B. Machinery cost**	:	**Rs. 30,00,000/-** (Hire Basis)
C	**Total Expenditure of EMP cost** (for five years)		
	1. Drinking Water Facility	:	Rs. 1,50,000/-
	2. Sanitary facility & Maintenance	:	Rs. 1,00,000/-
	3. Permanent water sprinkler	:	Rs. 5,00,000/-
	4. Afforestation and its maintenance	:	Rs. 1,00,000/-
	5. Safety Kits	:	Rs. 1,00,000/-
	6. Provision of tyre washing facility	:	Rs. 1,00,000/-
	7. Surface runoff management structures like garland drain, settling pond (0.06.7Hect or 670Sq.m X 400	:	Rs. 2,68,000/-
	8. Blasting materials with blast mat cost	:	Rs. 20,00,000/-
	9. Environment monitoring	:	Rs. 5,00,000/-
	Total	:	**Rs. 38,18,000/-**
D	**Total Project Cost (A+B+C)**	:	**Rs. 92,68,000/-**

13.0 FINANCIAL ASSURANCE:

Not applicable, it is a small B2 rough stone and gravel quarry.

14.0 CERTIFICATES:

All required certificates are enclosed.

15.0 PLAN AND SECTIONS, ETC:

Plan and Sections are submitted along with mining plan.

16.0 ANY OTHER DETAILS INTEND TO FURNISH BY THE APPLICANT

(i) Care and precautionary measures will be taken for the safety of workers as per Rules and Acts.

(ii) The applicant will endeavor every attempt to quarry the rough stone and gravel economically without any wastage and to improve the environment and ecology.

(iii) The Mining Plan is prepared by incorporating the conditions stipulated in the precise area communication issued by the Deputy Director, Department of Geology and Mining, Viluppuram vide letter **Rc.No.A/G&M/389/2022 Dated: 18.07.2023**

(iv)Total proposed production **605962m^3**. Of which, rough stone is **521848m^3** and gravel is **84114m^3** up to a depth of 40m below the ground level (R.L.77m-37m) for first five years plan period.

17.0 CSR Expenditure:

CSR (Corporate Social responsibility) shall provide by the applicant @ 2.0% of average net profit of the company for the last three financial years to the nearby village on the Ministry has notified the amendments in section 135 of the Act as well in the CSR Rules on 22nd January 2021 as circular no. CSR-05/01/2021-CSR-MCA dated 25th August 2021.

Place: Dharmapuri, TN

Date: 19/7/23

Dr.S.KARUPPANNAN.M.Sc.,Ph.D.,

Qualified Person

GEO TECHNICAL MINING SOLUTIONS
(ISO 9001: 2015 Certified Company
1/213-B, Ground Floor, Natesan Complex,
Collectorate Post Office
Oddapatti, Dharmapuri-636705.

This mining plan is approved based on the instructions and guidelines issued by the Commissioner of Geology and Mining, Chennai vide letter Rc. No. 3668/EC/2014, dated: 19-11-2012 and based on incorporation of the conditions laid by the Deputy Director of Geology and Mining, Viluppuram in precise area communication letter Re. No. A/GEM/389/2022 dated 18-07-2023

Date: 20.07.2023

Deputy Director,
Geology and Mining,
Viluppuram.

MB
20/7/23

20/7/23

ந.க.எண். அ/புவி (ம) சுர/389/2022 254
நாள்: 18.07.2023

துணை இயக்குநர்,
புவியியல் மற்றும் சுரங்கத்துறை அலுவலகம்
விழுப்புரம்

குறிப்பாணை

பொருள்: கனிமங்களும் குவாரிகளும் - விழுப்புரம் மாவட்டம் வானூர் வட்டம் - தொள்ளமூர் கிராமம், பட்டா புல எண்கள்: 19/12 (0.31.5), 19/13 (0.35.5), 19/14A (0.22.0), 19/14B (0.10.5), 19/7A (0.42.0), 19/7B (0.21.0) மற்றும் நெமிலி கிராம பட்டா புல எண்.119/1A (2.03.95) ஆகியவற்றின் மொத்த பரப்பு 3.66.45 ஹெக்டேர் பரப்பளவில் சாதாரண கற்கள் மற்றும் கிராவல் குவாரி குத்தகை உரிமம் வேண்டி மனுதாரர் திரு.A.சண்முகம், த/பெ.ஆறுமுகம் என்பவர் விண்ணப்பம் செய்தது - உரிமம் வழங்க பரிந்துரை செய்து அறிக்கை வரப்பெற்றது - தகுதியான நிலப்பரப்பாக கருதி வரைவு சுரங்க திட்டம் மற்றும் சுற்றுச்சூழல் தாக்க மதிப்பீட்டு ஆணைய இசைவிணை பெற்று சமர்பிக்கக் கோருதல் - தொடர்பாக.

பார்வை:
1. திரு.A.சண்முகம், த/பெ.ஆறுமுகம், எண்.176/2, மெயின் ரோடு, தளவானூர் கிராமம் மற்றும் அஞ்சல், விழுப்புரம் வட்டம் மற்றும் மாவட்டம் என்பவரது விண்ணப்பம் நாள்.23.12.2022.
2. வருவாய் கோட்டாட்சியர், விழுப்புரம் கடித எண். ந.க. அ1/1970/2023, நாள்: 03.06.2023.
3. விழுப்புரம், புவியியல் மற்றும் சுரங்கத்துறை துணை இயக்குநர் அலுவலக உதவி புவியியலாளர் புலத்தணிக்கை அறிக்கை நாள்: 23.06.2023.
4. திரு.A.சண்முகம், த/பெ.ஆறுமுகம், எண்.176/2, மெயின் ரோடு, தளவானூர் கிராமம் மற்றும் அஞ்சல், விழுப்புரம் வட்டம் மற்றும் மாவட்டம் என்பவரது மனு நாள்.17.07.2023.

----000----

விழுப்புரம் மாவட்டம் மற்றும் வட்டம், தளவானூர் கிராமம் மற்றும் அஞ்சல், எண்.176/2, மெயின் ரோடு என்ற முகவரியைச் சேர்ந்த திரு.A.சண்முகம், த/பெ.ஆறுமுகம் என்பவர் வானூர் வட்டம், தொள்ளமூர் கிராமம், பட்டா புல எண்கள்.19/12 (0.31.5), 19/13 (0.35.5), 19/14A (0.22.0), 19/14B (0.10.5), 19/7A (0.42.0), 19/7B (0.21.0) மற்றும் நெமிலி கிராம பட்டா புல எண்.119/1 (பகுதி) (2.04.0) ஆகியவற்றில் 3.66.5 ஹெக்டேர் பரப்பளவில் உள்ள நிலத்தில் 10 ஆண்டுகளுக்கு சாதாரண கற்கள் மற்றும் கிராவல் வெட்டியெடுத்து குவாரிபணி செய்ய உரிமம் வழங்கிட கோரி பார்வை 1-ல் கண்டவாறு விண்ணப்பம் செய்துள்ளார்.

அதன் அடிப்படையில், தமிழ்நாடு சிறு கனிம சலுகை விதிகள் 1959 விதி எண்.41-ன்படி குவாரிப்பணி மேற்கொள்வது தொடர்பாக வரைவு சுரங்க திட்டத்தினை தகுதிவாய்ந்த நபர் (QP) மூலமாக கீழ்கண்ட நிபந்தனைகளுக்குட்பட்டு தயாரித்து அதனை 90 தினங்களுக்குள் துணை இயக்குநர் (புவியியல் மற்றும் சுரங்கத்துறை) அவர்களின் பரிசீலனைக்கு சமர்ப்பிக்குமாறு விண்ணப்பதாரரை கேட்டுக்கொள்ளப்படுகிறது. மேலும் ஏற்பளிக்கப்பட்ட சுரங்கத்திட்டத்தின் தொடர்ச்சியாக 1959ம் வருடத்திய தமிழ்நாடு சிறுகனிம சலுகை விதிகள், விதி எண்.42-ன்படி சுற்றுச்சூழல் தாக்க மதிப்பீட்டு ஆணையத்தின் தடையின்மை சான்று பெற்று சமர்பிக்கும் பட்சத்தில் மட்டுமே குவாரி உரிமம் வழங்கப்படும் என இதன் மூலம் தெரிவிக்கப்படுகிறது.

i. விண்ணப்ப புலங்களின் அருகிலுள்ள பட்டா நிலங்களுக்கு 7.5 மீட்டர் பாதுகாப்பு இடைவெளிவிட்டும் அரசு புறம்போக்கு நிலங்களுக்கு 10 மீட்டர் பாதுகாப்பு இடைவெளி விட்டும் குவாரி பணி செய்ய வேண்டும்.
ii. விண்ணப்ப புலங்களின் மேற்கில் செல்லும் வண்டிபாதைக்கு 10 மீட்டர் பாதுகாப்பு இடைவெளி விட்டு குவாரி பணி செய்ய வேண்டும்.
iii. குவாரிப்பணி மேற்கொள்ளும் போது அருகிலுள்ள அரசு புறம்போக்கு, வண்டிப்பாதை மற்றும் பட்டா நிலங்களுக்கு எவ்வித இடையூறும் இல்லாமல் குவாரிப்பணி செய்ய வேண்டும்.
iv. குவாரி குத்தகை வழங்கும் முன்பு விண்ணப்பித்துள்ள இடத்தினை DGPS சர்வே பணி மேற்கொண்டு அதன் அறிக்கையை சமர்பிக்க வேண்டும்.

துணை இயக்குநர்,
புவியியல் மற்றும் சுரங்கத்துறை,
விழுப்புரம்.

பெறுநர்

திரு.A.சண்முகம்,
த/பெ.ஆறுமுகம்,
எண்.176/2, மெயின் ரோடு,
தளவானூர் கிராமம் மற்றும் அஞ்சல்,
விழுப்புரம் வட்டம் மற்றும் மாவட்டம்.

நகல்:-

1. மாநில சுற்றுச்சூழல் தாக்க மதிப்பீட்டு ஆணையம், சென்னை.
2. இயக்குநர், புவியியல் மற்றும் சுரங்கத்துறை, கிண்டி, சென்னை.

தமிழக அரசு

வருவாய்த் துறை

நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு

மாவட்டம் : விழுப்புரம் வட்டம் : வானூர்

வருவாய் கிராமம் : நெமிலி பட்டா எண் : 575

உரிமையாளர்கள் பெயர்

1. ஆறுமுகம் தந்தை சண்முகம்

புல எண்	உட்பிரிவு	புன்செய்		நன்செய்		மற்றவை		குறிப்புரைகள்
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை	
		ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	
105	6	0 - 19.00	0.80	--	--	--	--	2019/0103/07/206916-- -- 06-12-2019
106	4B	0 - 4.65	0.20	--	--	--	--	2022/0105/07/410229--2022/07/02/000082SD -- 02-08-2022
106	5	0 - 13.50	0.57	--	--	--	--	2019/0103/07/206916-- -- 06-12-2019
106	6	0 - 25.50	1.07	--	--	--	--	2019/0103/07/206916-- -- 06-12-2019
106	7A	0 - 15.80	0.66	--	--	--	--	2022/0105/07/410229--2022/07/02/000082SD -- 02-08-2022
119	1A	2 - 3.95	8.57	--	--	--	--	2022/0105/07/437478--2022/07/02/000086SD -- 31-12-2022
		2 - 82.40	11.87					

குறிப்பு2 :

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **https://eservices.tn.gov.in** என்ற இணைய தளத்தில் **07/02/052/00575/60277** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.
2. இத் தகவல்கள் 19-07-2023 அன்று 06:36:15 PM நேரத்தில் அச்சடிக்கப்பட்டது.
3. கைப்பேசி கேமராவின்2D barcode படிப்பான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்

District : Viluppuram

Taluk : VANUR

Village : Thollamur [266]

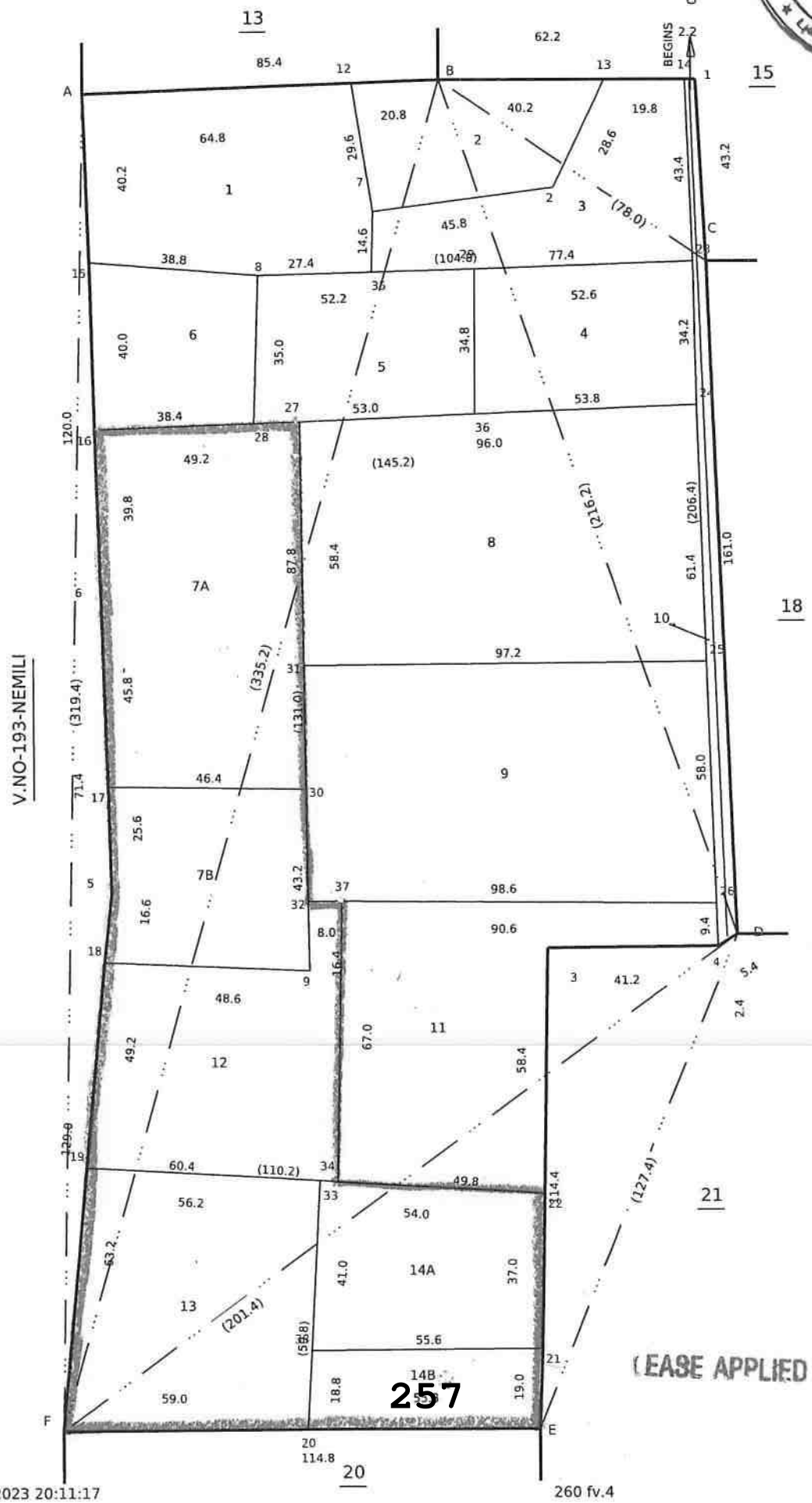
Survey No : 19

Area : Hect 04 Ares 39.5

Scale : 1 : 1000

ANNEXURE-II

20 JUL 2023



Date of Issue: 19-07-2023 20:11:17

260 fv.4

District : Viluppuram

Taluk : VANUR

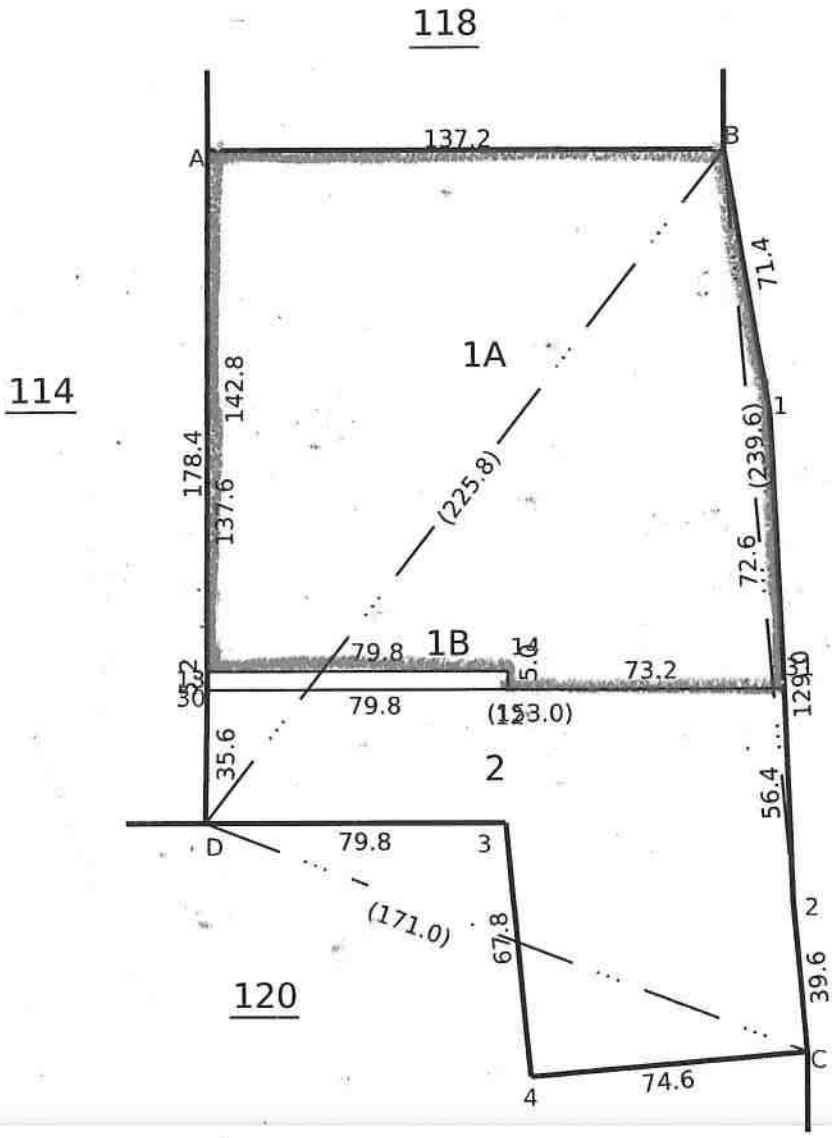
Village : Nemili [52]

Survey No : 119

Area : Hect 03 Ares 11.50

Scale : 1 : 2000

20 JUL 2023



V.NO.266.THOLLAMUR.

LEASE APPLIED AREA

258

Data Digitally Signed By
GOVARTHANAN
260 fv.3

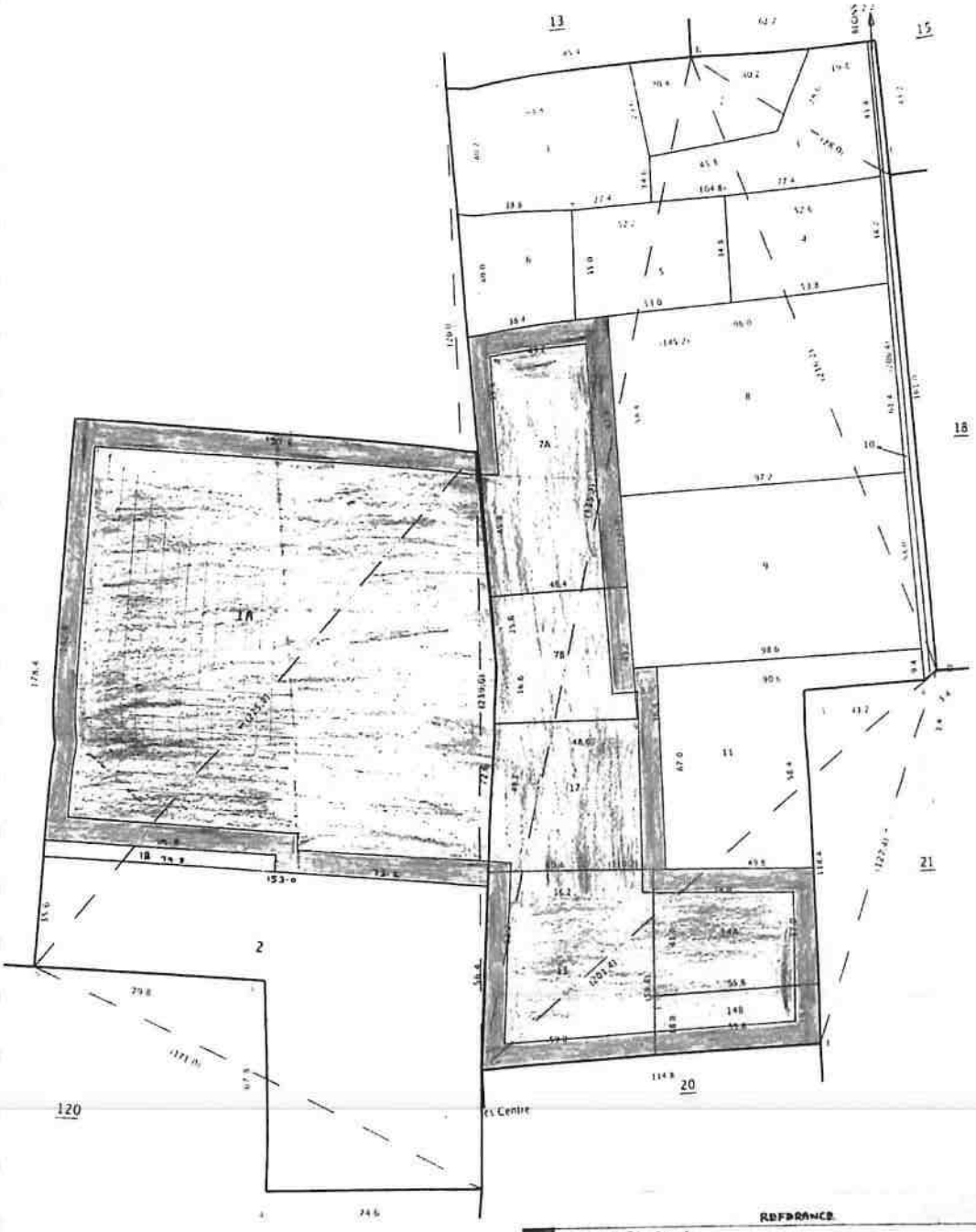
Date of Issue: 19-07-2023 20:10:06

மாவட்டம் : விருதுநகர்

தாலுகா : ஸ்ரீவில்லிபுத்தூர்

கிராமம் : ஆலங்குளம், சேத்தூர்

மொத்தரகம் : 119.9



REFERANCE

ஆலங்குளம் கிராமம்

- புல எண் 19/7A 0-32-0, 19/7B 0-31-0, 19/12 0-31-5, 19/13 0-35-5 19/14A 0-31-0, 19/14B 0-19-5 = 1-61-5 ஆகியவை

சேத்தூர் கிராமம்

புலஎண் 119/1A 2-03-95 ஆகிய மேலும் = 3-66-45 ஆகியவை

பாதுகாப்பு கையகப்படுத்தும் 0-73-72ஆகிய நீக்கம் 2-92-73 ஏக்கர் பரப்பில் தற்சான மற்ற மற்ற கிராம சுவர்களுக்கு அருகில் மேலும் பகுதி.

- பாதுகாப்பு கையகப்படுத்தி மற்றும் அகற்றப்பட்டது = 0-73-72 ஹெக்

ANNEXURE III

20 JUL 2023

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : தொள்ளாமூர்

1. புல எண்	19	9. மண் வயனமும் ரகமும்	3 - 5
2. உட்பிரிவு எண்	7A	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	-6	11. தீர்வை (ரூ - ஹெ)	4.20
4. பகுதி	P	12. பரப்பு (ஹெக்டேர் - ஏர்)	0 - 42.00
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	1.80
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	1378
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	1.சண்முகம்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் 20609 என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : தொள்ளாமூர்

1. புல் எண்	19	9. மண் வயனமும் ரகமும்	3 - 5
2. உட்பிரிவு எண்	7B	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	-6	11. தீர்வை (ரூ - ஹெ)	4.20
4. பகுதி	P	12. பரப்பு (ஹெக்டேர் - ஏர்)	0 - 21.00
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	0.90
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	1378
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	1.சண்முகம்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் http://eservices.tn.gov.in என்ற இணைய தளத்தில் 20609 என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : தொள்ளாமூர்

1. புல எண்	19	9. மண் வயனமும் ரகமும்	3 - 5
2. உட்பிரிவு எண்	8	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	53-7A	11. தீர்வை (ரூ - ஹெ)	4.20
4. பகுதி	-	12. பரப்பு (ஹெக்டேர் - ஏர்)	0 - 57.00
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	2.39
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	1378
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	1.சண்முகம்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் http://eservices.tn.gov.in என்ற இணைய தளத்தில் 20609 என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : தொள்ளாமூர்

1. புல எண்	19	9. மண் வயனமும் ரகமும்	3 - 5
2. உட்பிரிவு எண்	12	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	-9	11. தீர்வை (ரூ - ஹெ)	4.20
4. பகுதி	-	12. பரப்பு (ஹெக்டேர் - ஏர்)	0 - 31.50
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	1.32
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	1378
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	1.சண்முகம்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் 20609 என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : தொள்ளாமூர்

1. புல எண்	19	9. மண் வயனமும் ரகமும்	3 - 5
2. உட்பிரிவு எண்	13	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	-10	11. தீர்வை (ரூ - ஹெ)	4.20
4. பகுதி	-	12. பரப்பு (ஹெக்டேர் - ஏர்)	0 - 35.50
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	1.49
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	1378
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	1.சண்முகம்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் 20609 என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : தொள்ளாமூர்

1. புல எண்	**19**	9. மண் வயனமும் ரகமும்	**3 - 5**
2. உட்பிரிவு எண்	**14A**	10. மண் தரம்	**5**
3. பழைய புல உட்பிரிவு எண்	**-11**	11. தீர்வை (ரூ - ஹெ)	**4.20**
4. பகுதி	**P**	12. பரப்பு (ஹெக்டேர் - ஏர்)	**0 - 22.00**
5. அரசு / ரயத்துவாரி	**ரயத்துவாரி**	13. மொத்த தீர்வை (ரூ - பை)	**0.90**
6. நிலத்தின் வகை	**புஞ்சை**	14. பட்டா எண்	**1378**
7. பாசன ஆதாரம்	**-**	15. குறிப்பு	**-**
8. இரு போகமா	**-**	16. பெயர்	**1.சண்முகம்**

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **20609** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : நெமிலி

1. புல எண்	119	9. மண் வயனமும் ரகமும்	3 - 5
2. உட்பிரிவு எண்	1	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	6-1A	11. தீர்வை (ரூ - ஹெ)	4.20
4. பகுதி	P	12. பரப்பு (ஹெக்டேர் - ஏர்)	2 - 8.00
5. அரசு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	8.80
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	575
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	1.சண்முகம்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **20277** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

அ-பதிவேடு விவரங்கள்

மாவட்டம் : விழுப்புரம்

வட்டம் : வானூர்

கிராமம் : தொள்ளாமூர்

1. புல எண்	19	9. மண் வயனமும் ரகமும்	3 - 5
2. உட்பிரிவு எண்	14B	10. மண் தரம்	5
3. பழைய புல உட்பிரிவு எண்	-11	11. தீர்வை (ரூ - ஹெ)	4.20
4. பகுதி	P	12. பரப்பு (ஹெக்டேர் - ஏர்)	0 - 10.50
5. அர்சு / ரயத்துவாரி	ரயத்துவாரி	13. மொத்த தீர்வை (ரூ - பை)	0.50
6. நிலத்தின் வகை	புஞ்சை	14. பட்டா எண்	1378
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	1.சண்முகம்

குறிப்பு 1:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **http://eservices.tn.gov.in** என்ற இணைய தளத்தில் **20609** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

தமிழக அரசு

வருவாய்த் துறை

நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு

மாவட்டம் : விழுப்புரம் வட்டம் : வானூர்

வருவாய் கிராமம் : தொள்ளாமூர் பட்டா எண் : 1378

உரிமையாளர்கள் பெயர்

1. ஆறுமுகம் தந்தை சண்முகம்

புல எண்	உட்பிரிவு	புன்செய்		நன்செய்		மற்றவை		குறிப்புரைகள்
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை	
		ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	
19	12	0 - 31.50	1.32	--	--	--	--	2022/0103/07/276191- -- -- 31-07-2022
19	13	0 - 35.50	1.49	--	--	--	--	2022/0103/07/276191- -- -- 31-07-2022
19	14A	0 - 22.00	0.90	--	--	--	--	2022/0103/07/276191- -107/1415-1 -- 31-07-2022
19	14B	0 - 10.50	0.50	--	--	--	--	2022/0103/07/276191- -107/1415-1 -- 31-07-2022
19	7A	0 - 42.00	1.80	--	--	--	--	2022/0103/07/276191- -107/1415 -- 31-07-2022
19	7B	0 - 21.00	0.90	--	--	--	--	2022/0103/07/276191- -107/1415 -- 31-07-2022
19	8	0 - 57.00	2.39	--	--	--	--	2022/0103/07/276191- -- -- 31-07-2022
21	5	0 - 28.00	1.55	--	--	--	--	2022/0103/07/276191- -- -- 31-07-2022
		2 - 47.50	10.85					

குறிப்பு2 :

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் https://eservices.tn.gov.in என்ற இணைய தளத்தில் 07/02/266/01378/20609 என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.
2. இத் தகவல்கள் 22-12-2022 அன்று 06:29:22 PM நேரத்தில் அச்சடிக்கப்பட்டது.
3. கைப்பேசி கேமராவின்2D barcode படிப்பான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்.

20 JUL 2023

கிராமக் கணக்கு

1432 - ஆம் பசலியில் விழுப்புரம் மாவட்டம் வானூர் வட்டம் 52. நெமிலி

நில வரித் திட்டத்தின்படி புலன்களின் விபரம்.						சாகுபடியாளரின் பெயர்.	முதல் போகம்.				
நில அளவை எண்.	உட்பிரிவு எண்.	பரப்பு.	தீர்வை.	ஒரு போகம் அல்லது இரு போகம்.	கைப்பற்று தாரருடைய பெயரும் எண்ணும் அல்லது அநுபோகதாரருடைய பெயர்.	நிலத்தின் எந்த பகுதி யாவது சாகுபடியாளரால் பயிரிடப்பட்டுள்ளதா.	எந்த மாதத்தில் பயிர் செய்யப்பட்டது, எந்த மாதத்தில் அறுவடை செய்யப்பட்டது.	பயிரின் பெயர்.	பயிரான / அறுவடையான பரப்பு.	உண்மையான பாய்ச்சல் ஆதாரம்.	விளைச்சல் அளவு விழுக்காடு.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
119	1(P)	2.04.0	8.8	5.75	சண்முகம் த/பெ [illegible]		12	கரும்பு	2.04.0	———	→
							([illegible]	[illegible])	2.04.0		

கனிம மற்றும் சுரங்க, புவியியல் துறை பயன்பாட்டிற்காக வேண்டி வழங்கப்படுகிறது.

Village Administrative Officer,
Nemili Village,
Vanur Taluk.

380/18-R.F.III-A10-5,00,000 Cps.-GBP.-Mdu-7-2021.

கிராமக் கணக்கு

1432 - ஆம் பசலியில் விழுப்புரம் மாவட்டம் வானூர் வட்டம் பெ.தொள்ளாமூர்

நில வரித் திட்டத்தின்படி புலன்களின் விபரம்.						சாகுபடியாளரின் பெயர்.	முதல் போகம்.				
நில அளவை எண். (1)	உட்பிரிவு எண். (2)	பரப்பு. (3)	தீர்வை. (4)	ஒரு போகம் அல்லது இரு போகம். (5)	கைப்பற்று தாரருடைய பெயரும் எண்ணும் அல்லது அனுபோக தாரருடைய பெயர். (6)	நிலத்தின் எந்த பகுதி யாவது சாகுபடியாளரால் பயிரிடப்பட்டுள்ளதா. (7)	எந்த மாதத்தில் பயிர் செய்யப்பட்டது எந்த மாதத்தில் அறுவடை செய்யப்பட்டது. (8)	பயிரின் பெயர். (9)	பயிரான / அறுவடையான பரப்பு. (10)	உண்மையான பாய்ச்சல் ஆதாரம். (11)	விளைச்சல் அளவு விழுக்காடு. (12)
19	12	0315	1.32	1378	[illegible]		12	கரம்பு	0315		
19	13	0385	1.49	1378	[illegible]		12	கரம்பு	0385		
19	14A	0220	0.90	1378	-do-		12	கரம்பு	0220		
19	14B	0105	0.50	1378	-do-		12	கரம்பு	0105		
19	7A	0420	1.80	1378	-do-		12	கரம்பு	0420		
19	7B	0210	0.90	1378	-do-		12	கரம்பு	0210		
19	8	0570	2.39	1378	-do-		12	கரம்பு	0570		
									2.19.5		

/உண்மை நகல்/

[illegible]

S. Raj

கிராம நிர்வாக அலுவலர், [illegible] மற்றும் [illegible] பெ.தொள்ளாமூர் கிராமம் வானூர் வட்டம், விழுப்புரம் மாவட்டம்.

R.F.III-A10-5,00,000 Cps.-GBP.-Mdu-7-2021.

ANNEXURE - V

20 JUL 2023

PHOTOCOPY OF THE APPLIED LEASE AREA

Site photos in respect of rough stone and gravel quarry lease in S.F.No's 19/12, 19/13, 19/14A, 19/14B, 19/7A & 19/7B over an extent of 3.66.5 Hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State in belonging to **Mr.A.Shanmugam ,**


आयकर विभाग
INCOME TAX DEPARTMENT
भारत सरकार
GOVT. OF INDIA
SHANMUGAM
ARUMUGAM
14/05/1989
Permanent Account Number
GPIPS1360L
Signature


Government of India
Shanmugam Arumugam
MALE
9741 1253 1583
VID : 9162 4178 2873 9849

ANNEXURE (1)

No. 6450
20 JUL 2023

Reg. No. 03BBB1007
Col Code 013 /106

பெரியார் பல்கலைக்கழகம்
Periyar University

அறிவியல் புலம்
FACULTY OF SCIENCE

பெரியார் பல்கலைக்கழக ஆட்சிக்குழு **2005** ஆம் ஆண்டு ஏப்ரல் மாதம் நடந்த **பயன்பாட்டு புவியமைப்பியல்** தேர்வில்

S கருப்பண்ணன் என்பவர்

தனிச்சிறப்புடன் முதல் வகுப்பில் தேர்ச்சி பெற்றார் என்று தக்க தேர்வாளர்கள் சான்றளித்தபடி **அறிவியல் நிறைஞர்**

என்னும் பட்டத்தை அவருக்குப் பல்கலைக்கழக இலச்சினையுடன் வழங்குகிறது.

The Syndicate of the **Periyar University** *hereby makes known that* **KARUPPANNAN S** *has been admitted to the* **DEGREE OF MASTER OF SCIENCE** *in* **APPLIED GEOLOGY**

he /she having been certified by duly appointed Examiners to be qualified to receive the same and was placed in the **FIRST CLASS WITH DISTINCTION** *at the Examination held in* **APR-2005**

Given under the seal of this university

IAC. No. 142 / TNGST. No. 2702141
CST. No. 704829 / SLM / Dt. 7-4-99

BALAJI MINES

Proprietor : E. SANTHARAMAN,
PURITY LIME STONE SUPPLIERS,
5/88, CHINNAGOLLAPATTI, KANNANKURICHI P.O.
SALEM-636 008. Tamil Nadu.

Mines : Devar Malai Village, Kulithalai Tk., KARUR Dt. (Via) Karur to Palayam.

Date 15-10-2010

EXPERIENCE CERTIFICATE

I E.SANTHARAMAN being the Managing Director of BALAJI MINES do hereby certify that Thiru. S.KARUPPANNAN, son of T.SUNDARAM (Whose signature is appended) worked as a Geologist in Balaji Mine, Devar malai village, kulithalai Taluk, Karur District, from 01.06.2005 to 10.10.2010. During his term of work aforesaid, he has obtained practical experience as detailed overleaf. The duties connected with his work have involved his 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 person to be examined for Certificate of Competency.

E. Santharaman

(Signature with date and official Seal)

TIN No:33852702141
CST No:704829 / 7-4-99
BALAJI MINES
5/88, Chinnagollapatty,
Kannankurichi (P.O), SALEM-8.

(Signature of Candidate)

K.P.RAMAN
Cell : 94876 33359

K.P.LAKSHMANAN
Cell : 94432 84875
04348-244321

SRI RAMAJAYAM
GRANITES

731, Krishnagiri Main Road, Opp. E.B.Office, **MATHUR - 635 203.**
email : sriramajayamgranites@gmail.com

Date : 11.10.2011

EXPERIENCE CERTIFICATE

This is to certify that **Mr.Karuppannan Sundaram** has been worked as a **"Senior Geologist"** in our company from **11thOctober 2010 to 11thOctober 2011.** During this period, he has been involved in the Quality Control for Granite block extraction from quarry. Involvement of his work is highly appreciated and have been efficiently worked in our company. The duties connected with his work have been continuous attendance at the quarry.

I wish him all the best in all his future endeavors.

For SRI RAMAJEYAM GRANITES

K. P. Lakshmanan

Proprietor

11/10/2011

/Attested/
18/11/2020

DEPUTY DIRECTOR
DEPARTMENT OF GEOLOGY AND MINING
DHARMAPURI

GOLDEN ARROW CO. LTD
EXCLUSIVE DISTRIBUTOR FOR TOYOTA MOTORS
P.O Box: 465 Khartoum – Sudan
Tel: 83471597-83471598-83573323-
3573324- 83579497
Fax: 83-471592

TOYOTA

شركة السهم الذهبي المحدوده
الوكلاء الوحيدون لشركة تويوتا
ص.ب: 465 الخرطوم – السودان
-83573324-83573323-83471598-83471597
83579497
فاكس: 83471592

Date: October 13th 2013

CERTIFICATION

TO WHOM IT MAY CONCERN

This is to certify that **Mr. KARUPPANNAN SUNDARAM (PASS PORT NO: G0050390)** has being working in Golden Arrow Co. Ltd. As a Senior Geologist from **14th October 2011 to 13th October 2013.**

In this period he was done in the following disciplines:

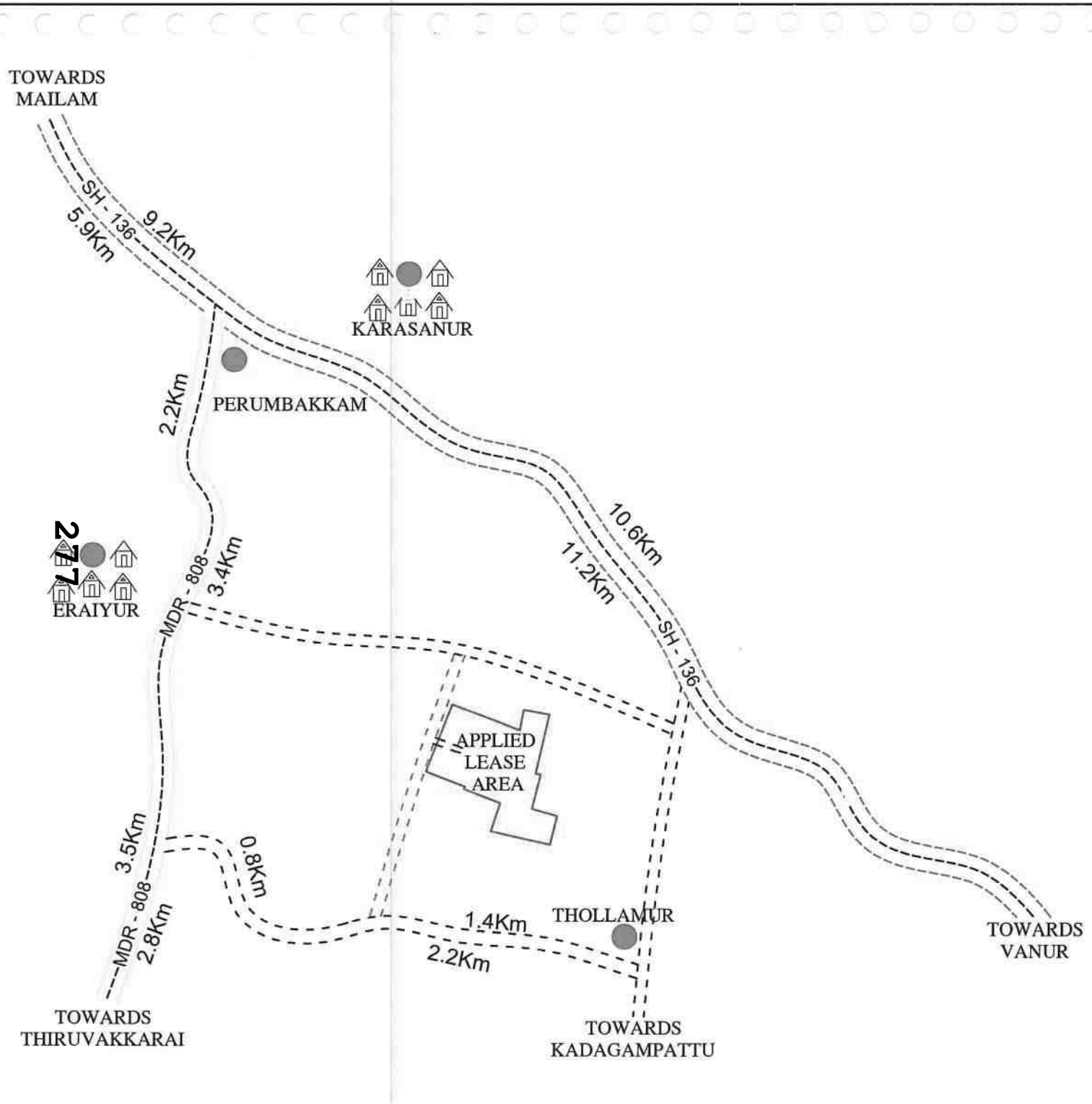
1. Exploration of gold and associate metals
2. Detail Geological Mapping.
3. Geochemical sampling
4. Trenching
5. Core Drilling sampling and analysis
6. Feasibility report, quarterly report and annual report preparation
7. Design the mine plan

During this period we found him enthusiastic and having strong knowledge in earth science field. Based on which we are confident that he can take up challenging tasks, in this field successfully.

We wish him all best in all his future endeavors.

13/10/2013
Khartoum

GOLDEN ARROW CO. LTD.



N

PLATE NO-I

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

- MINE LEASE AREA
- APPROACH ROAD
- CART ROAD
- VILLAGE ROAD
- MDR - 578 ROAD
- SH - 134 ROAD

KEY MAP

Not to Scale

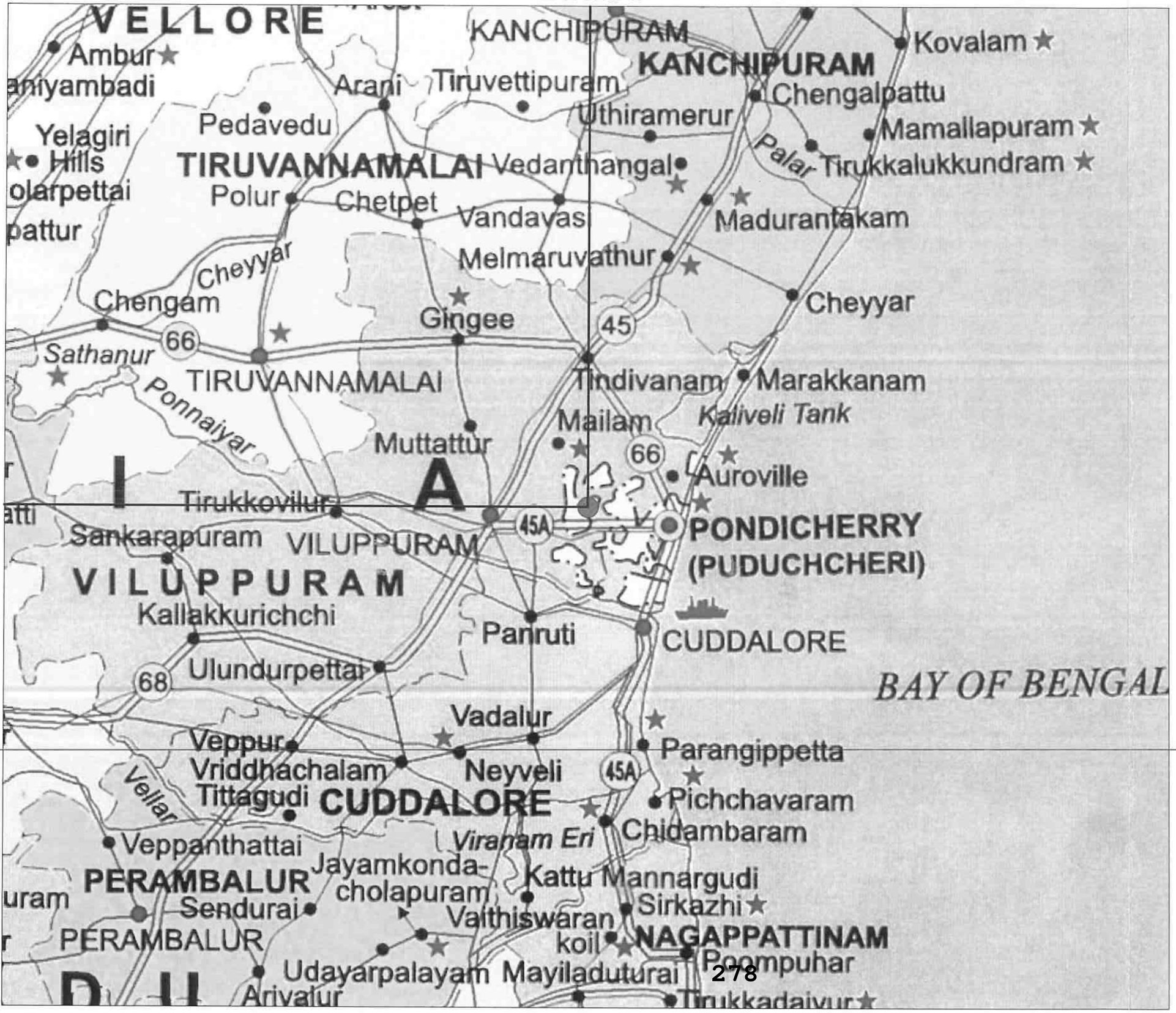
Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

12°03'19.07"N

79°39'55.90"E



278

N

PLATE NO-IA

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA :

TOPO SHEET NO : 57-P/12

LATITUDE : 12°3'10.41"N to 12°3'19.07"N

LONGITUDE : 79°39'55.90"E to 79°40'3.71"E

LOCATION PLAN
NOT TO SCALE

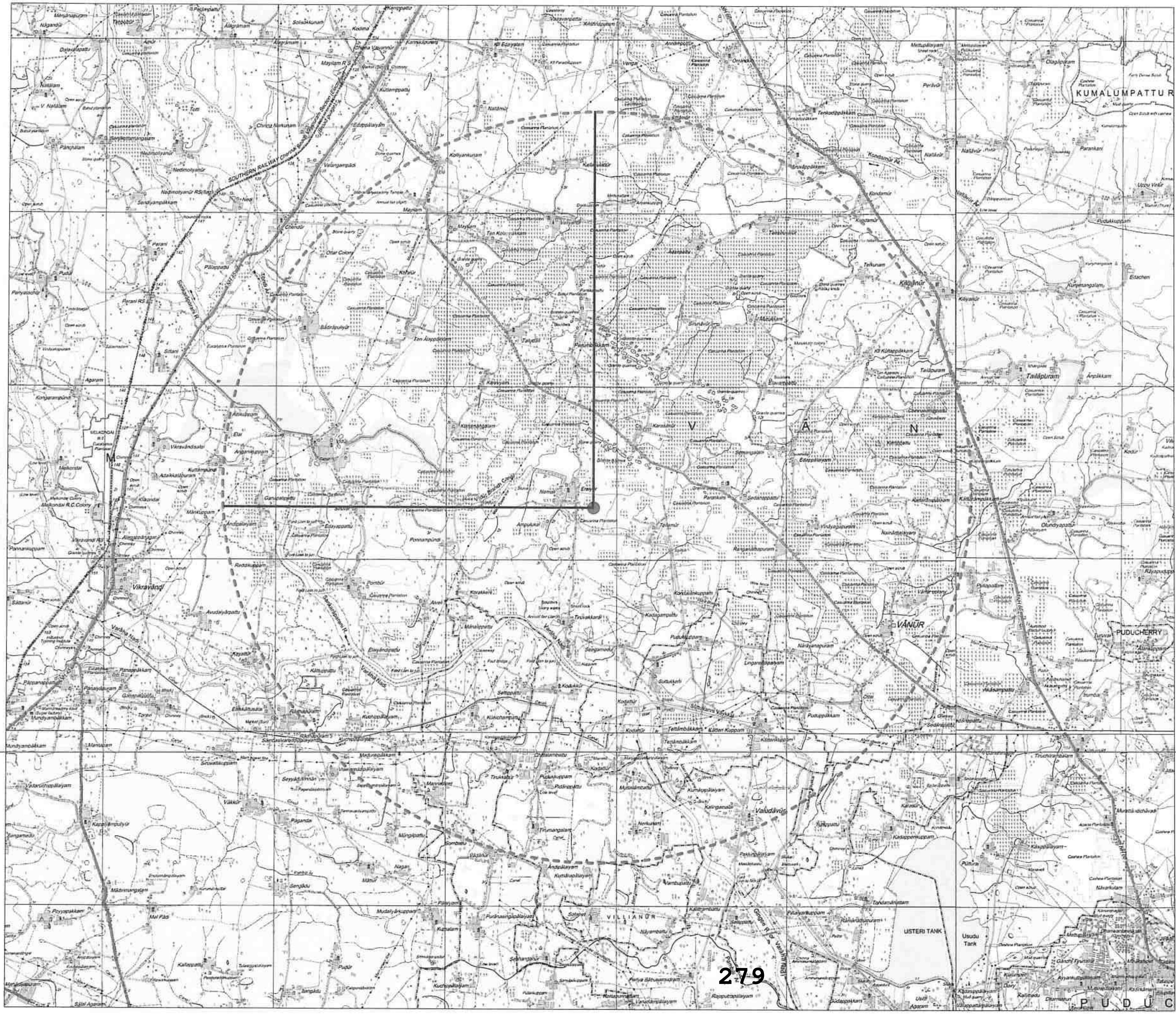
Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

12°03'19.07"N

79°39'55.90"E



N

PLATE NO-IB

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

TOPO SHEET NO : 57-P/12

LATITUDE : 12°3'10.41"N to 12°3'19.07"N

LONGITUDE : 79°39'55.90"E to 79°40'3.71"E

MINE LEASE AREA

10KM RADIUS

TOPOSHEET MAP

SCALE– 1:1,00,000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

12°03'19.07"N

TOWARDS ERAIYUR

79°39'55.90"E

TOWARDS THOLLAMUR

TOWARDS AMBUZHUKKAI

N

20 JUL 2023

PLATE NO-IC

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

- MINE LEASE AREA
- APPROACH ROAD
- CART ROAD
- VILLAGE ROAD
- EXISTING PIT
- 100m RADIUS
- 200m RADIUS
- 300m RADIUS
- 400m RADIUS
- 500m RADIUS

TOPO SHEET NO : 57-P/12

LATITUDE : 12°3'10.41"N to 12°3'19.07"N

LONGITUDE : 79°39'55.90"E to 79°40'3.71"E

SATELITE IMAGERY MAP

SCALE– 1:5000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

OCTOBER TO DECEMBER

12°03'19.07"N

TOWARDS THOLLAMUR

TOWARDS ERAIYUR

79°39'55.90"E

TOWARDS AMBUZHUKKAI

281

JULY TO SEPTEMBER

N

PLATE NO-ID

20 JUL 2023

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

- MINE LEASE AREA
- APPROACH ROAD
- CART ROAD
- VILLAGE ROAD
- EXISTING PIT
- 100m RADIUS
- 200m RADIUS
- 300m RADIUS
- 400m RADIUS
- 500m RADIUS
- SHRUBS & TREES
- HABITATIONS
- WIND DIRECTION

TOPO SHEET NO : 57-P/12

LATITUDE : 12°3'10.41"N to 12°3'19.07"N

LONGITUDE : 79°39'55.90"E to 79°40'3.71"E

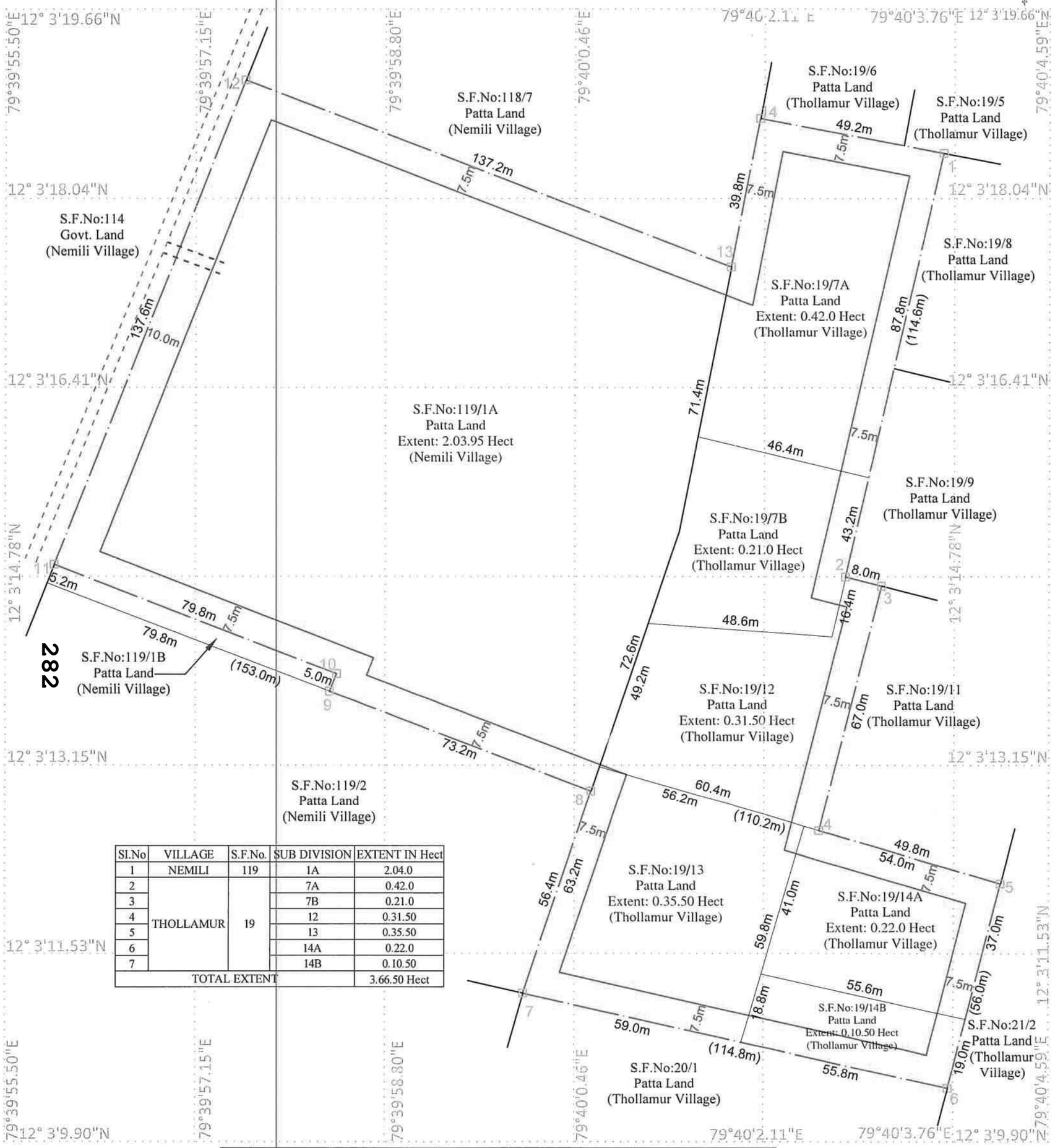
ENVIRONMENTAL PLAN

SCALE– 1:5000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON



Sl.No	VILLAGE	S.F.No.	SUB DIVISION	EXTENT IN Hect
1	NEMILI	119	1A	2.04.0
2	THOLLAMUR	19	7A	0.42.0
3			7B	0.21.0
4			12	0.31.50
5			13	0.35.50
6			14A	0.22.0
7			14B	0.10.50
TOTAL EXTENT				3.66.50 Hect

Sl.No	LATITUDE	LONGITUDE	Sl.No	LATITUDE	LONGITUDE	Sl.No	LATITUDE	LONGITUDE
1	12° 3'18.46"N	79°40'3.63"E	6	12° 3'10.41"N	79°40'3.71"E	11	12° 3'14.90"N	79°39'55.90"E
2	12° 3'14.82"N	79°40'2.80"E	7	12° 3'11.21"N	79°40'0.00"E	12	12° 3'19.07"N	79°39'57.54"E
3	12° 3'14.74"N	79°40'3.11"E	8	12° 3'12.96"N	79°40'0.59"E	13	12° 3'17.48"N	79°40'1.78"E
4	12° 3'12.62"N	79°40'2.58"E	9	12° 3'13.81"N	79°39'58.30"E	14	12° 3'18.76"N	79°40'2.02"E
5	12° 3'12.17"N	79°40'4.16"E	10	12° 3'13.96"N	79°39'58.36"E			

PLATE NO-II

MINE LEASE PLAN
SCALE 1 : 1000

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:
S.F.NO : 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT : 3.66.45 Hect
VILLAGE : THOLLAMUR & NEMILI,
TALUK : VANUR,
DISTRICT : VILUPPURAM.

INDEX
- MINE LEASE AREA
- SAFETY DISTANCE
- APPROACH ROAD
- CART ROAD
- BOUNDARY PILLAR STONES □1

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

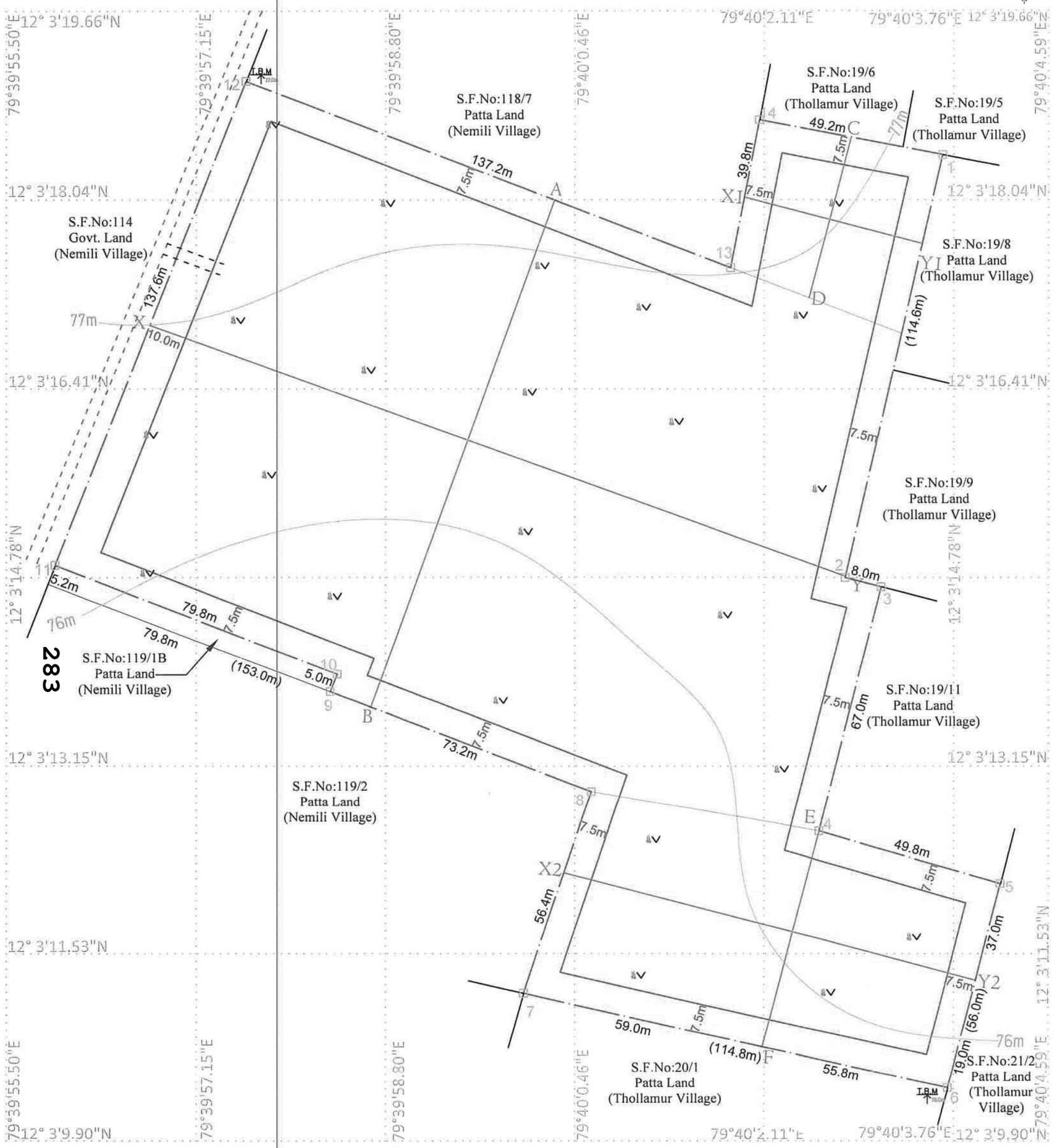


PLATE NO-III

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA		GRAVEL	V V V
SAFETY DISTANCE		SHRUBS	
APPROACH ROAD		TEMPORARY BENCH MARK	T.B.M
BOUNDARY PILLAR STONES		CONTOUR LINES	77m
CART ROAD			

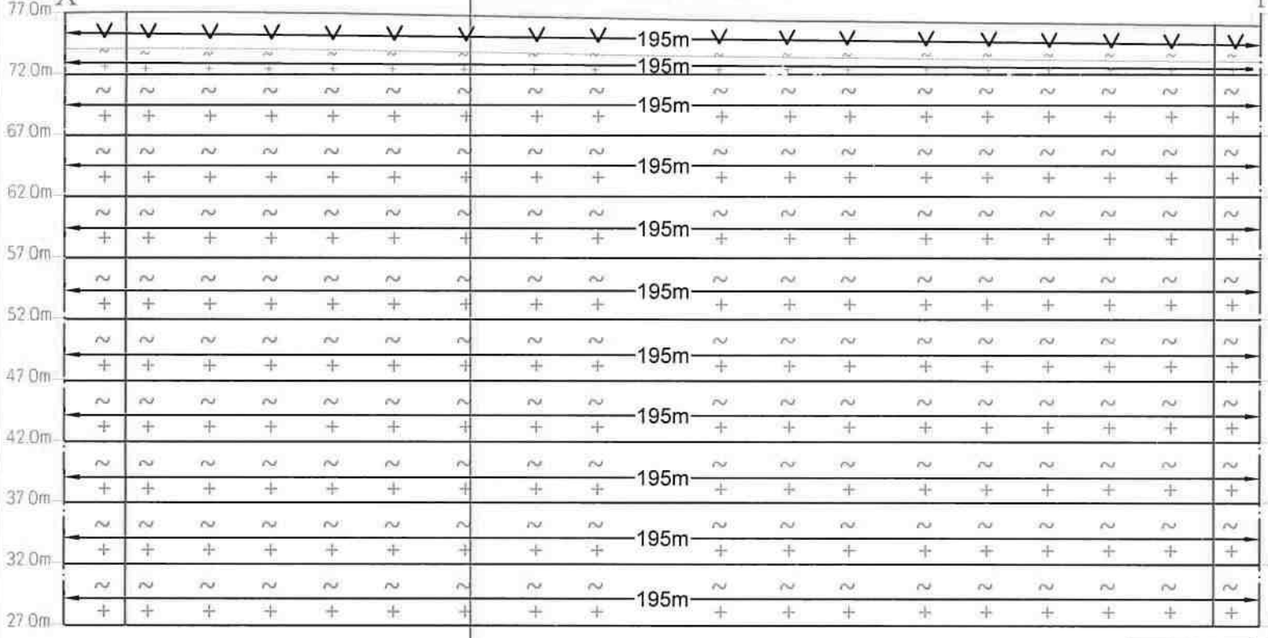
SURFACE & GEOLOGICAL PLAN
SCALE 1: 1000

Prepared By:

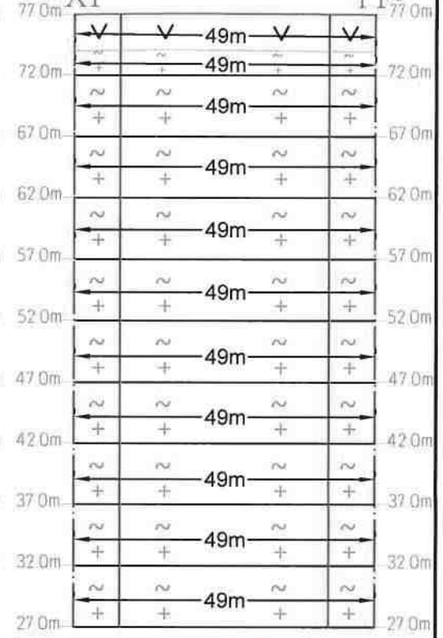
I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

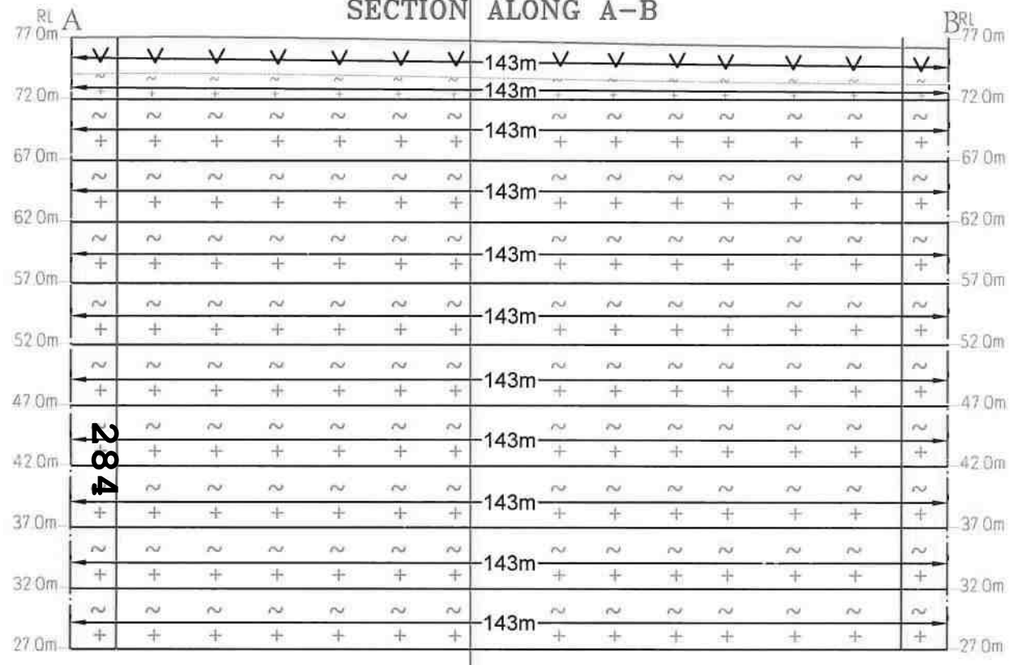
SECTION ALONG X–Y



SECTION ALONG X1–Y1



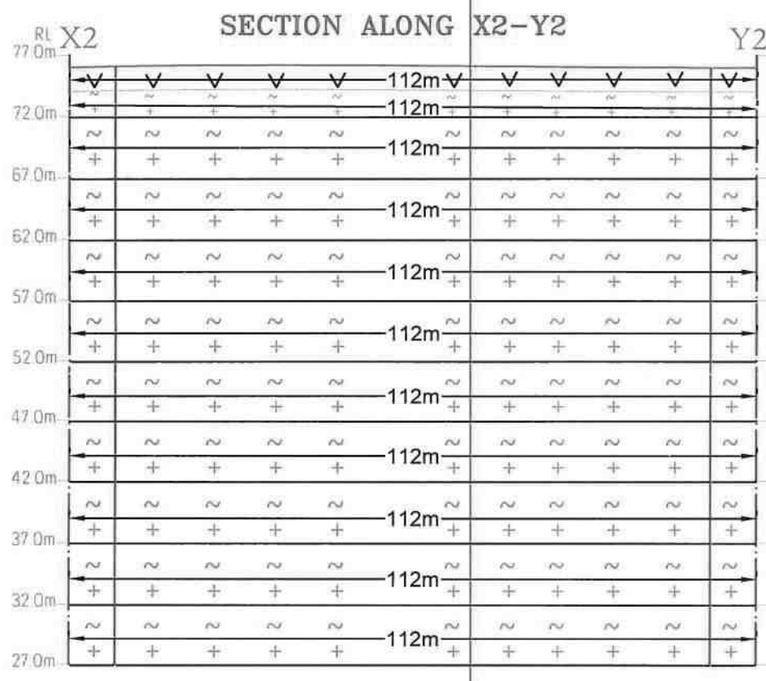
SECTION ALONG A–B



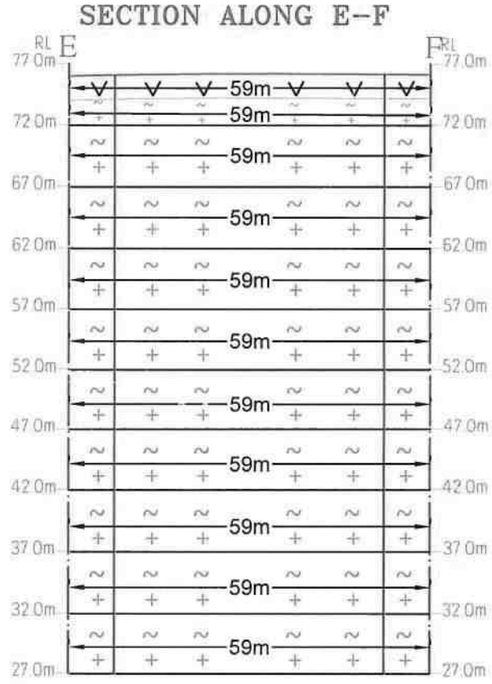
GEOLOGICAL RESOURCES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^2	Gravel in M^2
XY-AB	I	195	143	3	83655	.....	83655
	I	195	143	2	55770	55770	.....
	II	195	143	5	139425	139425	.....
	III	195	143	5	139425	139425	.....
	IV	195	143	5	139425	139425	.....
	V	195	143	5	139425	139425	.....
	VI	195	143	5	139425	139425	.....
	VII	195	143	5	139425	139425	.....
	VIII	195	143	5	139425	139425	.....
	IX	195	143	5	139425	139425	.....
	X	195	143	5	139425	139425	.....
TOTAL				**50**	**1394250**	**1310595**	**83655**
X1Y1-CD	I	49	44	3	6468	.....	6468
	I	49	44	2	4312	4312	.....
	II	49	44	5	10780	10780	.....
	III	49	44	5	10780	10780	.....
	IV	49	44	5	10780	10780	.....
	V	49	44	5	10780	10780	.....
	VI	49	44	5	10780	10780	.....
	VII	49	44	5	10780	10780	.....
	VIII	49	44	5	10780	10780	.....
	IX	49	44	5	10780	10780	.....
	X	49	44	5	10780	10780	.....
TOTAL				**50**	**107800**	**101332**	**6468**
X2Y2-EF	I	112	59	3	19824	.....	19824
	I	112	59	1	6608	6608	.....
	II	112	59	5	33040	33040	.....
	III	112	59	5	33040	33040	.....
	IV	112	59	5	33040	33040	.....
	V	112	59	5	33040	33040	.....
	VI	112	59	5	33040	33040	.....
	VII	112	59	5	33040	33040	.....
	VIII	112	59	5	33040	33040	.....
	IX	112	59	5	33040	33040	.....
	X	112	59	5	33040	33040	.....
TOTAL				**49**	**323792**	**303968**	**19824**
GRAND TOTAL					**1825842**	**1715895**	**109947**

SECTION ALONG X2–Y2



SECTION ALONG E–F



SECTION ALONG C–D

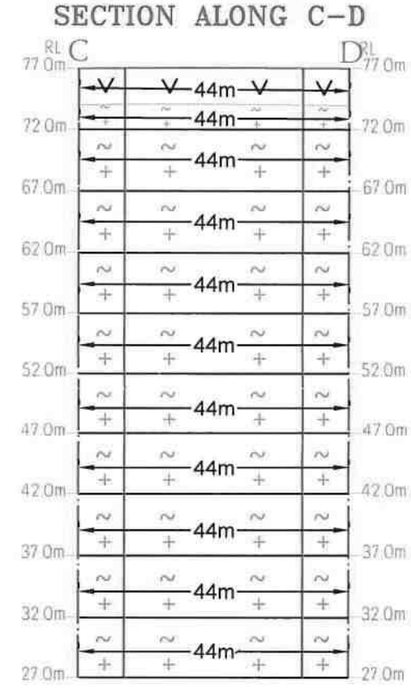


PLATE NO-IIIA

GEOLOGICAL SECTIONS

SECTION HOR 1 : 1000 & VER 1: 500

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

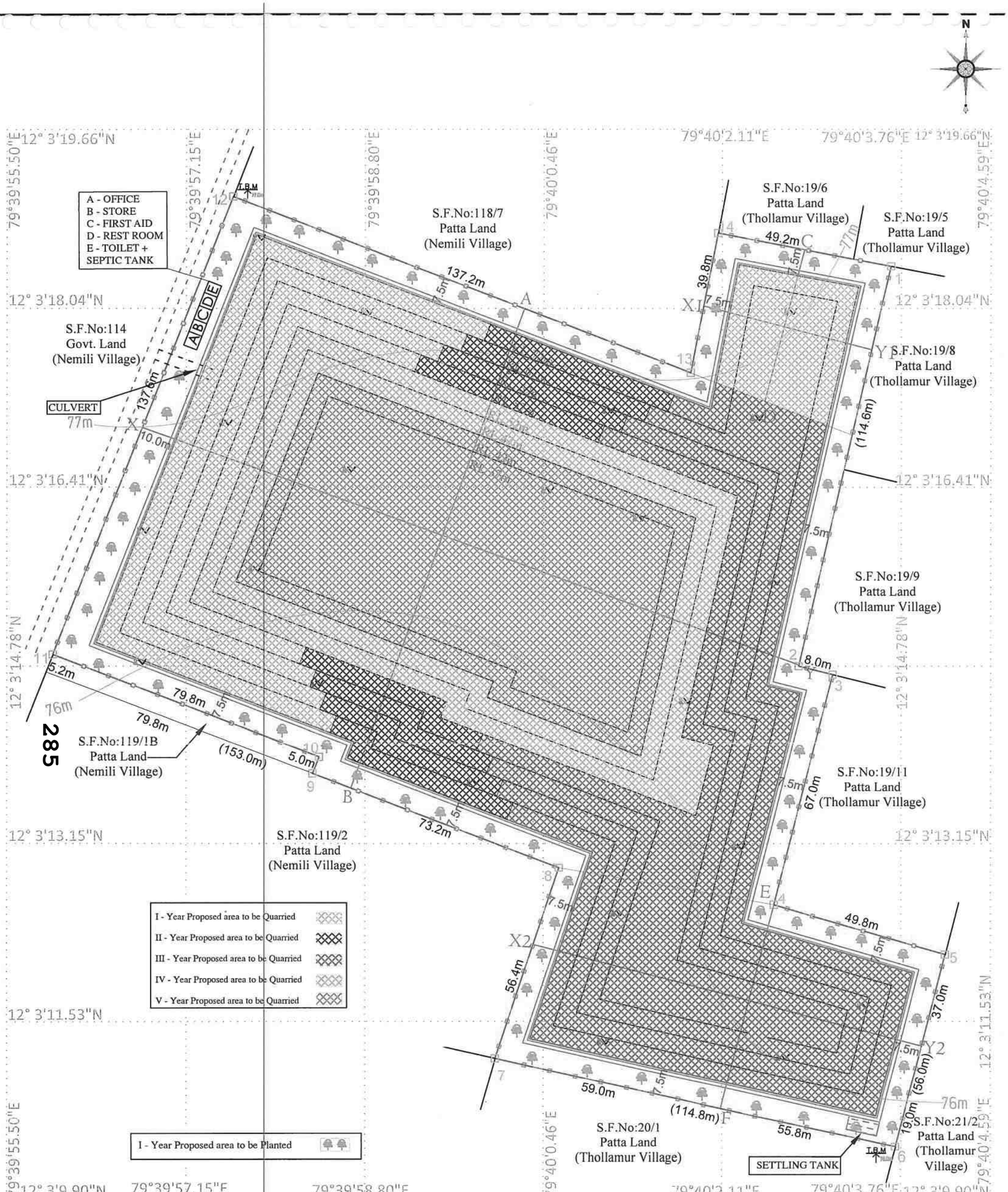


PLATE NO-IV

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA	GRAVEL
SAFETY DISTANCE	SHRUBS
APPROACH ROAD	TEMPORARY BENCH MARK
CART ROAD	CONTOUR LINES
BOUNDARY PILLAR STONES	FENCING
	DRAINAGE & SETTLING TANK

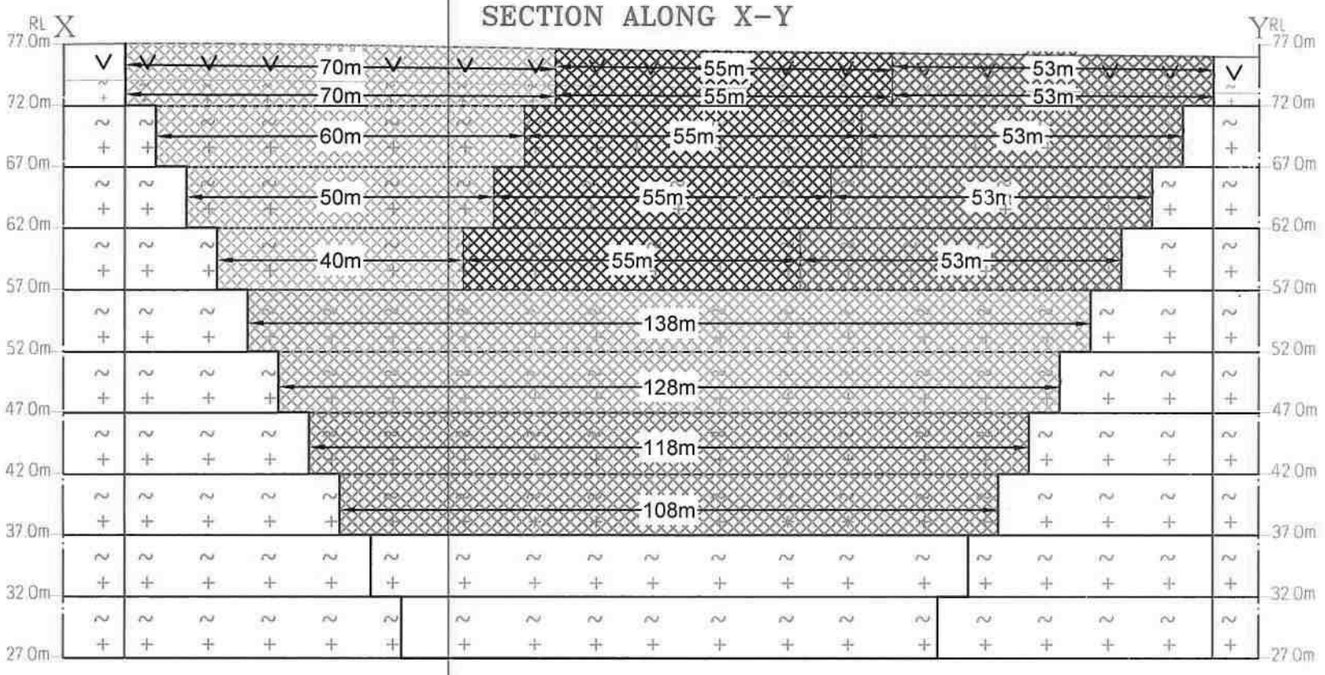
YEARWISE DEVELOPMENT & PRODUCTION PLAN
SCALE 1 :-1000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

SECTION ALONG X–Y



I - Year Proposed area to be Quarried

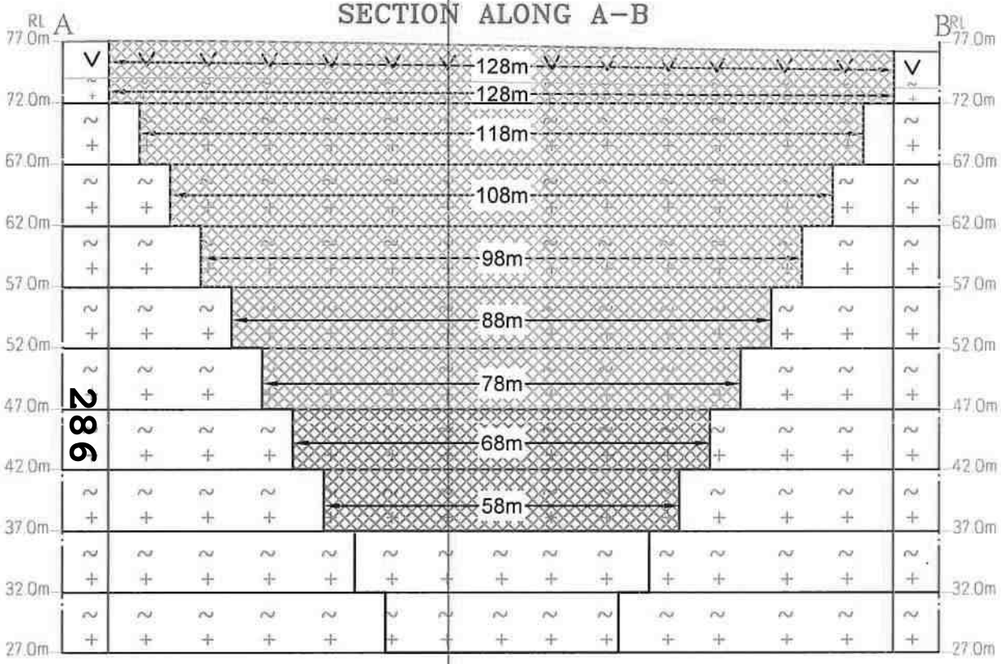
II - Year Proposed area to be Quarried

III - Year Proposed area to be Quarried

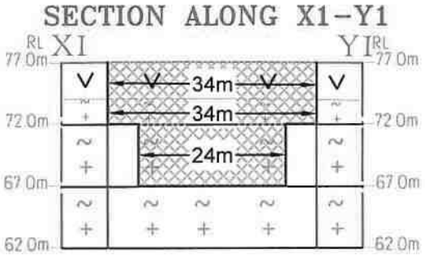
IV - Year Proposed area to be Quarried

V - Year Proposed area to be Quarried

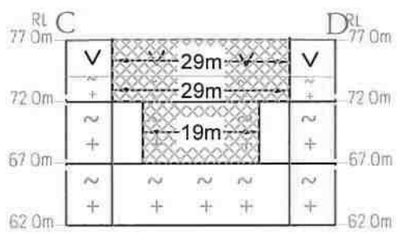
SECTION ALONG A–B



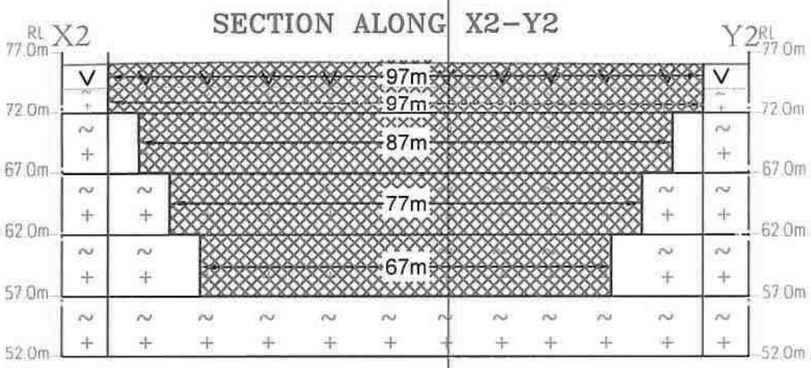
SECTION ALONG X1–Y1



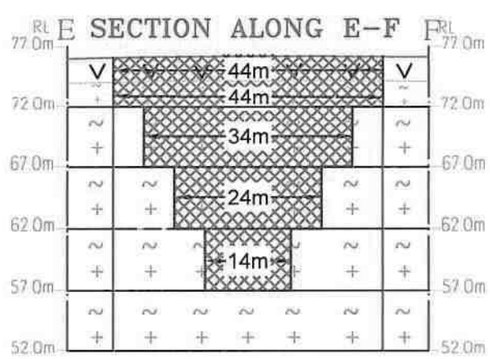
SECTION ALONG C–D



SECTION ALONG X2–Y2



SECTION ALONG E–F



YEARWISE PRODUCTION RESERVES

Year	Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
I-YEAR	X1Y1-CD	I	34	29	3	2958	.....	2958
		I	34	29	2	1972	1972	.....
		II	24	19	5	2280	2280	.....
	XY-AB	I	70	128	3	26880	.....	26880
		I	70	128	2	17920	17920	.....
		II	60	118	5	35400	35400	.....
		III	50	108	5	27000	27000	.....
		IV	40	98	5	19600	19600	.....
	TOTAL					**134010**	**104172**	**29838**
II-YEAR	XY-AB	I	55	128	3	21120	.....	21120
		I	55	128	2	14080	14080	.....
		II	55	118	5	32450	32450	.....
		III	55	108	5	29700	29700	.....
		IV	55	98	5	26950	26950	.....
	TOTAL					**124300**	**103180**	**21120**
III-YEAR	XY-AB	I	53	128	3	20352	.....	20352
	X2Y2-EF	I	97	44	3	12804	.....	12804
		I	97	44	1	4268	4268	.....
	XY-AB	I	53	128	2	13568	13568	.....
		II	53	118	5	31270	31270	.....
	X2Y2-EF	II	87	34	5	14790	14790	.....
		III	77	24	5	9240	9240	.....
	XY-AB	III	53	108	5	28620	28620	.....
	XY-AB	IV	53	98	5	25970	25970	.....
	X2Y2-EF	IV	67	14	5	4690	4690	.....
	TOTAL					**165572**	**132416**	**33156**
IV-YEAR	XY-AB	V	138	88	5	60720	60720	.....
		VI	128	78	5	49920	49920	.....
	TOTAL					**110640**	**110640**	**0**
V-YEAR	XY-AB	VII	118	68	5	40120	40120	.....
	XY-AB	VIII	108	58	5	31320	31320	.....
	TOTAL					**71440**	**71440**	**0**
GRAND TOTAL						**605962**	**521848**	**84114**

PLATE NO-IVA

YEARWISE DEVELOPMENT & PRODUCTION SECTION

SECTION HOR 1 : 1000 & VER 1: 500

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO : 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT : 3.66.45 Hect
VILLAGE : THOLLAMUR & NEMILI,
TALUK : VANUR,
DISTRICT : VILUPPURAM.

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

PROPOSED BENCH

ULTIMATE BENCH

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

A - OFFICE
B - STORE
C - FIRST AID
D - REST ROOM
E - TOILET +
SEPTIC TANK

S.F.No:118/7
Patta Land
(Nemili Village)

S.F.No:19/6
Patta Land
(Thollamur Village)

S.F.No:19/5
Patta Land
(Thollamur Village)

S.F.No:19/8
Patta Land
(Thollamur Village)

S.F.No:19/9
Patta Land
(Thollamur Village)

S.F.No:19/11
Patta Land
(Thollamur Village)

S.F.No:114
Govt. Land
(Nemili Village)

S.F.No:119/1B
Patta Land
(Nemili Village)

S.F.No:119/2
Patta Land
(Nemili Village)

S.F.No:20/1
Patta Land
(Thollamur Village)

S.F.No:21/2
Patta Land
(Thollamur Village)

ABCIDE

137.2m
49.2m
39.8m
(114.6m)
137.6m
10.0m
5.2m
79.8m
(153.0m)
5.0m
73.2m
67.0m
49.8m
56.4m
37.0m
59.0m
(114.8m)
55.8m
(56.0m)
19.0m
8.0m
7.5m
77m
76m

CULVERT

SETTLING TANK

T.B.M

287

I - Year Proposed area to be Planted

MINE LAYOUT LAND USE PATTERN

DESCRIPTION	PRESENT AREA (Hect)	AREA IN USE DURING THE QUARRYING PERIOD(Hect)	COLOR CODE
AREA UNDER QUARRYING	NIL	2.90.70	
INFRASTRUCTURE	NIL	0.03.00	
ROADS	NIL	0.12.00	
GREEN BELT	NIL	0.54.05	
DRAINAGE & SETTLING TANK	NIL	0.06.70	
UN-UTILIZED AREA	3.66.45	NIL	NIL
GRAND TOTAL	3.66.45	3.66.45	NIL

PLATE NO-V

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA		GRAVEL	
SAFETY DISTANCE		SHRUBS	
APPROACH ROAD		TEMPORARY BENCH MARK	T.B.M
CART ROAD		CONTOUR LINES	77m
BOUNDARY PILLAR STONES	1	FENCING	
PROPOSED BENCH		DRAINAGE & SETTLING TANK	

MINE LAYOUT PLAN
AND LAND USE PATTERN
SCALE : 1:2000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

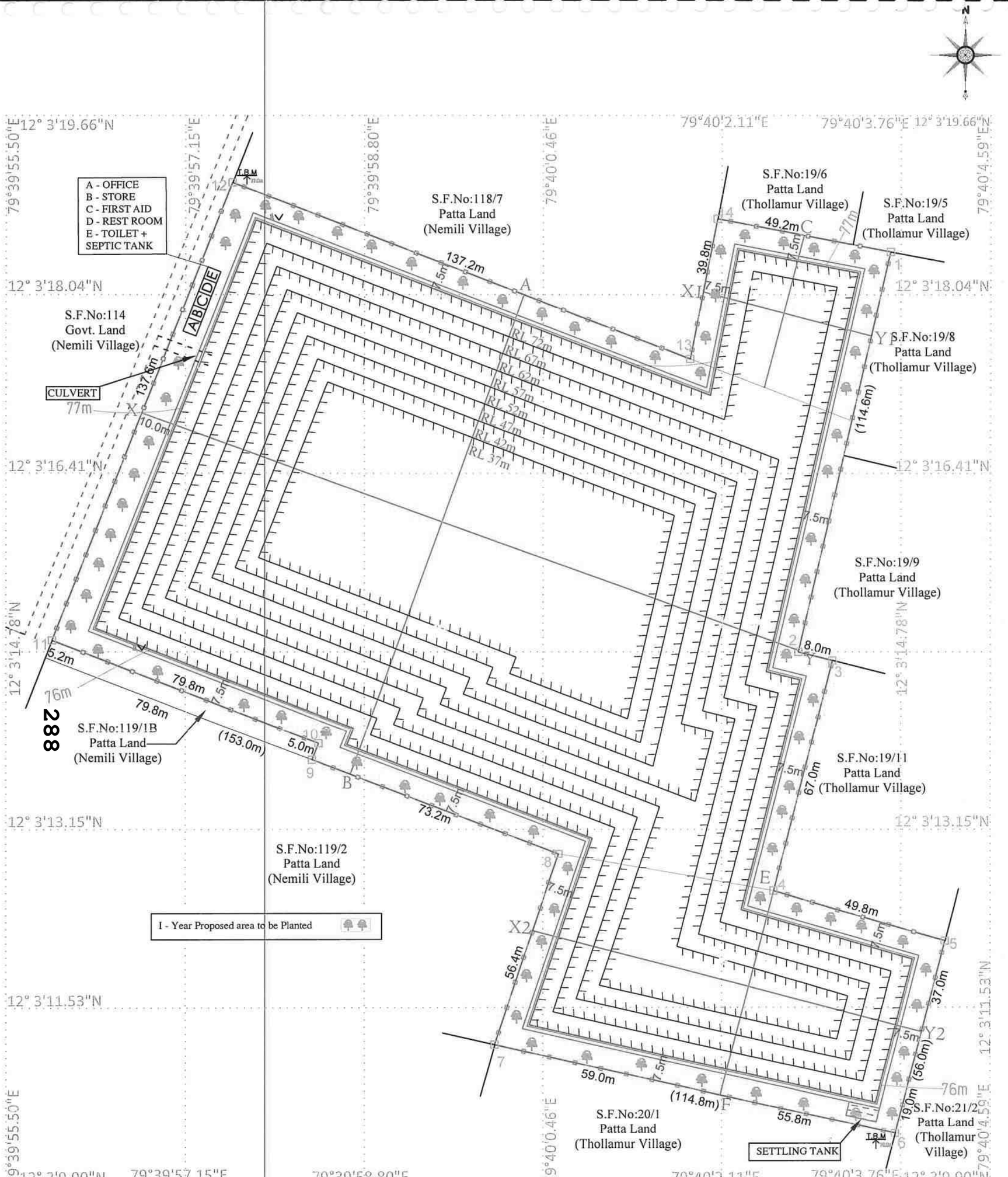


PLATE NO-VI

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA		GRAVEL	
SAFETY DISTANCE		SHRUBS	
APPROACH ROAD		TEMPORARY BENCH MARK	
CART ROAD		CONTOUR LINES	
BOUNDARY PILLAR STONES		FENCING	
PROPOSED BENCH		DRAINAGE & SETTLING TANK	

PROGRESSIVE MINE CLOSURE PLAN

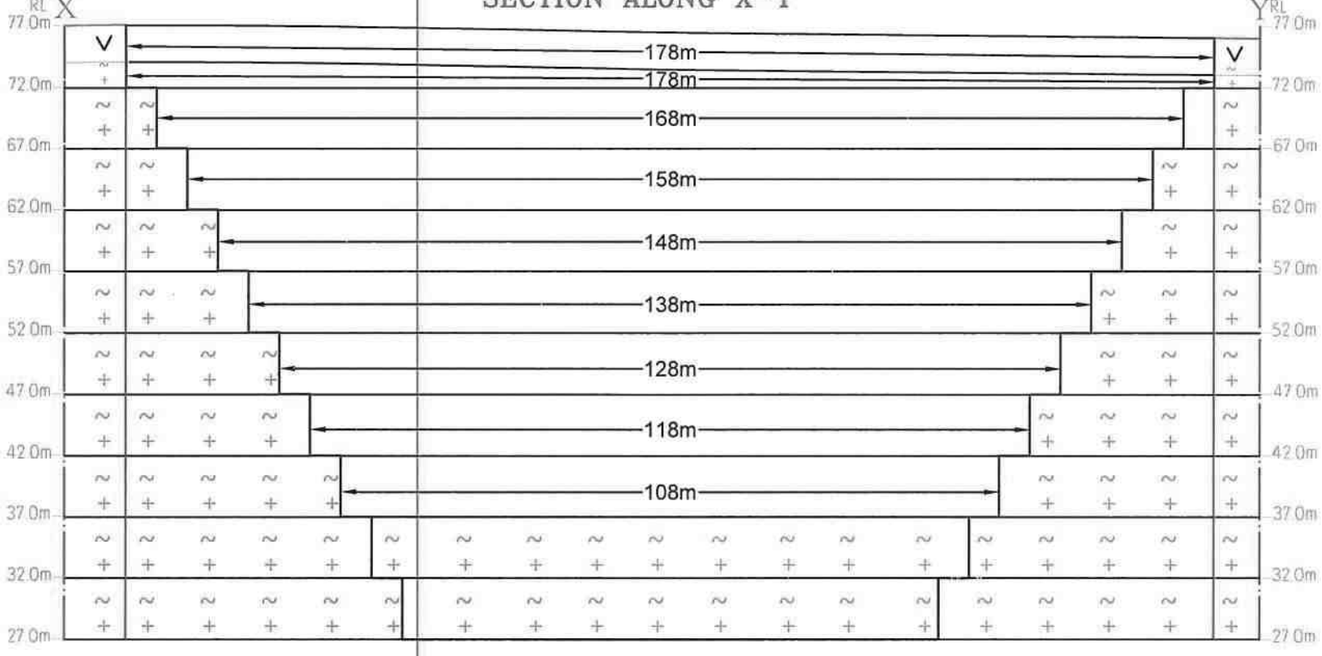
SCALE 1 : 1000

Prepared By:

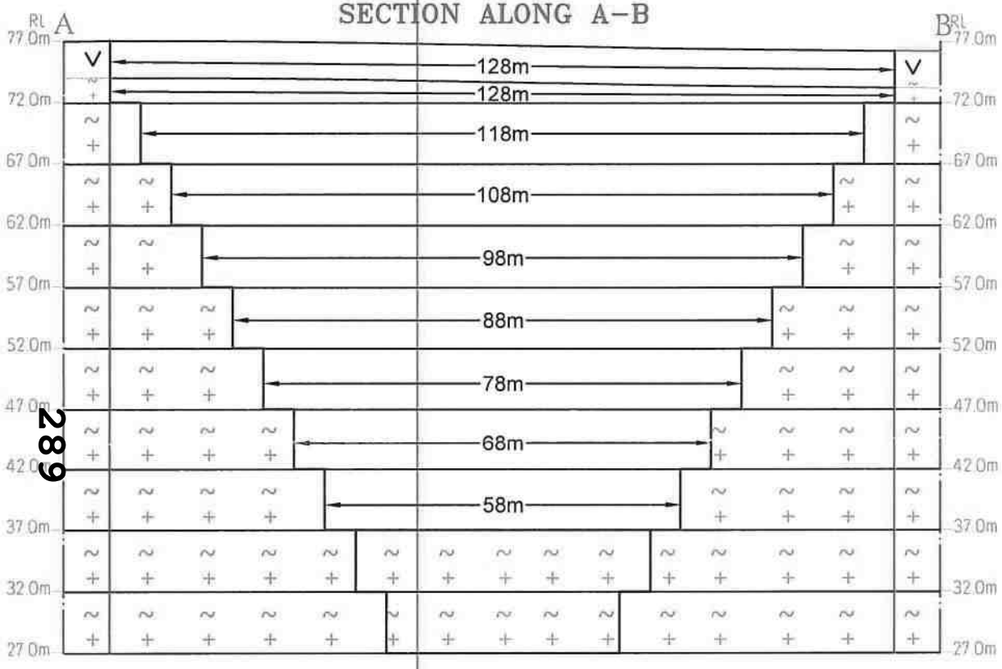
I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

SECTION ALONG X-Y



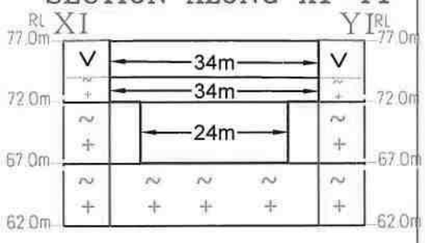
SECTION ALONG A-B



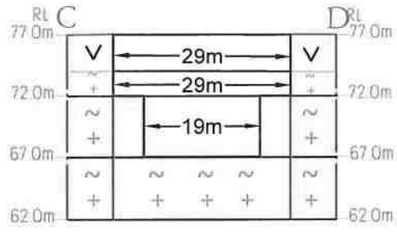
PRODUCTION RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
XY-AB	I	178	128	3	68352	.....	68352
	I	178	128	2	45568	45568	.....
	II	168	118	5	99120	99120	.....
	III	158	108	5	85320	85320	.....
	IV	148	98	5	72520	72520	.....
	V	138	88	5	60720	60720	.....
	VI	128	78	5	49920	49920	.....
	VII	118	68	5	40120	40120	.....
	VIII	108	58	5	31320	31320	.....
TOTAL				**40**	**552960**	**484608**	**68352**
X1Y1-CD	I	34	29	3	2958	.....	2958
	I	34	29	2	1972	1972	.....
	II	24	19	5	2280	2280	.....
TOTAL				**10**	**7210**	**4252**	**2958**
X2Y2-EF	I	97	44	3	12804	.....	12804
	I	97	44	1	4268	4268	.....
	II	87	34	5	14790	14790	.....
	III	77	24	5	9240	9240	.....
	IV	67	14	5	4690	4690	.....
TOTAL				**19**	**45792**	**32988**	**12804**
GRAND TOTAL					**605962**	**521848**	**84114**

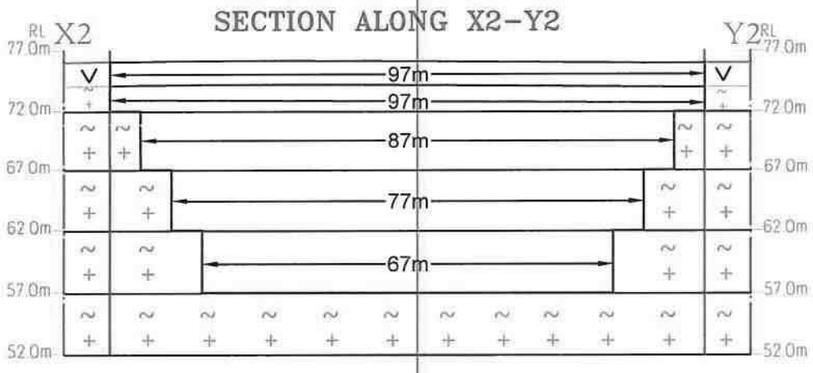
SECTION ALONG X1-Y1



SECTION ALONG C-D



SECTION ALONG X2-Y2



SECTION ALONG E-F

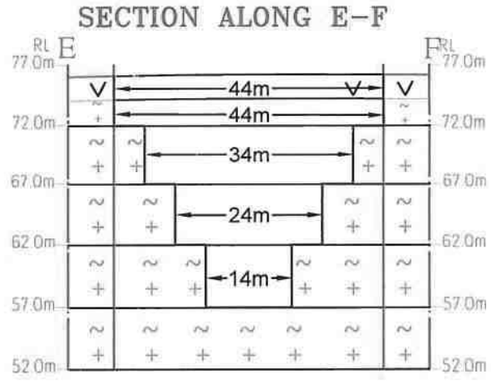


PLATE NO-VIA

PROGRESSIVE MINE CLOSURE SECTIONS

SECTION HOR 1 : 1000 & VER 1: 1000

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO : 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT : 3.66.45 Hect
VILLAGE : THOLLAMUR & NEMILI,
TALUK : VANUR,
DISTRICT : VILUPPURAM.

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

PROPOSED BENCH

ULTIMATE BENCH

Prepared By

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

A - OFFICE
B - STORE
C - FIRST AID
D - REST ROOM
E - TOILET +
SEPTIC TANK

S.F.No:118/7
Patta Land
(Nemili Village)

S.F.No:19/6
Patta Land
(Thollamur Village)

S.F.No:19/5
Patta Land
(Thollamur Village)

S.F.No:19/8
Patta Land
(Thollamur Village)

S.F.No:19/9
Patta Land
(Thollamur Village)

S.F.No:19/11
Patta Land
(Thollamur Village)

S.F.No:114
Govt. Land
(Nemili Village)

S.F.No:119/1B
Patta Land
(Nemili Village)

S.F.No:119/2
Patta Land
(Nemili Village)

S.F.No:20/1
Patta Land
(Thollamur Village)

S.F.No:21/2
Patta Land
(Thollamur Village)

ABCDE

137.2m
49.2m
39.8m
(114.6m)
137.6m
10.0m
79.8m
(153.0m)
5.2m
73.2m
49.8m
56.4m
37.0m
59.0m
(114.8m)
55.8m
(56.0m)
19.0m
67.0m
8.0m
7.5m
5.0m

RL 72m
RL 67m
RL 62m
RL 57m
RL 52m
RL 47m
RL 42m
RL 37m
RL 32m
RL 27m

77m
76m

290

I - Year Proposed area to be Planted

SETTLING TANK

12° 3'19.66"N
12° 3'18.04"N
12° 3'16.41"N
12° 3'14.78"N
12° 3'13.15"N
12° 3'11.53"N
12° 3'9.90"N
79°39'55.50"E
79°39'57.15"E
79°39'58.80"E
79°40'0.46"E
79°40'2.11"E
79°40'3.76"E
79°40'4.59"E

PLATE NO-VII

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA	GRAVEL
SAFETY DISTANCE	SHRUBS
APPROACH ROAD	TEMPORARY BENCH MARK
CART ROAD	CONTOUR LINES
BOUNDARY PILLAR STONES	FENCING
ULTIMATE BENCH	DRAINAGE & SETTLING TANK

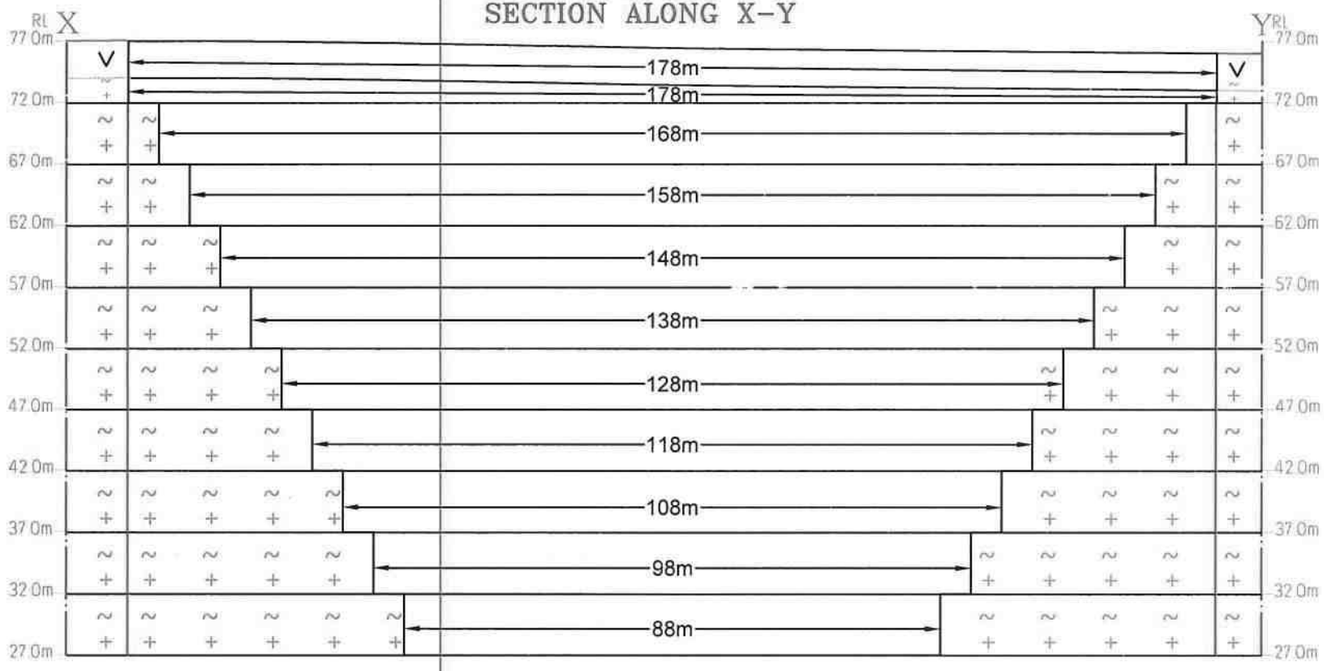
CONCEPTUAL PLAN
SCALE 1 : 1000

Prepared By

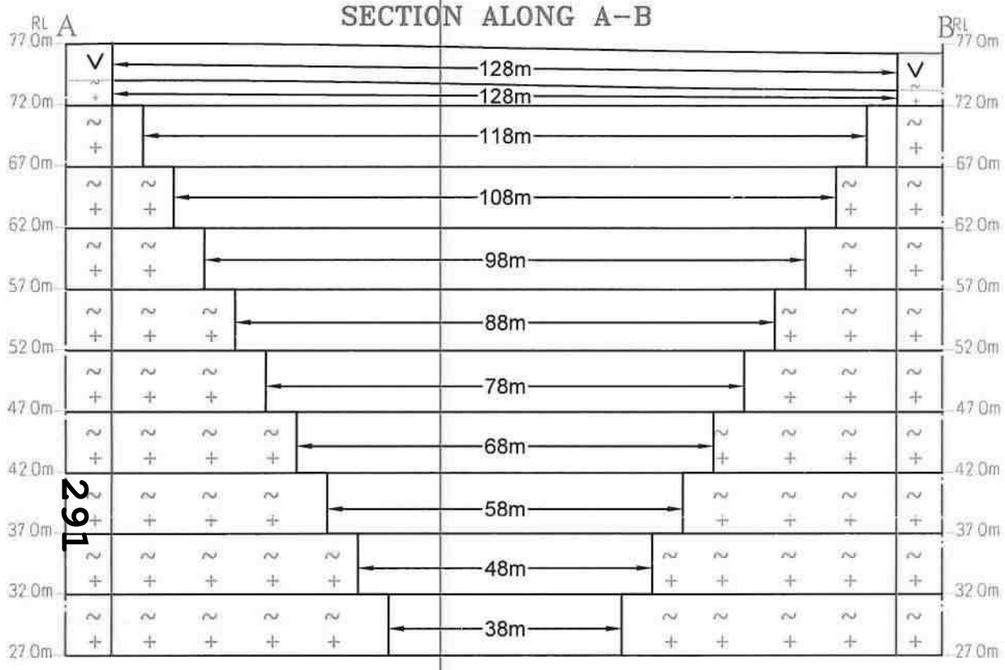
I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

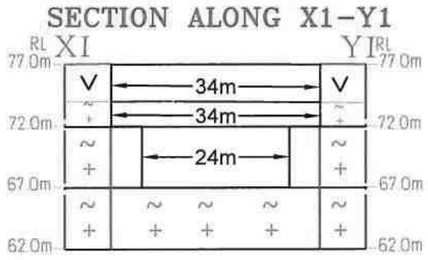
SECTION ALONG X-Y



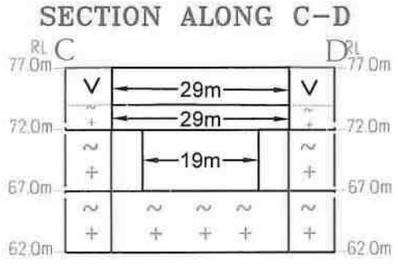
SECTION ALONG A-B



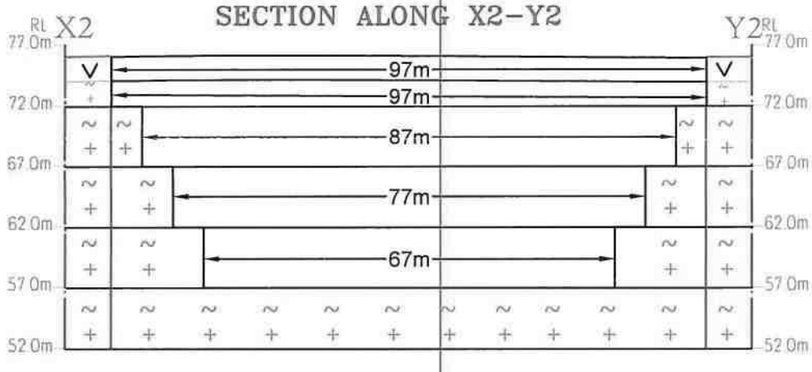
SECTION ALONG X1-Y1



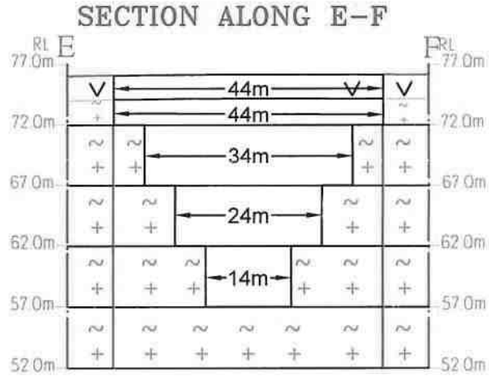
SECTION ALONG C-D



SECTION ALONG X2-Y2



SECTION ALONG E-F



MINEABLE RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
XY-AB	I	178	128	3	68352	.....	68352
	I	178	128	2	45568	45568	.....
	II	168	118	5	99120	99120	.....
	III	158	108	5	85320	85320	.....
	IV	148	98	5	72520	72520	.....
	V	138	88	5	60720	60720	.....
	VI	128	78	5	49920	49920	.....
	VII	118	68	5	40120	40120	.....
	VIII	108	58	5	31320	31320	.....
	IX	98	48	5	23520	23520	.....
	X	88	38	5	16720	16720	.....
TOTAL				**50**	**593200**	**524848**	**68352**
X1Y1-CD	I	34	29	3	2958	.....	2958
	I	34	29	2	1972	1972	.....
	II	24	19	5	2280	2280	.....
TOTAL				**10**	**7210**	**4252**	**2958**
X2Y2-EF	I	97	44	3	12804	.....	12804
	I	97	44	1	4268	4268	.....
	II	87	34	5	14790	14790	.....
	III	77	24	5	9240	9240	.....
	IV	67	14	5	4690	4690	.....
TOTAL				**19**	**45792**	**32988**	**12804**
GRAND TOTAL					**646202**	**562088**	**84114**

PLATE NO-VIIA

CONCEPTUAL SECTIONS
SECTION HOR 1 : 1000 & VER 1: 1000

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

ULTIMATE BENCH

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE.

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

A - OFFICE
B - STORE
C - FIRST AID
D - REST ROOM
E - TOILET +
SEPTIC TANK

S.F.No:118/7
Patta Land
(Nemili Village)

S.F.No:19/6
Patta Land
(Thollamur Village)

S.F.No:19/5
Patta Land
(Thollamur Village)

S.F.No:19/8
Patta Land
(Thollamur Village)

S.F.No:114
Govt. Land
(Nemili Village)

S.F.No:19/9
Patta Land
(Thollamur Village)

S.F.No:19/11
Patta Land
(Thollamur Village)

S.F.No:119/1B
Patta Land
(Nemili Village)

S.F.No:119/2
Patta Land
(Nemili Village)

S.F.No:20/1
Patta Land
(Thollamur Village)

S.F.No:21/2
Patta Land
(Thollamur Village)

I - Year Proposed area to be Quarried
II - Year Proposed area to be Quarried
III - Year Proposed area to be Quarried
IV - Year Proposed area to be Quarried
V - Year Proposed area to be Quarried

I - Year Proposed area to be Planted

PLATE NO-IV

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA
SAFETY DISTANCE
APPROACH ROAD
CART ROAD
BOUNDARY PILLAR STONES
GRAVEL
SHRUBS
TEMPORARY BENCH MARK
CONTOUR LINES
FENCING
DRAINAGE & SETTLING TANK

292

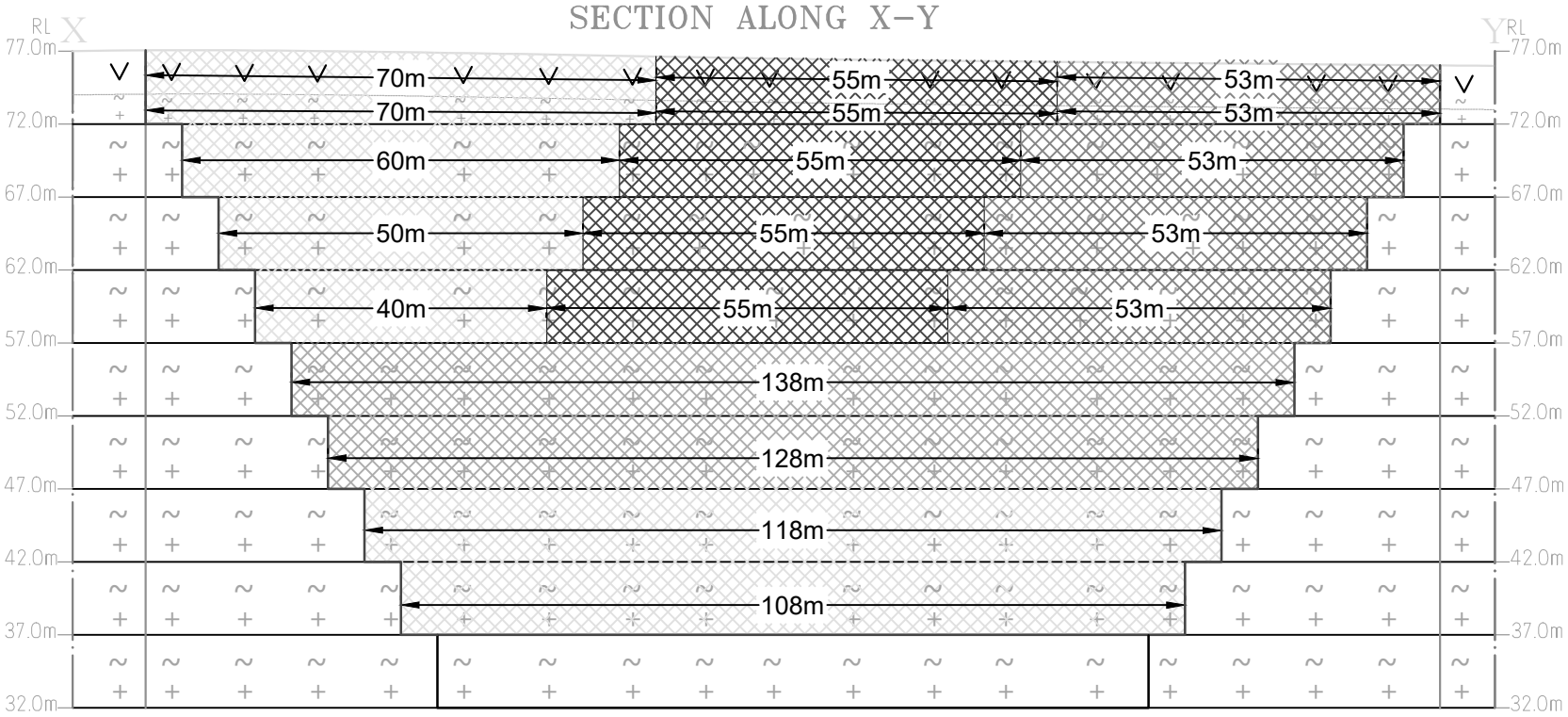
YEARWISE DEVELOPMENT & PRODUCTION PLAN
SCALE 1 : 1000

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

SECTION ALONG X-Y



I - Year Proposed area to be Quarried

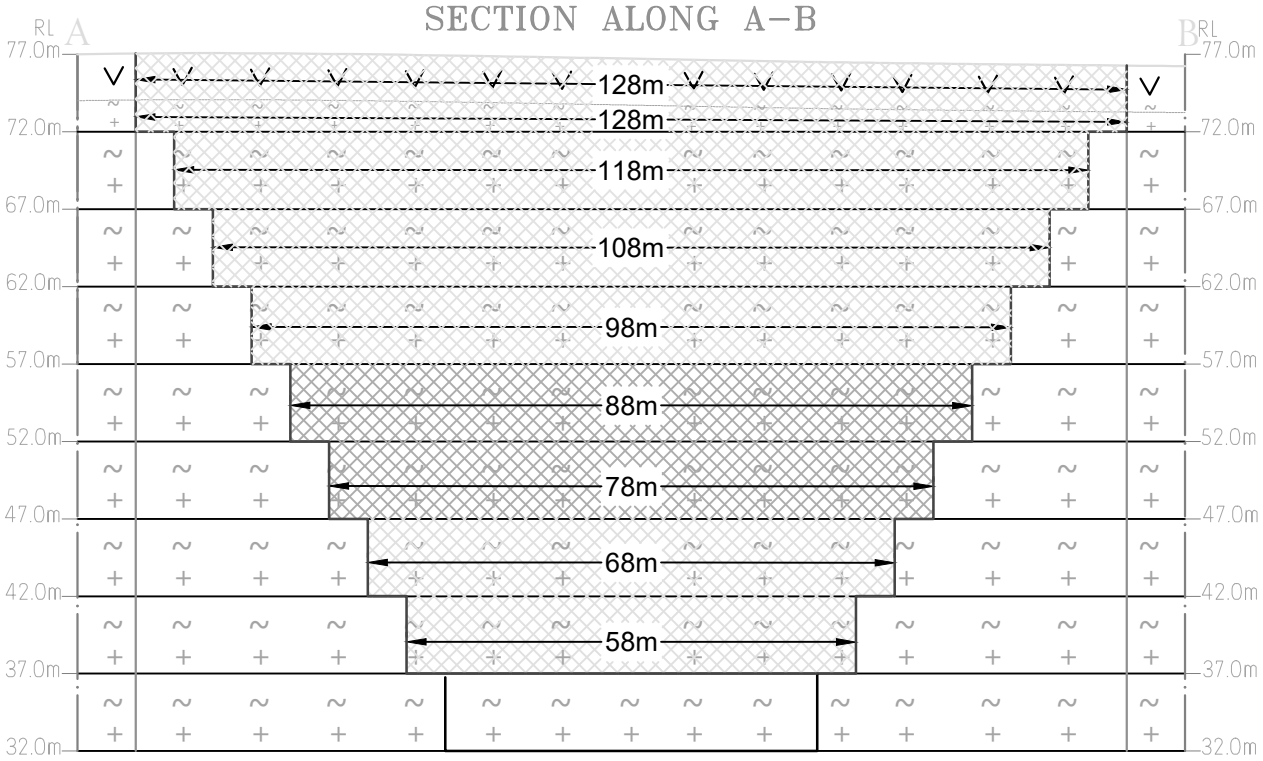
II - Year Proposed area to be Quarried

III - Year Proposed area to be Quarried

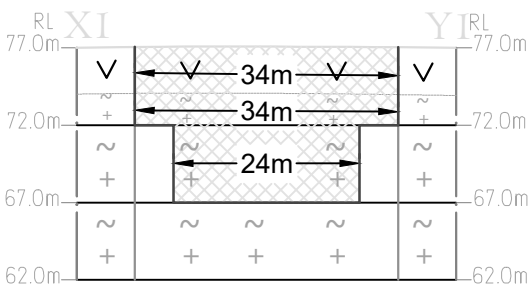
IV - Year Proposed area to be Quarried

V - Year Proposed area to be Quarried

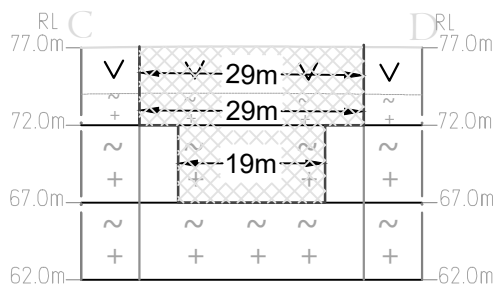
SECTION ALONG A-B



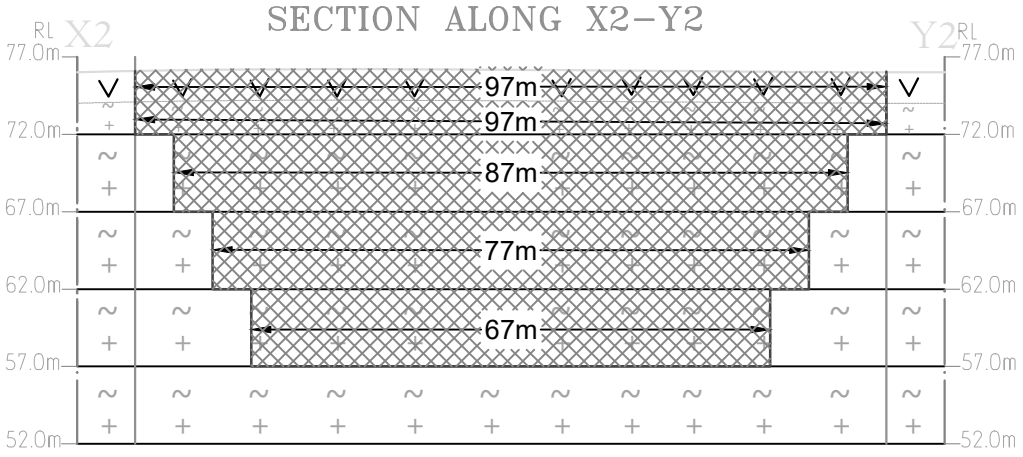
SECTION ALONG X1-Y1



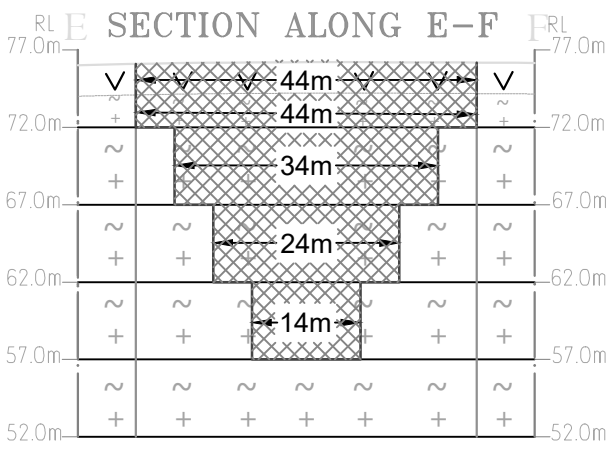
SECTION ALONG C-D



SECTION ALONG X2-Y2



SECTION ALONG E-F



YEARWISE PRODUCTION RESERVES

Year	Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
I YEAR	X1Y1-CD	I	34	29	3	2958	.....	2958
		I	34	29	2	1972	1972	.....
		II	24	19	5	2280	2280	.....
	XY-AB	I	70	128	3	26880	.....	26880
		I	70	128	2	17920	17920	.....
		II	60	118	5	35400	35400	.....
		III	50	108	5	27000	27000	.....
		IV	40	98	5	19600	19600	.....
	TOTAL					**134010**	**104172**	**29838**
II-YEAR	XY-AB	I	55	128	3	21120	.....	21120
		I	55	128	2	14080	14080	.....
		II	55	118	5	32450	32450	.....
		III	55	108	5	29700	29700	.....
		IV	55	98	5	26950	26950	.....
	TOTAL					**124300**	**103180**	**21120**
III YEAR	XY-AB	I	53	128	3	20352	.....	20352
	X2Y2-EF	I	97	44	3	12804	.....	12804
		I	97	44	1	4268	4268	.....
	XY-AB	I	53	128	2	13568	13568	.....
		II	53	118	5	31270	31270	.....
	X2Y2-EF	II	87	34	5	14790	14790	.....
		III	77	24	5	9240	9240	.....
	XY-AB	III	53	108	5	28620	28620	.....
	XY-AB	IV	53	98	5	25970	25970	.....
	X2Y2-EF	IV	67	14	5	4690	4690	.....
	TOTAL					**165572**	**132416**	**33156**
IV YEAR	XY-AB	V	138	88	5	60720	60720	.....
		VI	128	78	5	49920	49920	.....
	TOTAL					**110640**	**110640**	**0**
V-YEAR	XY-AB	VII	118	68	5	40120	40120	.....
	XY-AB	VIII	108	58	5	31320	31320	.....
	TOTAL					**71440**	**71440**	**0**
GRAND TOTAL						**605962**	**521848**	**84114**

PLATE NO-IVA

YEARWISE DEVELOPMENT & PRODUCTION SECTION

SECTION HOR 1 : 1000 & VER 1: 500

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO : 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT : 3.66.45 Hect
VILLAGE : THOLLAMUR & NEMILI,
TALUK : VANUR,
DISTRICT : VILUPPURAM.

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

PROPOSED BENCH

ULTIMATE BENCH

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

A - OFFICE
B - STORE
C - FIRST AID
D - REST ROOM
E - TOILET +
SEPTIC TANK

S.F.No:118/7
Patta Land
(Nemili Village)

S.F.No:19/6
Patta Land
(Thollamur Village)

S.F.No:19/5
Patta Land
(Thollamur Village)

S.F.No:19/8
Patta Land
(Thollamur Village)

S.F.No:19/9
Patta Land
(Thollamur Village)

S.F.No:19/11
Patta Land
(Thollamur Village)

S.F.No:114
Govt. Land
(Nemili Village)

S.F.No:119/1B
Patta Land
(Nemili Village)

S.F.No:119/2
Patta Land
(Nemili Village)

S.F.No:20/1
Patta Land
(Thollamur Village)

S.F.No:21/2
Patta Land
(Thollamur Village)

T.B.M 77.0m

T.B.M 76.0m

CULVERT

SETTLING TANK

137.2m
137.6m
49.2m
39.8m
(114.6m)
10.0m
5.2m
79.8m
79.8m
(153.0m)
5.0m
73.2m
49.8m
56.4m
59.0m
(114.8m)
55.8m
67.0m
8.0m
(56.0m)
19.0m
77m
76m
7.5m

RL 72m
RL 67m
RL 62m
RL 57m
RL 52m
RL 47m
RL 42m
RL 37m
RL 32m

I - Year Proposed area to be Planted

12° 3'19.66"N
12° 3'18.04"N
12° 3'16.41"N
12° 3'14.78"N
12° 3'13.15"N
12° 3'11.53"N
12° 3'9.90"N
79°39'55.50"E
79°39'57.15"E
79°39'58.80"E
79°40'0.46"E
79°40'2.11"E
79°40'3.76"E
79°40'4.59"E

PLATE NO-VII

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

- MINE LEASE AREA
- SAFETY DISTANCE
- APPROACH ROAD
- CART ROAD
- BOUNDARY PILLAR STONES
- ULTIMATE BENCH
- GRAVEL
- SHRUBS
- TEMPORARY BENCH MARK
- CONTOUR LINES
- FENCING
- DRAINAGE & SETTLING TANK

294

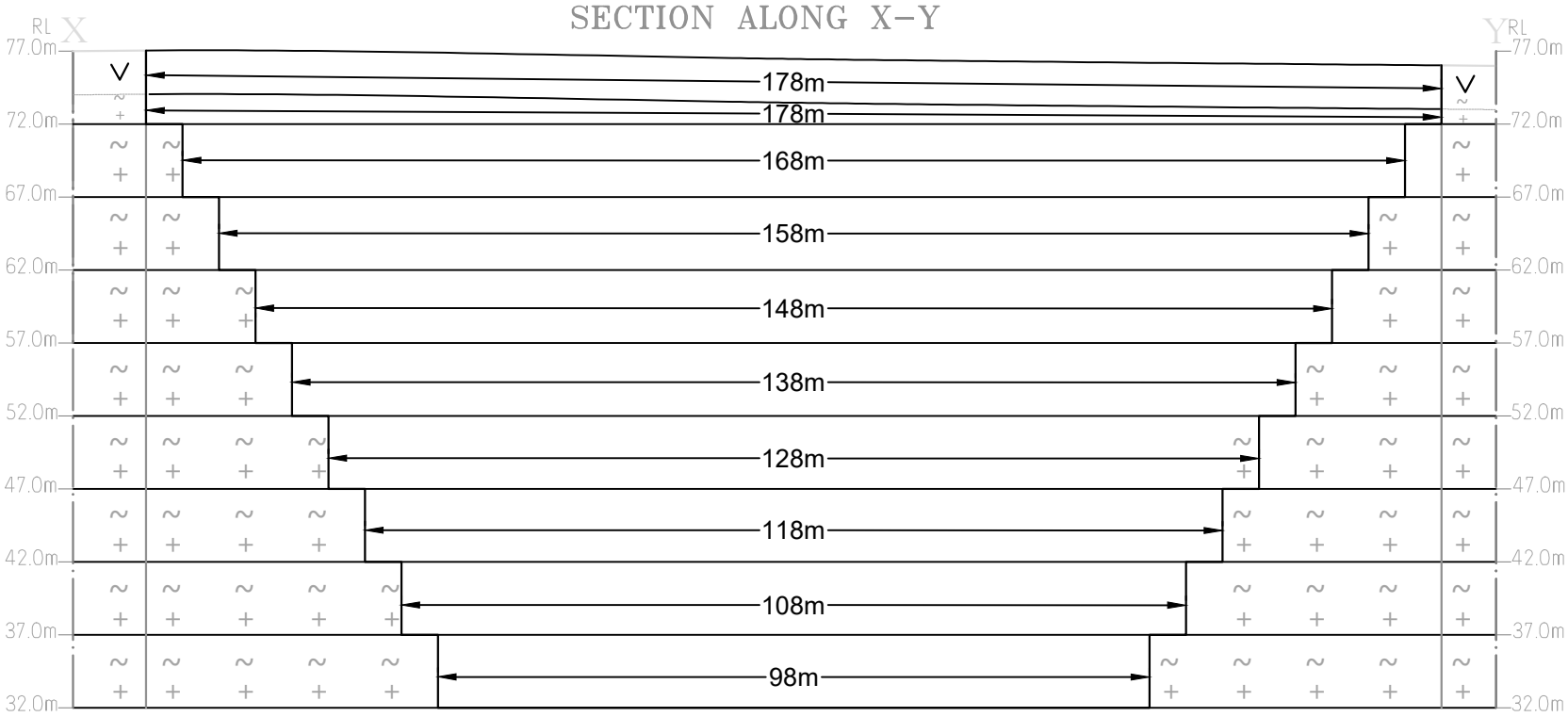
CONCEPTUAL PLAN
SCALE 1 : 1000

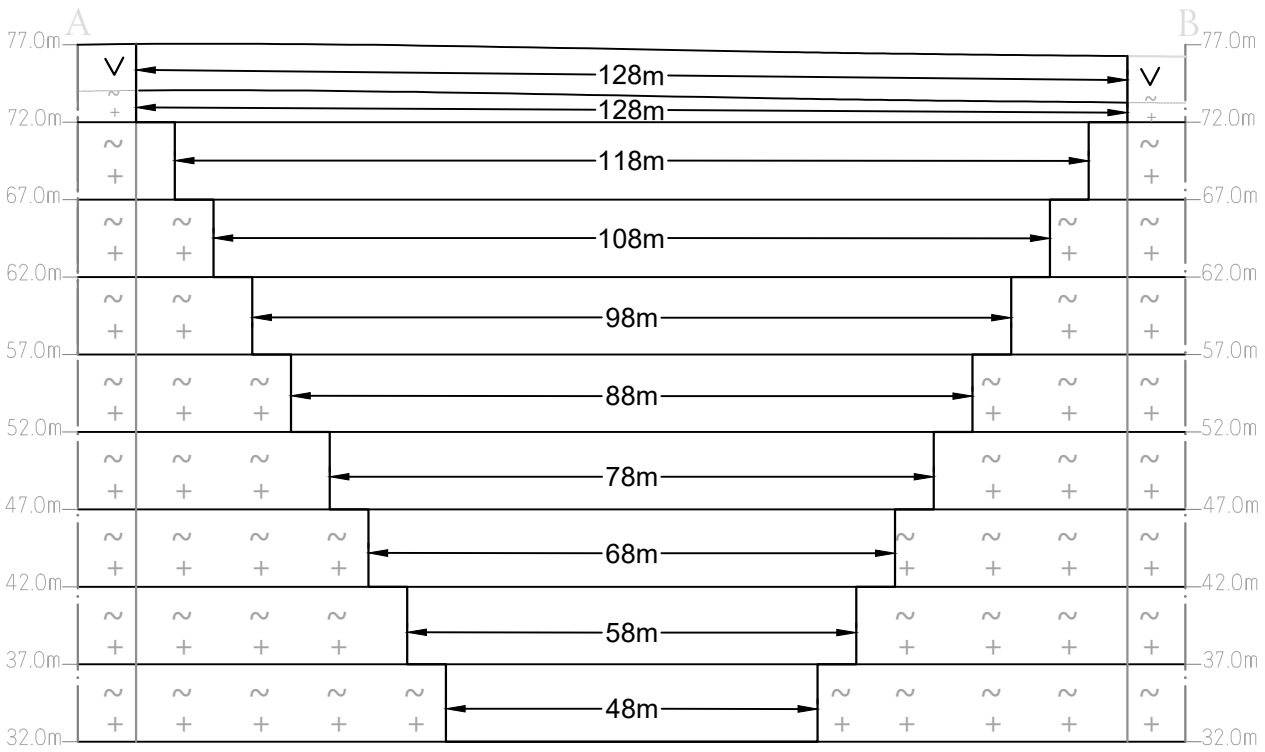
Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

SECTION ALONG X-Y

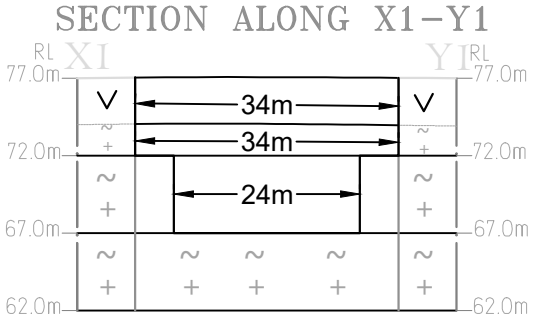




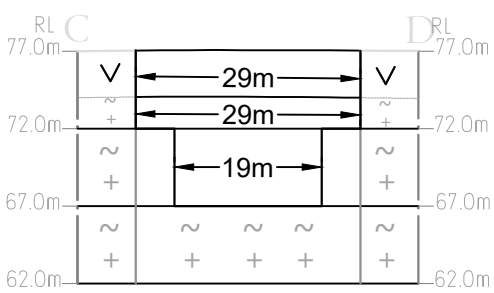
MINEABLE RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
XY-AB	I	178	128	3	68352	.....	68352
	I	178	128	2	45568	45568	.....
	II	168	118	5	99120	99120	.....
	III	158	108	5	85320	85320	.....
	IV	148	98	5	72520	72520	.....
	V	138	88	5	60720	60720	.....
	VI	128	78	5	49920	49920	.....
	VII	118	68	5	40120	40120	.....
	VIII	108	58	5	31320	31320	.....
	IX	98	48	5	23520	23520	.....
TOTAL				**45**	**576480**	**508128**	**68352**
X1Y1-CD	I	34	29	3	2958	.....	2958
	I	34	29	2	1972	1972	.....
	II	24	19	5	2280	2280	.....
TOTAL				**10**	**7210**	**4252**	**2958**
X2Y2-EF	I	97	44	3	12804	.....	12804
	I	97	44	1	4268	4268	.....
	II	87	34	5	14790	14790	.....
	III	77	24	5	9240	9240	.....
	IV	67	14	5	4690	4690	.....
TOTAL				**19**	**45792**	**32988**	**12804**
GRAND TOTAL					**629482**	**545368**	**84114**

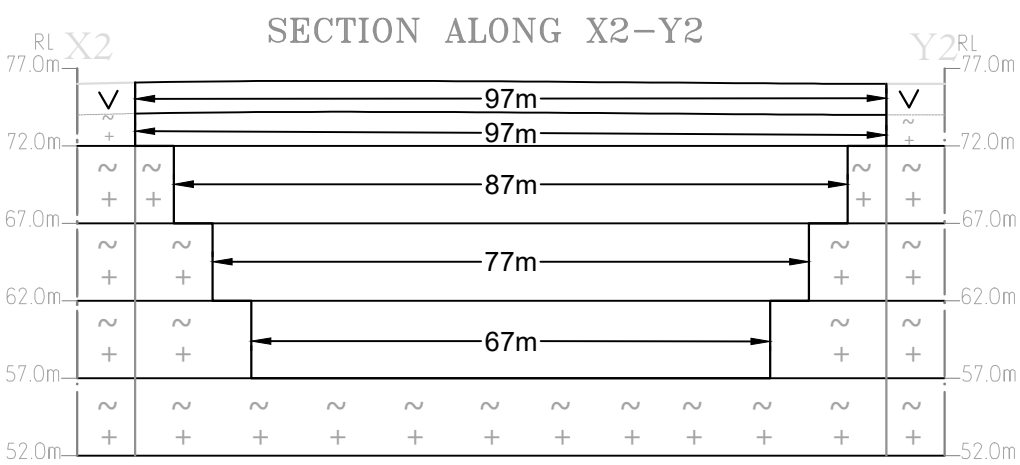
SECTION ALONG X1-Y1



SECTION ALONG C-D



SECTION ALONG X2-Y2



SECTION ALONG E-F

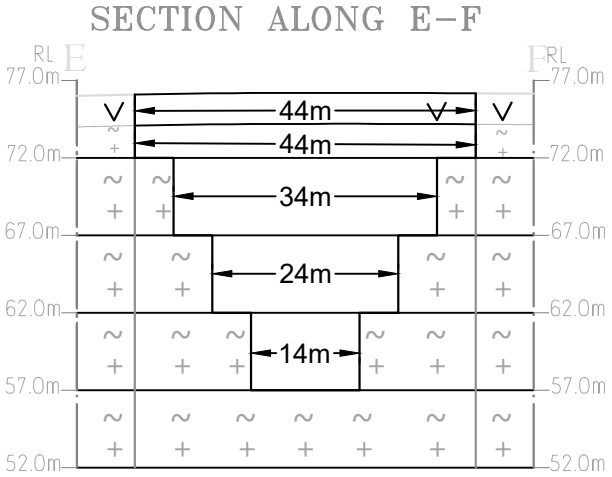


PLATE NO-VIIA

CONCEPTUAL SECTIONS
SECTION HOR 1 : 1000 & VER 1: 1000

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:
S.F.NO : 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT : 3.66.45 Hect
VILLAGE : THOLLAMUR & NEMILI,
TALUK : VANUR,
DISTRICT : VILUPPURAM.

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

TRAVEL

ROUGH STONE

ULTIMATE BENCH

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

A - OFFICE
B - STORE
C - FIRST AID
D - REST ROOM
E - TOILET +
SEPTIC TANK

ABCDE

T.B.M 77.0m

S.F.No:118/7
Patta Land
(Nemili Village)

137.2m

S.F.No:19/6
Patta Land
(Thollamur Village)

49.2m

S.F.No:19/5
Patta Land
(Thollamur Village)

39.8m

S.F.No:19/8
Patta Land
(Thollamur Village)

(114.6m)

S.F.No:114
Govt. Land
(Nemili Village)

137.6m

CULVERT

77m

10.0m

RL 72m
RL 67m
RL 62m
RL 57m
RL 52m
RL 47m
RL 42m
RL 37m

S.F.No:19/9
Patta Land
(Thollamur Village)

8.0m

5.2m

79.8m

76m

79.8m

S.F.No:119/1B
Patta Land
(Nemili Village)

(153.0m)

5.0m

73.2m

S.F.No:19/11
Patta Land
(Thollamur Village)

67.0m

S.F.No:119/2
Patta Land
(Nemili Village)

49.8m

56.4m

I - Year Proposed area to be Planted

59.0m

(114.8m)

55.8m

S.F.No:20/1
Patta Land
(Thollamur Village)

SETTLING TANK

(56.0m)

19.0m

76m

S.F.No:21/2
Patta Land
(Thollamur Village)

37.0m

7.5m

12° 3'19.66"N
12° 3'18.04"N
12° 3'16.41"N
12° 3'14.78"N
12° 3'13.15"N
12° 3'11.53"N
12° 3'9.90"N
79°39'55.50"E
79°39'57.15"E
79°39'58.80"E
79°40'0.46"E
79°40'2.11"E
79°40'3.76"E
79°40'4.59"E

PLATE NO-VI

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:

S.F.NO	: 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT	: 3.66.45 Hect
VILLAGE	: THOLLAMUR & NEMILI,
TALUK	: VANUR,
DISTRICT	: VILUPPURAM.

INDEX

MINE LEASE AREA		GRAVEL	
SAFETY DISTANCE		SHRUBS	
APPROACH ROAD		TEMPORARY BENCH MARK	T.B.M 77.0m
CART ROAD		CONTOUR LINES	77m
BOUNDARY PILLAR STONES	□1	FENCING	
PROPOSED BENCH		DRAINAGE & SETTLING TANK	

296

PROGRESSIVE MINE CLOSURE PLAN

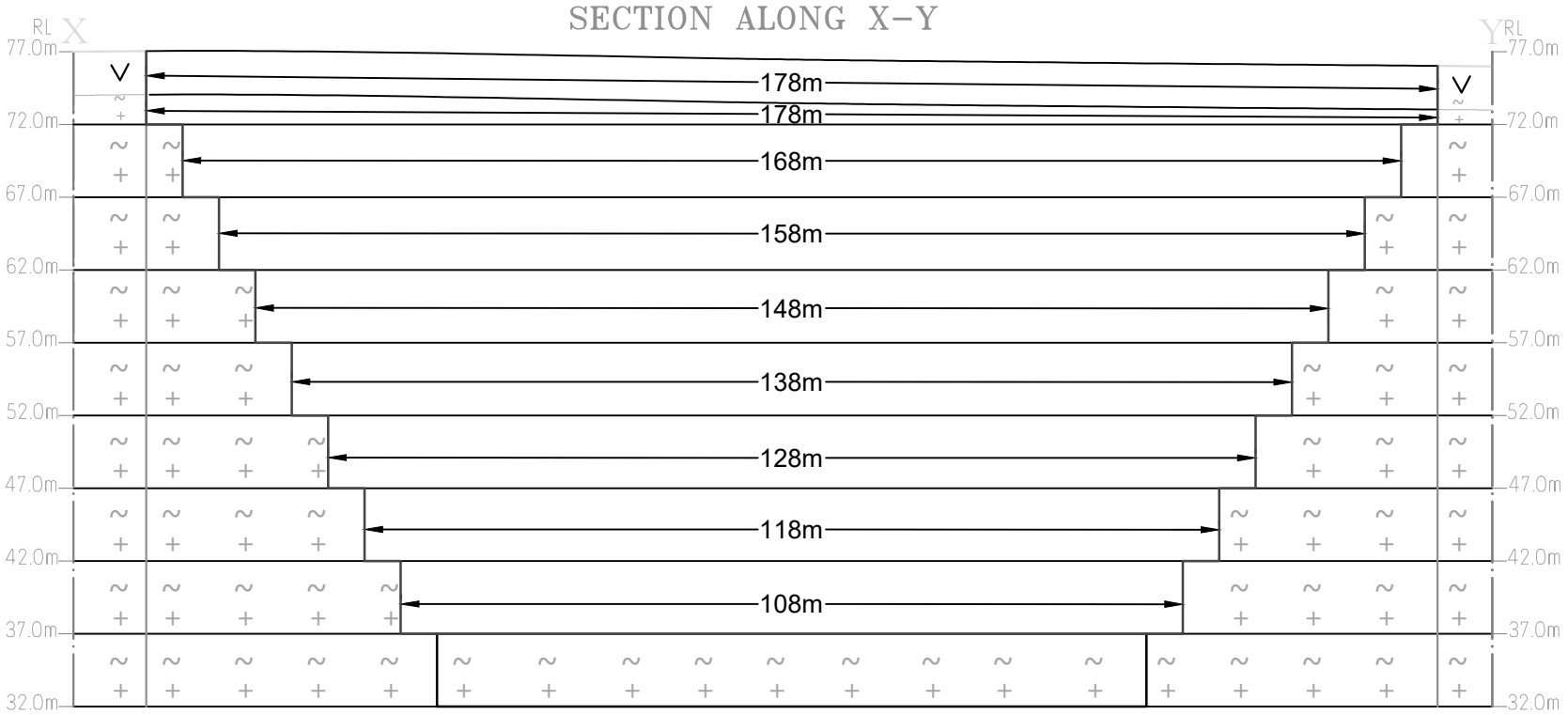
SCALE 1 : 1000

Prepared By:

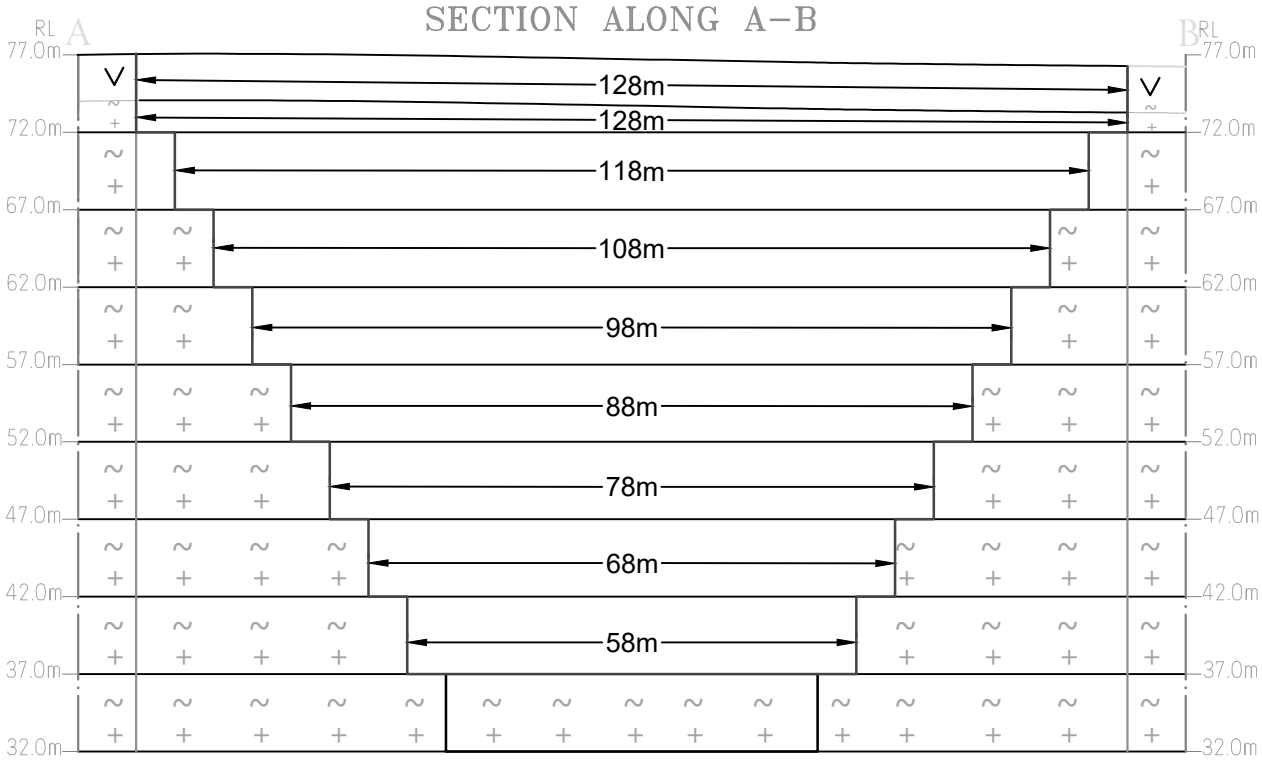
I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

SECTION ALONG X-Y



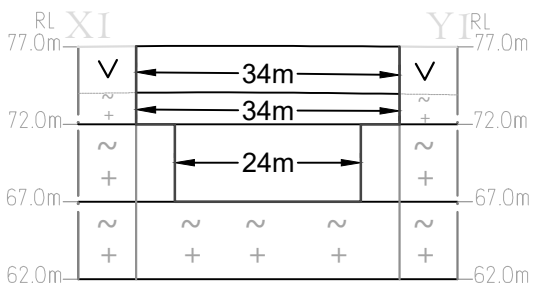
SECTION ALONG A-B



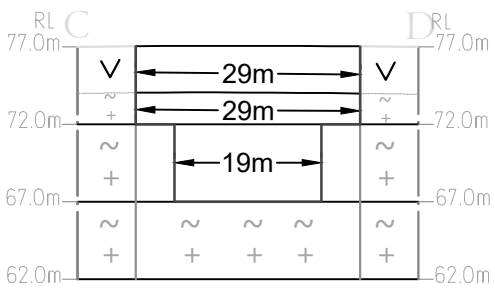
PRODUCTION RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in M^3	Rough Stone in M^3	Gravel in M^3
XY-AB	I	178	128	3	68352	.....	68352
	I	178	128	2	45568	45568	.....
	II	168	118	5	99120	99120	.....
	III	158	108	5	85320	85320	.....
	IV	148	98	5	72520	72520	.....
	V	138	88	5	60720	60720	.....
	VI	128	78	5	49920	49920	.....
	VII	118	68	5	40120	40120	.....
	VIII	108	58	5	31320	31320	.....
TOTAL				**40**	**552960**	**484608**	**68352**
X1Y1-CD	I	34	29	3	2958	.....	2958
	I	34	29	2	1972	1972	.....
	II	24	19	5	2280	2280	.....
TOTAL				**10**	**7210**	**4252**	**2958**
X2Y2-EF	I	97	44	3	12804	.....	12804
	I	97	44	1	4268	4268	.....
	II	87	34	5	14790	14790	.....
	III	77	24	5	9240	9240	.....
	IV	67	14	5	4690	4690	.....
TOTAL				**19**	**45792**	**32988**	**12804**
GRAND TOTAL					**605962**	**521848**	**84114**

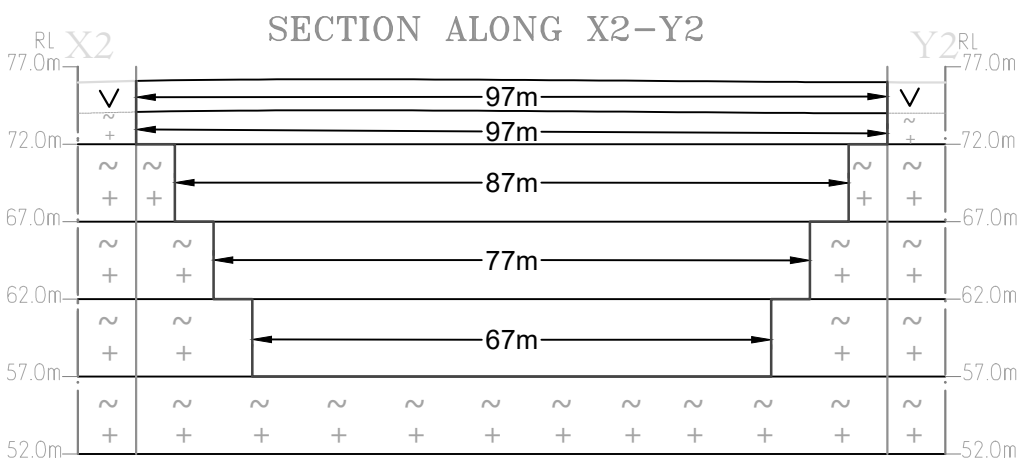
SECTION ALONG X1-Y1



SECTION ALONG C-D



SECTION ALONG X2-Y2



SECTION ALONG E-F

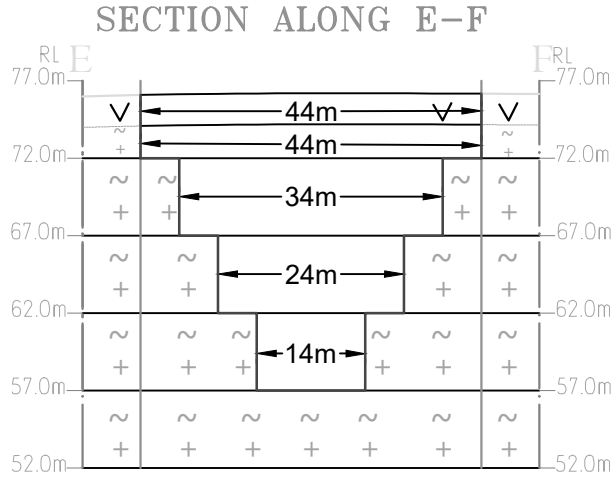


PLATE NO-VIA

PROGRESSIVE MINE CLOSURE SECTIONS

SECTION HOR 1 : 1000 & VER 1: 1000

APPLICANT:
Mr.A.SHANMUGAM,
S/o. ARUMUGAM,
No. 176/2 , MAIL ROAD,
THALAVANUR VILLAGE AND POST,
VILUPPURAM TALUK & DISTRICT.

LEASE APPLIED AREA:
S.F.NO : 19/7A,19/7B, 19/12, 19/13, 19/14A, 19/14B & 119/1A,
EXTENT : 3.66.45 Hect
VILLAGE : THOLLAMUR & NEMILI,
TALUK : VANUR,
DISTRICT : VILUPPURAM.

INDEX
MINE LEASE BOUNDARY
SAFETY BOUNDARY
GRAVEL
ROUGH STONE
PROPOSED BENCH
ULTIMATE BENCH

Prepared By:

I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
QUALIFIED PERSON

திருவள்ளூர் மாவட்டம். வானூர் தாலுகா.

52. நத்தமேடு கிராமம் நிர்வாக அலுவலர் அலுவலகம் அருகில் உள்ள

சாலை. திருத்தப்பட்டம் மாவட்டம். வானூர் தாலுகா.

நத்தமேடு கிராமம் புல எண் 119/1A -

2.03.95 ஆம் ஆண்டில் உள்ள நிலத்தில் தான்!.

சென்னை நகர அமைப்பு என்பதால் சாதாரண கிணறு

மற்றும் நிலம் முழுதிற்கு அனுமதி கோரியுள்ளார் மேலும்

புல எண்ணை சுற்றி 300. மீட்டர் சுற்றளவில் குடிநீர்க்கோ

மற்றும் நிலமேம்பாடு பணிக்கோ. புதிதாக ஆழ்துளைக் கிணறுகள்

ஏதும் உள்ளதா? தூரங்களோ ஏதும் இல்லை என்பதை

உறுதிசெய்து கொள்கிறேன்

21.07.2023

கிராம நிர்வாக அலுவலர்
52. நெசல் கிராமம்
வானூர் வட்டம்-605 014.
விழுப்புரம் மாவட்டம்.

I/c 52 நத்தமேடு

PHOTOCOPY OF THE APPLIED LEASE AREA

Site photos in respect of rough stone and gravel quarry lease in S.F.No's 19/12, 19/13, 19/14A, 19/14B, 19/7A, 19/7B & 119/1A over an extent of 3.66.45 Hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State in belonging to **Mr.A.Shanmugam** .

(இணைக்க நகல்)

21.07.2023

கிராம நிர்வாக அலுவலர்
38. நெல் கிராமம்
வானூர் வட்டம் 605 014.
விழுப்புரம் மாவட்டம்.

299

I/C 52 · நகல்

விழுப்புரம் மாவட்டம் வானூர் வட்டம்

தொள்ளமூர் கிராம நிர்வாக அலுவலர் கொடுத்துக் கொண்ட சான்று

விழுப்புரம் மாவட்டம் வானூர் வட்டம் தொள்ளமூர் கிராமம் புல எண்கள் 19/12, 19/13, 19/14B 19/7B ஆகியவற்றில் விஸ்தீரணம் 1.33.05 ஹெக்டேர் நிலத்தில் திரு ஆ. சண்முகம் S/o ஆறுமுகம் என்பவர் சாதாரண கற்கள் மற்றும் கிராவல் குவாரிக்கு அனுமதி கோரியுள்ளார். மேற்படி புல எண்களை சுற்றி 300 மீட்டர் சுற்றளவில் கோவில்களோ, குடியிருப்பு பகுதிகளோ, புராதன சின்னங்களோ வேறு வழிபாட்டு தலங்களோ இல்லை என்பதை தெரிவித்துக் கொள்கிறேன்

நாள் - 21/07/2023

இடம், தொள்ளமூர்

S. Ravi
கிராம நிர்வாக அலுவலர்
மற்றும் பிறப்பு, இறப்பு
பதிவாளர் 64 தொள்ளமூர் கிராமம்
வானூர் வட்டம், விழுப்புரம் மாவட்டம்.

PHOTOCOPY OF THE APPLIED LEASE AREA

Site photos in respect of rough stone and gravel quarry lease in S.F.No's 19/12, 19/13, 19/14A, 19/14B, 19/7A, 19/7B & 119/1A over an extent of 3.66.45 Hectares of Thollamur & Nemili Village, Vanur Taluk, Viluppuram District, Tamil Nadu State in belonging to **Mr.A.Shanmugam .**

S. Raj
கிராம நிர்வாக அலுவலர்
மற்றும் விழுப்பு, கிறப்பு
பதிவாளர் 84 தொள்ளமூர் கிராமம்
வானூர் வட்டம், விழுப்புரம் மாவட்டம்.
21/7/2023

QUALITY COUNCIL OF INDIA
Creating an Ecosystem for Quality

National Accreditation Board for Education and Training

Certificate of Accreditation

Geo Technical Mining Solutions

1/213B, Natesan Complex, Dharmapuri Salem Main Road, Oddapatti, Collectorate post office, Dharmapuri, Tamil Nadu-636705

The organization is accredited as ***Category-A*** *under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast/ underground mining	1	1 (a) (i)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated September 13, 2022 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/23/2641 dated January 19, 2023. The accreditation needs to be renewed before the expiry date by Geo Technical Mining Solutions following due process of assessment.

Sr. Director, NABET
Dated: January 19, 2023

Certificate No.
NABET/EIA/2124/SA 0184

Valid up to
Dec 31, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website