

**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 = 8.98.0 hectares

PERIYAVENMANI ROUGHSTONE AND GRAVEL QUARRY

At

**Periyavenmani Village, Maduranthagam Taluk, Chengalpattu District,
Tamil Nadu State**

ToR letter No. SEIAA-TN/F.No. 9814/SEAC/ToR-1461/Dated: 23.05.2023.

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and Address	Extent & S.F.No.
M/s. PCS Industries Private Limited C-10, Fifth Street, Industrial Estate, Ambattur, Chennai-600 058	4.74.50 ha & 223/1, 223/2, 224, 225/1, 225/2

ENVIRONMENTAL CONSULTANT

GEO TECHNICAL MINING SOLUTIONS

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

Oddapatti, Collectorate Post office,

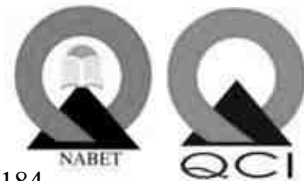
Dharmapuri-636705. Tamil Nadu.

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) Ltd

R-7/1, AVK Towers, Ground Floor,

North main road, Anna Nagar West Extn,

Chennai – 600101.

Baseline Study Period – March through May 2023

TERMS OF REFERENCE (ToR) COMPLIANCE

ToR issued vide Letter No. SEIAA-TN/F.No.9814/ToR-1461 dated 23.05.2023 for

M/s. PCS Industries Private Limited Rough Stone & Gravel Quarry

SPECIFIC CONDITIONS		
1	The Proponent shall carry out a detailed study on the impact of mining on the tank/ water body situated adjacent to the proposed area including the impact on the bund due to blasting, impact on runoff to the water body, etc, from a reputed Institution like IIT, NIT, Anna University, etc.	The detailed study will be given in the final EIA report.
2	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 is included in the Section 4.6 under Chapter IV, pp.112-118.
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 100m, (ii) 100m, (iii) 200m and (iv) 300m (v) 500m shall be enumerated with the 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.	All the details will be given in the final EIA report.
4	The PP shall submit a detailed hydrological report indicating the impact of proposed	The detailed hydrological report will be given in the final EIA report.

	quarrying operations on the waterbodies like lake, water tanks, etc are located within 1km of the proposed quarry.	
5	The proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Details regarding Bio diversity is given in the Section 3.5 under Chapter III, pp.64-81
6	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 prepare and submit an 'Slope Stability Action plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director and mining during the time of appraisal for obtaining the EC.	Slope stability report will be included in final EIA report.
7	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.	The affidavit for blasting has been enclosed in the approved mining plan report.
8	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.19-26.
9	The EIA Coordinators shall obtain and furnish the details of quarry/quarries	Photographic evidences showing mining activities of the project proponent will be

	operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.	attached with final EIA report.
10	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines.	
	a. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	All the documents will be attached with final EIA report.
	b. Quantity of minerals mined out.	
	c. Highest production achieved in any one year	
	d. Detail of approved depth of mining.	
	e. Actual depth of the mining achieved earlier.	
	f. Name of the person already mined in that leases area.	
	g. If EC and CTO already obtained, the copy of the same shall be submitted.	
	h. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	
11	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	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.14

	and buffer zone).	
12	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	Drone video and photographs showing fencing and greenbelt development will be included in the final EIA report. The drone video will be submitted during the final EIA report appraisal.
13	The PP shall furnish the revised manpower including the statutory & competent persons as required under-the provisions of the MMR 1961 for the prosed quarry based on the volume of rock handled & area of excavation.	Details of manpower required for this project have been given in Table 2.14 under Chapter II, p.27.
14	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.	The mineral reserves of the project have been discussed in Section 2.5 under Chapter II, pp.17-18. The anticipated impact of mining on land, air, noise, water, soil, biology, and socio economy is discussed under Chapter IV, pp.94-122.
15	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.	Details of manpower required for this project have been given in Table 2.14 under Chapter II, p.27.
16	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open	Detailed hydrogeological study was carried out. The results have been discussed Section 3.2 under Chapter III, pp.37-49.

	<p>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.</p>	
17	<p>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.</p>	<p>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. 28-93.</p>
18	<p>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.</p>	<p>Results of cumulative impact study due to mining operations are given in Section 7.4 under Chapter VII, pp.136-139.</p>
19	<p>Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.</p>	<p>The rainwater harvesting management plan will be submitted along with the final EIA report.</p>

20	<p>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.</p>	<p>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.28-36 under Chapter III. The details of surrounding sensitive ecological features have been provided in Table 3.42 under Chapter III, p.92. 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.27.</p>
21	<p>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.</p>	<p>This condition is not applicable to this project because no dumps have been proposed outside the lease area.</p>
22	<p>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.</p>	<p>This condition is not applicable to this project because this project is not located in proximity to the areas of areas declared as 'Critically Polluted' (or) the project areas which attracts the court restrictions for mining operations.</p>
23	<p>Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater</p>	<p>Details about rainwater harvesting structures will be included in the final EIA report.</p>

	harvesting proposed in the Project, if any, should be provided.	
24	Impact on local transport infrastructure due to the Project should be indicated.	Details regarding the impact of the project on traffic are given in Section 3.7 under Chapter III, pp.88-91.
25	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 carried out within 300 m radius and the results have been discussed in Section 3.5 under Chapter III, pp.64-81.
26	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, pp.209-295. The budget details for the progressive mine closure plan are shown in Table 2.9 under Chapter II, p.22.
27	Public Hearing points raised and commitments 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 and to be submitted to SEIAA/SEAC with regard to the Office Memorandum of MoEF & CC accordingly.	The comments made in public hearing meeting will be updated in the final EIA report after public hearing meeting.
28	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	Details of advertisement will be updated in the final EIA report.
29	The PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing in Tamil Language also.	The Tamil version of EIA report, executive summary and other related information will be incorporated in this report.

30	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.
31	The purpose of green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	A detailed greenbelt development plan has been provided in Section 4.6 under Chapter IV, pp.112-118.
32	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/Horticulture 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.
33	A Disaster management plan shall be prepared and included in the EIA/EMP	A disaster management plan for the project has been provided in Section 7.3

	Report for the complete life of the proposed quarry (or) till the end of the lease period.	under Chapter VII, pp.132-136.
34	A Risk Assessment and management plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	A risk assessment plan for the project has been provided in Section 7.2 under Chapter VII, pp.129-132.
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 discussed in detail in Section 4.8 under Chapter IV, pp.119 & 120.
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.144 & 145.
37	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 40 people directly as discussed in Section 8.1 under Chapter VIII, p.143.
38	Details of litigation pending against the	No litigation is pending in any court

	project, if any, with direction /order passed by any Court of Law against the Project should be given.	against this project.
39	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.143-145.
40	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.
41	The PP Shall prepare the EMP for the entire life/lease period of mine and also Furnish the sworn affidavit starting to Abide the EMP for the entire life of mine.	A detailed environment management plan has been prepared following the suggestion made by SEAC, as shown in Chapter X, pp.147-164. The sworn affidavit stating to abide the EMP for the entire life of mine will be submitted along with final EIA.
42	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.

	<p>The subject was placed in the 621th Authority meeting held on 23.05.2023. The authority noted that the subject was appraised in the 374th SEAC meeting held on 03.05.2023. 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 recommended by SEAC & normal conditions in addition to the following conditions mentioned in ‘Annexure B’ of this minute.</p>	
	Annexure ‘B’	
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 nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	All the information has been discussed in Section 2.6 & 2.7 under Chapter II, pp.19-27.
5	The committee shall deliberate on risk	It will be informed to the committee.

	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.	It will be advised to the cluster management committee to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised will be given in detail.
7	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	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.132-136.

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.	The study is under process. The results will be updated in the final EIA report.
	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.	There shall be negligible air emissions or effluents from the project site. During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly, as shown in Section 4.6 under Chapter IV, pp.112-118.

14	Impact on soil flora & vegetation around the project site.	The details on flora have been provided in Section 3.5 under Chapter III, pp.64-81. 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.
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.64-81. Details about transplantation of plants have been provided in Section 4.6 under Chapter IV, pp.112-118.
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.64-81 and measures have been provided in Section 4.6 under Chapter IV, pp.112-118.
17	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	All the essential environmental protective measures will be followed by the proponent to manage the surrounding environment and restore the ecosystem, as discussed in Chapter IV, pp.94-122.
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.94 & 95.
Forests		
19	The project proponent shall study on impact of mining on Reserve forests free ranging wildlife.	The project proponent shall do barbed wire fencing work and develop a green belt around the lease area to prevent

		wildlife from entering the site.
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.112-118.
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.112-118.
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. The list of environmentally sensitive areas within 10 km radius has been provided in Table 3.42 under Chapter III, pp.92.
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.	Detailed hydrogeological study was carried out. The results have been discussed Section 3.2 under Chapter III, pp.37-49.
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.96 &

		97.
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.	The matter has been discussed under Chapter IV, pp.94-122.
26	The project proponent shall study impact on fish habitats and the food WEB/food chain in the water body and Reservoir.	An analysis for food chain in aquatic ecosystem is under process and report will be added to the final EIA report.
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.94-122.
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.	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.112-118.
29.	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components.	The impact of mining on soil environment has been discussed in Section 4.2 under Chapter IV, pp.95 & 96.
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.96 & 97.
Energy		
31	The measures taken to control Noise, Air, water, Dust control and steps adopted to efficiently utilise the Energy shall be	The measures taken to control noise, air, water, and dust have been given under Chapter IV, pp.94-122.

	furnished.	
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.	The carbon emission and the measures to mitigate carbon emission have been discussed in Section 4.6 under Chapter IV, pp.112-118.
33	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The information will be included in the final EIA report.
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, pp.209-295. The budget details for the progressive mine closure plan are shown in Table 2.9 under Chapter II, p.22.
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.	A detailed Environment Management plan has been given under Chapter X, pp.147-164.
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.158-164.
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.129-132.
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.	The disaster management plan for this project has been provided in Section 7.3 under Chapter VII, pp.132-136.
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 attached in the Annexure IV, pp.296-297.
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 consultation and all the activities proposed shall be part of the Environment Management plan.	The concerns raised during the public consultation and all the activities proposed will be updated in the final EIA report.
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,	The matter on plastic waste management has been given in Section 7.5 under Chapter VII, p.139-140.

	contemplated during mining may be investigated and reported.	
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 private land. A copy of the document showing that the proponent is the rightful lessee has been enclosed along with the approved mining plan in Annexure III, pp.209-295.
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All the documents will be provided in the final EIA report.
4.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	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.14.

5.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Toposheets of Survey of India have been used for showing sampling locations of air, soil, water, and noise, as shown in Chapter III, pp.28-93.
6.	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The lease area was inspected by the officers of Department of Geology along with revenue officials and found that the land is fit for quarrying under the policy of State Government.
7.	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The proponent has framed Environmental Policy and the same has been discussed in Section 10.1 under chapter X, p.147 & 148.
8.	Issues relating to Mine Safety, including subsidence study in case of underground	It is an opencast quarrying operation proposed to operate in Manual method.

	<p>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.</p>	<p>The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90⁰ 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.</p>
9.	<p>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.</p>	<p>The study area considered for this study is of 5 km radius for air, soil, water, and noise level sample collections, while the study area is 10 km radius for ecology and biodiversity studies and all data contained in the EIA report such as waste generation etc., is for the life of the mine / lease period.</p>
10.	<p>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.</p>	<p>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, under Chapter III, pp.29-36. The details of surrounding sensitive ecological features have been provided in Table 3.42 under Chapter III, p.92. 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.22.</p>

11.	Details of the land for any over burden dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	It is not applicable as no dumps have been proposed outside the lease area. The entire quarried out rough stone will be transported to the needy customers.
12.	Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	It is not applicable as there is no forest land involved within the proposed project area. The details have been discussed in Table 3.42 under Chapter III, p.92.
13.	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	It is not applicable as the proposed project area does not involve any forest land.
14.	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006 as there are neither forests nor forest dwellers / forest dependent communities in the mine lease

		area. 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.	Reserve Forest is found within the study area. The matter has been discussed Section 3.5.1, under Chapter III, pp.66-78.
16.	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	There is no any wildlife/protected area within 10 km radius from the periphery of the project area. Information regarding the same has been given in Table 3.42 under Chapter III, p.92.
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	There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km radius from the periphery of the project area. Information regarding the same has been given in Table 3.42 under Chapter III, p.92.
18.	A detailed biological study of the study area [core zone and buffer zone (10 KM	A detailed biological study was carried out in both core and buffer zones and the

	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.	results have been discussed in Section 3.5 under Chapter III, pp.64-81.
19.	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
20.	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal	Not Applicable The project doesn't attract the C.R.Z. Notification, 2018.

	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.	Not Applicable. There are no approved habitations of SCs/STs and other weaker sections in the lease area. Therefore, R&R Plan / Compensation Plan for the Project Affected People (PAP) are not provided.
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	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 3.1-3.8 under Chapter III, pp. 29-93.

	<p>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.</p>	
23.	<p>Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.</p>	<p>Air quality modelling for prediction of incremental GLCs of pollutants was carried out using AERMOD view 11.2.0. The model results have been given in Section 4.4 under the Chapter IV, pp.97-107.</p>
24.	<p>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.</p>	<p>The water requirement for the project, its availability and source have been provided in Table 2.11 under Chapter II, p.25.</p>
25.	<p>Necessary clearance from the competent Authority for drawl of requisite quantity of water for the project should be provided.</p>	<p>Not Applicable. Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and</p>

		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 has been 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 safeguard measures, if any required, should be provided.	Impact studies and mitigation measures of water environment including surface water and ground water have been discussed in Section 4.3 under Chapter IV, pp. 96 & 97.
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	Not Applicable. The ground water table is found at the depth of 50-55 m below ground level. The ultimate depth of quarry is 35 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.37-49.

	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.	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 22 m AMSL. Ultimate depth of the mine is 35 m BGL. Depth to the water level in the area is 50-55 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 time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Greenbelt development plan has been given in Section 4.6 under Chapter IV, pp.112-118.
32.	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result	Traffic density survey was carried out to analyse the impact of transportation in the study area as per IRC guidelines 1961 and

	<p>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.</p>	<p>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, p.88 & 91.</p>
33.	<p>Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.</p>	<p>Infrastructure & other facilities will be provided to the mine workers after the grant of quarry lease and the same has been discussed in Section 2.6.6 under Chapter II, p.25.</p>
34.	<p>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.</p>	<p>Progressive mine closure plan has been prepared for this project and is given in Section 2.6.4 under Chapter II, p.22.</p>
35.	<p>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.</p>	<p>Occupational health impacts of the project and preventive measures have been explained in detail in Section 4.8 under Chapter IV, pp.119 & 120.</p>
36.	<p>Public health implications of the Project and related activities for the population in</p>	<p>No public health implications are anticipated due to this project. Details of</p>

	the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	CSR and CER activities have been discussed in Sections 8.6 and 8.7 under Chapter VIII, pp.144 & 145.
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 40 people directly as discussed in Section 8.1 under Chapter VIII, p.143.
38.	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	A detailed Environment Management Plan has been prepared and provided in Tables 10.9 & 10.10 under Chapter X, pp.158-164.
39.	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The outcome of public hearing will be updated in the final EIA/EMP report.
40.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost is Rs. 2,18,70,000/- CER Cost is Rs. 5,00,000/- In order to implement the environmental protection measures, an amount of

		Rs.7065459 as capital cost and recurring cost as Rs.3116743 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.24448760, as shown in Tables 10.9 & 10.10 under Chapter X, pp.158-164.
42	A disaster management Plan shall be prepared and included in the EIA/EMP Report.	The disaster management plan for this project has been provided in Section 7.3 under Chapter VII, pp.132-136.
43.	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Benefits of the project details have been given under Chapter VIII, pp.143-145.
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	Original Baseline monitoring reports will be included in the final EIA report.

	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.	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	The certified report of the status of compliance of the conditions will be submitted along with final EIA report.

	project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	
j)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	All the plans including surface & geological plans, and progressive closure plan have been included in Annexure III, pp.209-295.

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CHAPTER I

INTRODUCTION

1.0 PREAMBLE

Environmental Impact Assessment (EIA) study is a process used to identify the environmental, social and economic impacts of a project prior to decision-making. EIA systematically examines both beneficial and adverse consequences of the proposed project and ensure that these impacts are considered during the project designing. According to the Ministry of Environment and Forests, Govt. of India, EIA notification S.O. 1533 (E) of 14th September 2006 and its subsequent amendments 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.9814/ToR-1461/2023 Dated 23.05.2023 this EIA report has been prepared for the project proponent, M/s. PCS Industries Private Limited applied for rough stone and gravel quarry lease in the Patta land falling in S.F. No. 223/1, 223/2, 224, 225/1 and 225/2 over an extent of 4.74.50 ha in Periyavenmani Village, Maduranthagam Taluk, Chengalpattu 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 one proposed project known as P1 and One Existing project, known as E1 and One Expired project, known as EX1. 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 quarry is **8.98.0** 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/ Taluk	Extent (ha)	Status
P1	M/s. PCS Industries Private Limited	223/1, 223/2, 224, 225/1, 225/2	Periyavenmani Madurantakam	4.74.50	Proposed Area
Existing Quarries					
E1	PCS Industries Private Limited	218/2, 219, 220/3	Periyavenmani Madurantakam	1.74.00	02.07.2021 to 01.07.2026
Abandoned Quarries					
EX1	Tvl. PCS Industries Private Limited	220/1,220/2, 222	Periyavenmani Madurantakam	2.49.50	25.02.2016 to 24.02.2021
Total Cluster Extent				8.98.0	---

Source:

DD Letter - Rc.No.588/Q2/2018, Dated:27.01.2023.

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/ 417301/2023, dated 08.02.2023) 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) on 10.02.2023.

Scoping

The proposal was placed in the 374th meeting of SEAC on 03.05.2023. 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.

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.9814/ToR-1461/2023 Dated :23.05.2023** 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.

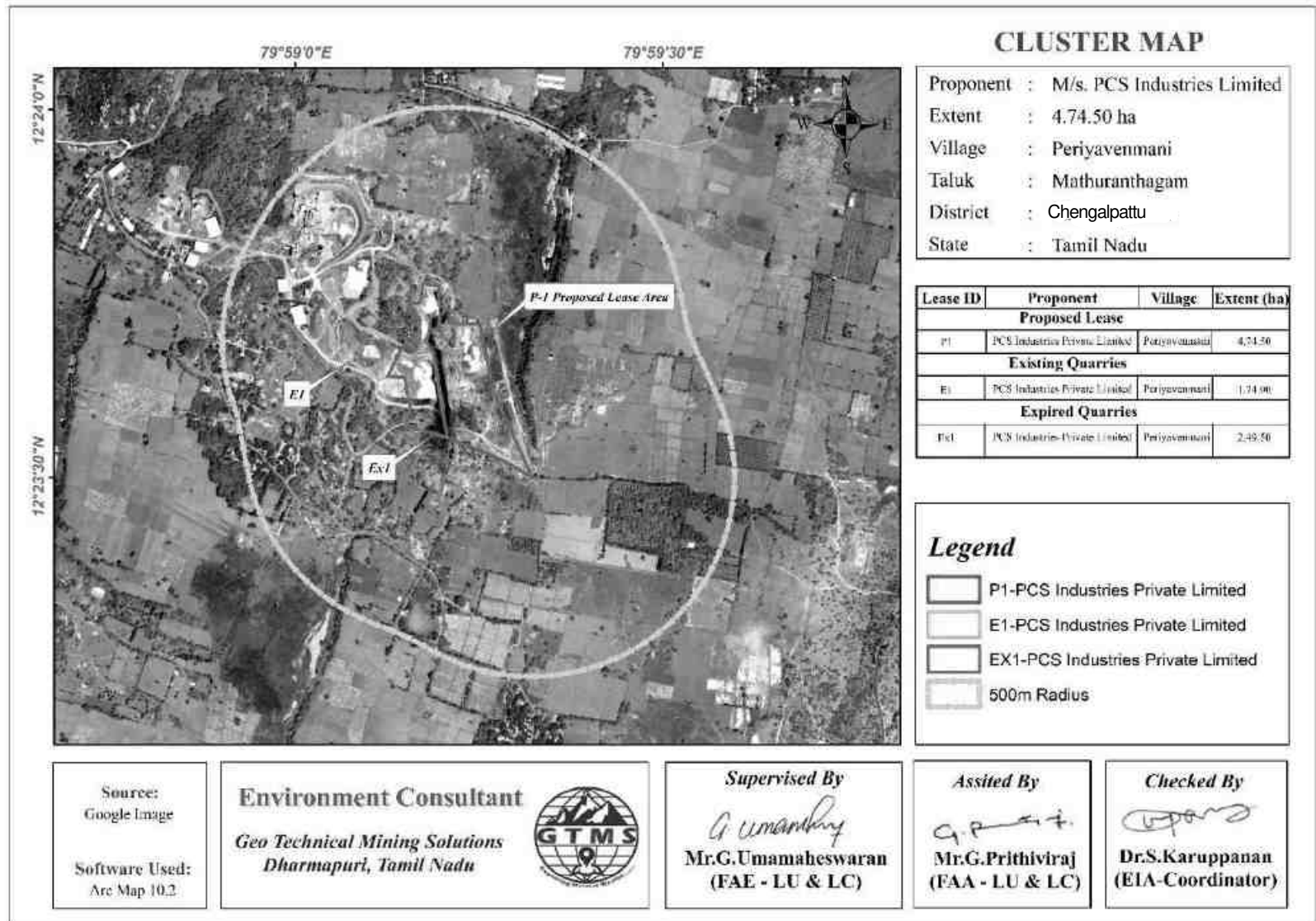


Figure 1.1 Location of the Proposed and Existing Rough Stone and Gravel Quarries in the Cluster of 500 m Radius

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	M/s. PCS Industries Private Limited
Address	C-10, Fifth Street, Industrial Estate, Ambattur, Chennai-600 058 Mobile No: +91 9444395008, 9444395007
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 Periyavenmani Village, Maduranthagam Taluk, Chengalpattu District, and Tamilnadu 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	M/s. PCS Industries Limited Rough Stone and Gravel Quarry	
Toposheet No	57-P/15	
Latitude	12°23'30.04"N to 12°23'43.89"N	
Longitude	79°59'10.57"E to 79°59'19.31"E	
Highest Elevation	22 m AMSL	
Proposed Depth as per ToR	35 m BGL	
Geological Resources	Rough Stone in m ³	Gravel in m ³
	2038071	94794
Mineable Reserves as per ToR	Rough Stone in m ³	Gravel in m ³
	609326	61344
	Rough Stone in m ³	Gravel in m ³

Proposed production as per ToR for five years	609326	61344
Method of Mining	Open-Cast Semi Mechanized Method	
Topography	Flat Terrain	
Machinery proposed	Jack Hammer	8
	Compressor	2
	Hydraulic Excavator	1
	Tippers	6
Blasting Method	The Quarrying Operation is proposed to carried out by open cost, semi-mechanized mining in conjunction with conventional method of mining using jack hammer drilling and blasting for shattering effect and loosen the rough stone	
Proposed Manpower Deployment	40	
Project Cost	Rs.2,18,70,000 /-	
CER Cost	Rs. 5,00,000/-	
Proposed Water Requirement	7.0 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.

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 DESCRIPTION OF THE PROJECT

The proponent **Tvl. PCS Industries Pvt Limited** 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 15.10.2018 to extract rough stone and gravel. The precise area communication letter was issued by Department of Geology and Mining, Chengalpattu vide Rc.No.588/Q2/2017, dated: 05.11.2019. Based on the precise area communication letter, mining plan was prepared. The mining plan thus prepared was approved by Assistant Director (i/c) Department of Geology and Mining, Chengalpattu Rc.No.588/Q2/2018, dated: 27.01.2023. 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 Periyavenmani Village, Maduranthagam Taluk, Chengalpattu District, as shown in Figure 2.2 & 2.3. The area lies between Latitudes from 12°23'30.04"N to 12°23'43.89"N and Longitudes from 79°59'10.57"E to 79°59'19.31"E. The maximum altitude of the project area is 22 m AMSL. Accessibility details to the proposed project site have been given in Table 2.1.

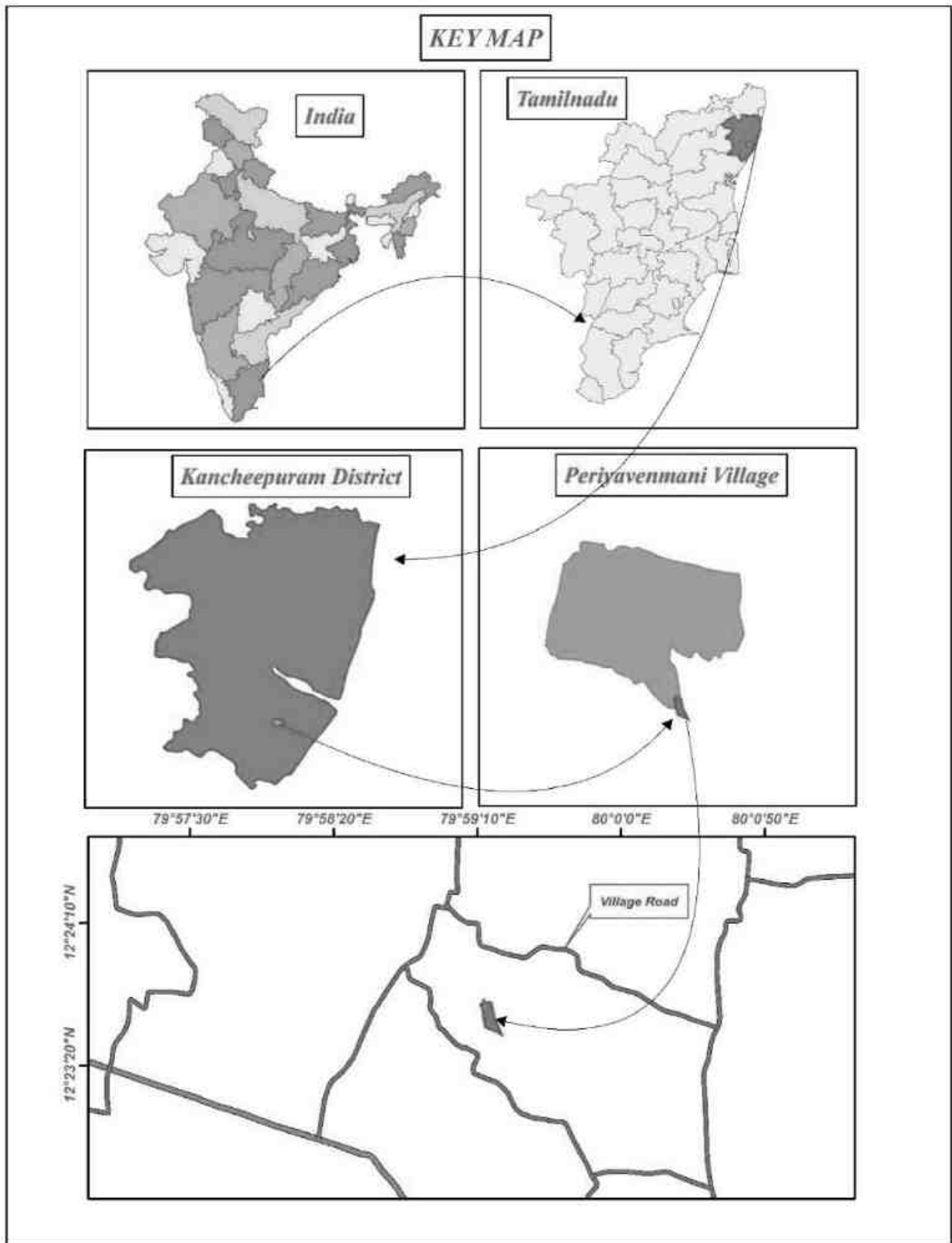


Figure 2.2 Key Map Showing Location of the Project Site

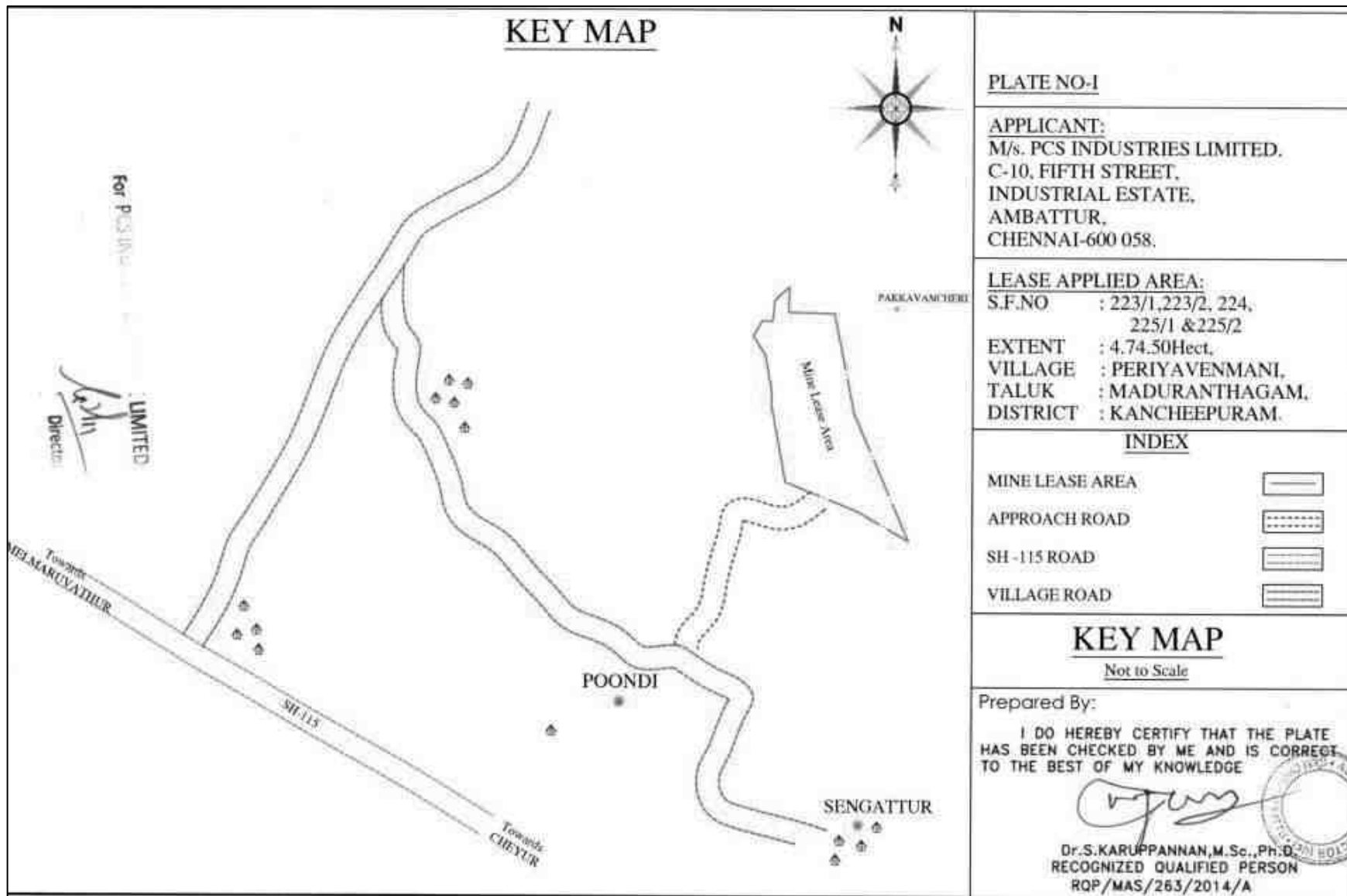


Figure 2.3 Site Connectivity to the Project Area

Table 2.1 Site Connectivity to the Project Area

Nearest Roadways	(SH-115) Melmaruvathur - Cheyyur	2 km S
Nearest Town	Pavunjur	6 km NE
Nearest Railway Station	Melmaruvathur	18 km W
Nearest Airport	Chennai	86 km N
Nearest Seaport	Chennai	110 km N
Nearest Village	Periyavenmani	1 km N
	Viralur	2 km S
	Poondi	1 km E
	Venmari	2 km W

2.3 LEASEHOLD AREA

- ❖ The extent of the proposed project site is 4.74.50 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 & 2.5.

Table 2.2 Corner Coordinates of Proposed Project

Pillar ID	Latitude	Longitude	Pillar ID	Latitude	Longitude
1	12°23'43.89''N	79°59'12.59''E	9	12°23'35.18''N	79°59'12.09''E
2	12°23'42.54''N	79°59'12.54''E	10	12°23'37.45''N	79°59'11.66''E
3	12°23'42.47''N	79°59'15.05''E	11	12°23'38.25''N	79°59'11.66''E
4	12°23'36.93''N	79°59'16.22''E	12	12°23'40.20''N	79°59'11.27''E
5	12°23'30.04''N	79°59'19.31''E	13	12°23'41.14''N	79°59'10.57''E
6	12°23'31.61''N	79°59'16.51''E	14	12°23'42.05''N	79°59'11.05''E
7	12°23'32.94''N	79°59'13.06''E	15	12°23'42.08''N	79°59'11.67''E
8	12°23'33.21''N	79°59'12.45''E	16	12°23'43.15''N	79°59'11.78''E

2.4 GEOLOGY AND GEOMORPHOLOGY

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

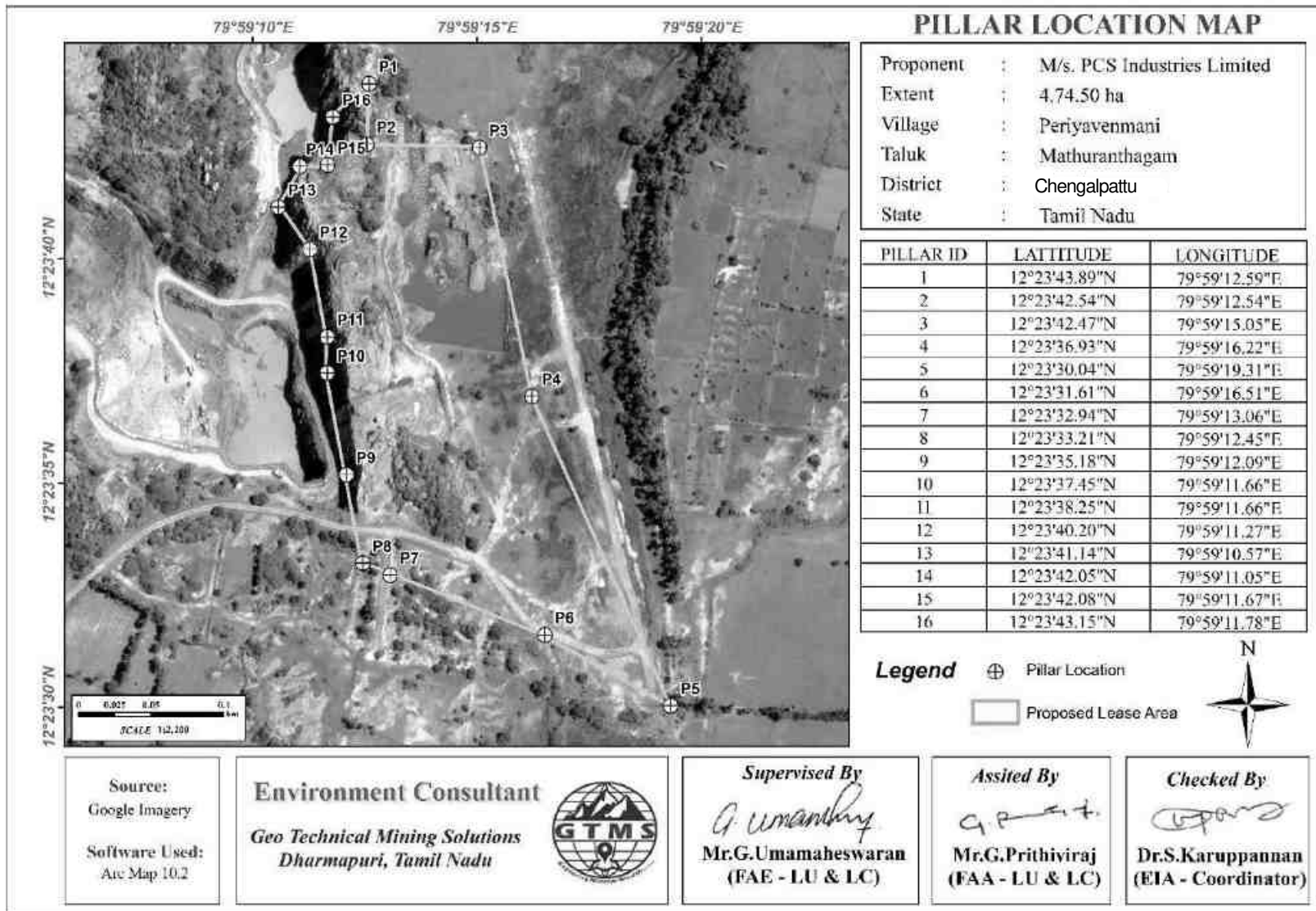


Figure 2.4 Google Earth Image Showing Lease Area with Pillars

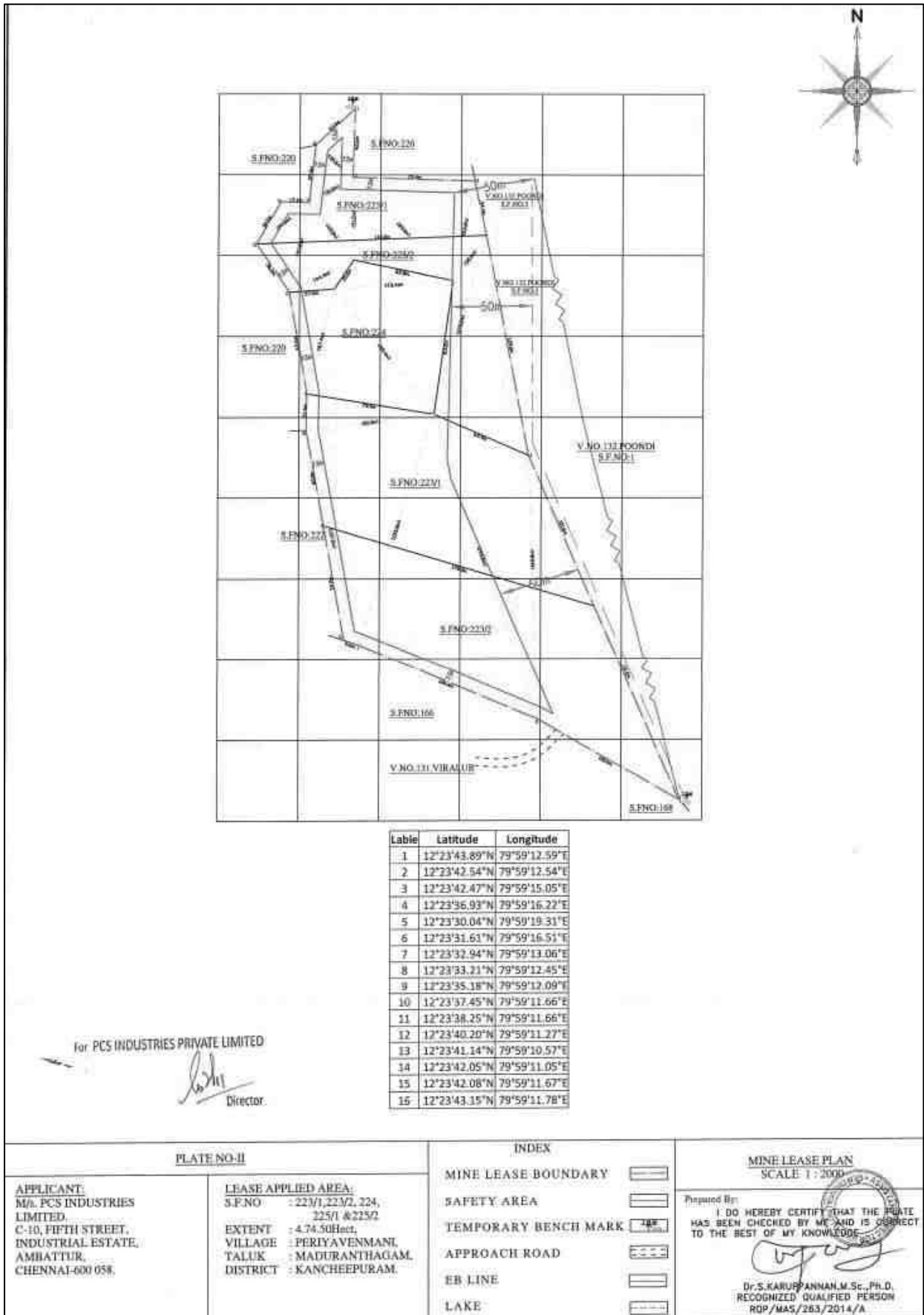


Figure 2.5 Mine Lease Plan

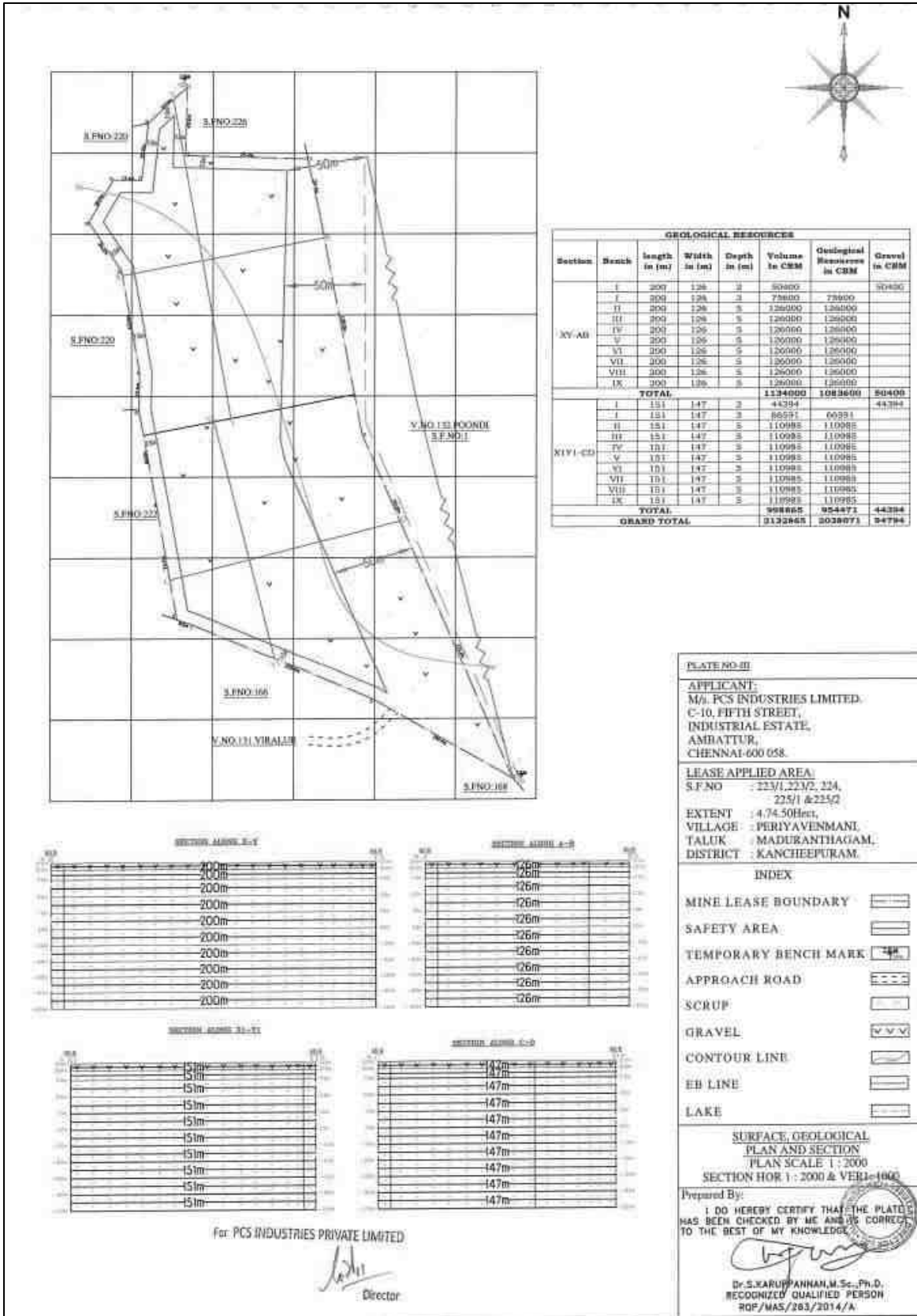


Figure 2.6 Surface and Geological Plan and Sections

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 35 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 2.6 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	2038071	94794
Mineable Reserves as per ToR in m ³	609326	61344
Proposed production as per ToR for 5 years m ³	609326	61344

Based on the year wise development and production plan and sections, the year wise production results have been given in Table 2.4 & Figure 2.7.

Table 2.4 Year-Wise Production Details

Year	Rough stone in (m ³)	Gravel in (m ³)
I	128683	35712
II	128650	---
III	104240	---
IV	131303	25632
V	116450	---
Total	609326	61344

Source: Approved Mining Plan & ToR

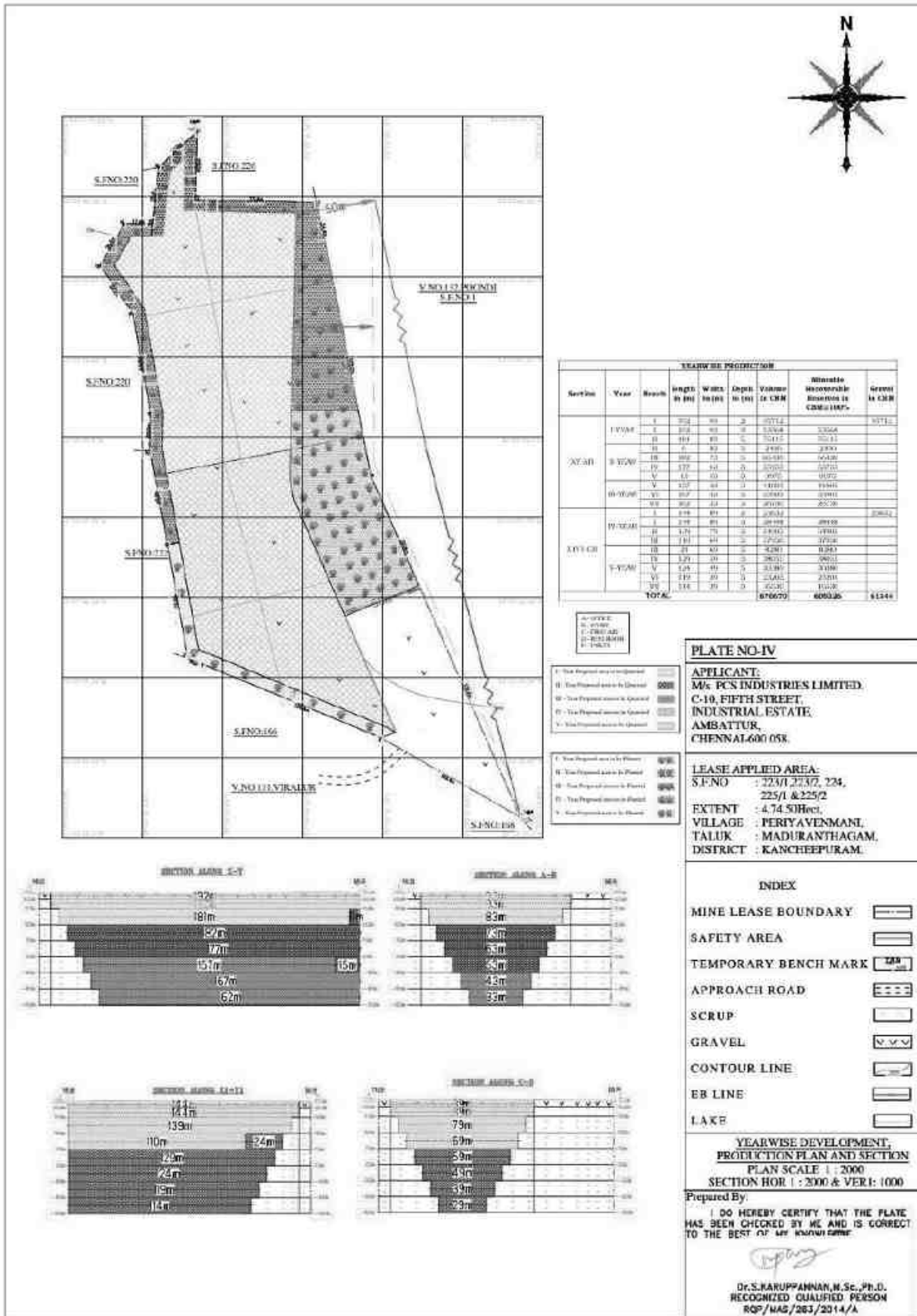


Figure 2.7 Yearwise Development Production Plan and Sections

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	451
Number of blastholes/day	109
Blasthole pattern	Staggered
Mass of explosive /day in kg	43.43
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	Gravel/2year
Proposed production for 5 years	609326	61344
Number of Working Days /Annum	270	270
Production of /Day (m ³)	451	114
No. of Lorry Loads	75	19

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	8	Hand held	Atlas Copco	Diesel Drive
2	Compressor	2	Air	Escorts Formtrac	Diesel Drive
3	Excavator	1	-	-	Diesel Drive
Haulage & Transport Equipment					
4	Tipper	6	15 M. T	Ashok Leyland	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 At Present about 4.73.50 ha of land is unutilized; Whereas, at the end of the mine life, about 2.69.43 ha of land is used for quarrying; about 1.40.53 of land is used for green belt and 0.02.00 will be used for roads and 0.01.00 is used for infrastructure.

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	2.69.43
Infrastructure	Nil	0.01.00
Roads	0.01.00	0.02.00
Green Belt & Dump	Nil	1.40.53
Unutilized area	4.73.50	0.61.54
Total	4.74.50	4.74.50

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
949 plants inside the lease area	189800	28470
1424 plants outside the lease area	427050	42705
Wire Fencing (4.74.50 ha)	949000	47450
Renovation of Garland Drain (4.74.50 ha)	47450	23725
Total	16,13,300	1,42,350

Source: Environment Management Plan

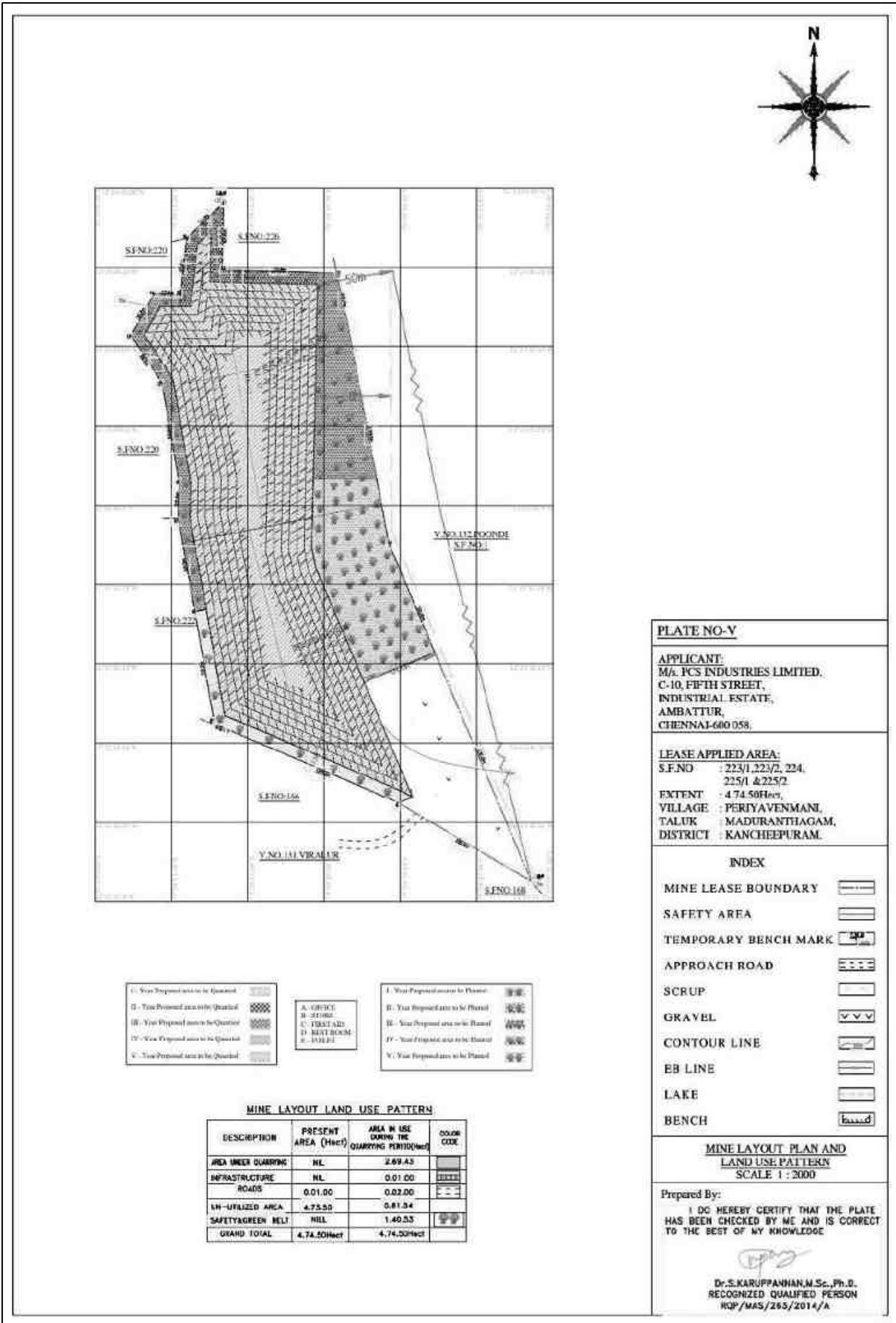


Figure 2.8 Mine Layout Plan and Land Use Pattern

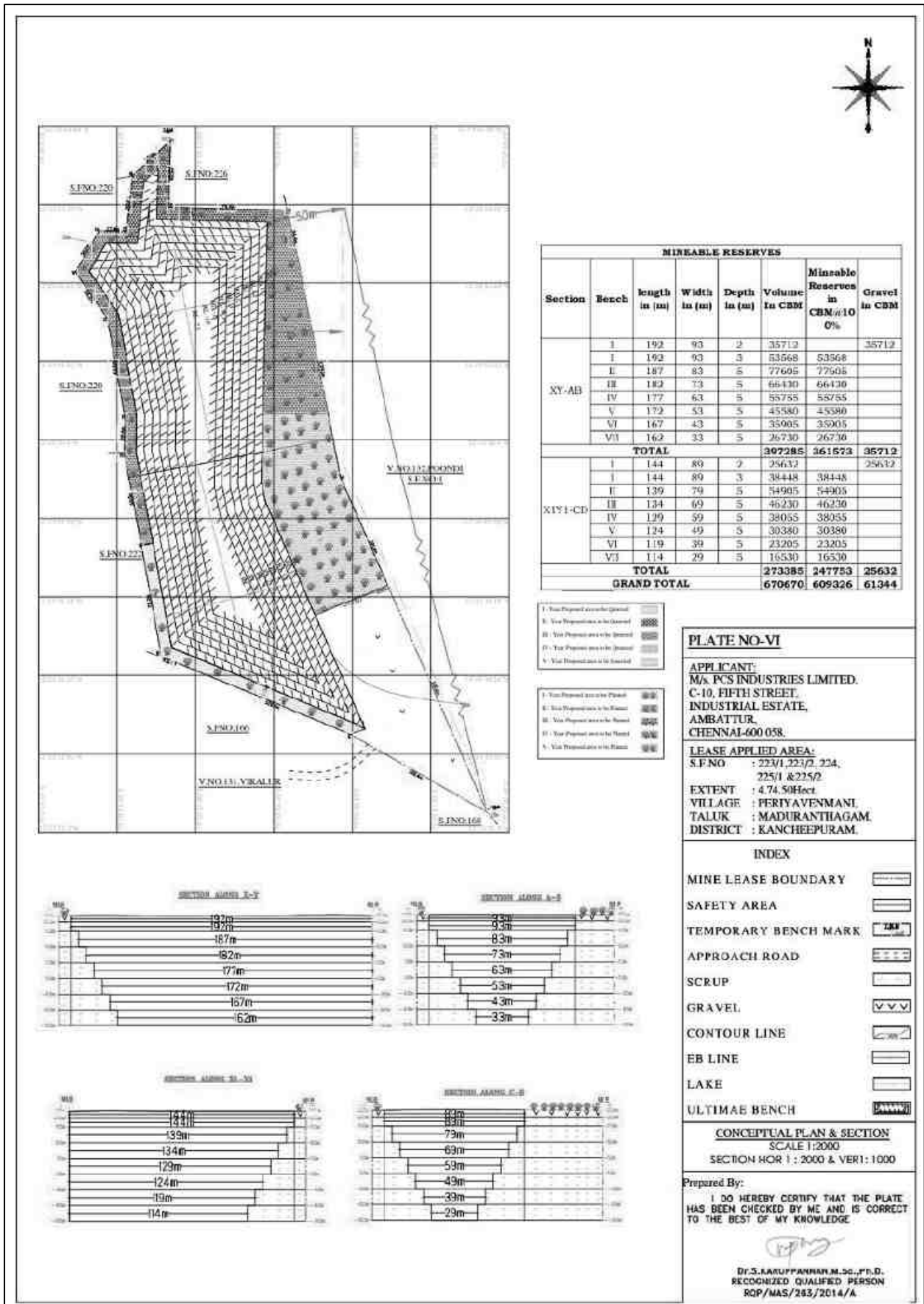


Figure 2.9 Conceptual Plan and Sections

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	192	93	35

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 is 7.0 KLD is given in Table 2.11.

Table 2.11 Water Requirement for the Project

Purpose	Quantity	Source
Dust Suppression	2.0 KLD	Existing bore wells nearby the lease area
Green Belt development	3.0 KLD	Existing bore wells nearby the lease area
Drinking & Domestic	2.0 KLD	Existing bore wells and approved water vendors
Total	7.0 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 **2786025** 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 (609326m³)	Gravel (61344 m³)	Total Diesel (litre)
Average Rate of Fuel Consumption (l/hr)	16	10	---
Working Capacity (m ³ /hr)	20	60	---
Time Required (hours)	30466	1022	---
Total Diesel Consumption for 5 years (litre)	487461	10224	497685
Fuel Requirement for Compressor			
Average Rate of Fuel Consumption/hole (litre)	0.4	---	---
Number of Drillholes/day	109	---	---
Total Diesel Consumption for 5 years (litre)	58860	---	58860
Fuel Requirement for Tipper			
Average Rate of Fuel Consumption/Trip (litre)	20	20	---
Carrying Capacity in m ³	6	6	---
Number of Trips / days	75	8*	---
Number of Trips / 5 years	101250	10224	---
Total Diesel Consumption for 5 years (litre)	2025000	204480	2229480
Total Diesel Consumption by Excavator, Compressor and Tipper			2786025

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

2.6.9 Capital Requirement

The project proponent will invest Rs.2,18,70,000/- to the project. The breakup summary of the investment has been given in Table 2.13.

Table 2.13 Capital Requirement Details

S. No.	Description	Cost (Rs.)
1	Fixed Asset Cost	51,70,000
2	Machinery cost	1,50,00,000
3	EMP Cost	10,50,000
4	Expenditure Cost	6,50,000
Total Project Cost		2,18,70,000/-

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	Mines Manager	1
		Account Cum & Admin	1
2	Skilled	Earth Moving Operator	4
		Driver	7
		Mechanic	2
		Blaster/Mat	1
3	Semi-Skilled	Helpers, Greaser's	3
4	Unskilled	Musdoor / Labours	16
		Cleaners	4
		Attendant's	1
Total			40

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
		1 st	2 nd	3 rd	4 th	5 th	
1	Environmental Clearance						
2	Consent to Establish						Project Establishment Period
3	Consent to operate						Production starting period.
Time line may vary; subjected to rules and regulations /& other unforeseen circumstances							

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

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 to May, 2023** with CPCB guidelines. Environmental baseline data were collected by an NABL accredited and MoEF notified **Ekdant Enviro Services (P) Limited** 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	7 (1 nearby core & 6 in buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi

*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	8 (3 surface water & 5 ground water)	IS 10500& CPCB Standards
Meteorology	Wind speed Wind direction Temperature Cloud cover Dry bulb temperature Rainfall	1 hourly continuous mechanical/automatic weather station	1	Site specific primary data & secondary data from IMD Station
*Ambient Air Quality	PM ₁₀ PM _{2.5} SO ₂ NO _x Fugitive dust	24 hours, twice a week	8 (1 core & 7 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient noise	Hourly observation for 24 hours per location	9 (1 core & 8 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 Quadrante & 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

The main objective of this section is to provide a baseline status of the study area covering 5 km radius around the proposed mine site so that temporal changes in the LU/LC pattern due to the mining activities can be assessed in future.

3.1.1 Land Use/ Land Cover

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.

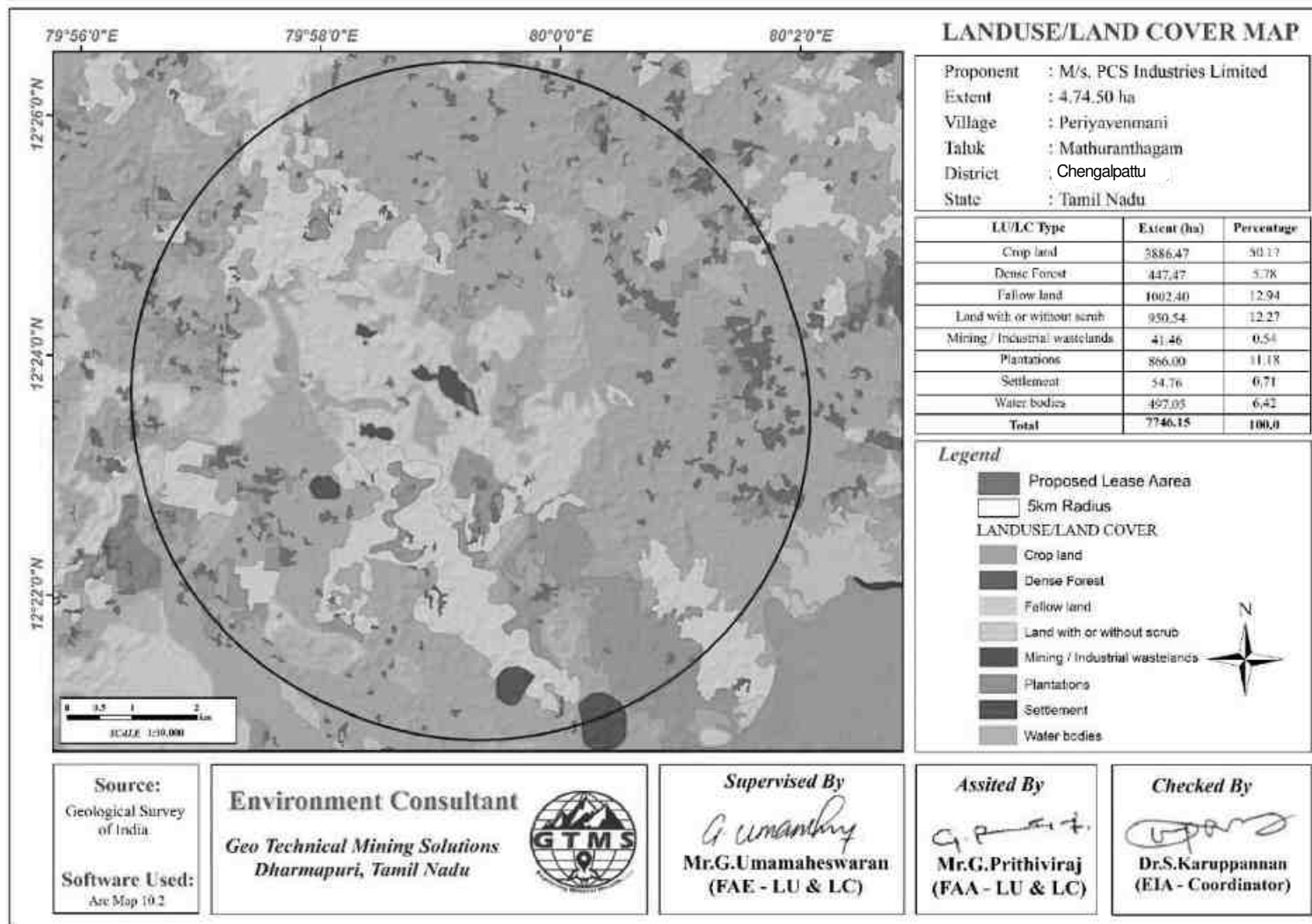


Figure 3.1 LULC Map of 5 km Radius from the Proposed Project Site

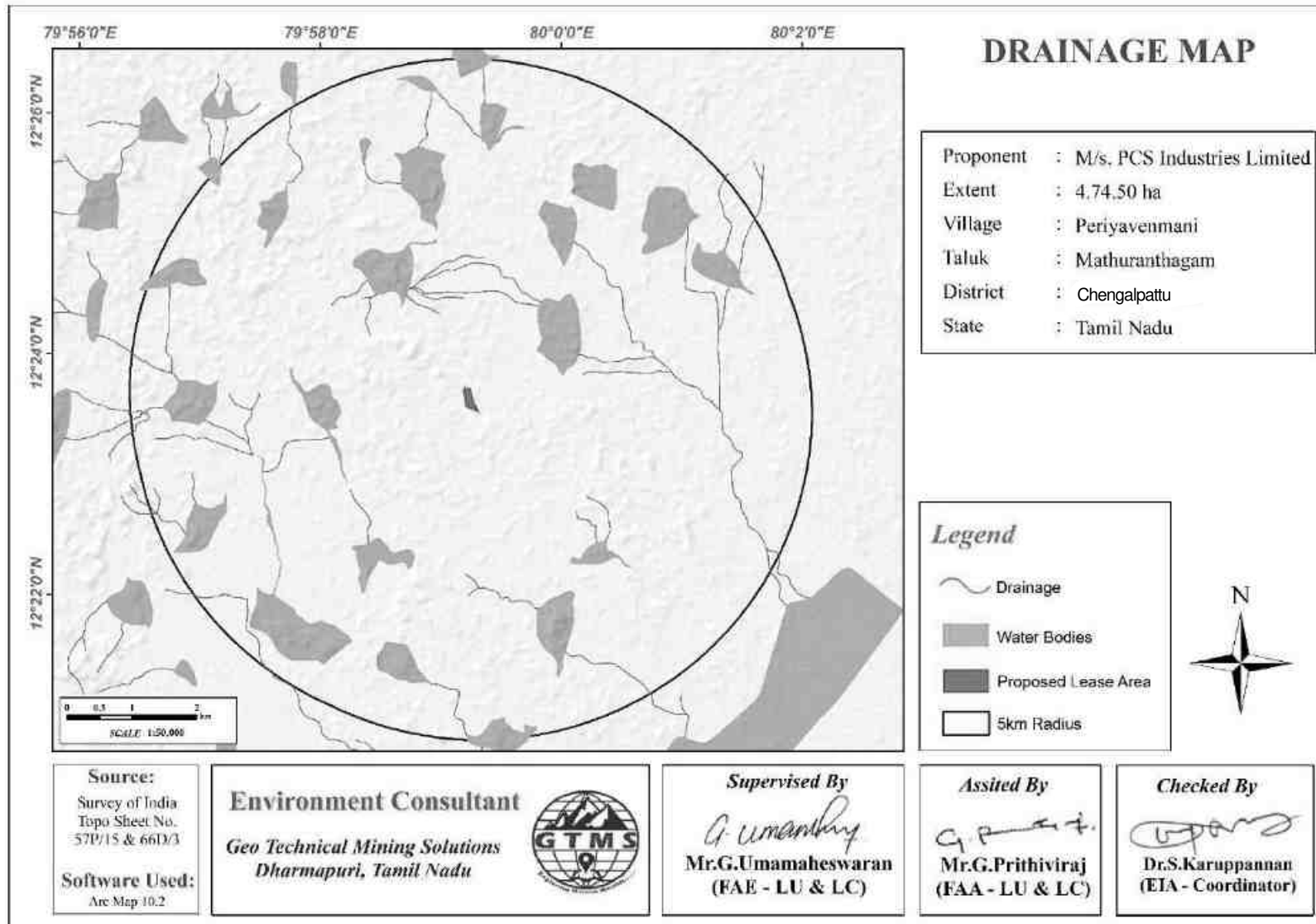


Figure 3.2 Drainage Map of 5 km Radius from the Proposed Project Site

The areal extent of each LULC is provided in Table 3.2. Of the total area, mining area covers only 41.46ha accounting for 0.54%, of which lease area of 4.74.50 ha contributes only about 0.061%. 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	Crop land	3886.47	50.17
2	Dense Forest	447.47	5.78
3	Fallow Land	1002.40	12.94
4	Land with or without scrub	950.54	12.27
5	Mining / Industrial wastelands	41.46	0.54
6	Plantations	866.00	11.18
7	Settlements	54.76	0.71
8	Water bodies	497.05	6.42
Total		7746.15	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 159-160 m AMSL, showing relief of 1 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 3.2.

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. Nine 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 3.3. The samples thus collected were analysed for physical and chemical characteristics. The physical and chemical characteristic results of soil samples are provided in Table 3.5. Some of the soil quality parameters were utilized for soil quality assessment as given in the results and discussion section.

Table 3.3 Soil Sampling Locations

S. No.	Sampling ID	Location	Distance (km)	Direction	Coordinates
1	S01	Core	---	---	12°23'36.27"N 79°59'15.94"E
2	S02	Vilanganur	3.80	W	12°23'21.12"N 79°57'6.86"E
3	S03	Poondi	0.97	ENE	12°23'55.02"N 79°59'41.70"E
4	S04	Iraniyasithi	3.39	NNE	12°25'31.39"N 79°59'26.79"E
5	S05	Keelacheri	3.45	ESE	12°22'57.88"N 80° 1'9.22"E
6	S06	Erumbedu	4.04	SSW	12°21'32.67"N 79°58'21.22"E
7	S07	Puthur	2.10	SSE	12°22'29.47"N 79°59'47.25"E

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

3.1.6 Results and Discussion

Physical Characteristics

The soil samples in the study area show Sandy Loam textures varying between sandy loam, silty loam and silty clay. pH of the soil varies from 6.92 to 7.42 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 153 to 283 $\mu\text{s}/\text{cm}$. Bulk density ranges between 0.88 and 1.23 g/cm^3 .

Chemical Characteristics

Potassium ranges between 113.2 and 234.51 %. Calcium ranges between 132 and 245 mg/kg. Organic matter content ranges between 1.07 and 1.34 %.

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.

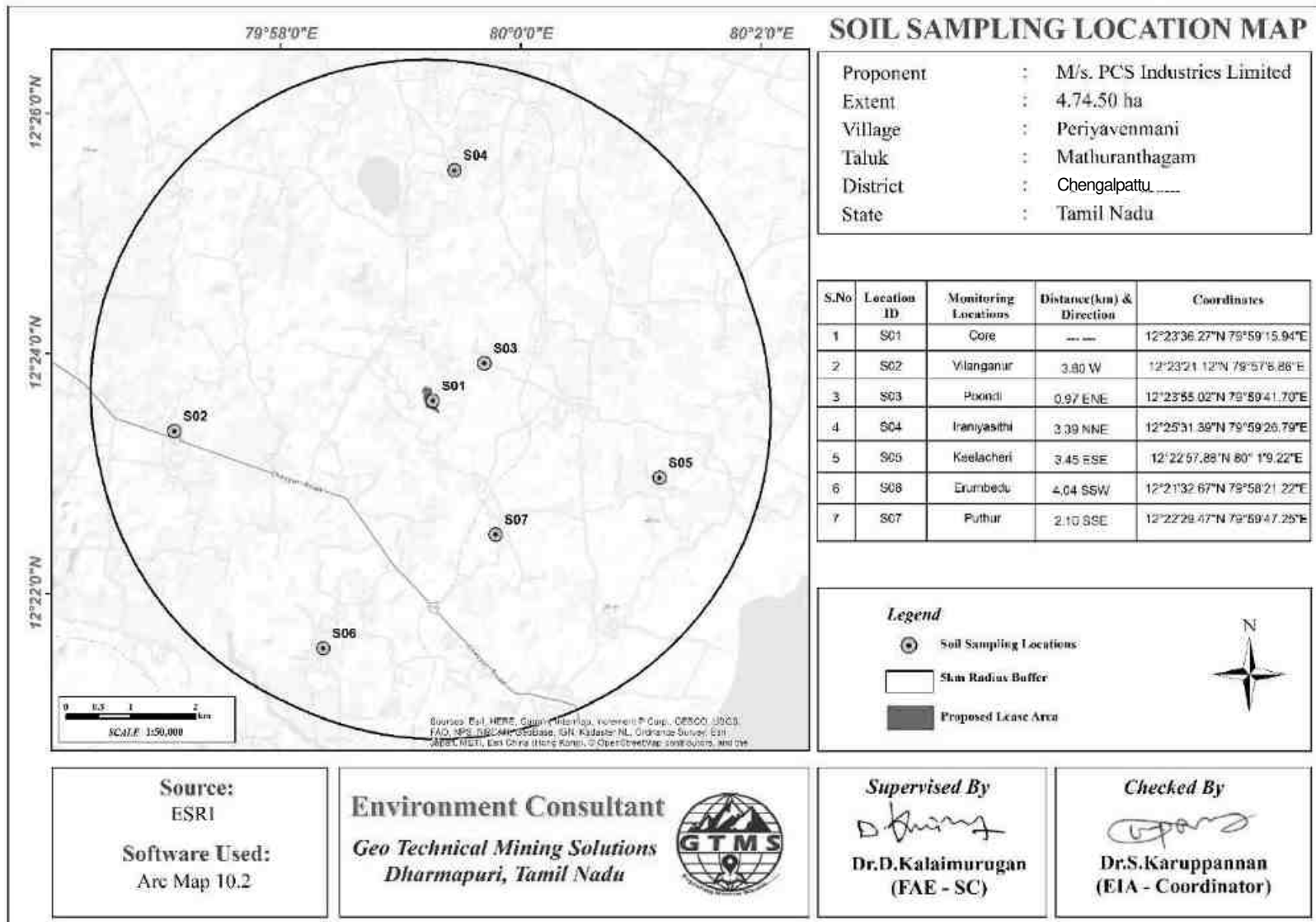


Figure 3.3 Toposheet Showing Soil Sampling Locations within 5 km Radius around the Proposed Project Site

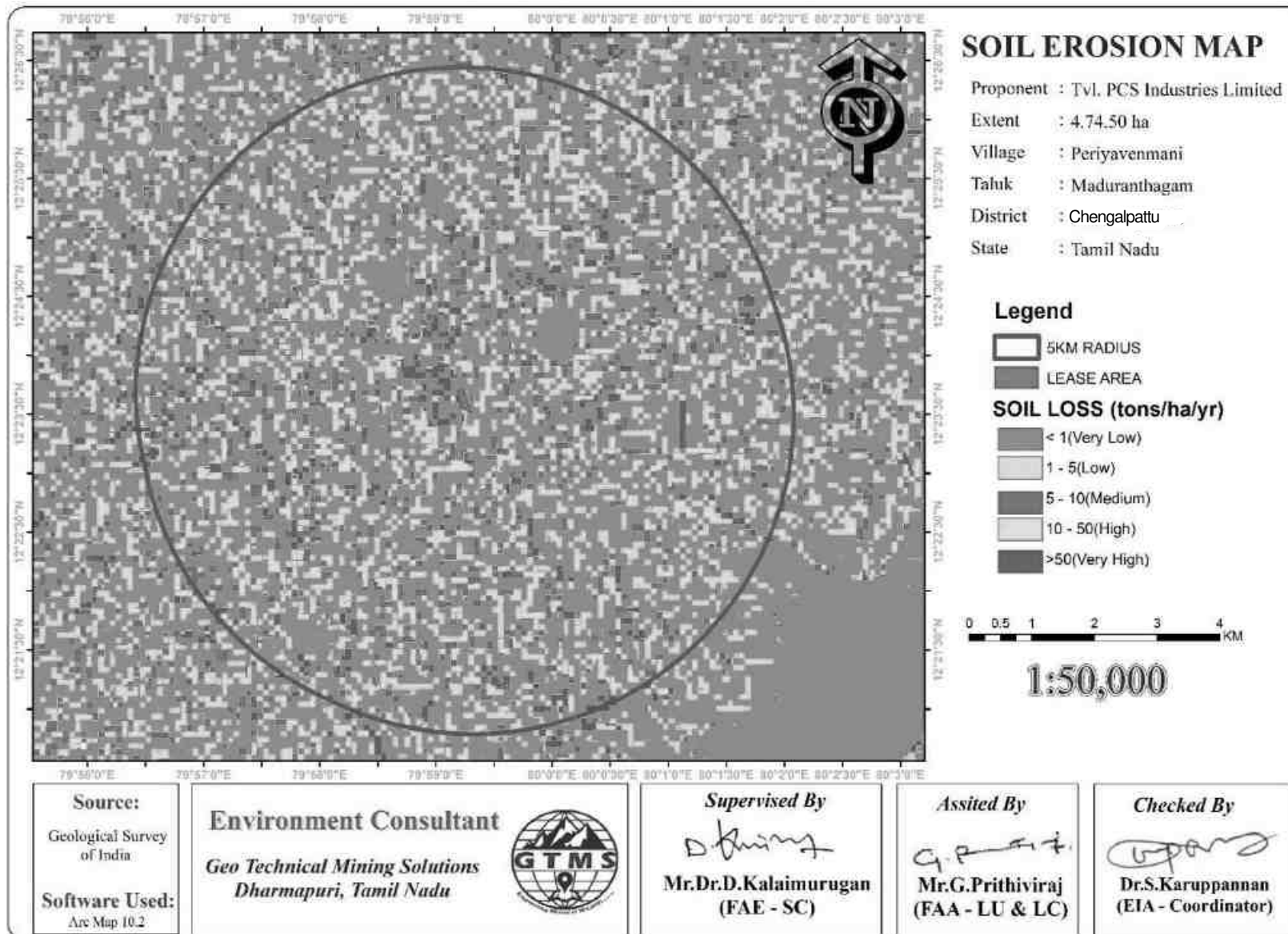


Figure 3.4 Soil Erosion map within 5 km Radius around the Proposed Project Site

Table 3.4 Soil Quality of the Study Area

S. No	Parameters	Unit	S01	Minimum	maximum	Average
1	pH value @ 25°C	-	7.14	6.92	7.42	7.2
2	EC @ 25°C	µS /cm	195	153	283	183.5
3	Texture	-	Sandy Loam	Sandy Loam		
	Sand	%	56.48	48.34	62.54	57.33
	Silt	%	31.62	25.69	32.58	29.01
	Clay	%	11.9	9.12	24.1	13.66
4	Bulk Density	g/cc	1.23	0.88	1.23	1.06
5	Water Content	%	5.49	2.43	7.54	4.45
6	Organic Matter	%	1.23	1.07	1.34	1.20
7	Alkalinity	mg/kg	76.23	32.56	92.3	63.64
8	Potassium (K)	mg/kg	134.90	113.2	234.51	146.14
9	Water Holding Capacity	%	35.6	31.25	52.3	41.22
10	Calcium (Ca)	mg/kg	149	132	245	181.67
11	Magnesium (Mg)	mg/kg	85	57	97	70.50
12	Sodium (Na)	mg/kg	234	123	249	195.83
13	Iron (Fe)	mg/kg	49.23	23.56	56.89	33.89
14	Copper (Cu)	mg/kg	BLQ (LOQ=0.05)	BLQ(LOQ=0.05)	BLQ(LOQ=0.05)	BLQ(LOQ=0.05)
15	Chlorides (Cl)	mg/kg	150	125	166	139.83

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

Table 3.5 Assigning Scores to Soil Quality Indicators

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

OM (Organic Matter) BD (Bulk Density) PH (Potential of Hydrogen) EC (Electrical Conductivity)

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	Poondi Lake	1.87	ENE	12°24'9.74"N 80° 0'9.74"E
2	SW02	Puthur Lake	1.70	SSE	12°22'36.34"N 79°59'31.57"E
3	SW03	Siruvangunam Lake	4.31	ENE	12°24'43.62"N 80° 1'21.77"E
4	OW01	Keelacheri	3.77	ESE	12°22'56.02"N 80° 1'18.57"E
5	OW02	Chittamur	2.97	WNW	12°24'13.39"N 79°57'39.20"E
6	OW03	Ariyanur	3.04	N	12°25'19.69"N 79°59'23.58"E
7	BW01	Erumbedu	4.38	SSW	12°21'23.50"N 79°58'15.44"E
8	BW02	Viralur	2.62	WSW	12°23'0.49"N 79°57'53.50"E

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

3.2.1 Surface Water Resources and Quality

Poondi River, Puthur Lake and Siruvangunam Lake are the three prominent surface water resources present in the study area. These are ephemeral in nature, which convey water only after rainfall events. Three surface water samples, known as SW01, SW02 and SW03 were collected from the three surface water bodies to assess the baseline water quality. Table 3.6 summarizes surface water quality data of the three samples and Sampling Locations.

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 are present in the 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. two groundwater samples, known as BW01 & BW02 and three open well water samples, known as OW02, OW02 & OW03 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 3.5. Table 3.7 summarizes ground water quality data of the seven samples.

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 April through June, 2022 (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 8.40 to 9.23 m BGL in post monsoon and from 10.50 to 11.57 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 55.77 to 58.20 m and from 61.30 to 67.17 m for the period of March through May, 2022 (Pre-Monsoon Season).

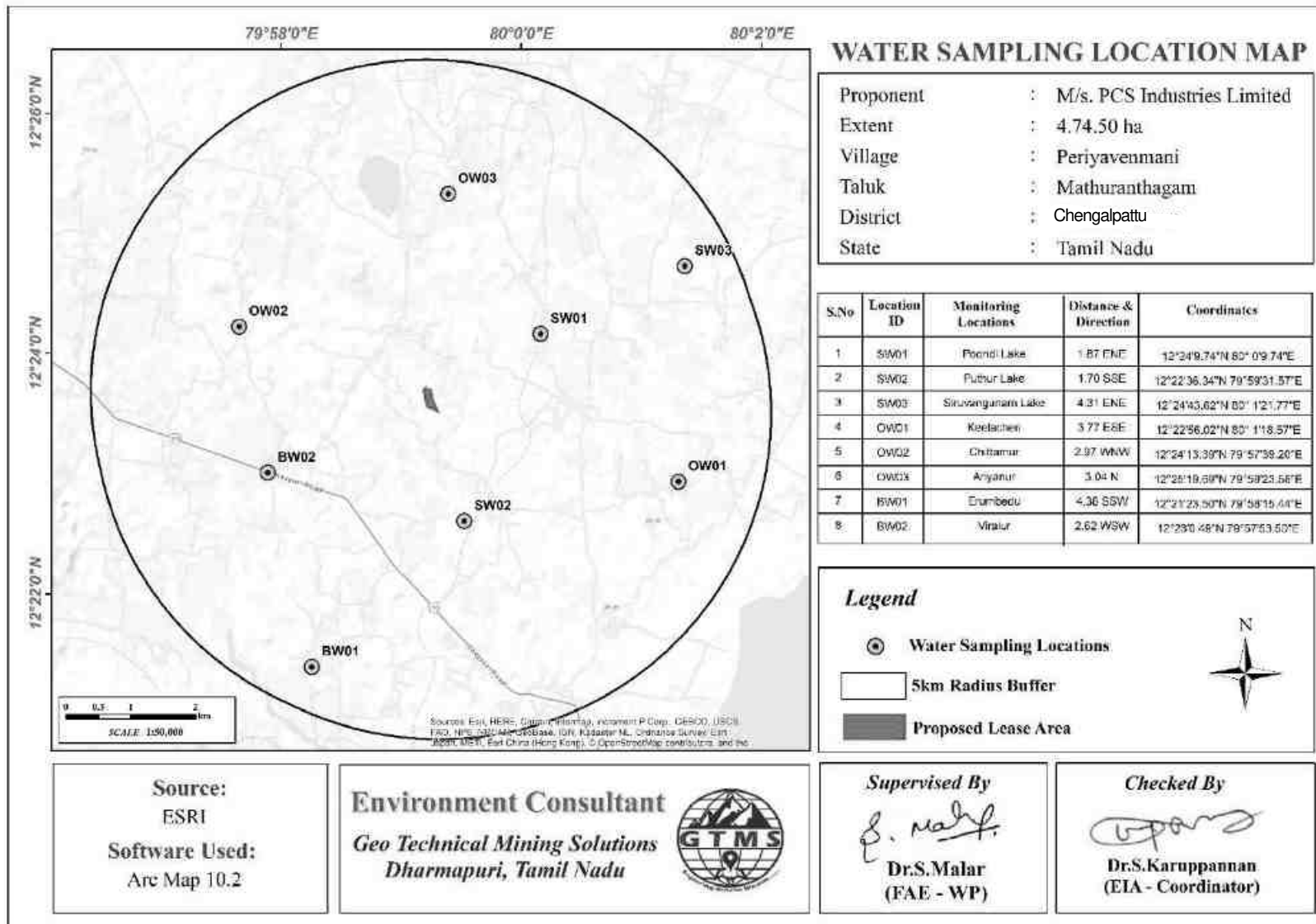


Figure 3.5 Toposheet Showing Water Sampling Locations within 5 km Radius around the Proposed Project Site

Table 3.7 Ground Water Quality Result

S. No.	Parameters	Units	Results		
			Minimum	Maximum	Average
1	pH@ 25°C	--	7.11	7.65	7.34
2	Turbidity	NTU	BLQ (LOQ=0.1)	BLQ (LOQ=0.1)	BLQ (LOQ=0.1)
3	Electrical Conductivity @ 25°C	µs/cm	344	1153	732.2
4	TSS	mg /l	BLQ (LOQ=1.0)	BLQ (LOQ=1.0)	BLQ (LOQ=1.0)
5	TDS	mg /l	210	619	387.8
6	Total Hardness	mg /l	79	420	248.6
7	Chloride (Cl)	mg /l	49	213	144.2
8	Sulphate (SO ₄)	mg /l	28	64	46.4
9	Iron (Fe)	mg /l	BLQ (LOQ=0.01)	BLQ (LOQ=0.01)	BLQ (LOQ=0.01)
10	Silica (SiO ₂)	mg /l	-	-	-
11	Total Coliform	MPN/ 100ml	Absent	Absent	Absent
12	E-Coli	MPN/ 100ml	Absent	Absent	Absent

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

Table 3.8 Surface Water Quality Result

S.No.	Parameters	Units	Results		
			Minimum	Maximum	Average
1	pH@ 25°C	--	7.59	7.73	7.6
2	Turbidity	NTU	BLQ(LOQ=0.1)	BLQ(LOQ=0.1)	BLQ(LOQ=0.1)
3	Electrical Conductivity @ 25°C	µs/cm	528	638	584.3
4	TSS	mg /l	BLQ(LOQ=1.0)	BLQ(LOQ=1.0)	BLQ(LOQ=1.0)
5	TDS	mg /l	297	344	325.3
6	Total Hardness	mg /l	172	232	204.7
7	Chloride (Cl)	mg /l	104	123	113.0
8	Sulphate (SO ₄)	mg /l	34	44	40.3
9	Iron (Fe)	mg /l	BLQ(LOQ=0.01)	BLQ(LOQ=0.01)	BLQ(LOQ=0.01)
10	Silica (SiO ₂)	mg /l	-	-	-
11	Total Coliform	MPN/ 100ml	Absent	Absent	Absent
12	E-Coli	MPN/ 100ml	Absent	Absent	Absent

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

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 3.6-3.7. 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 NE of the proposed project site respectively. The maps thus produced in bore wells are shown in Figures 3.8-3.9. From the groundwater flow map in fact that two monsoon seasons groundwater flows towards the bore well number 2 located in North 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-2022	Apr-2022	May- 2022	Average		
DW01	7.9	8.6	10.8	9.10	12°23'48.25"N	79°59'25.77"E
DW02	7.5	8.2	9.5	8.40	12°23'28.13"N	79°59'36.50"E
DW03	7.2	8.5	11	8.90	12°23'4.26"N	79°59'34.00"E
DW04	7.8	8.1	10.3	8.73	12°23'12.17"N	79°59'2.30"E
DW05	8	8.8	10.9	9.23	12°23'46.35"N	79°58'47.62"E
DW06	7.3	8.7	10.7	8.90	12°24'26.29"N	79°59'8.60"E
DW07	7.7	8.4	10.6	8.90	12°23'41.60"N	80° 0'3.95"E
DW08	7.2	8.6	10.4	8.73	12°22'34.00"N	79°58'58.81"E
DW09	7.7	8.9	10.8	9.13	12°23'39.09"N	79°58'16.51"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	9.1	10.5	12.9	10.83	12°23'48.25"N	79°59'25.77"E
DW02	8.9	10.1	12.5	10.50	12°23'28.13"N	79°59'36.50"E
DW03	8.4	10.3	13	10.57	12°23'4.26"N	79°59'34.00"E
DW04	9.1	10.5	12.8	10.80	12°23'12.17"N	79°59'2.30"E
DW05	10.2	9.5	13.1	10.93	12°23'46.35"N	79°58'47.62"E
DW06	9.6	11.2	12.6	11.13	12°24'26.29"N	79°59'8.60"E
DW07	9.8	11.4	12.7	11.30	12°23'41.60"N	80° 0'3.95"E
DW08	9.2	12.1	13.4	11.57	12°22'34.00"N	79°58'58.81"E
DW09	9.6	11.6	13.2	11.47	12°23'39.09"N	79°58'16.51"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				Latitude	Longitude
	BGL(m)					
	Mar-2022	Apr-2022	May- 2022	Average		
BW01	55.10	55.8	56.4	55.77	12° 23'34.00"N	79° 58'54.85"E
BW02	55.30	55.9	57.9	56.37	12°24'0.96"N	79°59'10.20"E
BW03	56.00	56.6	58.5	57.03	12°24'8.46"N	79°58'57.78"E
BW04	55.10	56.2	56.3	55.87	12°23'16.68"N	79°58'23.70"E
BW05	55.80	56.6	59.6	57.33	12°22'57.90"N	79°58'30.42"E
BW06	55.90	57.2	59.8	57.63	12°22'37.80"N	79°59'4.44"E
BW07	56.10	57.6	59.9	57.87	12°23'6.66"N	79°59'19.56"E
BW08	56.40	57.9	60	58.10	12°23'47.82"N	80° 0'0.54"E
BW09	57.00	58.2	59.4	58.20	12°23'32.70"N	80° 0'21.90"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				Latitude	Longitude
	BGL(m)					
	Oct-2022	Nov-2022	Dec-2022	Average		
BW01	60.5	61.9	63.2	61.87	12° 23'34.00"N	79° 58'54.85"E
BW02	60.7	63.4	66.5	63.53	12°24'0.96"N	79°59'10.20"E
BW03	60.2	61.1	62.6	61.30	12°24'8.46"N	79°58'57.78"E
BW04	62.3	65.3	69.2	65.60	12°23'16.68"N	79°58'23.70"E
BW05	62.8	66.2	70	66.33	12°22'57.90"N	79°58'30.42"E
BW06	63.9	66.8	69.3	66.67	12°22'37.80"N	79°59'4.44"E
BW07	64.5	67.6	69.4	67.17	12°23'6.66"N	79°59'19.56"E
BW08	64.2	67.2	69.8	67.07	12°23'47.82"N	80° 0'0.54"E
BW09	63.9	66.1	67.2	65.73	12°23'32.70"N	80° 0'21.90"E

Source: Onsite monitoring data

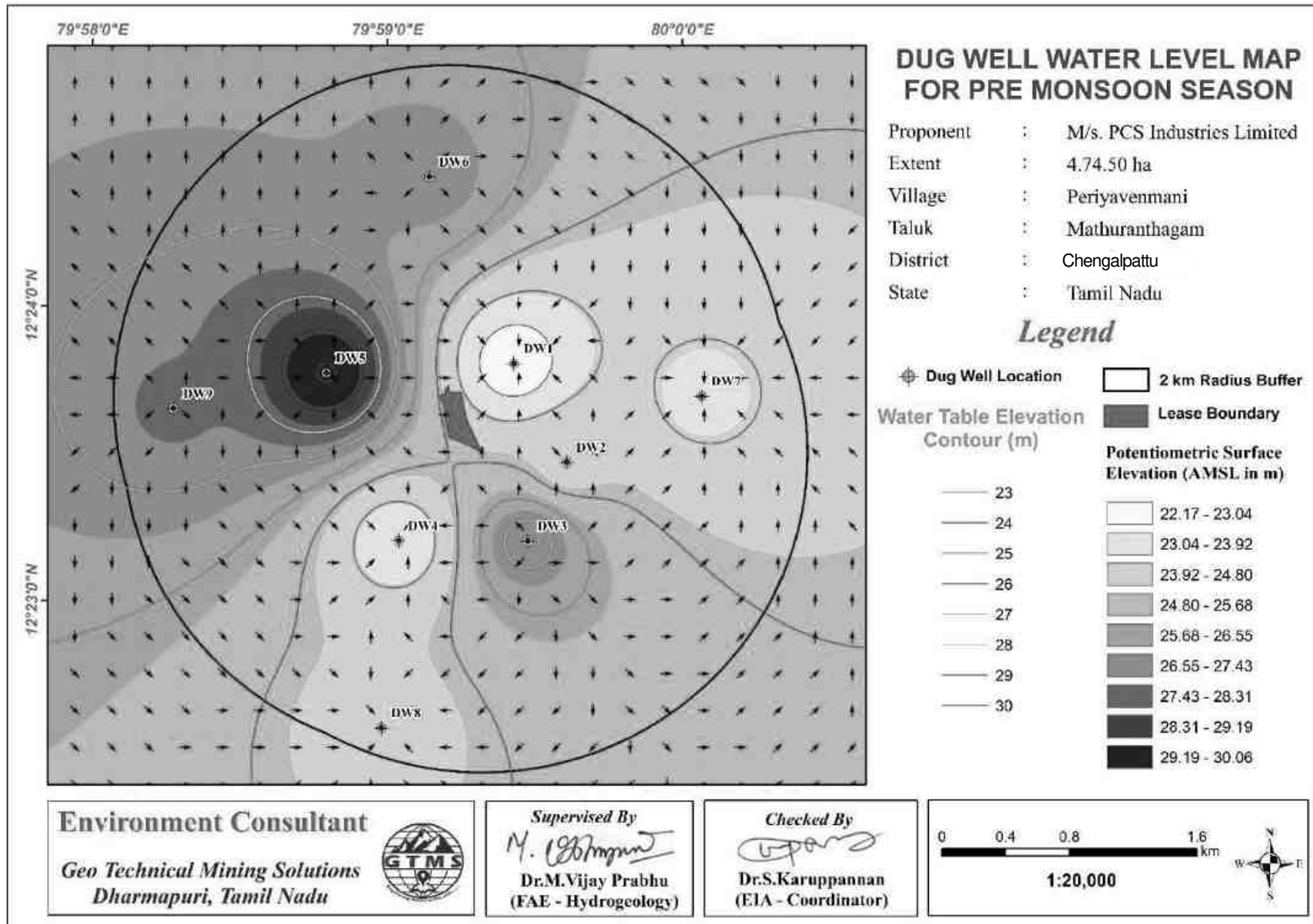


Figure 3.6 Open Well Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Pre-Monsoon Season

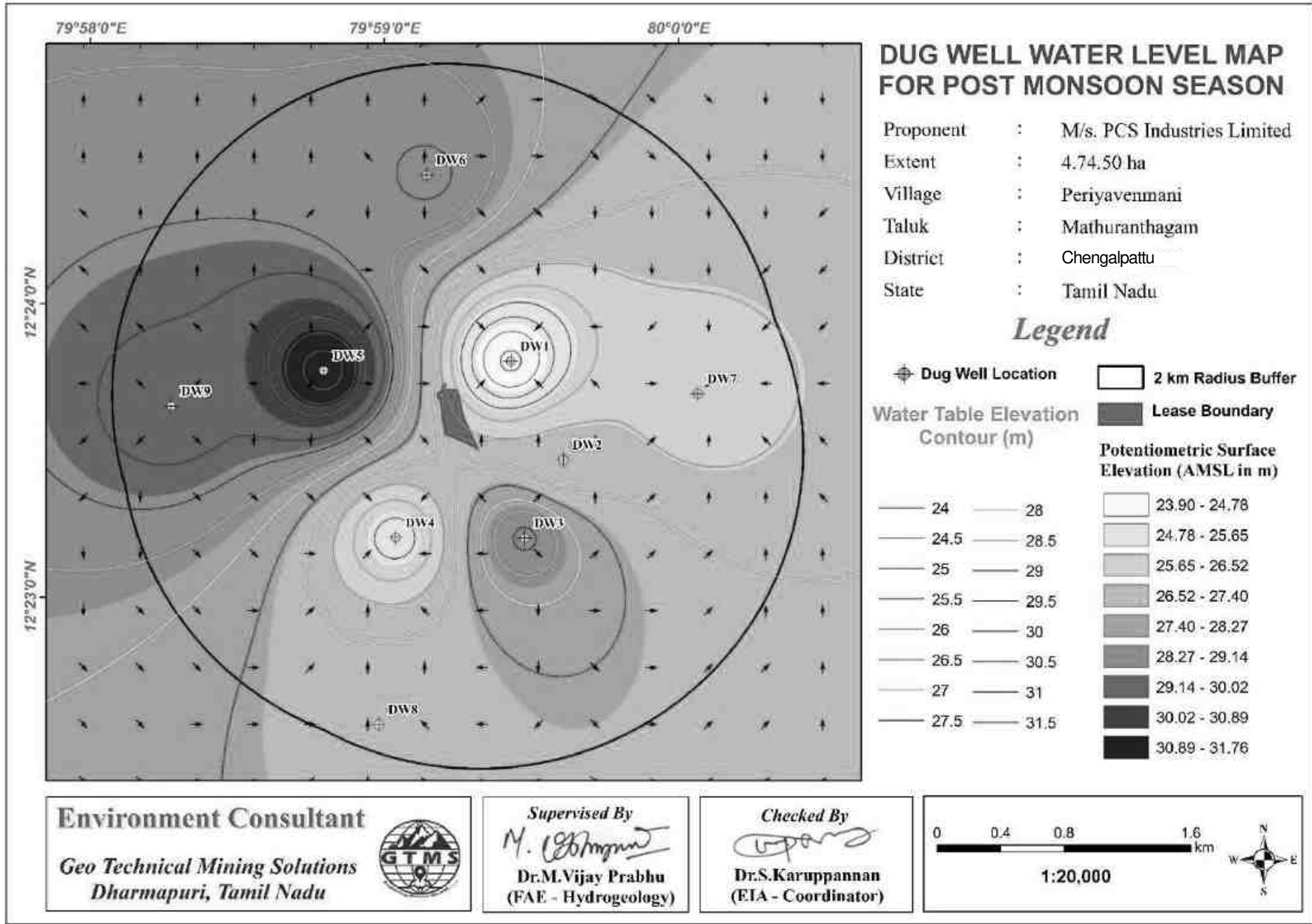


Figure 3.7 Open Well Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Post-Monsoon Season

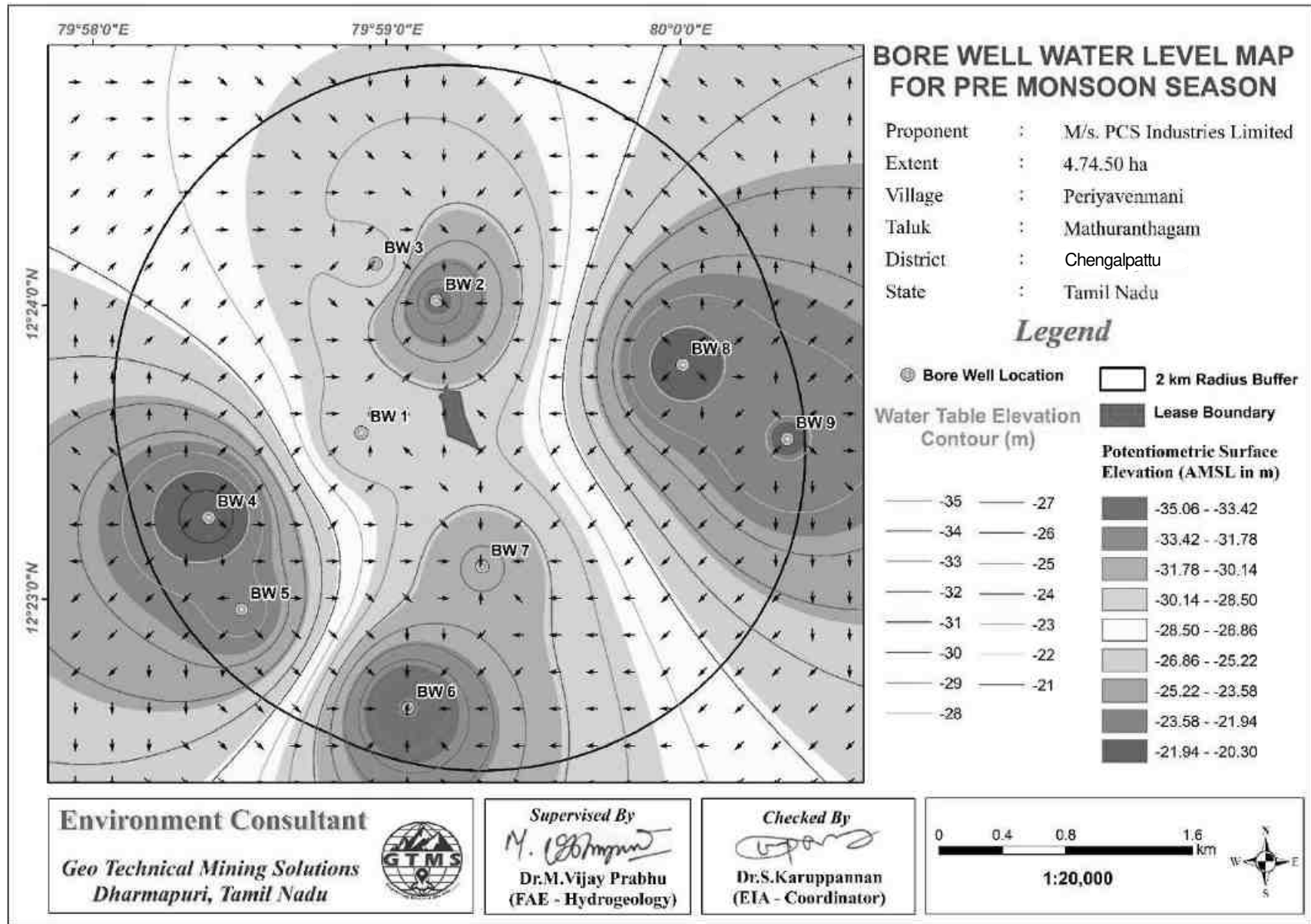


Figure 3.8 Borewell Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Pre-Monsoon Season

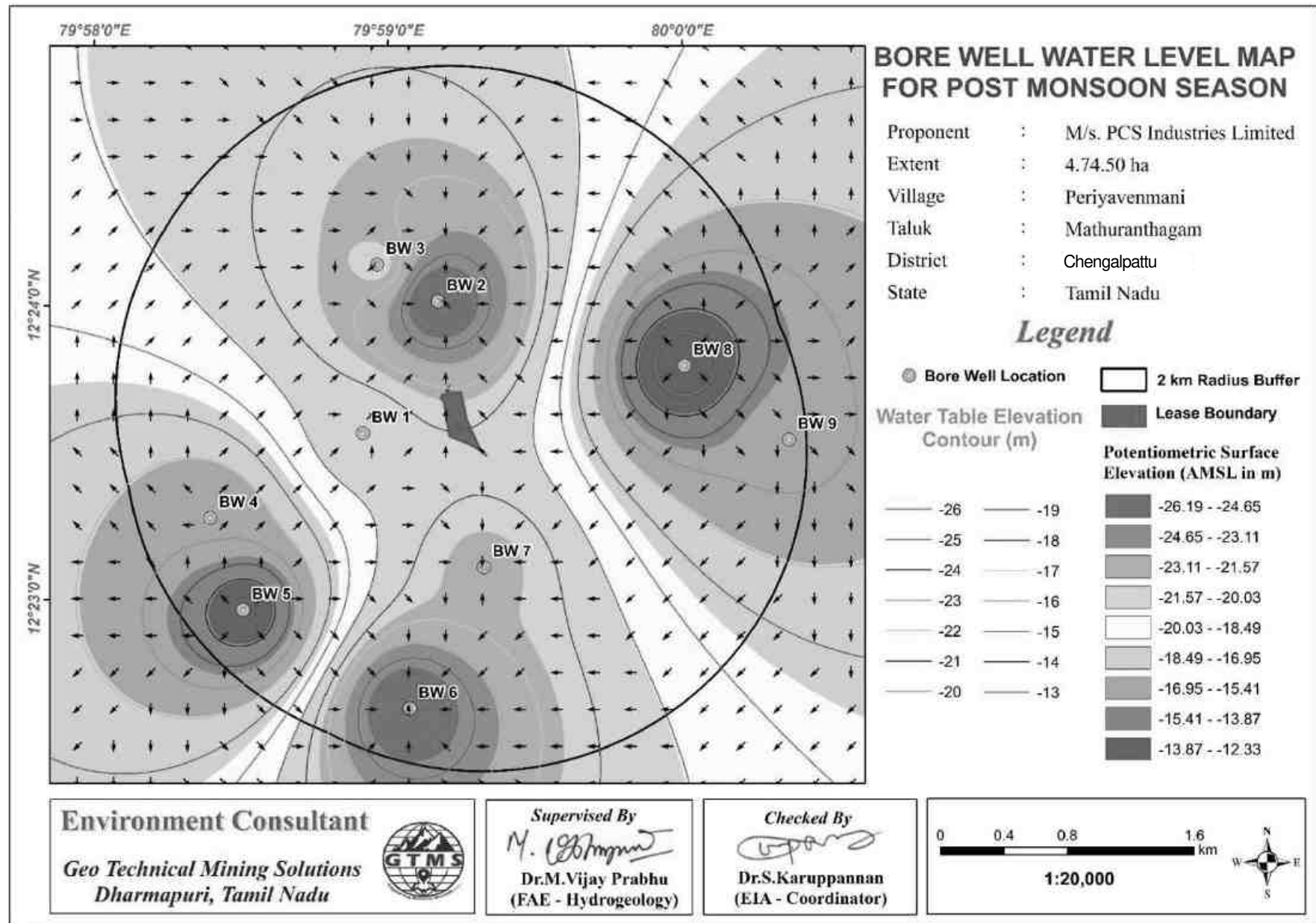


Figure 3.9 Borewell Static Groundwater Elevation Map Showing the Direction of Groundwater Flow During Post-Monsoon Season

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 3.10.

Table 3.13 Vertical Electrical Sounding Data

Location Coordinates – 12°23'34.92"N, 79°59'15.72"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

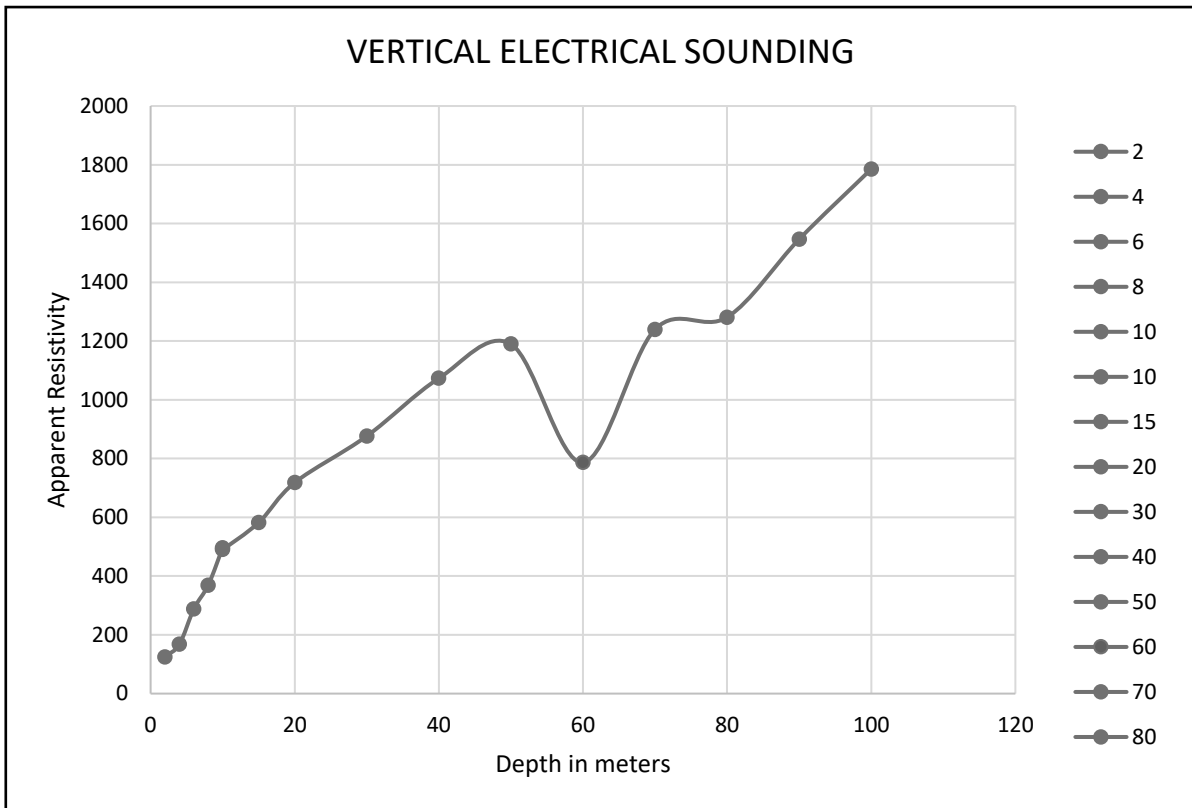


Figure 3.10 Graph Showing Occurrence of Water Bearing Fracture Zones at the Depth of 60m Below Ground Level in Proposed Project

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 35 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 22.59 to 33.80⁰C with the average of 27.88⁰C; in April, 2023 from 25.09 to 36.56⁰C with the average of 29.83C; and in May,2023 from 25.64 to 37.22⁰C with the average of 29.90⁰C. In March,2023, relative humidity ranged from 38.69 to 94.06 % with the average of 71.41%; in April, 2023, from 33.56 to 93.00 % with the average of 69.87 %; and in May,2023, from 39.12 to 93.19 % with the average of 72.79 %. The wind speed in March,2023 varied from 1.32 to 7.20 m/s with the average of 4.17 m/s; in April, 2023 from 0.02 to 6.75 m/s with the average of 3.74 m/s; and in May,2023 from 0.042 to 9.06 m/s with the average of 4.08 m/s. In March,2023, wind direction varied from 32.98 to 227.68⁰ with the average of 113.10⁰; in April, 2023, from 0.62 to 264.79⁰ with the average of 143.78⁰; and in May,2023, from 2.09 to 358.03⁰ with the average of 210.54⁰. In March,2023, surface pressure varied from 100.18 to 101.56 kPa with the average of 100.76 kPa; in April, 2023, from 99.84 to 101.19 kPa with the average of 100.52 kPa; and in May,2023, from 99.38 to 100.71 kPa with the average of 100.10 kPa

Table 3.14 Onsite Meteorological Data

S. No.	Parameters		MARCH,2023	APRIL,2023	MAY,2023
1	Temperature (⁰ C)	Min	22.59	25.09	25.64
		Max	33.80	36.56	37.22
		Avg	27.88	29.83	29.90
2	Relative Humidity (%)	Min	38.69	33.56	39.12
		Max	94.06	93.00	93.19
		Avg	71.41	69.87	72.79
3	Wind Speed (m/s)	Min	1.32	0.02	0.42
		Max	7.20	6.75	9.06
		Avg	4.17	3.74	4.08
4	Wind Direction (degree)	Min	32.98	0.62	2.09
		Max	227.68	264.79	358.03
		Avg	113.10	143.78	210.54
5	Surface Pressure(kPa)	Min	100.18	99.84	99.38
		Max	101.56	101.19	100.71
		Avg	100.76	100.52	100.10

Source: On-site monitoring/sampling by **Ekdant Enviro Services (P) Limited**, 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 3.11. The Figure 3.11 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.

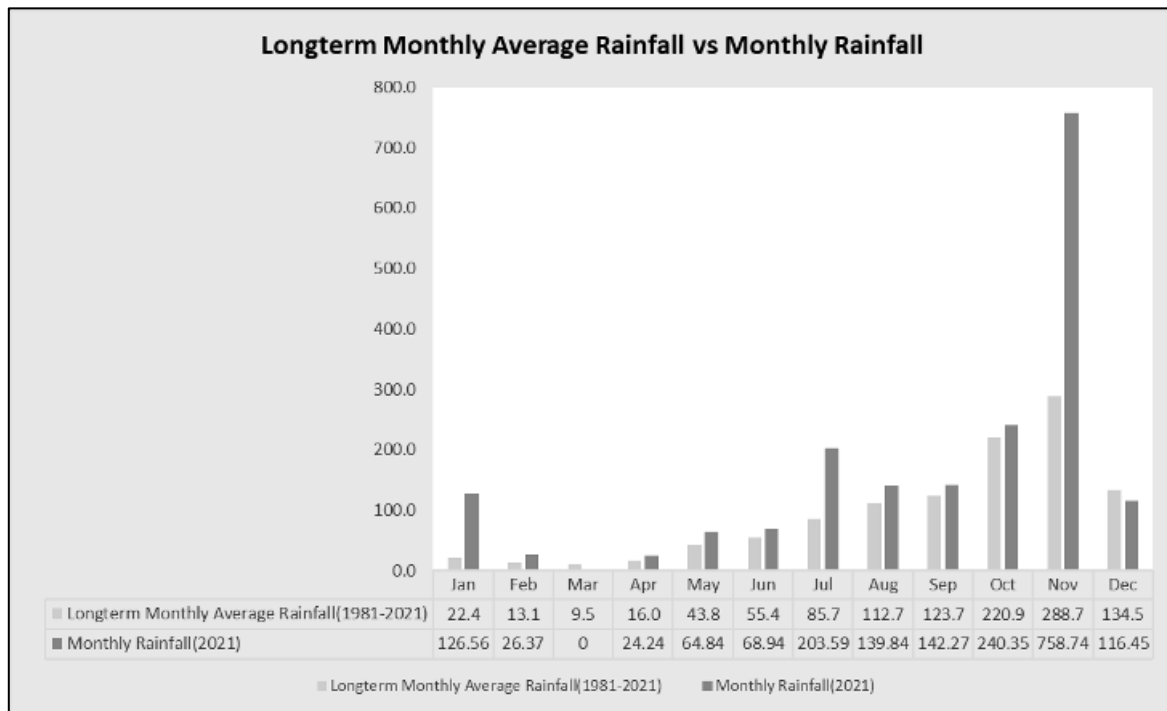


Figure 3.11 Long-Term Monthly Average Rainfall vs Monthly Rainfall

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 from 2019 to 2022 and the seasonal wind rose for the study period of March through May 2023. The wind rose diagrams thus produced are shown in Figures 3.12-3.12a. Figure 3.13 reveals that:

- ❖ The measured average wind velocity during the study period is 4.0m/s.
- ❖ Predominant wind was dominant in the directions ranging from Southeast to Northwest.

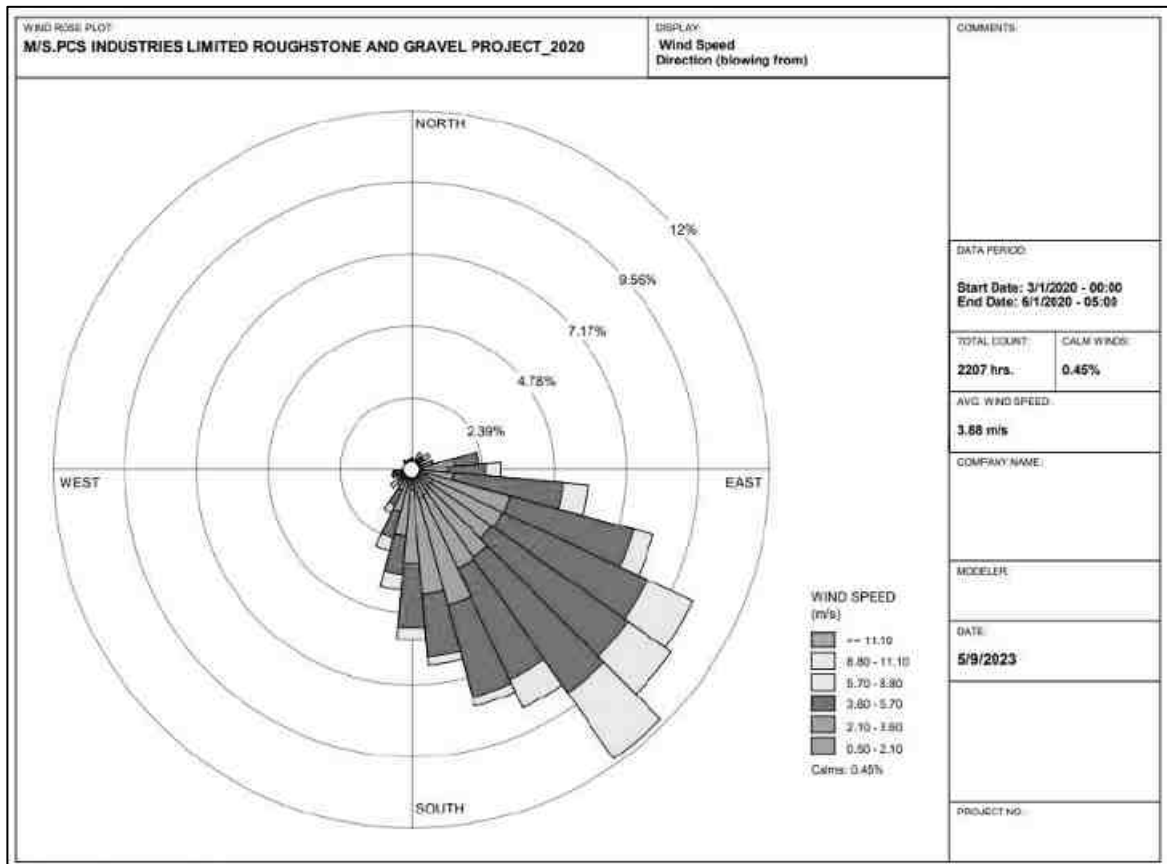
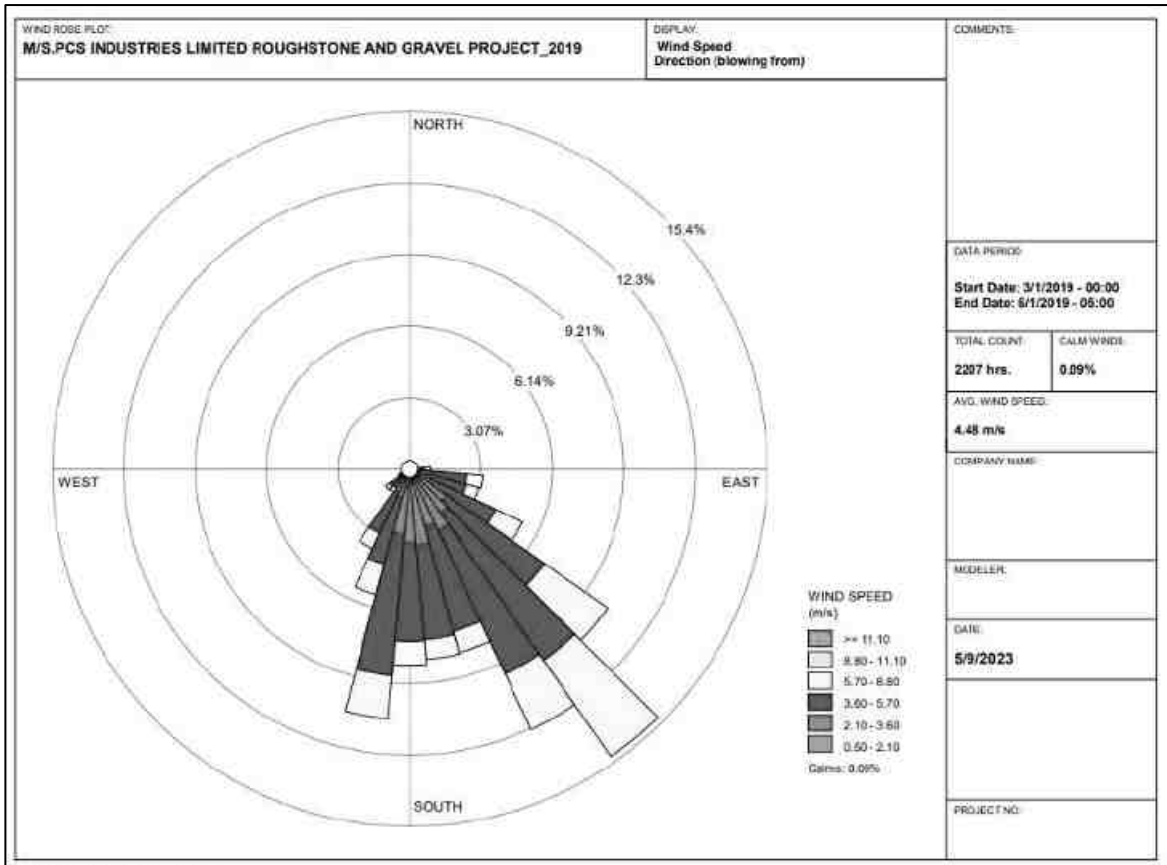


Figure 3.12 Windrose Diagram for 2019 and 2020 (March to May)

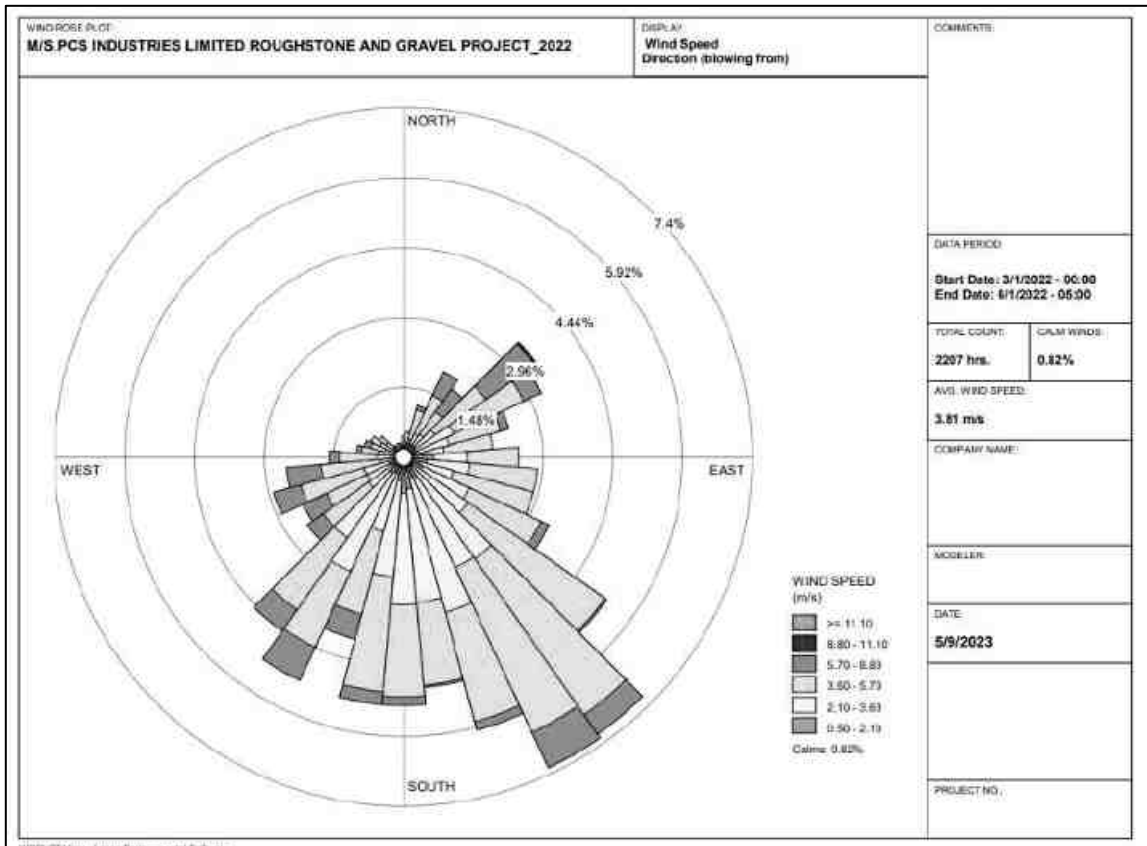
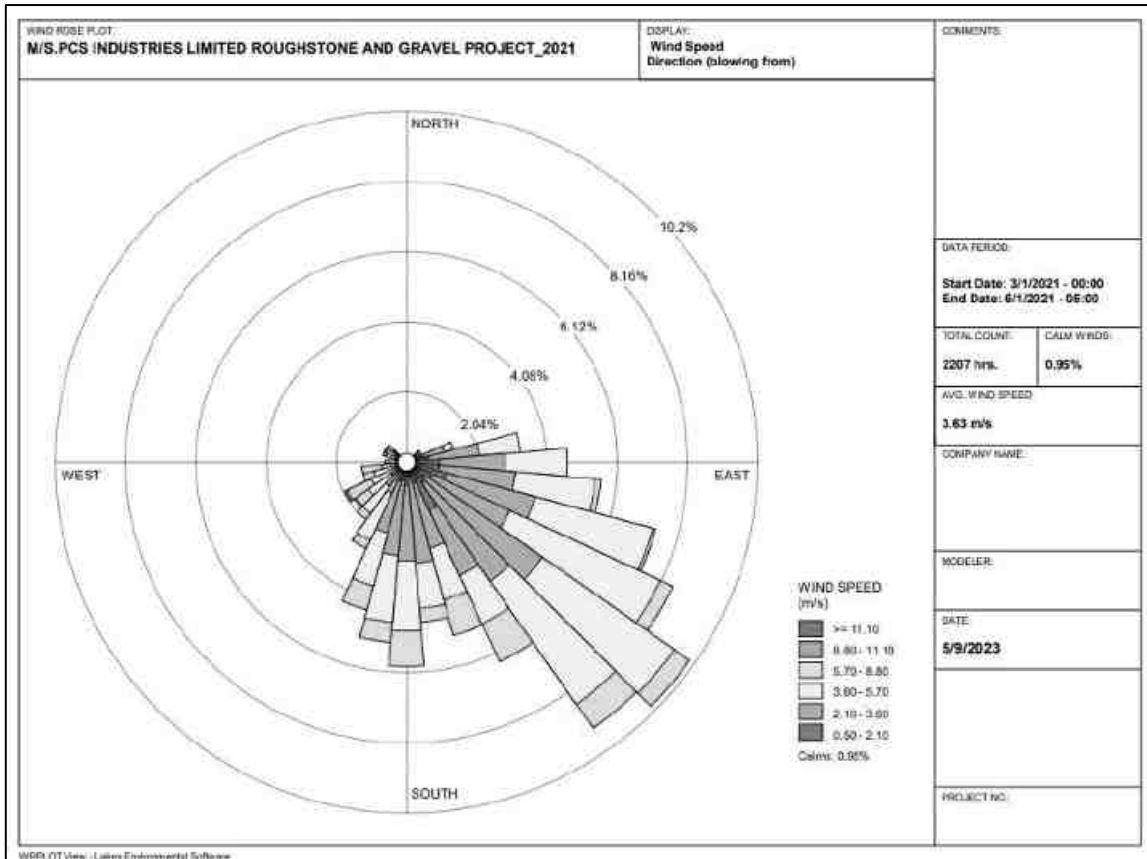


Figure 3.12a Windrose Diagram for 2021 and 2022 (March to May)

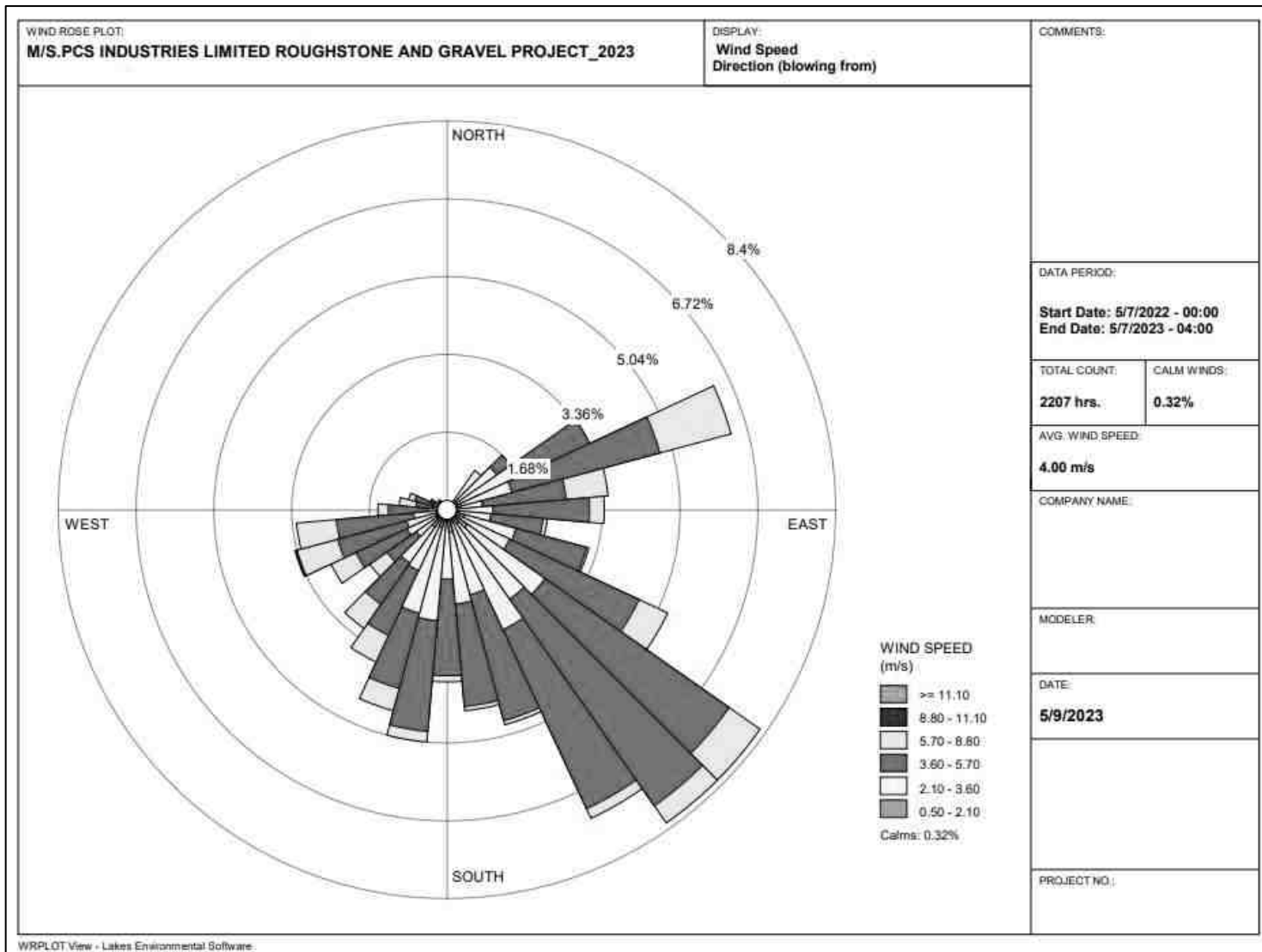


Figure 3.13 Onsite Wind Rose Diagram

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
NO _x	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) Limited, & 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 10°0	60.0 10°0
4	PM _{2.5} (µg/m ³)	Annual Avg. 24 hours	40.0 60.0	40.0 60.0

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

Methodology

Ambient air quality monitoring was carried out with a frequency of two samples per week at Eight (8) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period October-December, 2022 as per the CPCB, MoEF guidelines and notifications.

It was ensured that the equipment was placed preferably at a height of at least $3 \pm 0.5\text{m}$ above the ground level at each monitoring station for negating the effects of wind-blown ground dust. The equipment was placed at 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} , $\text{PM}_{2.5}$, sulphur dioxide (SO_2) and nitrogen dioxide (NO_x). The sampling locations are shown in Figure 3.14 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	
					Lat	Long
1	AAQ1	Core	--	--	12°23'33.68"N	79°59'12.46"E
2	AAQ2	Periyavenmani	0.93	NNW	12°24'9.05"N	79°58'55.56"E
3	AAQ3	Kalpattu	3.81	NNW	12°25'25.92"N	79°58'0.88"E
4	AAQ4	Puttur	2.07	SSE	12°22'29.28"N	79°59'48.67"E
5	AAQ5	Cheyyur	4.44	SSE	12°21'14.27"N	80° 0'10.25"E
6	AAQ6	Onambakkam	2.54	SW	12°22'59.49"N	79°57'55.59"E
7	AAQ7	Neemandam	2.19	NNE	12°24'37.71"N	80° 0'0.78"E
8	AAQ8	Chittamur	4.08	NW	12°24'23.56"N	79°57'2.47"E

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

Results

As per the monitoring data, $\text{PM}_{2.5}$ ranges from $15.9 \mu\text{g}/\text{m}^3$ to $20.9 \mu\text{g}/\text{m}^3$; PM_{10} from $33.5 \mu\text{g}/\text{m}^3$ to $39.2 \mu\text{g}/\text{m}^3$; SO_2 from $6.7 \mu\text{g}/\text{m}^3$ to $11.7 \mu\text{g}/\text{m}^3$; NO_x from $14.2 \mu\text{g}/\text{m}^3$ to $20.5 \mu\text{g}/\text{m}^3$. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

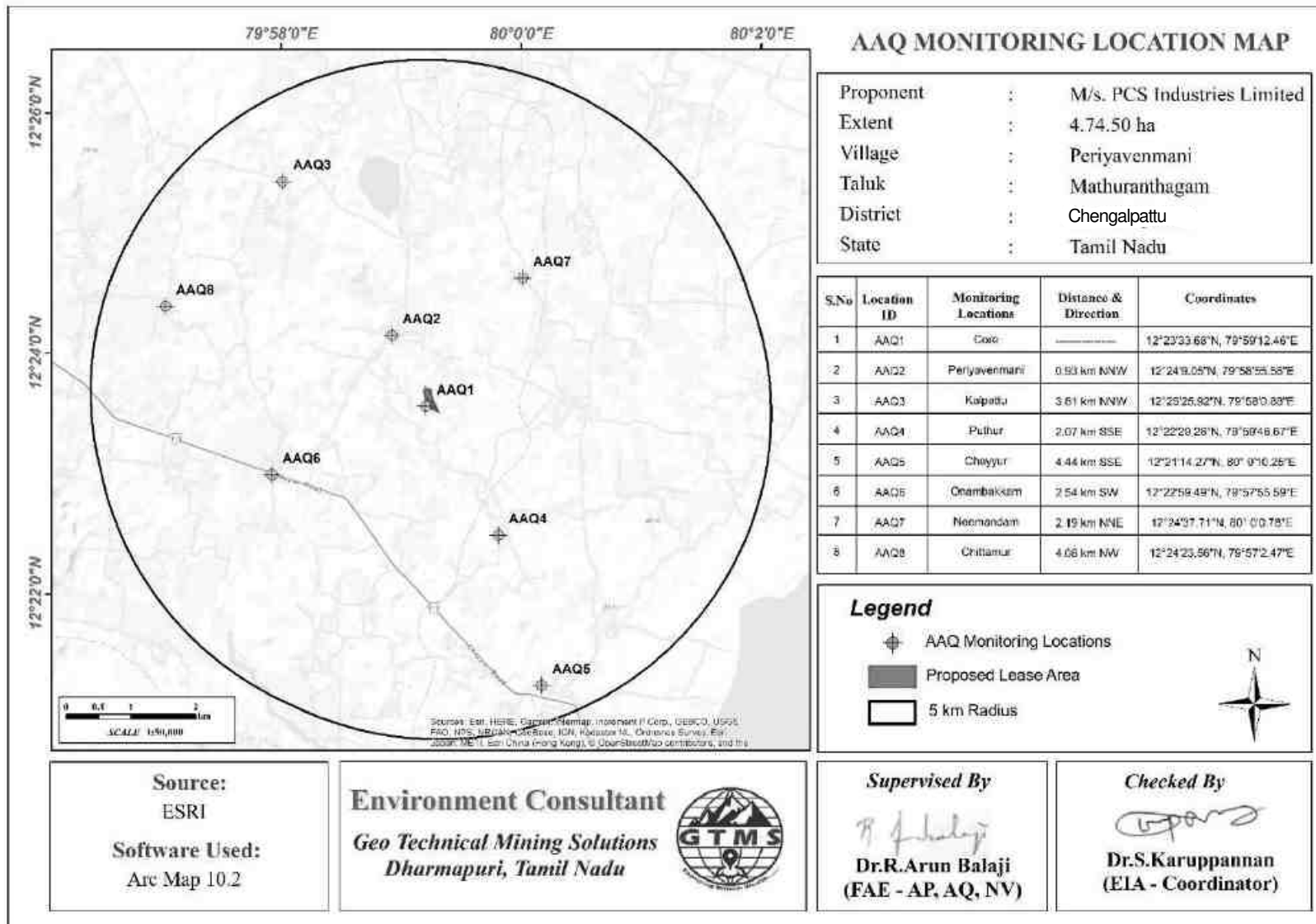


Figure 3.14 Toposheet Showing Ambient Air Quality Monitoring Station Locations Around 5 Km Radius from the Proposed Project Site

Table 3.18 Summary of AAQ Result

Station ID	PM _{2.5}				PM ₁₀			
	Max	Min	Mean	98 th Percentile	Max	Min	Mean	98 th Percentile
AAQ1	21.1	16.5	19.3	21.0	39.9	33.4	37.2	39.8
AAQ2	20.4	16.2	18.6	20.3	39.5	33.9	36.6	39.3
AAQ3	18.8	14.6	17.0	18.2	37.7	32.1	34.8	37.5
AAQ4	17.8	13.6	16.0	17.7	36.6	30.1	33.9	36.6
AAQ5	25.6	21.8	23.7	25.6	42.9	40.1	41.4	42.7
AAQ6	23.1	15.2	19.2	22.8	41.3	36.1	38.8	41.3
AAQ7	18.5	15.1	16.7	18.3	36.8	32.1	34.6	36.4
AAQ8	22.1	14.2	18.2	21.8	39.0	30.4	35.1	38.7
SO ₂					NO _x			
AAQ1	12.1	9.0	10.1	11.8	21.6	17.4	19.2	21.6
AAQ2	18.6	6.7	8.9	15.2	20.7	9.5	17.7	20.5
AAQ3	8.2	5.5	6.7	7.3	17.9	11.4	13.8	17.2
AAQ4	8.9	5.8	7.0	8.6	17.2	12.7	14.5	17.2
AAQ5	11.9	8.8	10.4	11.9	24.3	21.6	22.8	24.1
AAQ6	11.8	6.6	9.4	11.7	22.5	14.7	18.9	22.4
AAQ7	8.5	5.4	6.9	8.5	19.0	13.1	16.2	18.4
AAQ8	11.0	5.8	8.6	10.9	20.8	13.0	17.2	20.7

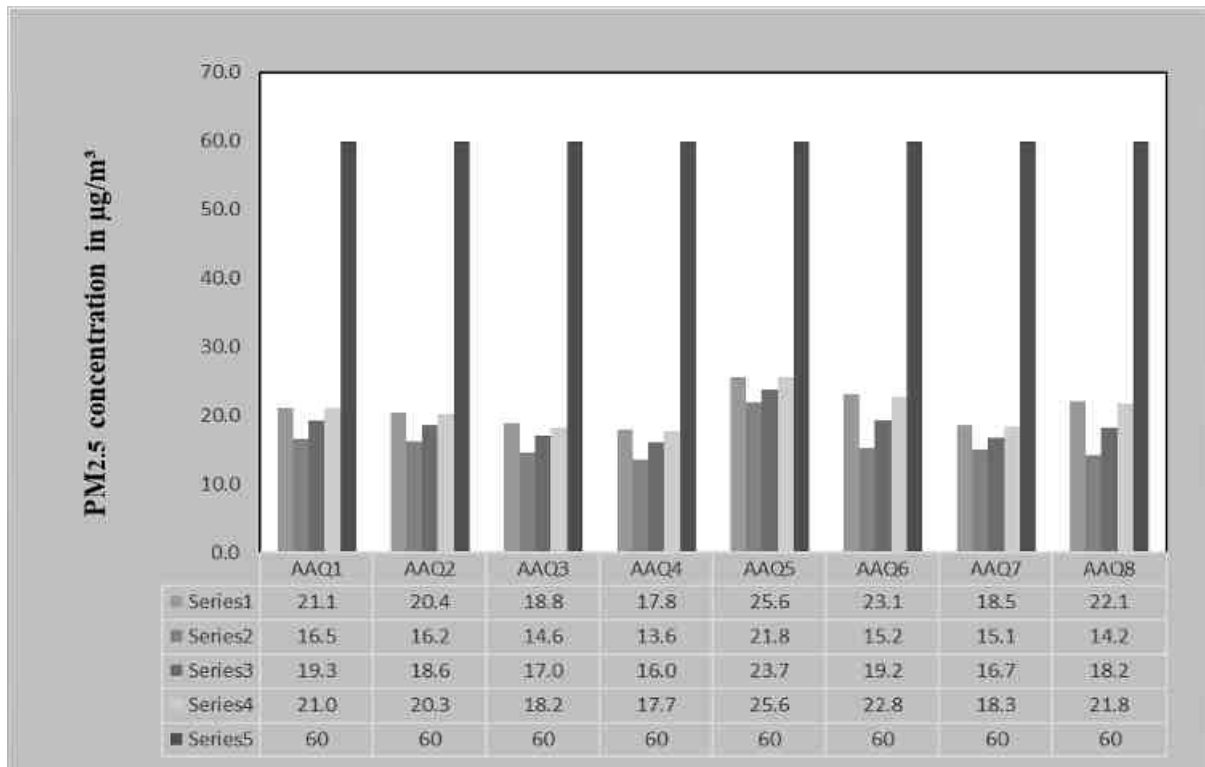


Figure 3.15 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of PM_{2.5} Measured from the 8 Air Quality Monitoring Stations Within 5 km Radius

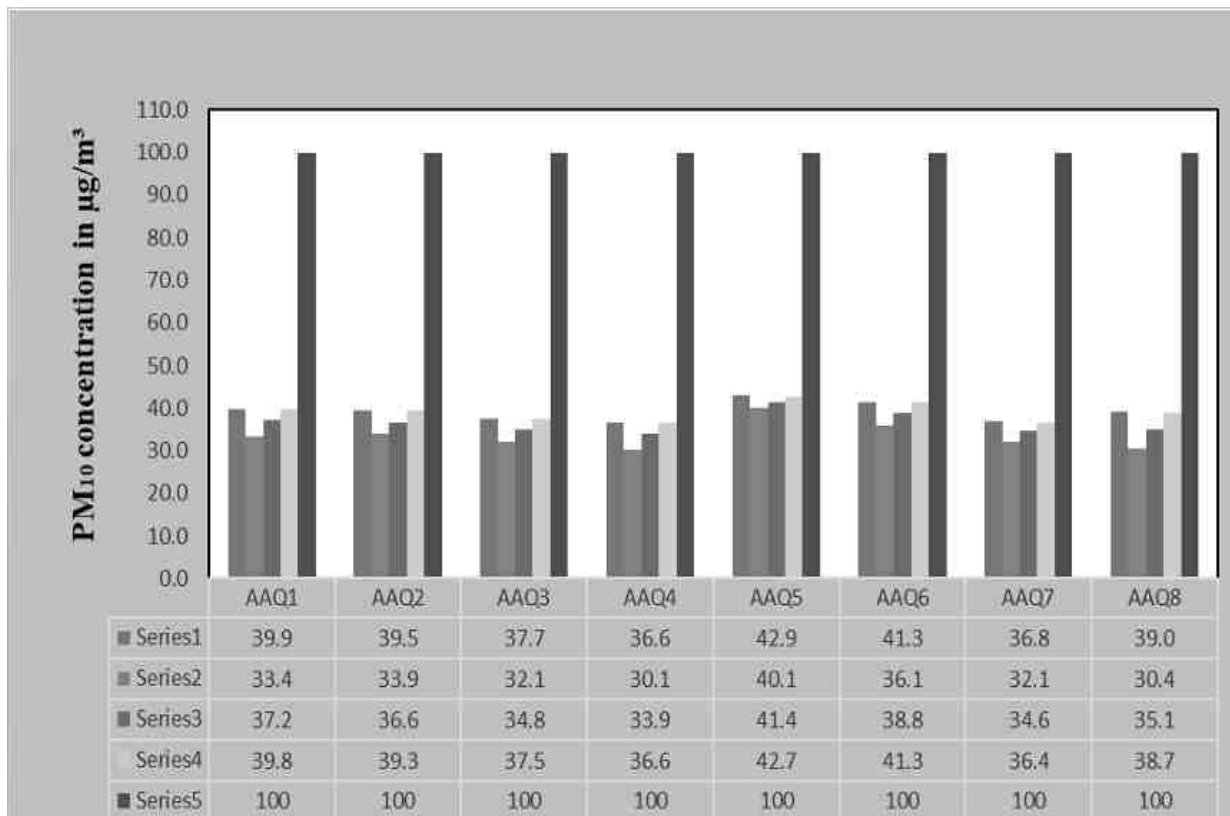


Figure 3.16 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of PM₁₀ Measured from the 8 Air Quality Monitoring Stations Within 5km Radius

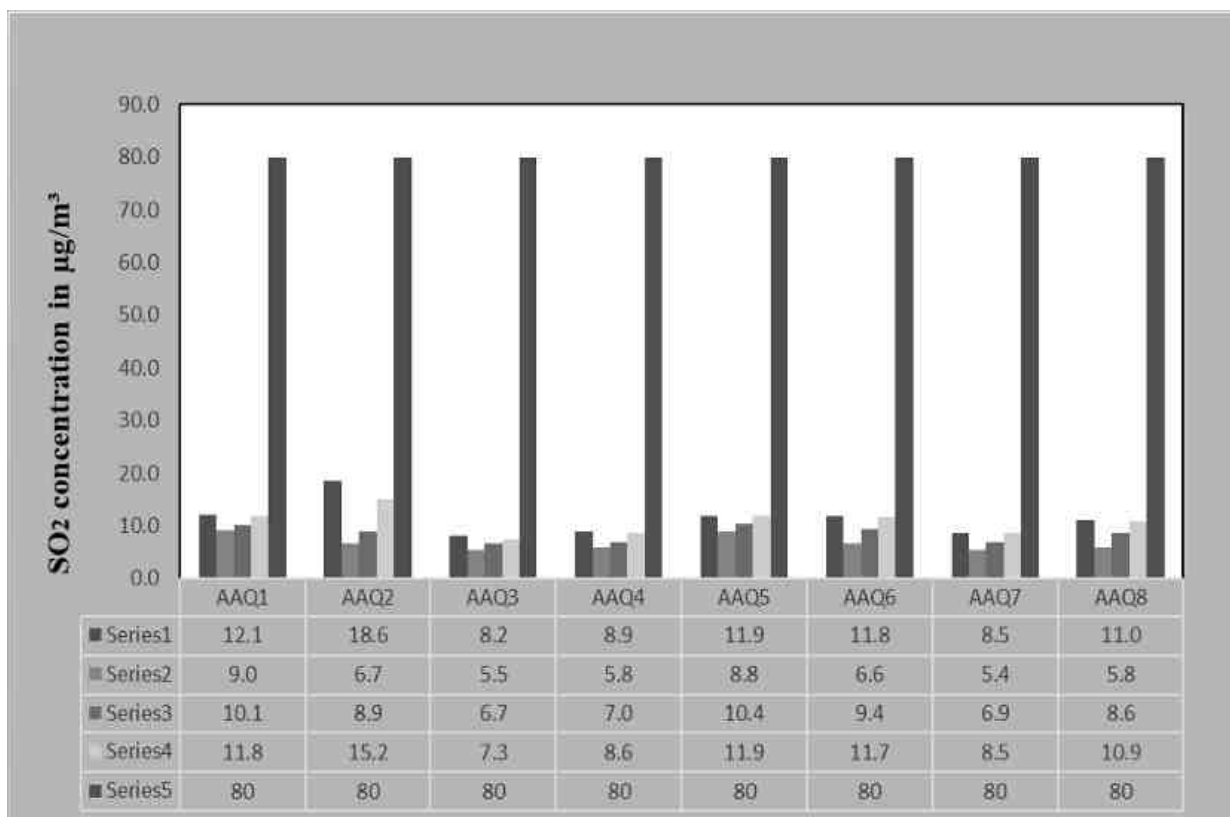


Figure 3.17 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of SO₂ Measured from the 8 Air Quality Monitoring Stations Within 5 km Radius

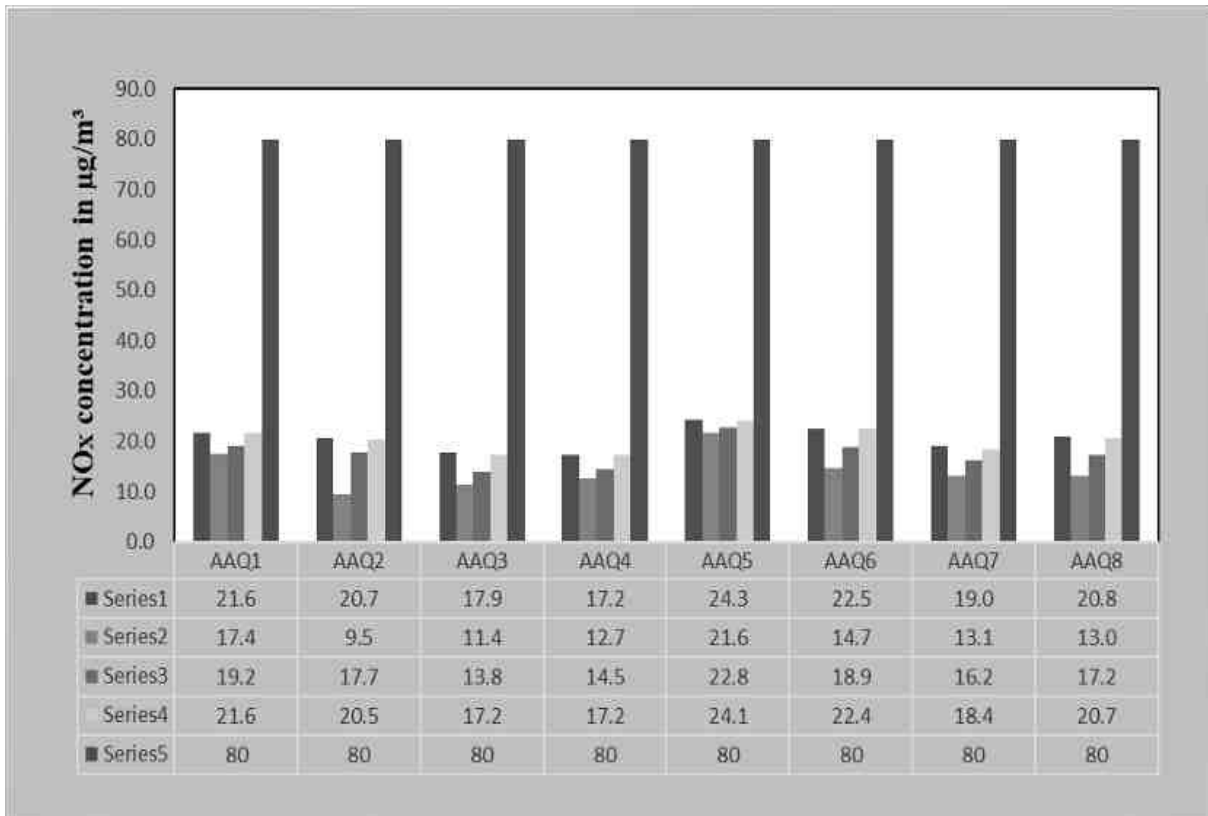


Figure 3.18 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of NO₂ Measured from the 8 Air Quality Monitoring Stations Within 5km Radius

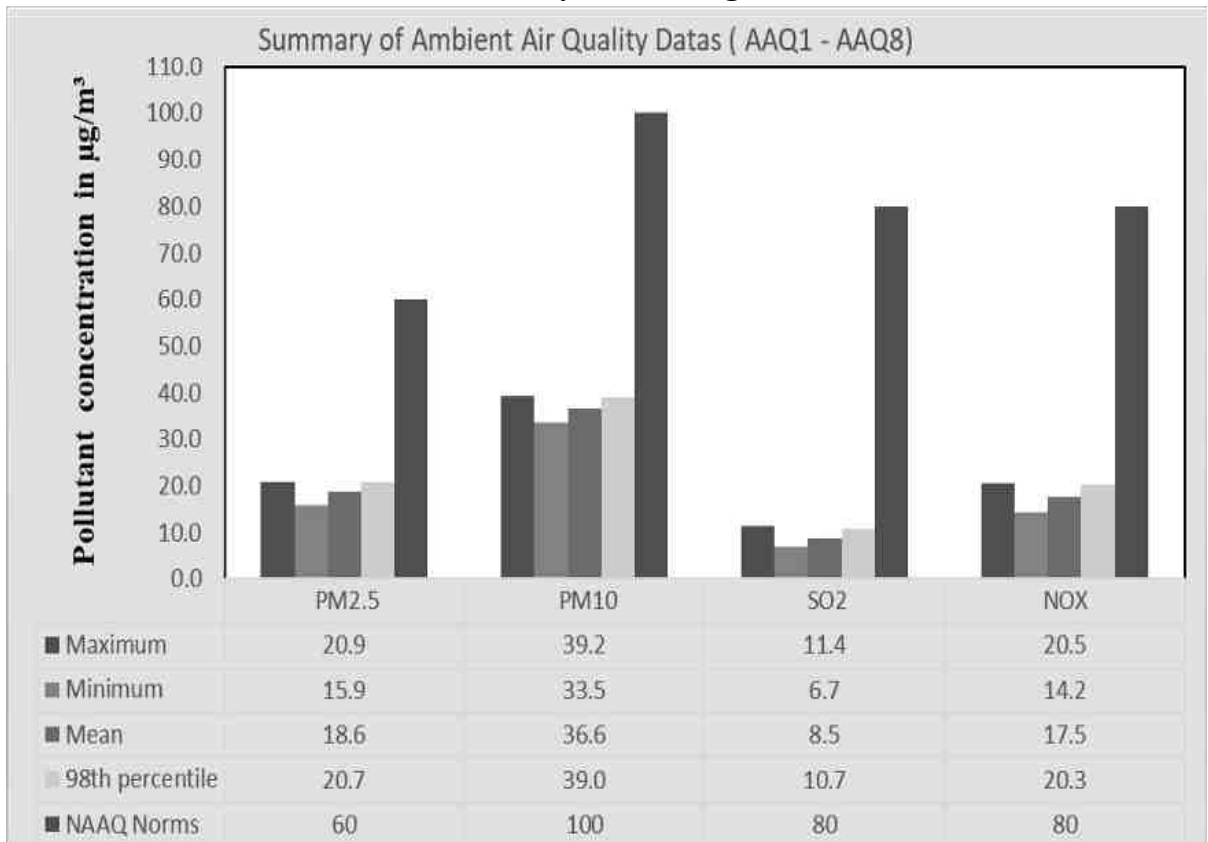


Figure 3.19 Bar Chart Showing Maximum, Minimum, and the Average Concentrations of Pollutants in the Atmosphere Within 5 km Radius

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 3.22.

Table 3.19 Noise Monitoring Locations

S. No	Location Code	Monitoring Locations	Distance (km)	Direction	Coordinates	
					Lat	Long
1	N1	Core	--	--	12°23'34.29"N	79°59'10.94"E
2	N2	Nagamalai	0.39	W	12°23'31.56"N	79°58'59.64"E
3	N3	Periyavenmani	0.97	NNW	12°24'10.72"N	79°58'55.26"E
4	N4	Kalpattu	3.81	NNW	12°25'26.57"N	79°58'1.83"E
5	N5	Puttur	2.05	SSE	12°22'30.15"N	79°59'49.18"E
6	N6	Cheyyur	4.47	SSE	12°21'13.14"N	80° 0'9.86"E
7	N7	Onambakkam	2.56	SW	12°23'0.59"N	79°57'54.31"E
8	N8	Neemandam	2.25	NNE	12°24'37.05"N	80° 0'4.69"E
9	N9	Chittampur	4.04	NW	12°24'22.94"N	79°57'3.57"E

Source: On-site monitoring/sampling by *Ekdant Enviro Services (P) Limited*, 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 (Leq in dB(A))	
N1	Core	Industrial area	44.4	39.6	75	70
N2	Nagamalai	Residential area	39.6	36.4	55	45
N3	Periyavenmani		39.8	34.6	55	45
N4	Kalpattu		39.6	33.8	55	45
N5	Puttur		39.2	33.2	55	45
N6	Cheyyur		48.2	40.4	55	45
N7	Onambakkam		43.8	38.6	55	45
N8	Neemandam		39.6	35.2	55	45
N9	Chittampur		38.4	33.2	55	45

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

The Table 3.20 shows that noise level in core zone was 44.4 dB (A) Leq during day time and 39.6 dB (A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 38.4 to 48.2dB (A) Leq and during night time from 33.2 to 40.4dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB. The results are also depicted below in Figures 3.20 and 3.21.

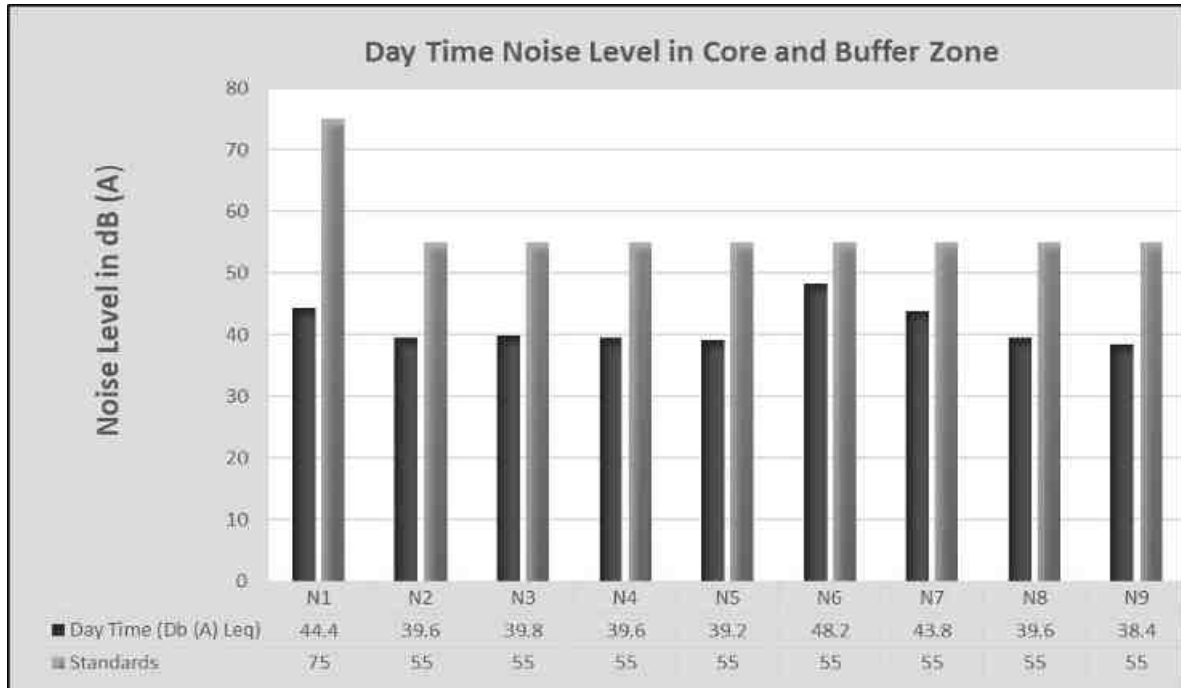


Figure 3.20 Bar Chart Showing Day Time Noise Levels Measured in Core and Buffer Zones

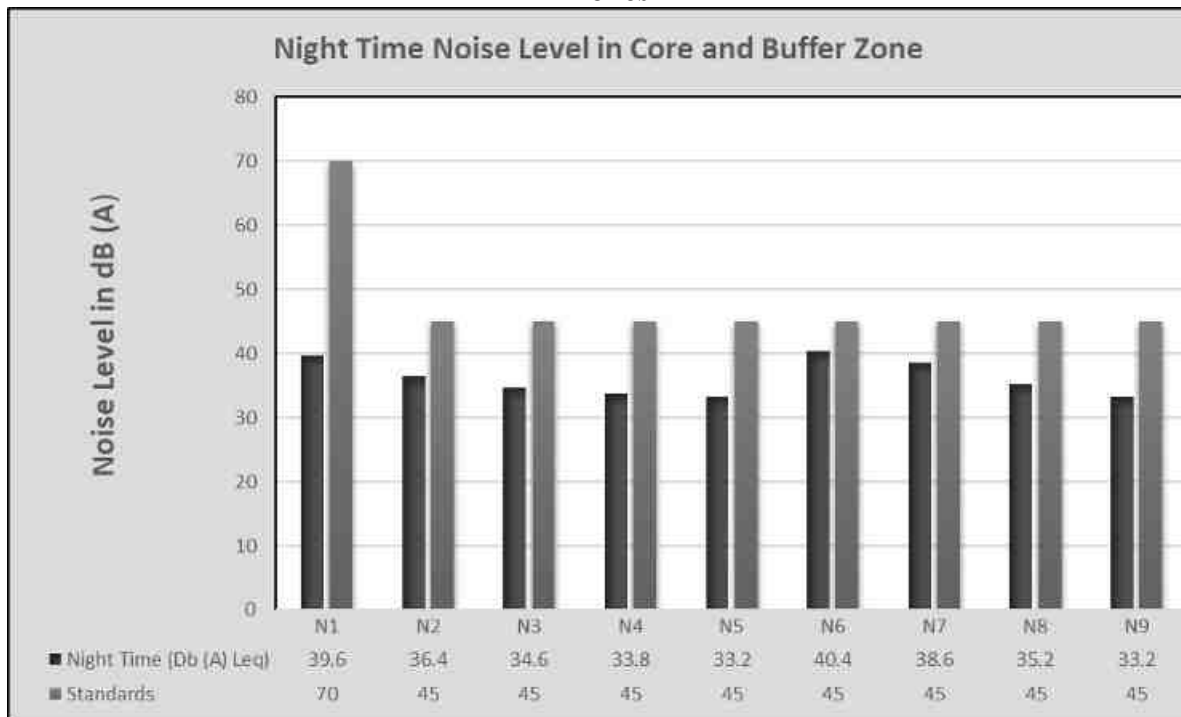


Figure 3.21 Bar Chart Showing Night Time Noise Levels Measured in Core and Buffer Zones

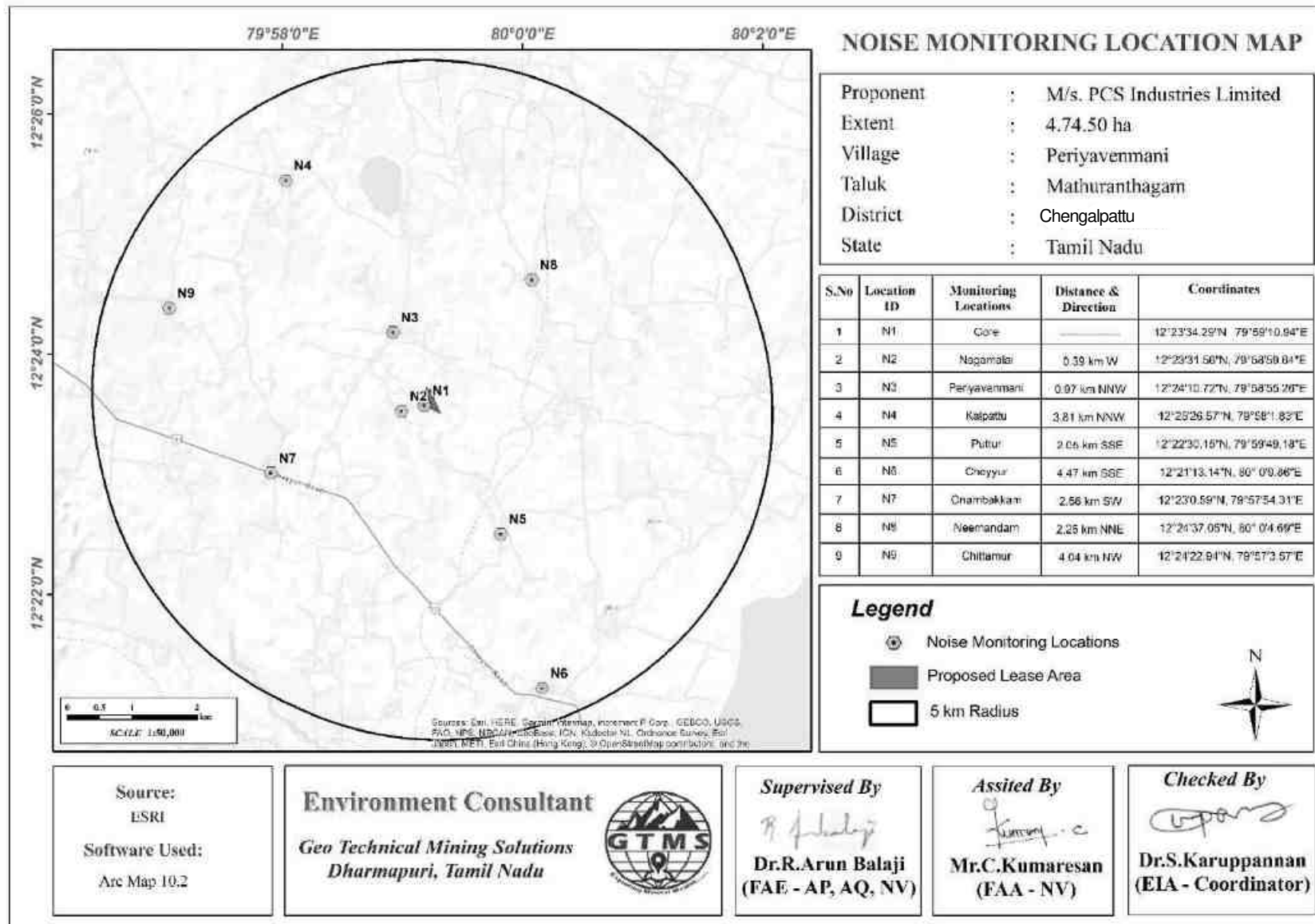


Figure 3.22 Toposheet Showing Noise Level Monitoring Station Locations Around 5 km Radius from the Proposed Project Site

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 3.23 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	$H = - \sum (p_i) \ln(p_i)$ Where p_i : Proportion of total sample represented by species i : number of individuals of species i / total number samples
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.

Crop Patterns in Maduranthagam Taluk

A variety of fruits and vegetables are cultivated in Maduranthagam Taluk. The important crops of this district are Paddy, Groundnut, Maize, water Melon, Ragi, Banana, Sugarcane, Cotton, Coconut. The land is very fertile and there is significant access to fresh water. In Periyavenmani village, rice cultivation is more intensive as shown in Figure 3.24.



Water melon



Water melon



Paddy



Sugarcane

Figure 3.24 Crop Patterns in Periyavenmani village

Flora in core zone

Taxonomically, a total of 16 species belonging to 13 families have been recorded from the mining lease area. The species in the lease area include herbs (7), trees (3), shrubs (6). the Details of flora with the scientific name details mention in Table 3.23

Table 3.23 Flora in Mine Lease Area

S.No.	Local Name	Scientific name	Family name	Number of species	IUCN Conservation Status
Trees					
1	Velikathan maram	<i>Prosopis juliflora</i>	Fabaceae	5	Not Listed
2	Arappu maram	<i>Albizia amara</i>	Fabaceae	2	Not Listed
3	Vembu	<i>Azadirachta indica</i>	Meliaceae	1	Not Listed
Shrubs					
4	Erukku	<i>Calotropis gigantea</i>	Apocynaceae	6	Not Listed
5	Avarai	<i>Senna auriculata</i>	Fabaceae	3	Not Listed
6	Arali	<i>Nerium indicum</i>	Apocynaceae	4	Not Listed
7	Sappathikalli	<i>Cereus pterogonus</i>	Cactaceae	5	Not Listed
8	Unichedi	<i>Lantana camara</i>	Verbenaceae	5	Not Listed
9	Suraimullu	<i>Ziziphus oenoplia</i>	Rhamnaceae	3	Not Listed
Herbs					
10	Thumbai	<i>Leucas aspera</i>	Lamiaceae	10	Not Listed
11	Kantang kathrikai	<i>Solanum virginianum</i>	Solanaceae	12	Not Listed
12	Arugampul	<i>Cynodon dactylon</i>	Poaceae	17	Not Listed
13	Poolai poondu	<i>Aerva lanata</i>	Amaranthaceae	13	Not Listed
14	Korai	<i>Cyperus rotundus</i>	Cyperaceae	22	Not Listed
15	Nerunji mull	<i>Tribulus terrestris</i>	Zygophyllales	15	Not Listed
16	Nayuruv	<i>Achyranthes aspera</i>	Amaranthaceae	8	Not Listed

Flora in 300 m radius zone

There is no agricultural land nearby. It contains a total of 26 species belonging to 16 families have been recorded from the buffer zone. Trees 9 (34%), Shrubs 6 (23%) Herbs and Climbers, Creeper, Grass & Cactus of 11 (42%) were identified. Details of flora with the scientific name details and diversity species Richness index were mentioned in Table 3.24-3.26 and Figure 3.25. There is no threat to the Flora and Fauna 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 because nearby agriculture land was found to dominate mostly in all the directions. Majority of the flat landscape around project unit is occupied by agriculture fields. It contains a total of 77 species belonging to 38 families have been recorded from the buffer zone. The floral 77 varieties among them 34 Trees (44%), 15 Shrubs (19%) Herbs and Climbers, Creeper, Grass & Cactus, 29 (37%) were identified. Details of flora with the scientific name details of diversity species Richness index were mentioned in Table 3.27-3.29 and Figure 3.25

Table 3.24 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
Tree													
1	Karuvelam	<i>Vachellia nilotica</i>	Fabaceae	4	3	5	0.8	60.0	1.3	11.4	11.5	23.0	Not Listed
2	Usilai Wunja	<i>Albizia amara</i>	Fabaceae	3	2	5	0.6	40.0	1.5	8.6	7.7	16.3	Not Listed
3	Vembu	<i>Azadirachta indica</i>	Meliaceae	4	3	5	0.8	60.0	1.3	11.4	11.5	23.0	Not Listed
4	Vealli vealan	<i>Vachellia leucophloea</i>	Babesiae	5	4	5	1.0	80.0	1.3	14.3	15.4	29.7	LC
5	Panai maram	<i>Borassus flabellifer</i>	Arecaceae	3	2	5	0.6	40.0	1.5	8.6	7.7	16.3	Not Listed
6	Eshamaram	<i>Phoenix Reclinata</i>	Arecaceae	4	3	5	0.8	60.0	1.3	11.4	11.5	23.0	Not Listed
7	Teanai Maram	<i>Cocos nucifera</i>	Arecaceae	3	2	5	0.6	40.0	1.5	8.6	7.7	16.3	Not Listed
8	Puliyamaram	<i>Tamarindus indica</i>	Legumes	4	3	5	0.8	60.0	1.3	11.4	11.5	23.0	Not Listed
9	Teaku	<i>Tectona grandis</i>	Lamiaceae	5	4	5	1.0	80.0	1.3	14.3	15.4	29.7	Not Listed
Shrubs													
1	Erukku	<i>Calotropis gigantea</i>	Apocynaceae	6	5	10	0.6	50.0	1.2	13.6	13.5	27.1	Not Listed
2	Uumaththai	<i>Datura metel</i>	Solanaceae	7	6	10	0.7	60.0	1.2	15.9	16.2	32.1	Not Listed

3	Thuthi	<i>Abutilon indicum</i>	Meliaceae	8	7	10	0.8	70.0	1.1	18.2	18.9	37.1	Not Listed
4	Avarai	<i>Senna auriculata</i>	Fabaceae	9	8	10	0.9	80.0	1.1	20.5	21.6	42.1	Not Listed
5	Surai mullu	<i>Ziziphus oenoplia</i>	Rhamnaceae	6	5	10	0.6	50.0	1.2	13.6	13.5	27.1	Not Listed
6	Kattamanakku	<i>Jatropha curcas</i>	Euphorbiaceae	8	6	10	0.8	60.0	1.3	18.2	16.2	34.4	Not Listed
Herbs													
1	Nayuruv	<i>Achyranthes aspera</i>	Amaranthaceae	7	6	15	0.5	40.0	1.2	8.9	8.8	17.7	Not Listed
2	Veetukaayapoondur	<i>Tridax procumbens</i>	Asteraceae	6	5	15	0.4	33.3	1.2	7.6	7.4	14.9	
3	Mukkirattai	<i>Boerhaavia diffusa</i>	Nyctaginaceae	8	7	15	0.5	46.7	1.1	10.1	10.3	20.4	Not Listed
4	Thumbai	<i>Leucas aspera</i>	Lamiaceae	7	6	15	0.5	40.0	1.2	8.9	8.8	17.7	Not Listed
5	Nai kadugu	<i>Celome viscosa</i>	Capparidaceae	6	5	15	0.4	33.3	1.2	7.6	7.4	14.9	Not Listed
6	Partiniyam	<i>Parthenium hysterophorus</i>	Asteraceae	8	7	15	0.5	46.7	1.1	10.1	10.3	20.4	Not Listed
7	Mukurattai	<i>Boerhavia diffusa</i>	Nyctaginaceae	6	5	15	0.4	33.3	1.2	7.6	7.4	14.9	Not Listed
8	Kovakkai	<i>Trichosanthes dioica</i>	Cucurbitaceae	8	7	15	0.5	46.7	1.1	10.1	10.3	20.4	Not Listed
9	mookuthi poondur	<i>Wedelia trilobata</i>	Asteraceae	9	8	15	0.6	53.3	1.1	11.4	11.8	23.2	Not Listed
10	Perandai	<i>Cissus quadrangularis</i>	Vitaceae	8	7	15	0.5	46.7	1.1	10.1	10.3	20.4	Not Listed
11	Pink Blumea	<i>Blumea axillaris</i>	Asteraceae	6	5	15	0.4	33.3	1.2	7.6	7.4	14.9	Not Listed

Table 3.25 Calculation of Species Diversity in 300 m Radius

S.No	Common name	Scientific name	No. of Species	Pi	In (Pi)	Pi x in (Pi)
Tree						
1	Karuvelam	<i>Vachellia nilotica</i>	4	0.11	-2.17	-0.25
2	Usilai Wunja	<i>Albizia amara</i>	3	0.09	-2.46	-0.21
3	Vembu	<i>Azadirachta indica</i>	4	0.11	-2.17	-0.25
4	Vealli vealan	<i>Vachellia leucophloea</i>	5	0.14	-1.95	-0.28
5	Panai maram	<i>Borassus flabellifer</i>	3	0.09	-2.46	-0.21
6	Eshamaram	<i>Phoenix Reclinata</i>	4	0.11	-2.17	-0.25
7	Teanai Maram	<i>Cocos nucifera</i>	3	0.09	-2.46	-0.21
8	Puliyamaram	<i>Tamarindus indica</i>	4	0.11	-2.17	-0.25
9	Teaku	<i>Tectona grandis</i>	5	0.14	-1.95	-0.28
H (Shannon Diversity Index) =2.18						
Shrubs						
1	Erukku	<i>Calotropis gigantea</i>	6	0.14	-1.99	-0.27
2	Uumaththai	<i>Datura metel</i>	7	0.16	-1.84	-0.29
3	Thuthi	<i>Abutilon indicum</i>	8	0.18	-1.70	-0.31
4	Avarai	<i>Senna auriculata</i>	9	0.20	-1.59	-0.32
5	Surai mullu	<i>Ziziphus oenoplia</i>	6	0.14	-1.99	-0.27
6	Kattamanakku	<i>Jatropha curcas</i>	8	0.18	-1.70	-0.31
H (Shannon Diversity Index) =1.78						
Herbs						
1	Nayuruv	<i>Achyranthes aspera</i>	7	0.09	-2.42	-0.21
2	Veetukaayapoond	<i>Tridax procumbens</i>	6	0.08	-2.58	-0.20
3	Mukkirattai	<i>Boerhaavia diffusa</i>	8	0.10	-2.29	-0.23
4	Thumbai	<i>Leucas aspera</i>	7	0.09	-2.42	-0.21
5	Nai kadugu	<i>Celome viscosa</i>	6	0.08	-2.58	-0.20
6	Parttiniyam	<i>Parthenium hysterophorus</i>	8	0.10	-2.29	-0.23
7	Mukurattai	<i>Boerhavia diffusa</i>	6	0.08	-2.58	-0.20
8	Kovakkai	<i>Trichosanthes dioica</i>	8	0.10	-2.29	-0.23
9	mookuthi poond	<i>Wedelia trilobata</i>	9	0.11	-2.17	-0.25
10	Perandai	<i>Cissus quadrangularis</i>	8	0.10	-2.29	-0.23
11	Pink Blumea	<i>Blumea axillaris</i>	6	0.08	-2.58	-0.20
H (Shannon Diversity Index) =2.39						

Table 3.26 Species Richness (Index) in 300 m Radius

Details	H	H max	Evenness	Species Richness
Tree	2.18	2.20	0.99	2.25
Shrubs	1.78	1.79	0.99	1.32
Herbs	2.39	2.40	1.00	2.29

Table 3.27 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	<i>Azadirachta indica</i>	Meliaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
2	Thekku	<i>Tectona grandis</i>	Verbenaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
3	Pongam oiltree	<i>Pongamia pinnata</i>	Fabaceae	4	3	10	0.4	30.0	1.3	2.5	2.3	4.8	Not Listed
4	Thennai maram	<i>Cocos nucifera</i>	Arecaceae	3	2	10	0.3	20.0	1.5	1.8	1.5	3.4	Not Listed
5	Manga	<i>Mangifera indica</i>	Anacardiaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
6	Puliyamaram	<i>Tamarindus indica</i>	Legumes	4	3	10	0.4	30.0	1.3	2.5	2.3	4.8	Not Listed
7	Vadanarayani	<i>Delonix elata</i>	Fabaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
8	Thenpazham	<i>Muntingia calabura</i>	Tiliaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
9	Punnai	<i>Calophyllu inophyllum</i>	Calophyllaceae	4	3	10	0.4	30.0	1.3	2.5	2.3	4.8	Not Listed
10	Ilanthai	<i>Ziziphus jujubha</i>	Rhamnaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
11	Karuvelam	<i>Acacia nilotica</i>	Mimosaceae	4	3	10	0.4	30.0	1.3	2.5	2.3	4.8	Not Listed
12	Nettilinkam	<i>Polylathia longifolia</i>	Annonaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
13	Arai nelli	<i>Phyllanthus acidus</i>	Euphorbiaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
14	Panai maram	<i>Borassus flabellifer</i>	Arecaceae	3	2	10	0.3	20.0	1.5	1.8	1.5	3.4	Not Listed
15	Sapota	<i>Manilkara zapota</i>	Sapotaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
16	Navalmaram	<i>Syzygium cumini</i>	Myrtaceae	7	6	10	0.7	60.0	1.2	4.3	4.6	8.9	Not Listed
17	Alamaram	<i>Ficus benghalensis</i>	Moraceae	3	2	10	0.3	20.0	1.5	1.8	1.5	3.4	Not Listed
18	Vazhaimaram	<i>Musa</i>	Musaceae	4	3	10	0.4	30.0	1.3	2.5	2.3	4.8	Not Listed
19	Karuvelam maram	<i>Vachellia nilotica</i>	Fabaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
20	Nelli	<i>Emblica officinalis</i>	Phyllanthaceae	3	2	10	0.3	20.0	1.5	1.8	1.5	3.4	Not Listed
21	Eucalyptus	<i>Eucalyptus globules</i>	Myrtaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed

22	Maramalli	<i>Millingtonia hortensis</i>	Bignoniaceae	4	3	10	0.4	30.0	1.3	2.5	2.3	4.8	Not Listed
23	Kudukapul	<i>Pithecellobium dulce</i>	Mimosaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
24	Karungali	<i>Acacia sundra</i>	Legumes	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
25	Nochi	<i>Vitex negundo</i>	Lamiaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
26	Karimurungai	<i>Moringa olefera</i>	Moraginaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
27	Pappali maram	<i>Carica papaya L</i>	Caricaceae	7	6	10	0.7	60.0	1.2	4.3	4.6	8.9	Not Listed
28	Poovarasu	<i>Thespesia populnea</i>	Malvaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
29	Arasanmaram	<i>Ficus religiosa</i>	Moraceae	3	2	10	0.3	20.0	1.5	1.8	1.5	3.4	Not Listed
30	Nuna maram	<i>Morinda citrifolia</i>	Rubiaceae	4	3	10	0.4	30.0	1.3	2.5	2.3	4.8	Not Listed
32	Nettilingam	<i>Polyalthia longifolia</i>	Annonaceae	5	4	10	0.5	40.0	1.3	3.1	3.1	6.1	Not Listed
33	Koyya	<i>Psidium guajava</i>	Myrtaceae	7	6	10	0.7	60.0	1.2	4.3	4.6	8.9	Not Listed
34	Seethapazham	<i>Annona reticulata</i>	Annonaceae	6	5	10	0.6	50.0	1.2	3.7	3.8	7.5	Not Listed
SHRUBS													
1	Avarai	<i>Senna auriculata</i>	Fabaceae	8	7	15	0.5	46.7	1.1	7.1	7.2	14.4	Not Listed
2	Sundaika	<i>Solanum torvum</i>	Solanaceae	9	8	15	0.6	53.3	1.1	8.0	8.2	16.3	Not Listed
3	Puramuttai	<i>Chrozophora rotleri</i>	Euphorbiaceae	6	5	15	0.4	33.3	1.2	5.4	5.2	10.5	Not Listed
4	Arali	<i>Nerium indicum</i>	Apocynaceae	7	6	15	0.5	40.0	1.2	6.3	6.2	12.4	Not Listed
5	Seemaigaththi	<i>Cassia alata</i>	Caesalpinaceae	8	7	15	0.5	46.7	1.1	7.1	7.2	14.4	Not Listed
6	Chemparuthi	<i>Hibiscu rosa-sinensis</i>	Malvaceae	9	8	15	0.6	53.3	1.1	8.0	8.2	16.3	Not Listed
7	Kattamanakku	<i>Jatropha curcas</i>	Euphorbiaceae	6	5	15	0.4	33.3	1.2	5.4	5.2	10.5	Not Listed
8	Chaturakalli	<i>Euphorbia antiquorum</i>	Euphorbiaceae	7	6	15	0.5	40.0	1.2	6.3	6.2	12.4	Not Listed
9	Idlipoo	<i>xoracoc cineia</i>	Rubiaceae	8	7	15	0.5	46.7	1.1	7.1	7.2	14.4	Not Listed
10	Thuthi	<i>Abutilon indicum</i>	Meliaceae	6	5	15	0.4	33.3	1.2	5.4	5.2	10.5	Not Listed
11	Nithyakalyani	<i>Cathranthus roseus</i>	Apocynaceae	8	7	15	0.5	46.7	1.1	7.1	7.2	14.4	Not Listed
12	Uumaththai	<i>Datura metel</i>	Solanaceae	7	6	15	0.5	40.0	1.2	6.3	6.2	12.4	Not Listed
13	Kundumani	<i>Abrus precatorius</i>	Fabaceae	6	5	15	0.4	33.3	1.2	5.4	5.2	10.5	Not Listed
14	Erukku	<i>Calotropis gigantea</i>	Apocynaceae	9	8	15	0.6	53.3	1.1	8.0	8.2	16.3	Not Listed
15	Neermulli	<i>Hydrophila auriculata</i>	Acanthaceae	8	7	15	0.5	46.7	1.1	7.1	7.2	14.4	Not Listed
HERBS & CLIMBER & CREEPER & GRASSES													
1	Nayuruvi	<i>Achyranthes aspera</i>	Amaranthaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.3	Not Listed
2	Veetukaayapoond	<i>Tridax procumbens</i>	Asteraceae	7	6	25	0.3	24.0	1.2	3.2	3.1	6.3	Not Listed
3	Mukkirattai	<i>Boerhaavia diffusa</i>	Nyctaginaceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed
4	Kuppaimeni	<i>Acalypha indica</i>	Euphorbiaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.2	Not Listed

5	Karisilanganni	<i>Eclipta prostrata</i>	Asteraceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed
6	Korai	<i>Cyperus rotundus</i>	Cyperaceae	7	6	25	0.3	24.0	1.2	3.2	3.1	6.3	Not Listed
7	Thumbai	<i>Leucas aspera</i>	Lamiaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.3	Not Listed
8	Nai kadugu	<i>Celome viscosa</i>	Capparidaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.2	Not Listed
9	Parttiniyam	<i>Parthenium hysterophorus</i>	Asteraceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.3	Not Listed
10	Mukurattai	<i>Boerhavia diffusa</i>	Nyctaginaceae	7	6	25	0.3	24.0	1.2	3.2	3.1	6.3	Not Listed
11	Thulasi	<i>Ocimum tenuiflorum</i>	Lamiaceae	10	9	25	0.4	36.0	1.1	4.5	4.7	9.2	Not Listed
12	Arugampul	<i>Cynodon dactylon</i>	Poaceae	11	10	25	0.4	40.0	1.1	5.0	5.2	10.2	Not Listed
13	Manathakkali	<i>Solanum nigrum</i>	Solanaceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed
14	Kudai korai	<i>Cyperus difformis</i>	Cyperaceae	7	6	25	0.3	24.0	1.2	3.2	3.1	6.3	Not Listed
15	Thoiya keerai	<i>Digeria muricata</i>	Amaranthaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.3	Not Listed
16	Kovai	<i>Coccinia grandis</i>	Cucurbitaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.2	Not Listed
17	Perandai	<i>Cissus quadrangularis</i>	Vitaceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed
18	Mudakkotan	<i>Cardiospermum helicacabum</i>	Sapindaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.3	Not Listed
19	Karkakartum	<i>Clitoria ternatea</i>	Fabaceae	7	6	25	0.3	24.0	1.2	3.2	3.1	6.3	Not Listed
20	Kovakkai	<i>Trichosanthes dioica</i>	Cucurbitaceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed
21	Sangupoo	<i>Clitoria ternatia</i>	Fabaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.2	Not Listed
22	Siru puladi	<i>Desmodium triflorum</i>	Fabaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.3	Not Listed
23	Sithrapaalavi	<i>Euphorbia prostrata</i>	Euphorbiaceae	7	6	25	0.3	24.0	1.2	3.2	3.1	6.3	Not Listed
24	Korai	<i>Cyperus rotundus</i>	Poaceae	6	5	25	0.2	20.0	1.2	2.7	2.6	5.3	Not Listed
25	Thumattikai	<i>Cucumis callosus</i>	Cucurbitaceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed
26	mookuthi poondu	<i>Wedelia trilobata</i>	Asteraceae	7	6	25	0.3	24.0	1.2	3.2	3.1	6.3	Not Listed
27	Kattu kanchippul	<i>Apluda mutica</i>	Poaceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed
28	Musthakasu	<i>Kyllinga brevifolia</i>	Cyperaceae	9	8	25	0.4	32.0	1.1	4.1	4.2	8.2	Not Listed
29	Nagathali	<i>Opuntia dillenii</i>	Cactaceae	8	7	25	0.3	28.0	1.1	3.6	3.6	7.3	Not Listed

Table 3.28 Calculation of Species Diversity in buffer Zone

S. mNo	Common name	Scientific name	No. of Species	Pi	In (Pi)	Pi x in (Pi)
Tree						
1	Vembu	<i>Azadirachta indica</i>	5	0.03	-3.51	-0.10
2	Thekku	<i>Tectona grandis</i>	6	0.04	-3.33	-0.12
3	Pongam oiltree	<i>Pongamia pinnata</i>	4	0.02	-3.74	-0.09
4	Thennai maram	<i>Cocos nucifera</i>	3	0.02	-4.03	-0.07
5	Manga	<i>Mangifera indica</i>	6	0.04	-3.33	-0.12
6	Puliyamaram	<i>Tamarindus indica</i>	4	0.02	-3.74	-0.09
7	Vadanarayani	<i>Delonix elata</i>	5	0.03	-3.51	-0.10
8	Thenpazham	<i>Muntingia calabura</i>	6	0.04	-3.33	-0.12
9	Punnai	<i>Calophyllum inophyllum</i>	4	0.02	-3.74	-0.09
10	Ilanthai	<i>Ziziphus jujubha</i>	5	0.03	-3.51	-0.10
11	Karuvelam	<i>Acacia nilotica</i>	4	0.02	-3.74	-0.09
12	Nettilinkam	<i>Polyalthia longifolia</i>	6	0.04	-3.33	-0.12
13	Arai nelli	<i>Phyllanthus acidus</i>	5	0.03	-3.51	-0.10
14	Panai maram	<i>Borassus flabellifer</i>	3	0.02	-4.03	-0.07
15	Sapota	<i>Manilkara zapota</i>	6	0.04	-3.33	-0.12
16	Navalmaram	<i>Syzygium cumini</i>	7	0.04	-3.18	-0.13
17	Alamaram	<i>Ficus benghalensis</i>	3	0.02	-4.03	-0.07
18	Vazhaimaram	<i>Musa</i>	4	0.02	-3.74	-0.09
19	Karuvelam maram	<i>Vachellia nilotica</i>	5	0.03	-3.51	-0.10
20	Nelli	<i>Emblica officinalis</i>	3	0.02	-4.03	-0.07
21	Eucalyptus	<i>Eucalyptus globules</i>	6	0.04	-3.33	-0.12
22	Maramalli	<i>Millingtonia hortensis</i>	4	0.02	-3.74	-0.09
23	Kuduka puli	<i>Pithecellobium dulce</i>	5	0.03	-3.51	-0.10
24	Karungali	<i>Acacia sundra</i>	6	0.04	-3.33	-0.12
25	Nochi	<i>Vitex negundo</i>	5	0.03	-3.51	-0.10
26	Karimurungai	<i>Moringa olefera</i>	6	0.04	-3.33	-0.12
27	Pappali maram	<i>Carica papaya L</i>	7	0.04	-3.18	-0.13
28	Poovarasu	<i>Thespesia populnea</i>	5	0.03	-3.51	-0.10
29	Arasanmaram	<i>Ficus religiosa</i>	3	0.02	-4.03	-0.07
30	Vilvam	<i>Aegle marmelos</i>	4	0.02	-3.74	-0.09
31	Nuna maram	<i>Morinda citrifolia</i>	5	0.03	-3.51	-0.10
32	Nettilingam	<i>Polyalthia longifolia</i>	7	0.04	-3.18	-0.13
33	Koyya	<i>Psidium guajava</i>	6	0.04	-3.33	-0.12
34	Seethapazham	<i>Annona reticulata</i>	5	0.03	-3.51	-0.10
H (Shannon Diversity Index) =3.50						
Shrubs						
1	Avarai	<i>Senna auriculata</i>	8	0.07	-2.64	-0.19
2	Sundaika	<i>Solanum torvum</i>	9	0.08	-2.52	-0.20
3	Puramuttai	<i>Chrozophora rotleri</i>	6	0.05	-2.93	-0.16
4	Arali	<i>Nerium indicum</i>	7	0.06	-2.77	-0.17
5	Seemaiagaththi	<i>Cassia alata</i>	8	0.07	-2.64	-0.19
6	Chemparuthi	<i>Hibiscu rosa-sinensis</i>	9	0.08	-2.52	-0.20
7	Kattamanakku	<i>Jatropha curcas</i>	6	0.05	-2.93	-0.16
8	Chaturakalli	<i>Euphorbia antiquorum</i>	7	0.06	-2.77	-0.17
9	Idlipoo	<i>Xoracoc cineia</i>	8	0.07	-2.64	-0.19
10	Thuthi	<i>Abutilon indicum</i>	6	0.05	-2.93	-0.16
11	Nithyakalyani	<i>Cathranthus roseus</i>	8	0.07	-2.64	-0.19
12	Uumaththai	<i>Datura metel</i>	7	0.06	-2.77	-0.17

13	Kundumani	<i>Abrus precatorius</i>	6	0.05	-2.93	-0.16
14	Erukku	<i>Calotropis gigantea</i>	9	0.08	-2.52	-0.20
15	Neermulli	<i>Hydrophila auriculata</i>	8	0.07	-2.64	-0.19
H (Shannon Diversity Index) =2.70						
HERBS&CLIMBER &CREEPER &GRASSES						
1	Nayuruv	<i>Achyranthes aspera</i>	6	0.03	-3.61	-0.10
2	Veetukaayapoond	<i>Tridax procumbens</i>	7	0.03	-3.45	-0.11
3	Mukkirattai	<i>Boerhaavia diffusa</i>	8	0.04	-3.32	-0.12
4	Kuppaimeni	<i>Acalypha indica</i>	9	0.04	-3.20	-0.13
5	Karisilanganni	<i>Eclipta prostrata</i>	8	0.04	-3.32	-0.12
6	Korai	<i>Cyperus rotundus</i>	7	0.03	-3.45	-0.11
7	Thumbai	<i>Leucas aspera</i>	6	0.03	-3.61	-0.10
8	Nai kadugu	<i>Celome viscosa</i>	9	0.04	-3.20	-0.13
9	Parttiniyam	<i>Parthenium hysterophorus</i>	6	0.03	-3.61	-0.10
10	Mukurattai	<i>Boerhavia diffusa</i>	7	0.03	-3.45	-0.11
11	Thulasi	<i>Ocimum tenuiflorum</i>	10	0.05	-3.10	-0.14
12	Arugampul	<i>Cynodon dactylon</i>	11	0.05	-3.00	-0.15
13	Manathakkali	<i>Solanum nigrum</i>	8	0.04	-3.32	-0.12
14	Kudai korai	<i>Cyperus difformis</i>	7	0.03	-3.45	-0.11
15	Thoiya keerai	<i>Digeria muricata</i>	6	0.03	-3.61	-0.10
16	Kovai	<i>Coccinia grandis</i>	9	0.04	-3.20	-0.13
17	Perandai	<i>Cissus quadrangularis</i>	8	0.04	-3.32	-0.12
18	Mudakkotan	<i>Cardiospermum helicacabum</i>	6	0.03	-3.61	-0.10
19	Karkakartum	<i>Clitoria ternatea</i>	7	0.03	-3.45	-0.11
20	Kovakkai	<i>Trichosanthes dioica</i>	8	0.04	-3.32	-0.12
21	Sangupoo	<i>Clitoriaterntia</i>	9	0.04	-3.20	-0.13
22	Siru puladi	<i>Desmodium triflorum</i>	6	0.03	-3.61	-0.10
23	Sithrapaalavi	<i>Euphorbia prostrata</i>	7	0.03	-3.45	-0.11
24	Korai	<i>Cyperus rotundus</i>	6	0.03	-3.61	-0.10
25	Thumattikai	<i>Cucumis callosus</i>	8	0.04	-3.32	-0.12
26	Malai mookuthi poond	<i>Wedelia trilobata</i>	7	0.03	-3.45	-0.11
27	Kattu kanchippul	<i>Apluda mutica</i>	8	0.04	-3.32	-0.12
28	Musthakasu	<i>Kyllinga brevifolia</i>	9	0.04	-3.20	-0.13
29	Nagathali	<i>Opuntia dillenii</i>	8	0.04	-3.32	-0.12
H (Shannon Diversity Index) =3.35						

Table 3.29 Species Richness (Index) in Buffer Zone

Details	H	H max	Evenness	Species Richness
Tree	3.50	3.53	0.99	6.44
Shrubs	2.70	2.71	1.00	2.97
Herbs	3.35	3.37	1.00	5.19

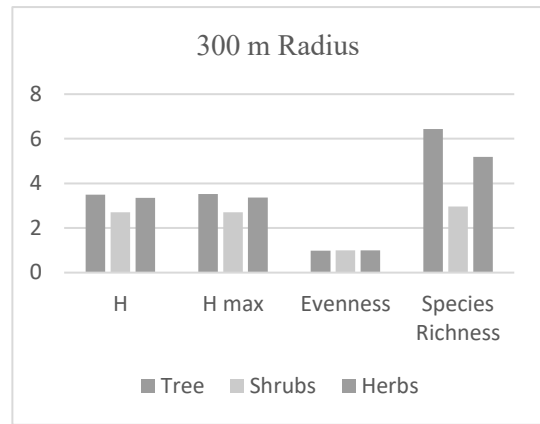
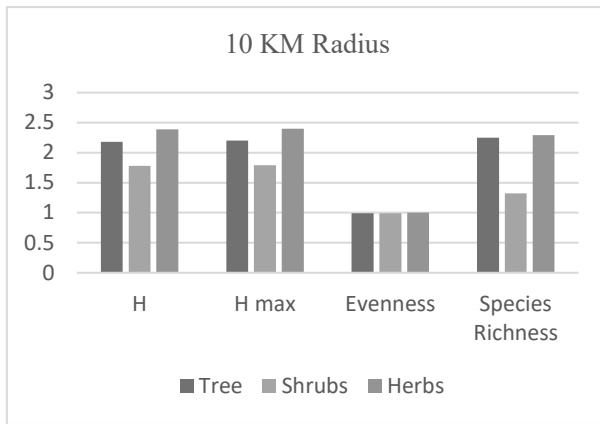
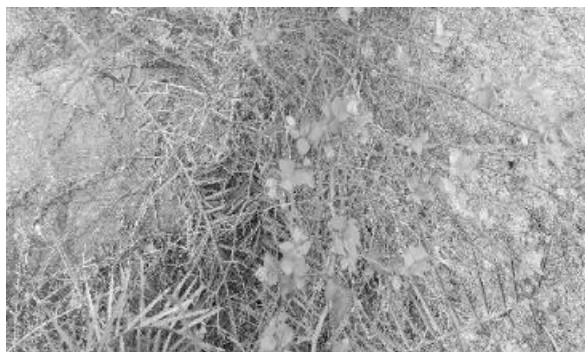
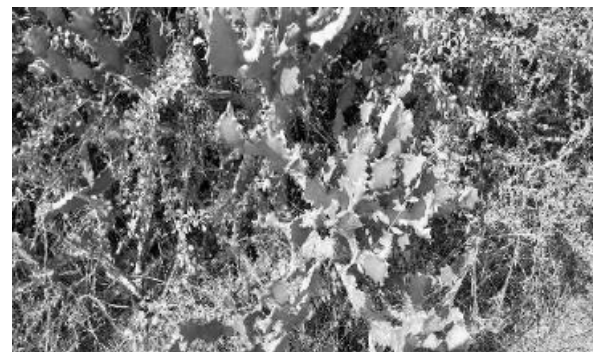


Figure 3.25 Floral Diversity Species Richness (Index) in Buffer Zone and 300 m Radius



Ziziphus oenopolia



Euphorbia lactea



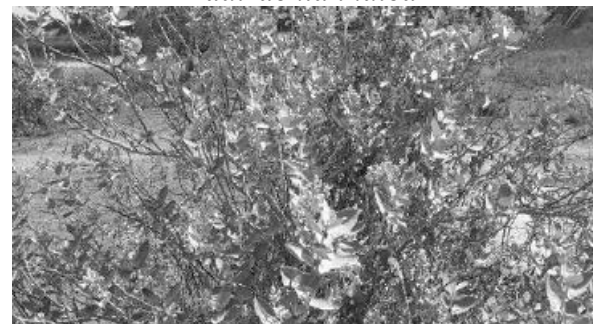
Opuntia stricta



Azadirachta indica



Solanum virginianum



Calotropis gigantea



Eleusine tristachya



Carissa carandas



Crotalaria incana



Leucas aspera



Tephrosia purpurea



Physalis angulata



Ipomoea carnea



Borassus flabellifer



Jatropha gossypifolia



Phoenix sylvestris

Figure 3.26 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 3.30

Table 3.30 Aquatic Vegetation

S.No.	Scientific name	Common Name	Vernacular Name (Tamil)	IUCN Red List of Threatened Species
1	<i>Eichornia crassipes</i>	Water hyacinth	Agayatamarai	NA
2	<i>Aponogeton natans</i>	Floating lace plant	Kottikizhnagu	NA
3	<i>Carex cruciata</i>	Cross Grass	Koraipullu	NA
4	<i>Cynodon dactylon</i>	Scutch grass	Arugampul	LC
5	<i>Cyperus exaltatus</i>	Tall Flat Sedge	Koraikizhangu	LC

*LC- Least Concern, NA-Not yet assessed

Forest Vegetation

There are no biosphere reserves or wildlife sanctuaries or National parks or Important Bird Areas (IBAs), or migratory routes of fauna. Kollattanallur R. F 8.92km SW, Palavur R. F 8.83km W, Sittarkadu R. F 5.98 SSW of core zone. It is a dense Scrub Forest Land, mostly containing *Calliea cinerea*, *Catunaregam spinosa*, *Carissa spinarum*, *Albizia amara*, *Buchanania lanzan*, and *Dodonaea viscosa*. Thus, the area under study (Mine lease area and the 10 Km buffer zone) is not ecologically sensitive. Showing in Forest location map Figure 3.28.

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 3.31

Table 3.31 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 22 varieties of species belonging to 14 families were observed in the core zone. Among them are 10 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 7 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. 3.32.

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 3.33.

Table 3.32 Fauna in Core Zone

S. No	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
INSECTS				
1	Nymphalidae	<i>Danaus plexippus</i>	Schedule IV	LC
2	Peridae	<i>Catopsilia pyranthe</i>	NL	LC
3	Acrididae	<i>Hieroglyphus sp</i>	NL	LC
4	Blattodea	<i>Hamitermes silvestri</i>	Schedule IV	LC
5	Lonchodidae	<i>Crausius morosus</i>	NL	LC
6	Peridae	<i>Catopsilia pyranthe</i>	NL	LC
7	Libellulidae	<i>Sympetrum fonscolombii</i>	NL	LC
8	Nymphalidae	<i>Acraea violae</i>	NL	LC
9	Nymphalidae	<i>Danaus genutia</i>	NL	NL
10	Mantis religiosa	<i>Mantidae</i>	NL	NL
REPTILES				
7	Agamidae	<i>Calotes versicolor</i>	NL	LC
8	Gekkonidae	<i>Hemidactylus frenatus</i>	NL	LC

9	Agamidae	<i>Sitanaponticeriana</i>	NL	LC
Mammals				
10	Muridae	<i>Mus booduga</i>	Schedule IV	NL
AVES				
11	Meropidae	<i>Meropsorientalis</i>	NL	LC
12	Cucalidae	<i>Eudynamys</i>	Schedule IV	LC
13	Sturnidae	<i>Acridotheres tristis</i>	NL	LC
14	Ardeidae	<i>Bubulcus ibis</i>	NL	LC
15	Corvidae	<i>Corvus splendens</i>	NL	LC
16	Cucalidae	<i>Centropus sinensis</i>	Schedule IV	LC
17	Ardeidae	<i>Ardeola grayii</i>	Schedule IV	LC
18	Dicruridae	<i>Dicrurus leucophaeus</i>	Schedule IV	LC

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

Table 3.33 Fauna in Buffer Zone

S.No	Family Name	Scientific Name	Schedule List Wildlife Protection Act 1972	IUCN Red List Data
INSECTS				
1	Nymphalidae	<i>Tirumala limniace</i>	Schedule IV	LC
2	Nymphalidae	<i>Danainae</i>	NL	LC
3	Nymphalidae	<i>Danaus chrysippus</i>	Schedule IV	LC
4	Apidae	<i>Apis cerana</i>	Schedule IV	LC
5	Acrididae	<i>Hieroglyphus sp</i>	NL	LC
6	Libellulidae	<i>Sympetrum fonscolombii</i>	NL	LC
7	Papilionidae	<i>Papilio demoleus</i>	Schedule IV	LC
8	Formicidae	<i>Camponotus Vicinus</i>	NL	NL
9	Gomphidae	<i>Ceratogomphus pictus</i>	Schedule IV	LC
10	Nymphalidae	<i>Danaus genutia</i>	Schedule IV	LC
11	Nymphalidae	<i>Euploea core</i>	Schedule IV	LC
12	Mantidae	<i>mantis religiosa</i>	NL	NL
13	Nymphalidae	<i>Danaus plexippus</i>	Schedule IV	LC
14	Lycaenidae	<i>Zizina Otis indica</i>	Schedule IV	LC
15	Buprestidae	<i>Eurythyrea austriaca</i>	Schedule IV	NA
REPTILES				
16	Agamidae	<i>Calotes versicolor</i>	NL	LC
17	Gekkonidae	<i>Hemidactylus frenatus</i>	NL	LC
18	Chamaeleonidae	<i>Chamaeleo zeylanicus</i>	Sch II (Part I)	LC
19	Natricidae	<i>Atretium schistosum</i>	Sch II (Part II)	LC
20	Scincidae	<i>Eutropis carinata</i>	NL	LC
21	Colubridae	<i>Ptyas mucosa</i>	Sch II (Part II)	LC
22	Scincidae	<i>Mabuya carinatus</i>	NL	LC
Mammals				
23	Sciuridae	<i>Funambulus palmarum</i>	Schedule IV	LC
24	Leporidae	<i>Lepus nigricollis</i>	Schedule IV	LC
25	Muridae	<i>Mus booduga</i>	Schedule IV	LC

26	Herpestidae	<i>Herpestes javanicus</i>	Schedule (Part II)	LC
AVES				
27	Ardeidae	<i>Ardeola grayii</i>	Schedule IV	LC
28	Dicruridae	<i>Dicrurus macrocercus</i>	Schedule IV	LC
29	Meropidae	<i>Meropsorientalis</i>	NL	LC
30	Psittaculidae	<i>Psittacula alexandri</i>	NL	LC
31	Rallidae	<i>Fulica atra</i>	Schedule IV	LC
32	Sturnidae	<i>Acridotheres tristis</i>	NL	LC
33	Accipitridae	<i>Accipiter badius</i>	NL	LC
34	Cucalidae	<i>Eudynamys</i>	Schedule IV	LC
35	Phasianidae	<i>Coturnix coturnix</i>	Schedule IV	LC
36	Pycnonotidae	<i>Pycnonotuscafer</i>	Schedule IV	LC
37	Sturnidae	<i>Sturnia pagodarum</i>	Schedule IV	LC
38	Oriolidae	<i>Oriolus kundoo</i>	Schedule IV	LC
39	Psittaculidae	<i>Psittacula krameria</i>	NL	LC
40	Ardeidae	<i>Bubulcus ibis</i>	NL	LC
41	Phasianidae	<i>Coturnix coturnix</i>	Schedule IV	LC
42	Rallidae	<i>Amaurornis phoenicurus</i>	NL	LC
43	Dicruridae	<i>Dicrurus macrocercus</i>	Schedule IV	LC
44	Phasianidae	<i>Francolinus pondicerianus</i>	Schedule IV	LC
45	Corvidae	<i>Corvussplendens</i>	NL	LC
Amphibians				
46	Dicroglossidae	<i>Sphaerotheca breviceps</i>	Schedule IV	LC
47	Ranidae	<i>Rana hexadactyla</i>	Schedule IV	LC
48	Chordata	<i>Hoplobatrachus tigerinus (Rana tigerina)</i>	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 analyze 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 Socio-Economic Status of Study Area

The study area covers 31 villages. Around 5km radius. As Periyavenmani is the village in which the proposed project site is located, the summary of population facts for the village is exclusively provided in Table 3.34 and for other 30 villages in Tables 3.35-3.37.

Table 3.34 Periyavenmani Village Population Facts

Periyavenmani Village	
Number of Households	304
Population	1215
Male Population	625
Female Population	590
Children Population	121
Sex-ratio	944
Literacy	63.16%
Male Literacy	70.23%
Female Literacy	55.72%
Scheduled Tribes (ST) %	7.61%
Scheduled Caste (SC) %	0.12%
Total Workers	674
Main Worker	527
Marginal Worker	147

Source: <https://etrace.in/census/village/venmari-maduranthakam-district-Chengalpattu-tamil-nadu-630088>

Table 3.35 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
Vellarai	109	426	205	221	259	137	122	167	68	99
Akkinambattu	691	2334	1167	1167	6210	3241	2969	1521	567	954
Poondi	17	64	37	27	43	27	16	21	10	11
Pudupattu	256	1030	514	516	593	316	277	437	198	239
Dharmapuram	136	526	243	283	293	153	140	233	90	143
Nesapakkam	185	671	348	323	400	236	164	271	112	159
Ariyanur	171	669	340	329	398	223	175	271	117	154
Venmari	304	1215	625	590	691	394	297	524	231	293
Chinnavenmani	207	794	388	406	549	291	258	245	97	148
Ozhavetti	265	1104	561	543	703	400	303	401	161	240
Nallamur Keelakaranai	743	3122	1545	1577	2148	1136	1012	974	409	565
Chitamur	67	315	166	149	189	120	69	126	46	80
Kattudevadur	891	3398	1700	1698	2074	1152	922	1324	548	776
Viralur	118	467	231	236	268	149	119	199	82	117
Devanur	56	204	102	102	126	73	53	78	29	49
Nallur	161	625	309	316	425	236	189	200	73	127
Erumbedu	660	2614	1299	1315	1905	1056	849	709	243	466
Z.Budur	788	2873	1422	1451	1985	1086	899	888	336	552
Periavelikadu	198	802	410	392	533	282	251	269	128	141

Thiruvadur	462	1887	949	938	1193	660	533	694	289	405
Kadugupattu	450	1765	874	891	1022	561	461	743	313	430
Perumbakkam	604	2448	1223	1225	1493	868	625	955	355	600
Iranyasidhi	189	712	368	344	419	252	167	293	116	177
Nemanadam	153	538	267	271	312	189	123	226	78	148
Pakkavancheri	87	357	181	176	211	122	89	146	59	87
Sengattur	412	1745	875	870	1322	727	595	423	148	275
Thirupurakoil	42	211	112	99	153	86	67	58	26	32
Madayambakkam	309	1193	586	607	831	447	384	362	139	223
Pakkur	326	1229	599	630	760	423	337	469	176	293
Cheyyur	2626	10664	5274	5390	7936	4190	3746	2728	1084	1644
Ammanur	589	2334	1167	1167	1622	915	707	712	252	460
Maruderi	42	152	74	78	109	62	47	43	12	31

Table 3.36 Details on Educational Facilities, Water, and Drainage & Health Facilities

Village	Govt Primary School (Numbers)	Govt Vocational Training School/ITI (Numbers)	Primary Health Centre (Numbers)	Tap Water Untreated	River/Canal	Is the Area Covered under Total Sanitation Campaign	Telephone (landlines)	Public Bus Service	Gravel (kuchha) Roads	Commercial Bank	Agricultural Credit Societies	Self - Help Group (SHG)	Nutritional Centres- Anganwadi Centre	Community Centre with/without TV	Power Supply for Domestic Use
Vellarai	1	0	0	1	2	2	2	2	1	2	2	2	1	2	1
Poondi	0	0	0	2	2	2	2	2	1	2	2	1	2	2	1
Pudupattu	1	0	0	1	2	2	1	1	1	2	2	1	1	2	1
Dharmapuram	1	0	0	1	2	2	1	2	1	2	2	1	1	1	1

Ariyanur	1	0	0	1	2	2	1	2	1	2	2	1	1	2	1
Venmari	1	0	0	1	2	1	1	2	1	2	2	1	1	2	1
Chinnavenmani	1	0	0	1	2	2	1	2	1	2	2	1	1	2	1
Ozhavetti	1	0	0	1	2	2	1	1	1	2	2	1	1	2	1
Nallamur Keelakaranai	1	0	0	1	2	2	1	2	1	2	2	1	1	2	1
Chitamur	1	0	0	1	2	2	2	2	1	2	2	1	1	2	1
Kattudevadur	2	0	0	1	2	2	1	1	1	2	2	1	1	1	1
Viralur	2	0	0	1	2	2	1	2	1	2	2	1	1	2	1
Devanur	1	0	0	2	2	2	1	2	2	2	2	1	1	2	1
Nallur	1	0	0	1	2	2	1	2	1	2	2	1	1	1	1
Erumbedu	3	0	1	1	2	2	1	1	2	2	2	1	1	2	1
Z.Budur	4	0	0	2	2	2	1	1	1	2	2	1	1	2	1
Periavelikadu	1	0	0	1	2	1	1	1	1	2	2	2	1	2	1
Thiruvadur	1	0	0	1	2	2	1	2	1	2	1	1	1	1	1
Kadugupattu	1	0	0	1	2	2	1	2	1	2	1	1	1	2	1
Akkinambattu	1	0	0	1	2	2	1	1	1	2	2	1	1	2	1
Perumbakkam	1	0	0	1	2	1	1	1	1	2	2	1	1	2	1
Iranyasidhi	1	0	0	2	2	2	1	2	1	2	2	1	1	2	1
Nemanadam	1	0	0	1	2	2	1	2	1	2	2	2	1	1	1
Pakkavancheri	0	0	0	1	2	2	2	2	1	2	2	2	1	1	1
Sengattur	2	0	0	1	2	2	1	1	1	2	2	1	1	2	1
Thirupurakoil	0	0	0	2	2	2	2	1	1	2	2	1	2	1	1
Madayambakkam	1	0	0	1	2	2	1	1	1	2	2	1	1	1	1
Pakkur	0	0	0	1	2	1	1	2	1	2	2	1	1	2	1
Cheyyur	6	0	2	1	2	1	1	1	1	1	1	1	1	1	1
Ammanur	3	0	0	1	2	2	1	1	1	2	2	1	1	2	1
Maruderi	0	0	0	2	2	2	2	1	1	2	2	1	2	2	1

Table 3.37 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
Vellarai	212	120	92	142	92	50	4	0	138	214
Poondi	22	21	1	17	16	1	6	1	10	42
Pudupattu	462	306	156	336	280	56	13	88	232	568
Dharmapuram	265	151	114	94	58	36	9	10	74	261
Ariyanur	309	204	105	305	200	105	21	221	54	360
Venmari	674	401	273	527	354	173	90	354	74	541
Chinnavenmani	520	269	251	518	268	250	96	304	118	274
Ozhavetti	591	344	247	344	217	127	17	251	76	513
Nallamur Keelakaranai	1608	911	697	720	488	232	214	353	151	1514
Chitamur	175	112	63	175	112	63	11	155	5	140
Kattudevadur	1675	979	696	1357	807	550	56	1073	220	1723
Viralur	263	137	126	50	39	11	26	5	12	204
Devanur	86	60	26	60	47	13	27	16	17	118

Nallur	299	180	119	48	33	15	5	3	40	326
Erumbedu	1117	642	475	863	505	358	89	532	236	1497
Z.Budur	1480	918	562	1209	793	416	202	706	285	1393
Periavelikadu	501	255	246	128	73	55	16	26	81	301
Akkinambattu	1401	814	587	708	449	259	287	320	76	1152
Perumbakkam	1361	746	615	1093	620	473	266	589	235	1087
Thiruvadur	868	573	295	470	393	77	6	180	280	1019
Kadugupattu	991	548	443	879	485	394	80	616	180	774
Iranyasidhi	412	225	187	180	163	17	18	74	79	300
Nemanadam	321	169	152	245	138	107	83	140	18	217
Pakkavancheri	204	123	81	11	9	2	1	0	8	153
Sengattur	1085	599	486	605	383	222	81	255	213	660
Thirupurakoil	136	78	58	102	64	38	30	65	6	75
Madayambakkam	863	425	438	125	67	58	18	58	46	330
Pakkur	582	345	237	273	192	81	58	152	58	647
Cheyyur	4610	3025	1585	2383	1711	672	209	471	1602	6054
Ammanur	1340	754	586	630	445	185	138	309	181	994
Maruderi	49	42	7	24	24	0	7	6	10	103

3.6.3 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.

3.6.4 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 Cheyyur to Melmaruvathur (SH115) Road as shown in Table 3.38 and in Figure 3.27. 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 3.38 Traffic Survey Locations

Station Code	Road Name	Distance and Direction	Type of Road
TS1	Village road	0.92 km NW	Village road
TS2	Cheyyur to Melmaruvathur (SH115)	1.84 kmSW	Cheyyur to Melmaruvathur (SH115)

Source: On-site monitoring by GTMS FAE & TM

Table 3.39 Existing Traffic Volume

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	60	180	41	41	98	49	270
TS2	115	345	55	55	107	54	454

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 3.40 Rough Stone and Gravel Transportation Requirement

Transportation of Rough Stone & Gravel per day		
Capacity of trucks	No. of Trips per day	Volume in PCU
15 tonnes	94	282

Source: Approved Mining Plan

Table 3.41 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	270	282	552	1200
TS2	454	282	736	1200

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

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

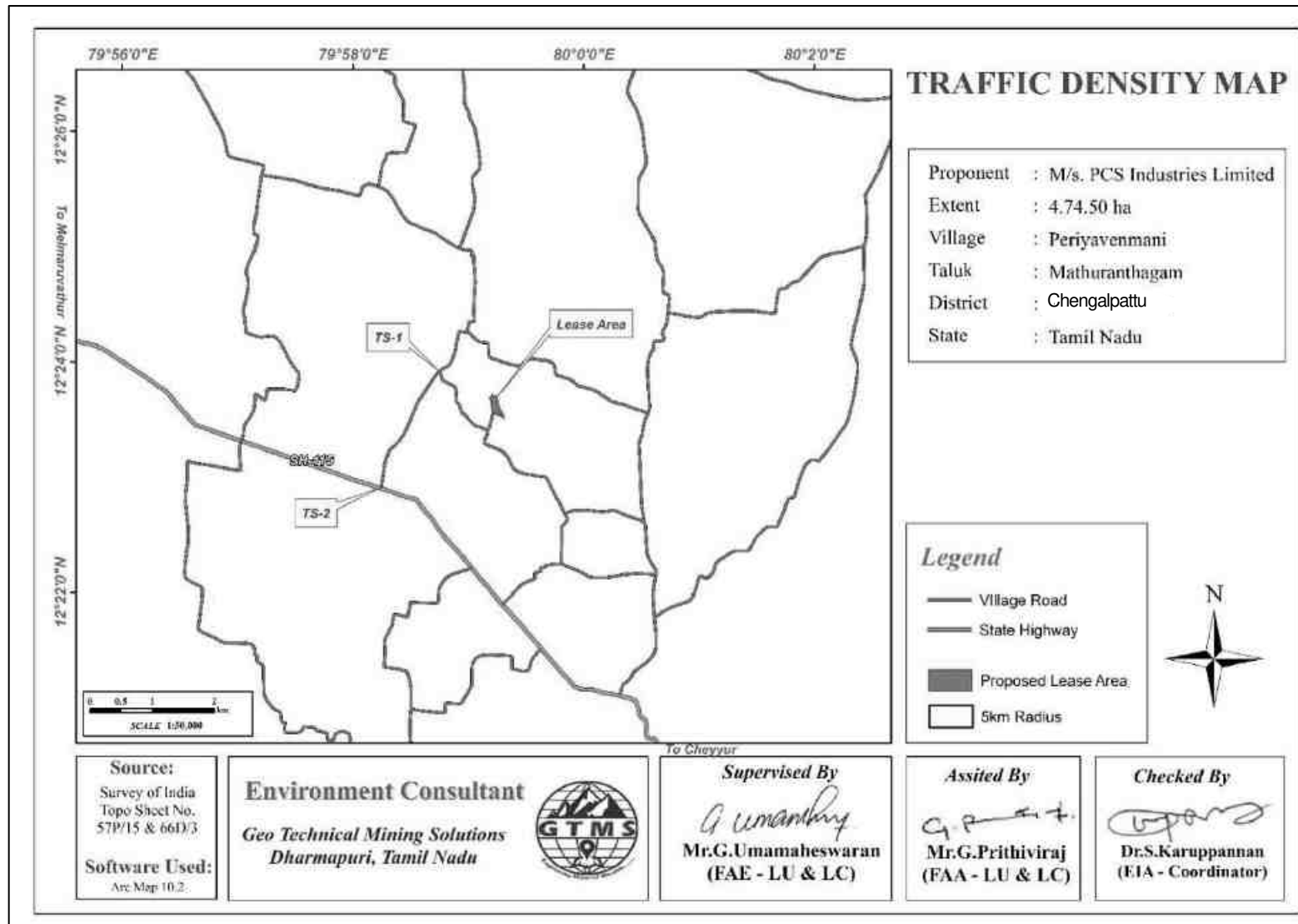


Figure 3.27 Traffic Density Map

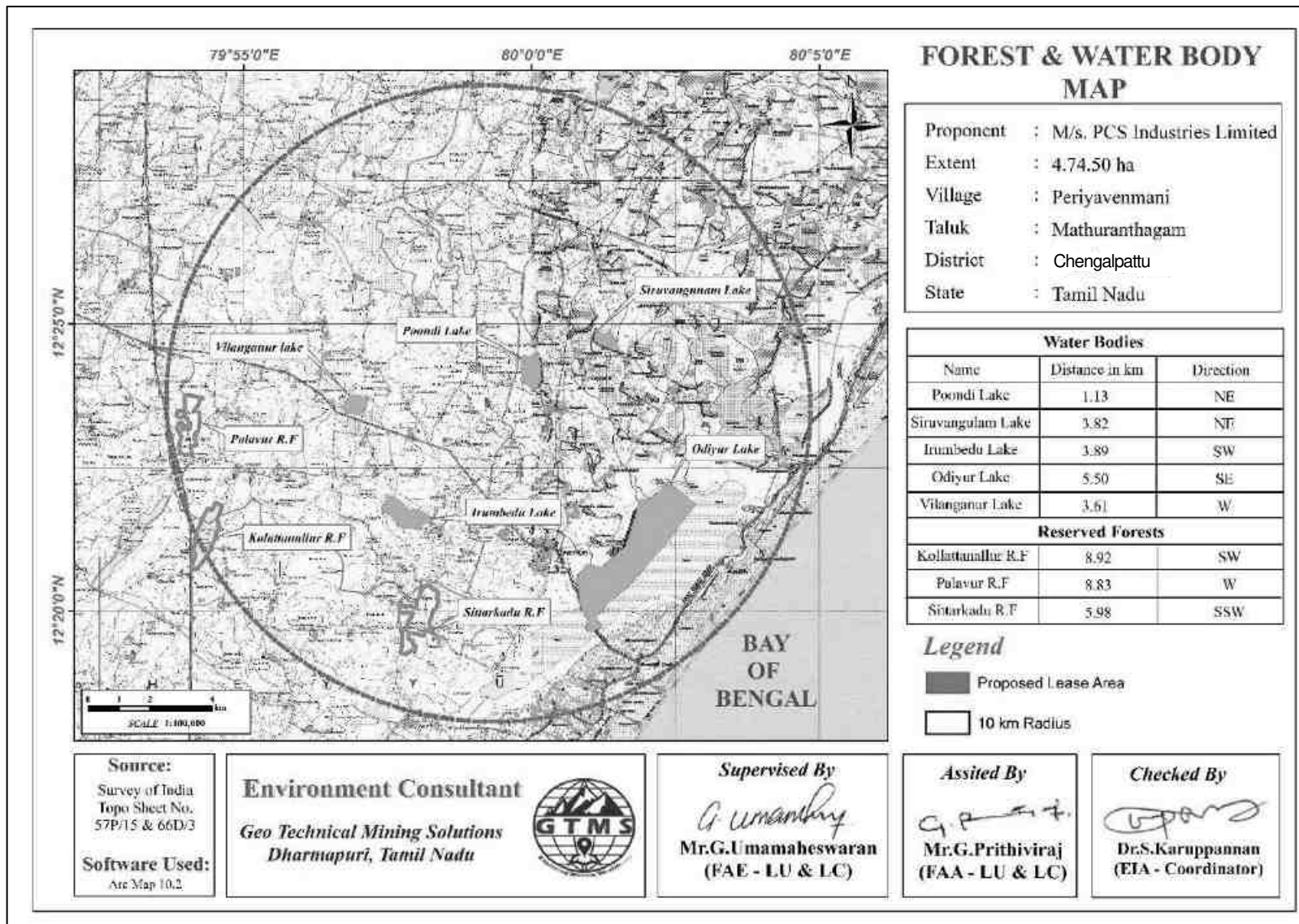


Figure 3.28 Forest & Water Body Location Map

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 3.42.

Table 3.42 Details of Environmentally Sensitive Ecological Features in the Study Area

Sl. 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	Kollattanallur R. F	8.92km SW
		Palavur R. F	8.83km W
		Sittarkadu R. F	5.98 SSW
3	Lakes/Reservoirs/ Dams/Streams/Rivers	Poondi lake	1.13 NE
		Siruvangulam lake	3.82 NE
		Irumbedu lake	3.89 SW
		Odiyur lake	5.50 SE
		Vilanganur lake	3.61 W
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/CRZ Zone	None	Nil within 10 km radius
7	Mountains/Hills	None	Nil within 10 km radius
8	Notified Archaeological Sites	None	Nil within 10 km radius
9	Industries/ Thermal Power Plants	None	Nil within 10 km radius
10	Defence Installation	None	Nil within 10 km radius

Source: Survey of India Toposheet



Figure 3.29 Field 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

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 7.0 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 7.0 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 judiciously 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 Chauhya et al.,2001. The equations used for SPM, SO₂, 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	$E = a0.25\{u/(4.3 + 32.5u)\} [1.5p + \{b/(0.06 + 0.08b)\}]$	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 PM₁₀ keeping in mind that proper control measures are followed. It is important to note that PM₁₀ emission rate is derived from the SPM estimation in the background that PM₁₀ constitutes 52% of SPM emission. The PM_{2.5}, PM₁₀, SO₂ 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}	0.03547135372	47450	7.47552E-07
Overall Mine	PM ₁₀	0.05931557330	47450	1.25006E-06
Overall Mine	SO ₂	0.02265855065	47450	4.77525E-07
Overall Mine	NO _x	0.03030753357	47450	6.38726E-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}, PM₁₀, SO₂ 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 PM₁₀ and PM_{2.5} generated by quarrying operation, transportation, and wind erosion of the exposed areas and emissions of sulphur dioxide (SO₂) and oxides of nitrogen (NO_x) 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 PM₁₀, PM_{2.5}, SO₂ & 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($\mu\text{g}/\text{m}^3$)			Comparison against air quality standard ($60 \mu\text{g}/\text{m}^3$)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	19.3	10	29.3	Below standard	51.81	Not significant
AAQ2	0.93	NNW	18.6	0.5	19.1		2.69	
AAQ3	3.81	NNW	17.0	0	17		0.00	
AAQ4	2.07	SSE	16.0	1	17		6.25	
AAQ5	4.44	SSE	23.7	0	23.7		0.00	
AAQ6	2.54	SW	19.2	1	20.2		5.21	
AAQ7	2.19	NNE	16.7	0.5	17.2		2.99	
AAQ8	4.08	NW	18.2	0.5	18.7		2.75	

Table 4.4 Incremental & Resultant GLC of PM₁₀

Station ID	Distance to core area (km)	Direction	PM ₁₀ concentrations($\mu\text{g}/\text{m}^3$)			Comparison against air quality standard	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	37.2	17.2	54.4	Below standard	46.24	Not significant
AAQ2	0.93	NNW	36.6	1	37.6		2.73	
AAQ3	3.81	NNW	34.8	0.5	35.3		1.44	
AAQ4	2.07	SSE	33.9	5	38.9		14.75	
AAQ5	4.44	SSE	41.4	0	41.4		0.00	
AAQ6	2.54	SW	38.8	5	43.8		12.89	
AAQ7	2.19	NNE	34.6	1	35.6		2.89	
AAQ8	4.08	NW	35.1	0.5	35.6		1.42	

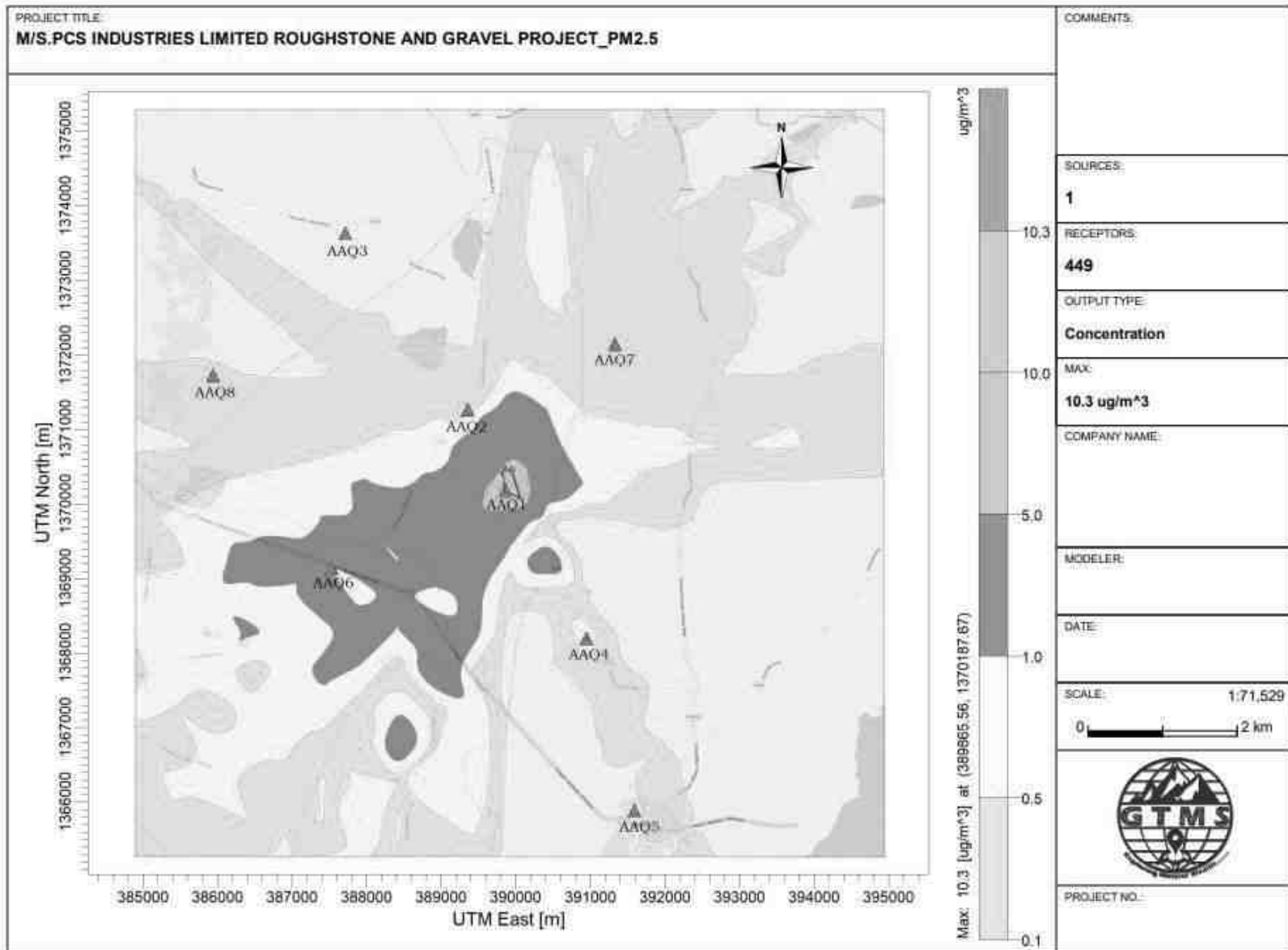


Figure 4.1 Predicted Incremental Concentration of PM_{2.5}

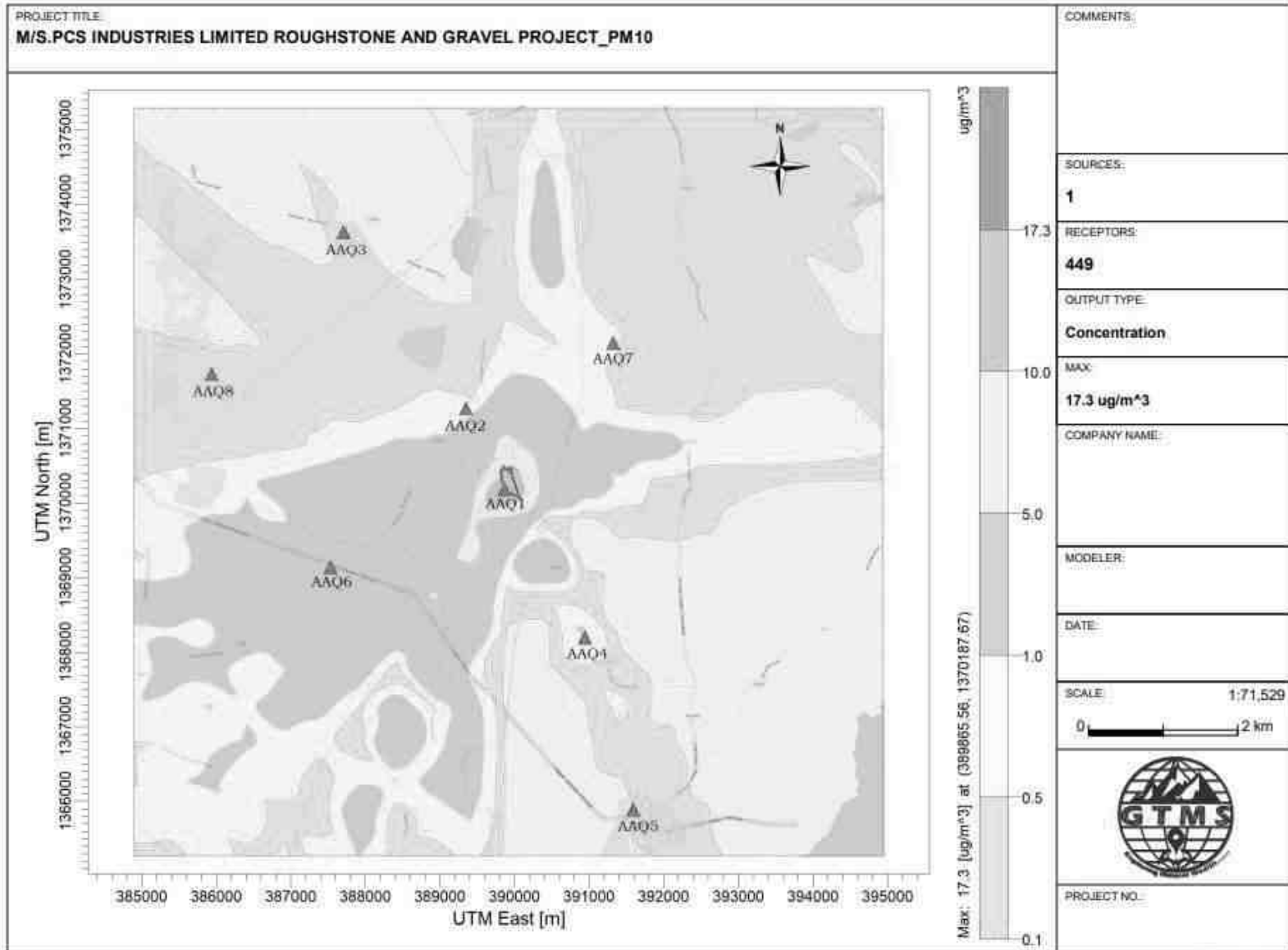


Figure 4.2 Predicted Incremental Concentration of PM₁₀

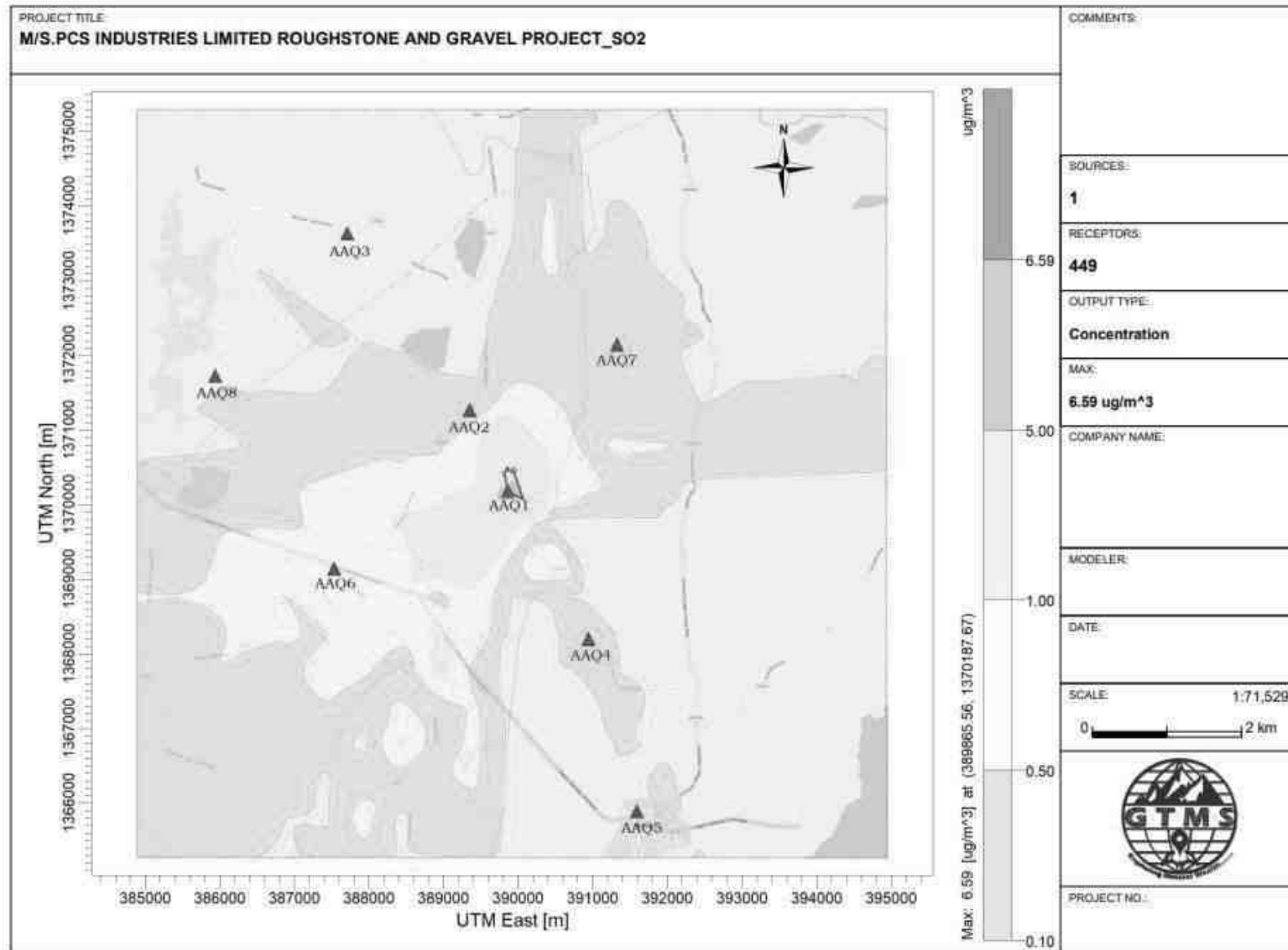


Figure 4.3 Predicted Incremental Concentration of SO₂

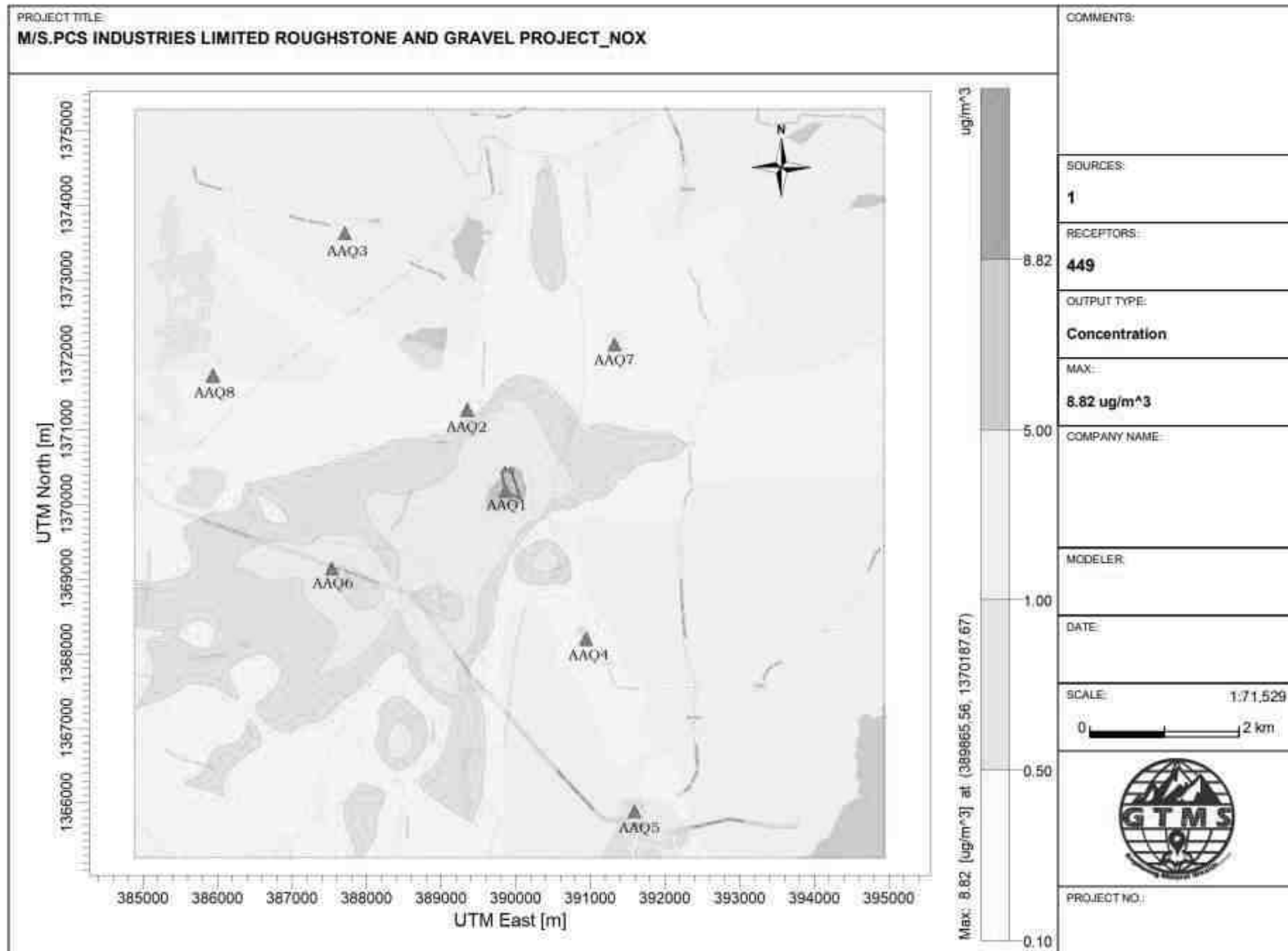


Figure 4.4 Predicted Incremental Concentration of NO_x

Table 4.5 Incremental & Resultant GLC of SO₂

Station ID	Distance to core area (km)	Direction	SO ₂ concentrations(µg/m ³)			Comparison against air quality standard (80 µg/m ³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	10.1	6.6	16.7	Below standard	65.25	Not significant
AAQ2	0.93	NNW	8.9	0.5	9.4		5.62	
AAQ3	3.81	NNW	6.7	0	6.7		0.00	
AAQ4	2.07	SSE	7.0	0.5	7.5		7.14	
AAQ5	4.44	SSE	10.4	0	10.4		0.00	
AAQ6	2.54	SW	9.4	1	10.4		10.64	
AAQ7	2.19	NNE	6.9	0.5	7.4		7.25	
AAQ8	4.08	NW	8.6	0	8.6		0.00	

Table 4.6 Incremental & Resultant GLC of NO_x

Station ID	Distance to core area (km)	Direction	NO _x concentrations(µg/m ³)			Comparison against air quality standard (80 µg/m ³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	19.2	8.8	28	Below standard	45.83	Not significant
AAQ2	0.93	NNW	17.7	0.5	18.2		2.82	
AAQ3	3.81	NNW	13.8	0	13.8		0.00	
AAQ4	2.07	SSE	14.5	1	15.5		6.90	
AAQ5	4.44	SSE	22.8	0	22.8		0.00	
AAQ6	2.54	SW	18.9	1	19.9		5.29	
AAQ7	2.19	NNE	16.2	0.5	16.7		3.09	
AAQ8	4.08	NW	17.2	0.5	17.7		2.91	

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-metalled 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.

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

Where,

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

$A_{e1,2}$ is the excess attenuation due to environmental conditions.

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

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

4.5.1 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)
Core	100	44.4	57.16	57.38
Nagamalai	390	39.6	45.34	46.37
Periyavenmani	970	39.8	37.42	41.78
Kalpattu	3810	39.6	25.54	39.77
Puttur	2050	39.2	30.92	39.80
Cheyyur	4470	48.2	24.15	48.22
Onambakkam	2560	43.8	28.99	43.94
Neemandam	2250	39.6	30.12	40.06
Chittamur	4040	38.4	25.03	38.60
NAAQ Standards	Industrial Day Time - 75 dB (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 24.15 and 45.34 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 through 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	43	390	0.76	19	0.25	142

Table 4.10 Predicted PPV Values due to Blasting at 100-500 m 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	43	100	6.74	19	1.30	156
		200	2.22		0.56	149
		300	1.16		0.35	145
		400	0.73		0.25	142
		500	0.51		0.19	139

The peak particle velocity produced by the charge of 46 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 46 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
- There are 8 trees in the quarry lease area and these trees are affected during quarry snow.
- 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 5543 kg per day, 1496572 kg per year and 7482859 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	369	99537	497685
Fuel consumption of compressor	43.6	11772	58860
Fuel consumption of tipper	1656	447113	2235567
Total fuel consumption in liters	2068	558422	2792111
Co ₂ emission in kg	5543	1496572	7482859

4.6.2 Mitigation Measures on Flora

- ❖ During conceptual stage, the top bench will be re-vegetated by planting local /native species and lower benches will be converted into rainwater harvesting structure following completion of mining activities, which will replace habitat resources for fauna species in this locality over a longer time.
- ❖ As the survival rate due to uprooting was only 30%, 80 seedlings were procured at 10 seedlings per tree. Seedlings are planted and protected in a 7.5-meter safety zone.
- ❖ 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 24 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 4.12), about 2183 trees will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 211 kg of the total carbon, as provided in Table 4.12.

Table 4.12 CO₂ Sequestration

CO ₂ sequestration in kg	211	56883	284415
Remaining CO ₂ not sequestered in kg	5332	1439689	7198443
Trees required for environmental compensation	59987		
Area required for environmental compensation in hectares	120		

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.



Figure 4.5 Green Belt Development Photos

Table 4.13 Recommended Species for Greenbelt Development Plan

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

Table 4.14 Greenbelt Development Plan

	No. of trees proposed for plantation	No. of trees expected to survive @ 80%	Area to be covered(m ²)
Plantation in the construction phase (3 months)	Number of plants inside the mine lease area		
	949	759	8541
	Number of plants outside the mine lease area		
	1424	1139	12812
Total	2373	1898	21353

Table 4.15 Budget for Greenbelt Development Plan

Activity	Plantation in the construction phase(3Months)	Cost	Capital Cost (Rs.)	Recurring Cost-per annum
Plantation inside the mine lease area (in safety margins)	949	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @	189800	28470

		200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring))"		
Plantation outside the area	1424	Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	427050	42705
Total			616850	71175

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.

4.6.3. Anticipated Impact on Fauna

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

4.6.4 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 mitigates 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

Mining activities will not disturb the existing aquatic ecology as there is no effluent discharge proposed from the rough stone and gravel quarry. There is no natural perennial surface water body within the mine lease area. Hence, aquatic biodiversity is not observed in the mine 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	1. Kollattanallur R. F 8.92km SW, 2. Palavur R. F 8.83km W, 3. Sittarkadu R. F 5.98 SSW of Lease area.
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 boundary,

		Site specific loss of associated faunal diversity (Partial impact)	Site supports only common species, which use wide variety of habitats of the buffer zone reserve forest area. So, there is no threat of faunal diversity.		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 as 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 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.

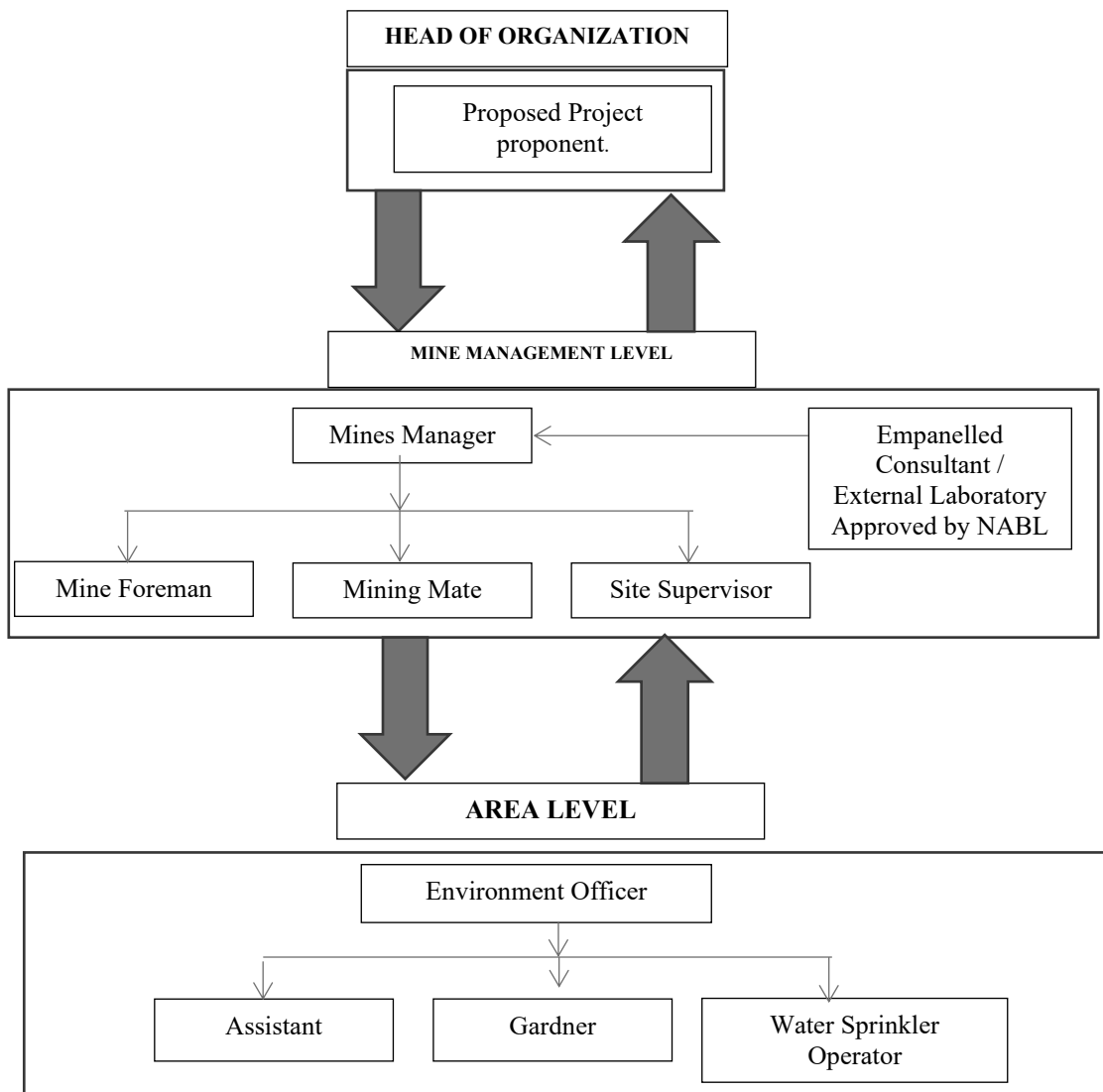


Figure 6.1 Proposed Environmental Monitoring Chart

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	<p>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;</p> <p>Workers will be sent to the Training in the nearby Group Vocational Training Centre Entry of unauthorized persons will be prohibited;</p> <p>Fire-fighting and first-aid provisions in the mine office complex and mining area;</p> <p>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</p> <p>Working of quarry, as per approved plans and regularly updating the mine plans;</p> <p>Cleaning of mine faces on daily basis shall be daily done in order to avoid any overhang or undercut;</p> <p>Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of a Mine Manager;</p> <p>Maintenance and testing of all mining equipment as per manufacturer 's guidelines.</p>
2	Drilling	<p>Improper and unsafe practices</p> <p>Due to high pressure of compressed air, hoses may burst</p>	<p>Safe operating procedure established for drilling (SOP) will be strictly followed.</p> <p>Only trained operators will be deployed.</p> <p>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,</p> <p>Drilling shall not be carried on simultaneously on the benches at places directly one above the other.</p>

		Drill Rod may break	<p>Periodical preventive maintenance and replacement of worn-out accessories in the compressor and drill equipment as per operator manual.</p> <p>All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition.</p> <p>Operator shall regularly use all the personal protective equipment.</p>
3	Blasting	<p>Fly rock, ground vibration, Noise and dust.</p> <p>Improper charging, stemming & Blasting/fining of blast holes</p> <p>Vibration due to movement of vehicles</p>	<p>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.</p> <p>SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation</p> <p>Shots are fired during daytime only.</p> <p>All holes charged on any one day shall be fired on the same day.</p> <p>The danger zone will be distinctly demarcated (by means of red flags)</p>
4	Transportation	<p>Potential hazards and unsafe workings contributing to accident and injuries</p> <p>Overloading of material</p>	<p>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.</p> <p>Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle.</p>

		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
5	Natural Calamities	Unexpected happenings	Escape Routes will be provided to prevent inundation of storm water Fire Extinguishers & Sand Buckets
6	Failure of mine benches and pit slope	Slope geometry, Geological structure	Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m 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.

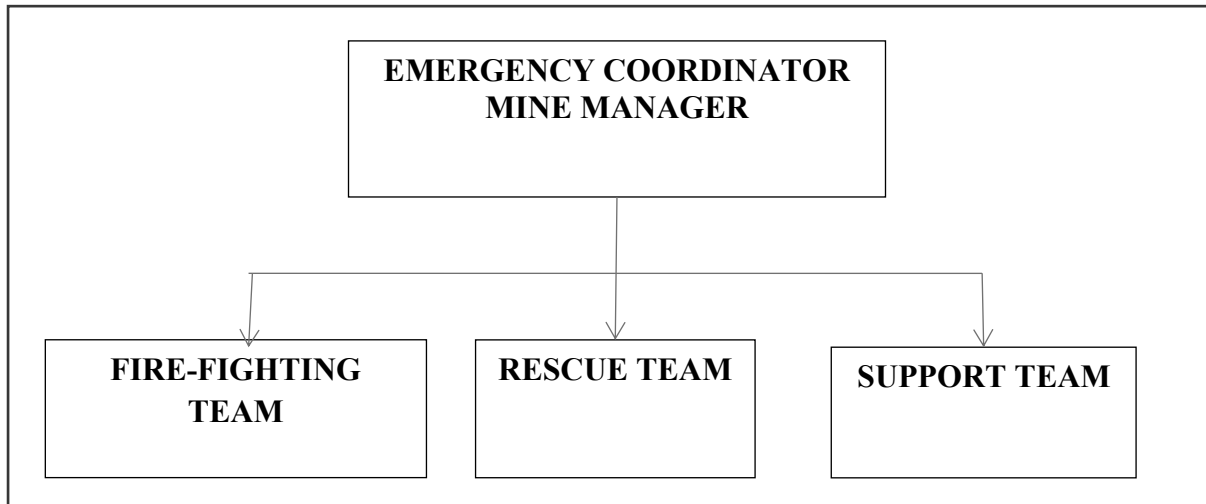


Figure 7.1 Disaster management team layout for proposed project

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, 1 proposed project, known as P1 is taken into consideration. The details of P1 have been given in Table 1.2.

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 7.4 and 7.5

Table 7.4 Cumulative Production Load of Rough Stone

Proposed Production Details				
Quarry	5 Years in m³	Per Year in m³	Per Day in m³	Number of Lorry Load Per Day
P1	609326	121865	451	75
Grand Total	609326	121865	451	75

Table 7.5 Cumulative Production Load of Gravel

Proposed Production Details				
Quarry	2Years in m³	Per Year in m³	Per Day in m³	Number of Lorry Load Per Day
P1	61344	30672	114	19
Grand Total	61344	30672	114	19

The cumulative study shows that the overall production of rough stone from the 1 quarry is 451 m³ per day with a capacity of 75 trips per day, gravel from the 1 quarry is 114 m³ per day with a capacity of 19 trips per day.

7.4.1.1 Cumulative Impact of Air Pollutants

The results on the cumulative impact of the one proposed project on air environment of the cluster have been provided in Table 7.6. The cumulative values resulting from the one project for each pollutant do not exceed the permissible limits set by CPCB.

Table 7.6 Cumulative impact results from the one proposed project

Pollutants	Baseline Data(µg/m³)	Incremental Values(µg/m³)	Cumulative Value (µg/m³)
		P1	
PM _{2.5}	19.3	10	29.3
PM ₁₀	37.2	17.2	54.4
SO ₂	10.1	6.6	16.7
NO _x	19.2	8.8	28.0

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 7.7 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	390	W	39.6	45.34	46.37	55
Cumulative Noise (dB(A))					46.37	

Source: Lab Monitoring Data

The cumulative analysis of noise due to one proposed project shows that habitation near P1 will receive about 46.37 dB (A), as shown in Table 7.7. 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 2 mines have been shown in Table 7.8.

Table 7.8 Ground Vibrations at 2 Mines

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	43	390	0.42
E1	5	290	0.20
Total			0.62

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 one proposed project were calculated and the results are shown in Tables 7.9. The one project will contribute Rs. 5,00,000 towards CER fund.

Table 7.9 Socio Economic Benefits from one Mines

Location ID	Project Cost (Rs.)	CER as per SEAC Suggestion (Rs.)
P1	2,18,70,000	5,00,000
Grand Total	2,18,70,000	5,00,000

Table 7.10 Employment Benefits from one Mines

Location ID	Employment
P1	40
Grand Total	40

A total of 40 people will get employment due to 1 proposed mine in cluster

7.4.5 Ecological Environment

Table 7.11 Greenbelt Development Benefits From one Mines

ID	No of Trees proposed to be planted	Area to be Covered(m²)	Name of the Species	No. of Trees expected to be grown @ 80% survival rate
P1	2373	1898	Neem,	21353
Total	2373	1898	Pongamia, Teak	21353

Cumulative studies show that the two proposed projects will plant about **2373 native tree** species like Neem, Teak, etc both inside and outside the lease area. It is expected that 80 % of trees, i.e., 21353 trees will survive in this green belt development program.

7.4.6 Traffic Density

Table 7.4 shows that proposed project will add 94 truck load per day, accounting for addition of 282 PCUs 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 7.12.

Table 7.12 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 sequelae 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 O₂ < 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 Periyavenmani Village aims to produce **609326 m³** of rough stone and **61344 m³** 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 40 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 20 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 Periyavenmani Village, Maduranthagam Taluk and Chengalpattu 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 Periyavenmani 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 \leq 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 **Rs 4,60,69,502** to the state government through various ways, as provided in Table 8.2.

Table 8.2 Project Benefits to the State Government

Particulars	Budget (Rs.)
CER	500000
Seigniorage @ Rs.59/m ³ of Rough stone	35950234
District Mineral Foundation Tax @ 10% of Seigniorage	3595023
Green Tax @ 10% of Seigniorage	3595023
Seigniorage @ Rs.33/m ³ of Gravel	2024352
District Mineral Foundation Tax @ 10% of Seigniorage	202435
Green Tax @ 10% of Seigniorage	202435
Total	46069502

CHAPTER IX
ENVIRONMENTAL COST BENEFIT ANALYSIS

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

CHAPTER X

ENVIRONMENTAL MANAGEMENT PLAN

10.0 GENERAL

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

10.1 ENVIRONMENTAL POLICY

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

The Proponent, **M/s. PCS Industries Limited**, 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 35 m. The water table in the area is at 50-55 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 assess 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 assess the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by 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(m²)
Plantation in the construction phase (3 months)	Number of plants inside the mine lease area		
	949	759	8541
	Number of plants outside the mine lease area		
	1424	1139	12812
Total	2373	1898	21353

Source: Proposed by FAEs & EIA Coordinator

About 2373 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	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th 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	<ul style="list-style-type: none"> ✓ 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,	Employees assigned to new work tasks	Before new Assignments	Variable	<ul style="list-style-type: none"> ✓ Task-specific health & safety procedures and SOP for various mining activity

Dewatering, Haul Road maintenance.				<ul style="list-style-type: none"> ✓ Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	<ul style="list-style-type: none"> ✓ 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	<ul style="list-style-type: none"> ✓ 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	Recurring Cost/annum
			(Rs.)	(Rs.)
Air Environment	Compaction, gradation and drainage on both sides	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare and yearly maintenance @ Rs. 10,000/- per hectare (Proposed Project Area = 2.91.5 ha)	47450	47450
	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	200000	20000
	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	30000	0
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes	0	7500
	Regular sweeping and maintenance of roads for at least about 200 m from quarry entrance	Provision for 2 labours @ Rs.10,000/labour (Contractual) / hectare	0	94900
	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	1706113
Water Environment	Water Management	Provision for garland drain @ Rs. 10,000/- per hectare with maintenance of Rs. 5,000/- per annum (2.91.5 ha X 10000)	47450	23725
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
Occupational Health	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)	160000	40000

and Safety	Health checkup for workers will be provisioned	IME & PME Health checkup @ Rs. 1000/- per employee	0	40000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	18980
	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 (2.91.5 hectare)	949000	47450
	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	237250	47450
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1 st Class / 2 nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000

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))"	189800	28470
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	427050	42705
Mine Closure	Closure includes 10% of the ammount allotted for Greenbelt development, wire fencing, and garland drainage (Rule 27 in MCDR 2017 for Cat B mines will pay 2 lakhs per hectare or minimum amount of financial assurance of 5 lakhs)		0	161330
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.59 and for Gravel= Rs.33)	3797459	0
TOTAL			7065459	3116743 (Excl. Mine Closure)

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

I st Year	II nd Year	III rd Year	IV th Year	V th Year (including Mine Closure Cost)	Total
10182201	3272580	3436209	3608019	3949750	24448760

In order to implement the environmental protection measures, an amount of Rs. **7065459** as capital cost and recurring cost as Rs. **3116743** 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. **24448760**, 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 Lr No. SEIAA-TN/F.No.9814/ToR-1461/2023.Dated 23.05.2023 by considering 1 proposed quarry, 3 existing quarry, and 1 expired quarry in a cluster with the total extent of 8.98.0 hectares in Periyavenmani Village, Maduranthagam Taluk,Chengalpattu District and Tamil Nadu State. 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 a manual open cast 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°23'30.04"N to 12°23'43.89"N and from longitudes from 79°59'10.57"E to 79°59'19.31"E in Periyavenmani Village, Maduranthagam Taluk, Chengalpattu District. The project site is a Patta land with the extent of 4.74.50 ha leased for the project proponent, M/s. PCS Industries Pvt Limited. The proponent had applied for quarry lease on 10.02.2023 to extract rough stone and gravel obtained the precise area communication letter issued by Department of Geology and Mining, Chengalpattu vide Rc.No.588/Q2/2017, dated:05.11.2019. 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, Chengalpattu Rc.No.588/Q2/2018, dated:27.01.2023.

According to the approved mining plan, about 609326 m³ of rough stone and 61344 m³ gravel will be mined up to the depth of 35 m BGL in five years. To achieve the estimated production, 8 Jack Hammers, 2compressor, 1 excavator with bucket/rock breaker, and 6 tippers will be deployed. To operate the machineries and to break the rough stone to preferred dimension, about 40 persons will be employed. At the end of the quarry life, the dimension of the ultimate pit will be 192 m*93 m*35 m and about 0.61.54 ha of land is unutilized. Whereas, at the end of the mine life, about 2.69.43 ha of land will have been quarried; about 1.40.53 ha of land will be used for green belt development and the rest will be used for road and infrastructures.

The final mine closure plan shows that about Rs. **16,13,300** capital cost with the annual recurring cost of Rs. **1,42,350** will be spent towards mine closure.

11.2 DESCRIPTION OF THE ENVIRONMENT

The baseline monitoring studies were carried out during March-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, 6 LULC were mapped. The area extent of each LULC is provided in Table 3.2. Of the total area, mining area covers only 41.46ha accounting for 0.54%, of which lease area of 4.74.50 ha contributes only about 0.061%. 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 Sandy Loam textures varying between sandy loam, silty loam and silty clay. pH of the soil varies from 6.92 to 7.42 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 153 to 283 $\mu\text{s}/\text{cm}$. Bulk density ranges between 0.88 and 1.23 g/cm^3 .

Chemical Characteristics

Potassium ranges between 113.2 and 234.51 %. Calcium ranges between 132 and 245 mg/kg. Organic matter content ranges between 1.07 and 1.34 %.

11.2.3 Water Environment

Surface Water

Poondi River, Puthur Lake and Siruvangunam Lake are the three prominent surface water resources present in the study area. These are ephemeral in nature, which convey water only after rainfall events. Three surface water samples, known as SW01, SW02 and SW03 were collected from the three surface water bodies to assess the baseline water quality. Table 3.8 summarizes surface water quality data of the three samples. Results for surface water samples in the Table 3.6 indicate that the physical and chemical parameters, and heavy metals are within permissible limits. Of the two biological parameters, Coliform bacteria are present 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. two groundwater samples, known as BW01 & BW02 and three open well water samples, known as OW02, OW02 & OW03 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 3.7 and the spatial occurrence of water sampling locations is shown in Figure 3.5. Table 3.7 summarizes ground water quality data of the seven samples. 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

Site specific meteorology during the study period was recorded by an automated weather station. According to the onsite data, the temperature in March,2023 varied from 22.59 to 33.80⁰C with the average of 27.88⁰C; in April, 2023 from 25.09 to 36.56⁰C with the average of 29.83C; and in May,2023 from 25.64 to 37.22⁰C with the average of 29.90⁰C. In March,2023, relative humidity ranged from 38.69 to 94.06 % with the average of 71.41%; in April, 2023, from 33.56 to 93.00 % with the average of 69.87 %; and in May,2023, from 39.12 to 93.19 % with the average of 72.79 %. The wind speed in March,2023 varied from 1.32 to 7.20 m/s with the average of 4.17 m/s; in April, 2023 from 0.02 to 6.75 m/s with the average of 3.74 m/s; and in May,2023 from 0.042 to 9.06 m/s with the average of 4.08 m/s. In March,2023, wind direction varied from 32.98 to 227.68⁰ with the average of 113.10⁰; in April, 2023, from 0.62 to 264.79⁰ with the average of 143.78⁰; and in May,2023, from 2.09 to 358.03⁰ with the average of 210.54⁰. In March,2023, surface pressure varied from 100.18 to 101.56 kPa with the average of 100.76 kPa; in April, 2023, from 99.84 to 101.19 kPa with the average of 100.52 kPa; and in May,2023, from 99.38 to 100.71 kPa with the average of 100.10 kPa

Ambient Air Quality Results

As per the monitoring data, PM_{2.5} ranges from 15.9 µg/m³ to 20.9µg/m³; PM₁₀ from 33.5µg/m³ to 39.2 µg/m³; SO₂ from 6.7 µg/m³ to 11.7 µg/m³; NO_x from 14.2 µg/m³ to 20.5µg/m³. 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 9 locations around the proposed project area. The Table 3.20 shows that noise level in core zone was 44.4 dB (A) Leq during day time and 39.6 dB (A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 38.4 to 48.2dB (A) Leq and during night time from 33.2 to 40.4dB (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	
<ul style="list-style-type: none"> ❖ Destruction of natural landscapes ❖ Changes in soil characteristics ❖ Soil erosion and slope instability 	<ul style="list-style-type: none"> ❖ Mining will be carried out as per approved mine plan in scientific and systematic way ❖ 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	
<ul style="list-style-type: none"> ❖ 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; 	<ul style="list-style-type: none"> ❖ 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

<ul style="list-style-type: none"> ❖ Contamination of aquifers due to removal of the natural filter medium. 	<p>drains to a settling tank, which has an oil & grease trap, only clear water will be reused for greenbelt development.</p>
<p>Air Environment</p>	
<ul style="list-style-type: none"> ❖ Generation of Fugitive Dust ❖ Dust will be generated mainly during excavation, loading & unloading activities. ❖ Gaseous pollutants will be 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. 	<ul style="list-style-type: none"> ❖ 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

	<p>emissions that could arise from the surface during detonation.</p> <ul style="list-style-type: none"> ❖ 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 10⁰ 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	
<ul style="list-style-type: none"> ❖ Annoyance and deterioration of the quality of life; ❖ Propelling of rocks fragments by blasting. ❖ Shaking of buildings and people due to blasting; 	<ul style="list-style-type: none"> ❖ 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;

	<ul style="list-style-type: none"> ❖ Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise; ❖ Provision of sound insulated chambers for the workers working on machines (HEMM) producing higher levels of noise; ❖ Silencers / mufflers will be installed in all machineries; ❖ Green Belt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise; ❖ Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured through training and awareness.
Biological Environment	
<ul style="list-style-type: none"> ❖ 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. 	<ul style="list-style-type: none"> ❖ 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	
<ul style="list-style-type: none"> ❖ Health and safety of workers and the general public; ❖ Increase in traffic volumes and sizes of road vehicles; ❖ Economic issues, including the increase in employment opportunities; 	<ul style="list-style-type: none"> ❖ 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. ❖ New patterns of indirect employment/ income will generate. ❖ Regular health check-up camp.

	<ul style="list-style-type: none"> ❖ Assistance to schools and scholarship to children will be provided.
Occupational Health & Safety	
<ul style="list-style-type: none"> ❖ Exposure to Dust ❖ Noise and Vibration Exposure ❖ Physical Hazards ❖ Respiratory hazards due to Dust exposure 	<ul style="list-style-type: none"> ❖ 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 three 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 one proposed project will allocate Rs. 500000/- towards CER as recommended by SEAC.
- The one proposed project will directly provide jobs to 40 local people, in addition to indirect jobs.
- The one proposed project will plant 2373 about trees in and around the lease area.
- The one proposed project will add 282 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 40 local people and indirect employment 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 Periyavenmani 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.7065459** as capital cost and recurring cost as Rs. **3116743** 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.24448760**.

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.

CHAPTER XII

DISCLOSURES OF CONSULTANT

The Project Proponent, **M/s. PCS Industries Limited** has engaged **Geo Technical Mining Solutions**, a NABET accredited consultancy for carrying out the EIA study as per the ToR Issued.

Address of the consultancy:

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

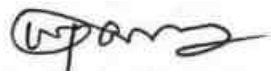
The accredited experts and associated members who were engaged in this EIA study are given below:

S.No.	Name of the expert	In house/ Empanelled	Sector	Functional Area	Category
Approved Functional Area Experts & EC					
1.	Dr. S. Karuppannan	EIA Coordinator (EC) In-house	1(a)(i)	Mining	B
2.	Dr. M. Vijayprabhu	In-house FAE	1(a)(i)	HG, LU, GEO	B
3.	Dr. J. Rajarajeswari	In-house, FAE	1(a)(i)	EB, SC	B
4.	Dr. G. Prabakaran	In-house, FAE	1(a)(i)	SE	B
5.	Dr. R. Arunbalaji	In-house, FAE	1(a)(i)	AP, AQ, NV	B
6.	J.N. Manikandan	Empanelled FAE	1(a)(i)	RH, SHW, AP	B
7.	Dr. S. Malar	In-house, FAE	1(a)(i)	WP	B
8.	G. Umamaheswaran	In-house, FAE	1(a)(i)	HG, LU, GEO	B
9.	S. Gopalakrishnan	In-house, FAE	1(a)(i)	HG, GEO	B
10.	P. Venkatesh	In-house, FAE	1(a)(i)	AP	B
11.	Dr.D.Kalaimurugan	In-house, FAE	1(a)(i)	SC	B
Approved Functional Area Associates					
12.	G. Prithiviraj	FAA	1(a)(i)	LU, HG	B
13.	C. Kumaresan	FAA	1(a)(i)	NV	B
14.	P. Vellaiyan	FAA	1(a)(i)	HG, GEO	B
15.	S.Vasugi	FAA	1(a)(i)	AQ	B
16.	P.Dhatchayini	FAA	1(a)(i)	AQ	B
17.	V.Malavika	FAA	1(a)(i)	NV, SHW	B

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

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA & EMP

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

Signature : 

Date :

Name : **Dr. S. Karuppannan**



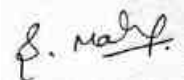
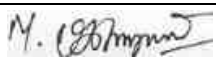

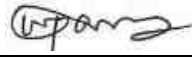


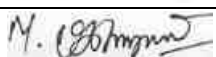
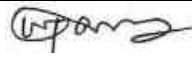


Designation : EIA Coordinator


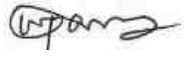







Name of the EIA Consultant Organization : Geo Technical Mining Solutions

Period of Involvement : Till date



We, the FAEs and FAAs hereby declare that information furnished in this EIA/EMP report for **M/s. PCS Industries Limited** rough stone and gravel quarry project with the extent of 4.74.5 ha situated in the cluster with the extent of **8.98.0** ha in Periyavenmani Village of Maduranthagam Taluk, Chengalpattu District of Tamil Nadu is true and correct to the best of our knowledge.





List of Functional Area Experts Engaged in this Project

S. No.	Functional Area	Involvement	Name of the Experts	Signature
1	AP	<ul style="list-style-type: none"> ○ Identification of different sources of air pollution due to the proposed mine activity ○ Prediction of air pollution and propose mitigation measures / control measures 	J. N. Manikandan	
			P.Venkatesh	
2	WP	<ul style="list-style-type: none"> ○ Suggesting water treatment systems, drainage facilities ○ Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures. 	Dr.S. Malar	
3	HG	<ul style="list-style-type: none"> ○ Interpretation of ground water table and predict impact and propose mitigation measures. ○ Analysis and description of aquifer Characteristics 	Dr.M. Vijay Prabhu	
			G. Uma Maheswaran	
			Dr.S. Karuppannan	
4	GEO	<ul style="list-style-type: none"> ○ Field Survey for assessing the regional and local geology of the area. ○ Preparation of mineral and geological maps. ○ Geology and Geo morphological analysis/description and Stratigraphy/Lithology. 	G.Gopala Krishnan	
			G.Uma Maheswaran	
			Dr.M. Vijay Prabhu	
			Dr.S. Karuppannan	
5	SE	<ul style="list-style-type: none"> ○ Revision in secondary data as per Census of India, 2011. ○ Impact Assessment & Preventive Management Plan ○ Corporate Environment Responsibility. 	Dr. G. Prabhakaran	
6	EB	<ul style="list-style-type: none"> ○ 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. 	Dr.J. Rajarajeshwari	

7	RH	<ul style="list-style-type: none"> ○ Identification of hazards and hazardous substances ○ Risks and consequences analysis ○ Vulnerability assessment ○ Preparation of Emergency Preparedness Plan ○ Management plan for safety. 	J.N. Manikandan	
8	LU	<ul style="list-style-type: none"> ○ Construction of Land use Map ○ Impact of project on surrounding land use ○ Suggesting post closure sustainable land use and mitigative measures. 	Dr.S. Karuppannan	
			G.Uma Maheswaran	
			Dr.M. Vijay Prabhu	
9	NV	<ul style="list-style-type: none"> ○ Identify impacts due to noise and vibrations ○ Suggesting appropriate mitigation measures for EMP. 	Dr.R. Arun Balaji	
10	AQ	<ul style="list-style-type: none"> ○ Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. ○ Recommending mitigations measures for EMP 	Dr.R. Arun Balaji	
11	SC	<ul style="list-style-type: none"> ○ Assessing the impact on soil environment and proposed mitigation measures for soil conservation 	Dr.J. Rajarajeshwari	
			Dr. D.Kalaimurugan	
12	SHW	<ul style="list-style-type: none"> ○ Identify source of generation of non-hazardous solid waste and hazardous waste. ○ Suggesting measures for minimization of generation of waste and how it can be reused or recycled. 	J.N. Manikandan	

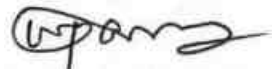
List of Functional Area Associate Engaged in this Project

S.No.	Name	Functional Area	Involvement	Signature
1	G. Prithiviraj	LU, HG	<ul style="list-style-type: none"> ○ Site visit with FAE ○ Provide inputs & Assisting FAE for LU and HG 	
2	C. Kumaresan	NV	<ul style="list-style-type: none"> ○ Assistance to FAE in both primary and secondary data collection ○ Assistance in noise prediction modelling 	

3	P. Vellaiyan	HG & GEO	<ul style="list-style-type: none"> ○ Field visits along with FAE ○ Assistance to FAE in both primary and secondary data collection 	
4	S. Vasugi	AQ	<ul style="list-style-type: none"> ○ Field visits along with FAE ○ Assistance to FAE in both primary and secondary data collection 	
5	P. Dhatchayini	AQ	<ul style="list-style-type: none"> ○ Site visit with FAE ○ Assistance to FAE in collection of both primary and secondary data 	
6	V. Malavika	NV, SHW	<ul style="list-style-type: none"> ○ Site visit along with FAE ○ Assistance in report preparation 	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, **Dr. S. KARUPPANNAN**, Managing Partner, **Geo Technical Mining Solutions**, hereby, confirm that the above-mentioned functional area experts and team members prepared the EIA/EMP report for **M/s. PCS Industries Limited** rough stone and gravel quarry project with the extent of 4.74.50 ha located within the cluster of **8.98.0** ha in Periyavenmani Village of Maduranthagam Taluk, Chengalpattu District of Tamil Nadu is true and correct to the best of my knowledge.

Signature : 

Date :

Name : **Dr. S. Karuppannan**

Designation : Managing Partner

Name of the EIA Consultant Organization : Geo Technical Mining Solutions

NABET Certificate No & Issue Date : NABET/EIA/2124/SA 0184

Validity : Till 31.12.2023



THIRU.DEEPAK S. BILGI, I.F.S.
MEMBER SECRETARY

STATE LEVEL ENVIRONMENT IMPACT
ASSESSMENT AUTHORITY-TAMILNADU

3rd Floor, Panagal Maaligai,

No.1, Jeenis Road, Saidapet,

Chennai - 600 015.

Phone No. 044-24359973

Fax No. 044-24359975

TERMS OF REFERENCE (ToR)

Lr No.SEIAA-TN/F.No.9814/ToR-1461/2023 Dated:23.05.2023.

To

M/S. PCS Industries Private Limited

C-10, Fifth Street,

Industrial Estate, Ambattur,

Chennai – 600 058.

Sir / Madam,

Sub: SEIAA, Tamil Nadu – Terms of Reference with public Hearing (ToR) for the Proposed Rough Stone and gravel quarry lease over an extent 4.74.5 Ha at S.F.No. 223/1, 223/2, 224, 225/1 & 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kanchipuram District, Tamil Nadu by M/s.PCS Industries Limited - under project category – “B1” and Schedule S.No.1(a) “Mining of Minerals Projects” – ToR issued along with Public Hearing- preparation of EIA report – Regarding.

Ref: 1. Online proposal No. SIA/TN/MIN/417301/2023 dated 08.02.2023.
2. Your application submitted for Terms of Reference dated: 10.02.2023.
3. Minutes of the 374th SEAC meeting held on 03.05.2023.
6. Minutes of the 621st SEIAA meeting held on 23.05.2023.


MEMBER SECRETARY
SEIAA-TN



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

The proponent, M/s.PCS Industries Limited has submitted application for Terms of Reference (ToR) on 10.02.2023, in Form-1, Pre- Feasibility report for the Proposed Rough Stone and gravel quarry lease over an extent 4.74.5 Ha at S.F.No. 223/1, 223/2, 224, 225/1 & 225/2 Periyavenmani Village, Maduranthagam Taluk, Kanchipuram District, Tamil Nadu.

Discussion by SEAC and the Remarks:-

The proposal was placed in this 370th meeting of SEAC held on 08.02.2023. The details of the project are available in the website (parivesh.nic.in).

The SEAC noted the following:

1. The project proponent, **M/s.PCS Industries Limited** has applied for Terms of Reference for the Proposed Rough Stone and gravel quarry lease over an extent 4.74.5 Ha at S.F.No. 223/1, 223/2, 224, 225/1 & 225/2 Periyavenmani Village, Maduranthagam Taluk, Kanchipuram District, Tamilnadu.
2. The project/activity is covered under Category "B1" of Item 1(a) "Mining of Minerals Projects" of the Schedule to the EIA Notification, 2006.
3. As per the mining plan, the lease period is for 5 years and the mining plan is for 5 years. The production for 5 years not to exceed **6,44,436m³ of rough stone & 61,344m³ of gravel.**

Based on the presentation made by the proponent, **SEAC decided to recommend the proposal for Terms of Reference (TOR) with Public Hearing subject to the following additional TORs**, in addition to the standard terms of reference for EIA study for non-coal mining projects and details issued by the MOEF & CC to be included in EIA/EMP Report:

1. The proponent shall carry out a detailed study on the impact of mining on the tank/ water body situated adjacent to the proposed area including the impact on the bund due to blasting, impact on runoff to the water body, etc., from a reputed Institutions like IIT, NIT, Anna University, etc.
2. 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.
3. The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with

details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.

4. The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.
5. The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.
6. **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 prepare and submit a conceptual 'Action Plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director of Geology and Mining during the time of appraisal for obtaining the EC.**
7. 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.
8. 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.
9. 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.
10. If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,
 - a. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?
 - b. Quantity of minerals mined out.
 - c. Highest production achieved in any one year
 - d. Detail of approved depth of mining.


MEMBER SECRETARY
SEIAA-TN

- e. Actual depth of the mining achieved earlier.
 - f. Name of the person already mined in that leases area.
 - g. If EC and CTO already obtained, the copy of the same shall be submitted.
 - h. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.
11. 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).
 12. The PP shall carry out Drone video survey covering the cluster, Green belt, fencing etc.,
 13. The PP shall furnish the revised manpower including the statutory & competent persons as required under the provisions of the MMR 1961 for the proposed quarry based on the volume of rock handled & area of excavation.
 14. 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.
 15. 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.
 16. The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD/TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.
 17. 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.

18. 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.
19. Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.
20. 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.
21. 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.
22. 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.
23. 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.
24. Impact on local transport infrastructure due to the Project should be indicated.
25. 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.
26. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.
27. Public Hearing points raised and commitments 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 and to be submitted


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- to SEIAA/SEAC with regard to the Office Memorandum of MoEF& CC accordingly.
28. The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.
 29. The PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing in Tamil Language also.
 30. 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.
 31. The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the **appendix-I** in consultation with the DFO, State Agriculture University and local school/college authorities. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.
 32. 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
 33. 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.
 34. A Risk Assessment and Management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.
 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. 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.
38. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
39. 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.
40. 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.
41. The PP shall prepare the EMP for the entire life/lease of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.
42. 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.



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Appendix -I
List of Native Trees Suggested for Planting

No	Scientific Name	Tamil Name	Tamil Name
1	<i>Aegle marmelos</i>	Vilvam	விலவம்
2	<i>Adenanthera pavonina</i>	Mayyadi	மதுசூடு ஆனைக்குன்றிமணி
3	<i>Albizia lebbek</i>	Vaagai	வாகை
4	<i>Albizia amara</i>	Usil	உசில்
5	<i>Bauhinia purpurea</i>	Mantharai	மந்தாரை
6	<i>Bauhinia racemosa</i>	Aathu	ஆத்தி
7	<i>Bauhinia tomentosa</i>	Iruvadu	இருவாத்தி
8	<i>Euchanama axillaris</i>	Kattuma	கட்டிமரம்
9	<i>Borassus flabellifer</i>	Parau	பனை
10	<i>Eutea monosperma</i>	Murukkamaram	முருக்கமரம்
11	<i>Borax ceiba</i>	Ilayu, Serrilavu	இலவம்
12	<i>Calophyllum inophyllum</i>	Purmai	பழை
13	<i>Cassia fistula</i>	Sarakondrai	சரகண்டிரை
14	<i>Cassia torbushiana</i>	Sengondrai	செங்கண்டிரை
15	<i>Chloroxylon swietenia</i>	Puramaram	புரம் மரம்
16	<i>Cochlospermum religiosum</i>	Kongu, Maryallavu	கோங்கு, மதுசூடு இலவம்
17	<i>Cordia dichotoma</i>	Naruvai	நருவா
18	<i>Cretata adansonii</i>	Mavalingum	மாலைலங்கம்
19	<i>Dillenia indica</i>	Uva, Uzha	உவா
20	<i>Dillenia pentagyna</i>	SuruUva, Sitruzha	சீறு உவா
21	<i>Diospyros ebenum</i>	Karungali	கருங்காலை
22	<i>Diospyros schloroxylon</i>	Vaganai	வாகனை
23	<i>Ficus amphissima</i>	Kallitchi	கல் இச்சி
24	<i>Hibiscus tiliaceus</i>	Aatrupoovarasu	ஆற்றிப்பலரசு
25	<i>Hardwickia binata</i>	Aacha	ஆச்சா
26	<i>Holoptelia integrifolia</i>	Aavili	ஆவா மரம், ஆயில்
27	<i>Lannea coromandelica</i>	Odham	ஓதம்
28	<i>Laecostoechia speciosa</i>	Poo Marudhu	பூ முருகு
29	<i>Lopisanthus tetraphylla</i>	Neukottamaram	நேயு கோட்டை மரம்
30	<i>Limonia acidissima</i>	Vila naram	வில்லா மரம்
31	<i>Litsea glutinos</i>	Pimpattai	கரையா பிச்சிப்படை
32	<i>Madhuca longifolia</i>	Iluppai	இலுப்பை
33	<i>Manilkara hexandra</i>	UlakkaPaalai	உலக்கை மரம்
34	<i>Mimusops elengi</i>	Magizhamaram	மகிழ்மரம்
35	<i>Mitragyna parvifolia</i>	Kadambu	கடம்பு
36	<i>Morinda pubescens</i>	Nuna	நுனா
37	<i>Morinda citrifolia</i>	Vellai Nuna	வெள்ளை நுனா
38	<i>Phoenix sylvestre</i>	Eachu	ஈச்சமரம்
39	<i>Pongamia pinnat</i>	Pungam	பங்கம்

40	<i>Premna mollissima</i>	Muvuru	முள்ளை
41	<i>Premna serratifolia</i>	Narayanururai	3டி முள்ளை
42	<i>Premna tomentosa</i>	Malapoovalasu	மலை யுயிசு
43	<i>Prosopis cinerola</i>	Varru maram	வள்ளி மரம்
44	<i>Pterocarpus maritimum</i>	Vengai	வேங்கை
45	<i>Pterospermum sanctocens</i>	Vennangu Tada	வேணாங்கை
46	<i>Pterospermum xolocaryum</i>	Polavu	புலவு
47	<i>Putranjiva roxburghii</i>	Karipala	கரிபலா
48	<i>Salvadora persica</i>	Ugaa Maram	ஊதா மரம்
49	<i>Sapindus emarginatus</i>	Marupungan, Soapukai	மண்புரங்கள் செயுக்கைய
50	<i>Saraca asoca</i>	Asoca	அசோகா
51	<i>Strobilus asper</i>	Pirav maram	பிராவி மரம்
52	<i>Stychnos nuxdomic</i>	Yethi	யேதி
53	<i>Stychnos potatorum</i>	Therthang Kottu	தேத்தாங் கெட்டை
54	<i>Suzanyum cumini</i>	Naval	நாவல்
55	<i>Terminalia bellierie</i>	Thandri	தாந்தரி
56	<i>Terminalia arjuna</i>	Ven marudhu	வேணி மருது
57	<i>Toona ciliata</i>	Sandhana vembu	சந்தான வேம்பு
58	<i>Thespesia populinea</i>	Puvarasu	புவாசா
59	<i>Walsuratrifoliata</i>	valoura	வாலூரா
60	<i>Wrightia tinctoria</i>	Veppalai	வேப்பலா
61	<i>Pithecellobium dulce</i>	Kodukkapuli	கெட்டுக்காய்

Discussion by SEIAA and the Remarks:-

The subject was placed in the 621st authority meeting held on 23.05.2023. The authority noted that the subject was appraised in the 374th SEAC meeting held on 03.05.2023. 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 in addition to the following conditions and the conditions mentioned in 'Annexure B' of this minutes.

- i) Considering the safety aspects & the water regime of the locality, this Terms of reference is accorded for the **restricted depth of 35m below ground level.**

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.

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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

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.
- 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

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 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


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- management, mining technology etc. and should be in the name of the lessee.
- 4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
 - 5) Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
 - 6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.
 - 7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.
 - 8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.
 - 9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
 - 10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.

- 11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
- 12) Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
- 13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.
- 14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
- 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
- 16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.
- 17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.
- 18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest


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and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.

- 19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.
- 20) Similarly, for Coastal Projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease with respect to CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).
- 21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.
- 22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM₁₀, particularly for free silica, should be given.
- 23) Air quality modeling should be carried out for prediction of impact of the project on the air

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

- 24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
- 25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
- 26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
- 27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.
- 28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
- 29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.
- 30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.
- 31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have


MEMBER SECRETARY
SEIAA-TN

- greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.
- 32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.
 - 33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.
 - 34) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.
 - 35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.
 - 36) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.
 - 37) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.
 - 38) Detailed Environmental Management Plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.
 - 39) Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.
 - 40) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

- 41) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.
- 43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
- 44) Besides the above, the below mentioned general points are also to be followed:-
 - a) Executive Summary of the EIA/EMP Report
 - b) All documents to be properly referenced with index and continuous page numbering.
 - c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
 - d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.
 - e) Where the documents provided are in a language other than English, an English translation should be provided.
 - f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
 - g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.
 - h) Changes, if any made in the basic scope and project parameters (as submitted in Form-1 and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.
 - i) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the Environment Clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.
 - j) The EIA report should also include (i) surface plan of the area indicating contours of main


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topographic features, drainage and mining area. (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

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

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

1. Project name and location (Village, District, State, Industrial Estate (if applicable).
2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
3. Measures for mitigating the impact on the environment and mode of discharge or disposal.
4. Capital cost of the project, estimated time of completion.
5. The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.
6. A detailed study of the lithology of the mining lease area shall be furnished.
7. Details of village map, "A" register and FMB sketch shall be furnished.
8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be submitted along with EIA report.
9. Obtain a letter /certificate from the Assistant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report.
10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010.
11. Detail plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.
12. The EIA study report shall include the surrounding mining activity, if any.
13. Modeling study for Air, Water and noise shall be carried out in this field and incremental increase in the above study shall be substantiated with mitigation measures.
14. A study on the geological resources available shall be carried out and reported.
15. A specific study on agriculture & livelihood shall be carried out and reported.
16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.
17. Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./


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- private land, status of its acquisition, nearby (in 2-3 km.) water body, population, within 10km other industries, forest, eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
18. Baseline environmental data - air quality, surface and ground water quality, soil characteristics, flora and fauna, socio-economic condition of the nearby population
 19. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
 20. Likely impact of the project on air, water, land, flora-fauna and nearby population
 21. Emergency preparedness plan in case of natural or in plant emergencies
 22. Issues raised during public hearing (if applicable) and response given
 23. CER plan with proposed expenditure.
 24. Occupational Health Measures
 25. Post project monitoring plan
 26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited agencies.
 27. A detailed report on the green belt development already undertaken is to be furnished and also submit the proposal for green belt activities.
 28. The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines.
 29. A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals.
 30. Reserve funds should be earmarked for proper closure plan.
 31. A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and forests (EC.2) Department dated 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.

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

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


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SEIAA-TN



- b. All documents may be properly referenced with index, page numbers and continuous page numbering.
- c. Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.
- d. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF& CC vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry should also be followed.
- e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website <http://www.moef.nic.in/> may be referred.
- After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
 - The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
 - The TORs with public hearing prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.

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. Monitoring Cell, IA Division, Ministry of Environment, Forests & CC, Paryavaran Bhavan, CGO Complex, New Delhi 110003
5. The District Collector, Kanchipuram District.
6. Stock File.

From

To

Thiru A. Arumuganainar, M.Sc.,
Assistant Director, (i/c)
Dept. of Geology and Mining,
Chengalpattu.

Tvl.PCS Industries Pvt.Limited,
C-10, 5th Street,
Industrial Estate,
Ambattur,
Chennai-58.

Rc.No.588/Q2/2018, Dated 27.01.2023

Sir,

Sub: Mines and Quarries - Chengalpattu District -
Madurantakam Taluk - Periya Venmani Village - S.F.
Nos.223/1, 223/2, 224, 225/1 & 225/2 - over an extent
of 4.74.50 Hectares of patta lands -permission
requested for Quarrying Rough stone and Gravel
under rule 19(1) of Tamil Nadu Minor Mineral
Concession Rules 1959 - applied by Tvl.PCS Industries
Pvt.Limited - Details of quarries situated within 500
meter radial distance - furnished - reg.

- Ref : 1. Precise are notice issued by the District Collector,
Kancheepuram (presently Chengalpattu District)
in Rc.No.588/Q2/2017, dated. 05.11.2019.
2. Representation of Tvl.PCS Industries Pvt. Limited,
dt.23.01.2023.

With reference to your letter in the reference 2nd cited, the details
of existing, proposed and abandoned quarries located within 500
meter radius from the proposed Rough Stone and Gravel quarry, over
an extent of 4.75.50 Hectares of patta lands in S.F.Nos.223/1 (1.45.00),
223/2 (1.31.00), 224 (0.70.00), 225/1 (0.61.00) & 225/2 (0.67.50) over an
extent of 4.74.50 hectares of Periya Venmani Village, Madurantakam
Taluk, Chengalpattu District are as follows.

For PCS INDUSTRIES PRIVATE LIMITED



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Director

I. Existing quarries:

Sl. No	Name of the lessee / permit holder	Name of the Mineral	Taluk & Village	S.F. Nos.	Extent (in hecets)	Lease period	Remarks
1.	PCS Industries Private Limited, C.10, 5th Street, Industrial Estate, Ambattur, Chennai-58	Rough stone and Gravel	Madurantakam Periyavenmani	218/2, 219, 220/3	1.74.00	02.07.2021 to 01.07.2026	Operation
2.	Thiru.S.Ravisundar, S/o.Santhiyagu, No.1/1178-A, 1 st Cross Street, South Pethel Nagar, Enjambakkam, Chennai-600 115	Rough stone and Gravel	Madurantakam Periyavenmani	174/5, 174/6 & 180/12	1.37.50	13.01.2023 to 23.09.2027	Operation
3.	S.Dharmaraj, S/o.Sitrambala Reddiar, Mundalapuram, Ondippulinayakanur Muthulapuram, Virudhunagar-626 119.	Rough stone and Gravel	Madurantakam Periyavenmani	180/1, 180/2, 180/3 & 181/1	2.08.50	13.01.2023 to 23.09.2027	Operation

II. Proposed Quarries :


Sl. No.	Name of the lessee / permit holder	Name of the Mineral	Taluk & Village	S.F. Nos.	Extent (in hecets)	Remarks
1.	Tvl.PCS Industries Pvt.Limited, C-10, 5th Street, Industries Estate, Ambattur, Chennai-600 058	Rough Stone & Gravel	Madurantakam Periya Venmani	223, 223/2, 224, 225/1 & 225/2	4.74.50	Under Processing present application.

For PCS INDUSTRIES PRIVATE LIMITED

[Signature]
Director

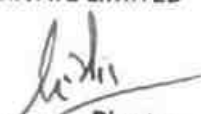
III. Abandoned quarries :

Sl. No.	Name of the lessee / permit holder	Name of the Mineral	Taluk & Village	S.F. Nos.	Extent (in hecets)	Lease period
1.	C.Rekha, W/o.D.U.Chandira prakash, No.46, Irulappan Street, Chennai-79.	Rough stone and Gravel	Madurantakam, Periyavenmani	221 (Govt)	0.88.50	11.01.2007 to 10.01.2012
2.	Tvl.PCS Industries Pvt.Ltd, B-7, B Wing, 6th Floor, Gemini Parsn Manere 602 Anna Salai, Chennai 600 006.	Rough stone and Gravel	Madurantakam, Periyavenmani	216/2B, 2C, 2D, 218/2 (P), 219, 220/2,3 & 222	3.27.50	31.03.2010 to 30.03.2015
3	Tvl.PCS Industries Pvt.Limited, C-10, 5th Street, Industries Estate, Ambattur, Chennai-600 058	Rough Stone & Gravel	Madurantakam Periya Venmani	220/1, 220/2, 222	2.49.50	25.02.2016 to 24.02.2021


Assistant Director (i/c)
Geology and Mining,
Chengalpattu.

2
22.1.2022

For PCS INDUSTRIES PRIVATE LIMITED


Director

From
Thiru A. Arumuganainar, M.Sc.,
Assistant Director,(i/c)
Dept. of Geology and Mining,
Chengalpattu.

To
Tvl.PCS Industries Pvt.Limited,
C-10, 5th Street,
Industrial Estate,
Ambattur,
Chennai-58.

Rc.No.588/Q2/2018, Dated 27.01.2023

Sir,

Sub: Mines and Quarries - Chengalpattu District -
Madurantakam Taluk - Periya Venmani Village - S.F.
Nos.223/1, 223/2, 224, 225/1 & 225/2 - over an
extent of 4.74.50 Hectares of patta lands - permission
requested for Quarrying Rough stone and Gravel
under rule 19(1) of Tamil Nadu Minor Mineral
Concession Rules 1959 - applied by Tvl.PCS
Industries Limited - Mining Plan submitted for
approval - **Mining Plan approved for Five years** -
directed to obtain Environmental clearance from State
Level Environment Impact Assessment Authority,
Tamil Nadu -Reg.

- Ref:
1. Application of Tvl.PCS Industries Pvt.Limited, C-10, 5th Street, Industries Estate, Ambattur, Chennai-600 058 dated 15.10.2018.
 2. Precise are notice issued by the District Collector, Kanchipuram (presently Chengalpattu District) in Rc.No.588/Q2/2017, dated. 05.11.2019.
 3. Representation of Tvl.PCS Industries Pvt. Limited, dt. 23.01.2023.

In the reference 1st cited, one Tvl.PCS Industries Pvt. Limited, C-10, 5th Street, Industries Estate, Ambattur, Chennai-600058 has applied for quarrying Rough stone and gravel from S.F.Nos.223/1 (1.45.00), 223/2 (1.31.00), 224 (0.70.00), 225/1 (0.61.00) & 225/2 (0.67.50) over an extent of 4.74.50 hectares of Periya Venmani Village, Madurantakam Taluk, Chengalpattu District under Rule 19(1) of Tamil Nadu Minor Mineral Concession Rules, 1959.

In this regard, based on the recommendations of the Revenue Divisional Officer, Maduranthagam, and Inspection report submitted by the Assistant Director, Geology and Mining, Kanchipuram

For PCS INDUSTRIES PRIVATE LIMITED

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Director

(presently Chengalpattu) the above application was considered for quarrying Rough stone and Gravel from the above area under rule 19(1) of Tamil Nadu Minor Mineral Concession Rules, 1959 for a period of **Five years** subject to certain conditions and precise area has been communicated to the applicant vide reference 2nd cited.

In exercise of the power delegated under Rule 42 of Tamil Nadu Minor Mineral Concession Rules, 1959, I hereby approve the mining plan submitted by Tvl.PCS Industries Pvt.Limited, for the grant of lease to quarry Rough Stone and Gravel in S.F.Nos.223/1 (1.45.00), 223/2 (1.31.00), 224 (0.70.00), 225/1 (0.61.00) & 225/2 (0.67.50) over an extent of 4.74.50 hectares of Periya Venmani Village, Maduranthagam Taluk, Chengalpattu District the mineable reserves of Rough stone & Gravel after leaving safety distance is arrived as 6,44,436 M³ of Rough stone and 61,344 M³ of Gravel for **Five years** upto a depth of 45 meter (2m Gravel + 43m rough stone) below ground level. This approval is subject to the following conditions:-

- i) That the Mining Plan is approved without prejudice to any other Law applicable to quarrying Rough stone and Gravel from time to time whether such laws are made by the Central Government/State Government or any other authority.
- ii) The approval of the Mining Plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development and Regulation) Act, 1957 or any other connected laws including Forest (Conservation) Act, 1980 Forest Conservation Rules 1981, Environment Protection Act, 1980, Indian Explosives Act, 1884 (Central Act IV of 1884) and the rules made there under the Tamil Nadu Minor Mineral Concession Rules, 1959.
- iii) The Mining Plan is approved without prejudice to any other order or direction from any Court of competent jurisdiction.
- iv) The applicant is directed to submit the application in Form -I as prescribed by the MoEF along with the approved Mining Plan.

Encl: Approved Mining Plan


Assistant Director, (i/c)
Geology and Mining,
Chengalpattu.

For PCS INDUSTRIES PRIVATE LIMITED


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Director





MINING PLAN

**FOR PERIYAVENMANI ROUGH STONE AND GRAVEL QUARRY LEASE
INCLUDING PROGRESSIVE QUARRY CLOSURE PLAN**

Patta- Rythowari land/Open cast-Semi Mechanized mining/Non-forest/
Non-Captive Use- "B2' Category
Lease period 5 Years *(from the date of lease execution)*

**(Prepared under rule 41 (3) (i) of Tamil Nadu Minor Mineral Concession Rules, 1959
for a fresh mining lease)**

LOCATION OF THE APPLIED AREA

STATE	:	TAMILNADU
DISTRICT	:	KANCHEEPURAM
TALUK	:	MADURANTHAGAM
VILLAGE	:	PERIYAVENMANI
S.F.NO	:	223/1, 223/2, 224, 225/1 and 225/2
EXTENT	:	4.74.50HECTARES

APPLICANT

**M/s. PCS Industries Limited,
C-10, Fifth Street,
Industrial Estate, Ambattur,
Chennai-600 058.
Mobile No: +919444395008, 9444395007.
Email: pcsquarry@gmail.com**

PREPARED BY

**Dr.S.KARUPPANNAN., M.Sc., Ph.D.,
RQP/MAS/263/2014/A
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



[Signature]
Director



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Director



ANNEXURES

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1.	Precise Area Communication letter	I
2.	Copy of the FMB	II
3.	Copy of Village map	III
4.	Copy of land documents and Patta chitta	IV
5.	Photocopy of the Lease area	V
6.	Copy of Company Certificate	VI
7.	Copy of agreement from Explosive License holder, Explosive License, Blaster certificate	VII
8.	Copy of ID Proof authorized signatory	VIII
9.	Copy of RQP Certificate	IX

For PCS INDUSTRIES PRIVATE LIMITED

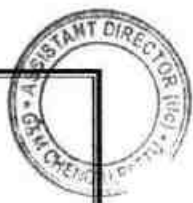
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[Signature]
Director



LIST OF PLATES

SI. No.	Description	Plate No.	Scale
1	Key Map	I	Not to scale
2	Location Plan	I-A	Not to scale
3	Topo Sheet Map	I-B	1:1,00,000
4	Satellite Imaginary Map	I-C	1:5,000
5	Environmental Plan	I-D	1:5,000
6	Mine Lease Plan	II	1:2000
7	Surface, Geological Plan	III	1:2000
8	Geological Sections	IIIA	HOR 1:2000 VER 1:1000
9	Year wise Development & Production Plan	IV	1:2000
10	Year wise Development & Production sections	IVA	HOR 1:2000 VER 1:1000
11	Mine Layout Plan And Land Use Pattern	V	1:2000
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13	Conceptual Sections	VIA	HOR 1:2000 VER 1:1000



M/s. PCS Industries Limited,
C-10, Fifth Street,
Industrial Estate, Ambattur,
Chennai-600 058.
Mobile No:+919444395008, 9444395007.
Email: pcsquarry@gmail.com.

CONSENT LETTER FROM THE APPLICANT

The Mining Plan in respect of Rough Stone and Gravel quarry over an extent of 4.74.50hectares of Patta Land in S.F.No: 223/1, 223/2, 224, 225/1 and 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kancheepuram District, Tamil Nadu State has been prepared by

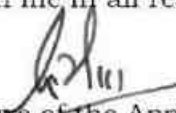
Dr. S.KARUPPANNAN.M.Sc., Ph.D., Reg. No. RQP/MAS/263/2014/A

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

Dr. S.KARUPPANNAN.M.Sc., Ph.D.,
RQP/MAS/263/2014/A
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 Recognized 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: Kancheepuram, TN
Date:


Signature of the Applicant

For **M/s. PCS INDUSTRIES LIMITED**
(G.THIYAGARAJAN)



M/s. PCS Industries Limited,
C-10, Fifth Street,
Industrial Estate, Ambattur,
Chennai-600 058.
Mobile No:+919444395008, 9444395007.
Email: pcsquarry@gmail.com.

DECLARATION

The Mining Plan in respect of Rough Stone and Gravel quarry over an extent of 4.74.50hectares of Patta Land in S.F.No: 223/1, 223/2, 224, 225/1 and 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kancheepuram District, Tamil Nadu State has been prepared with my consultation and I have understood the contents and agree to implement the same in accordance with the Mining Laws.

For PCS INDUSTRIES PRIVATE LIMITED

Signature of the Applicant Director

Place: Kancheepuram, TN

Date:

For **M/s. PCS INDUSTRIES LIMITED**
(G.THIYAGARAJAN)

For PCS INDUSTRIES PRIVATE LIMITED

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Director



Dr. S.KARUPPANNAN.M.Sc., Ph.D.
 RQP/MAS/263/2014/A
GEO TECHNICAL MINING SOLUTIONS
 (A NABET Accredited & ISO certified Company)
 No: 1/213-B, Ground Floor, Natesan Complex,
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 Ph: +91 9443937841,7010076633
 E-mail: info.gtmsdpi@gmail.com,
 Website: www.gtmsind.com

CERTIFICATE

This is to certify that, the provisions of 19(1), 20 and 33 Tamil Nadu Minor Mineral Concession Rules, 1959 have been observed in the Mining Plan for the grant of Rough Stone and Gravel quarry lease over an extent of 4.74.50hectares of Patta Land in S.F.No. 223/1, 223/2, 224, 225/1 and 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kancheepuram District, Tamil Nadu State applied by **M/s. PCS Industries Limited**, Chennai.

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:

Signature of the Recognized Qualified Person

Dr. S. KARUPPANNAN, M.Sc., Ph.D.,
 RQP/MAS/263/2014/A
GEO TECHNICAL MINING SOLUTIONS
 1/213-B, Ground Floor, Natesan Complex,
 Collectorate Post Office, Oddapatti,
 Dharmapuri - 636 705, Tamil Nadu, India.

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

RQP/MAS/263/2014/A

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

Certified that, in Preparation of Mining Plan for Rough Stone and Gravel quarry over an extent of 4.74.50hectares of Patta Land in S.F.No: 223/1, 223/2, 224, 225/1 and 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kancheepuram District, Tamil Nadu State for **M/s. PCS Industries Limited**, Chennai 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

Signature of the Recognized Qualified Person

Date:

Dr. S. KARUPPANNAN, M.Sc., Ph.D.,
RQP/MAS/263/2014/A
GEO TECHNICAL MINING SOLUTIONS
1/213-B, Ground Floor, Natesan Complex,
Collectorate Post Office, Oddapatti,
Dharmapuri - 636 705, Tamil Nadu, India.

Director



MINING PLAN

FOR PERIYAVENMANI ROUGH STONE AND GRAVEL QUARRY LEASE INCLUDING PROGRESSIVE QUARRY CLOSURE PLAN

Patta- Rythowari land/Open cast-Semi-Mechanized mining/Non-forest/
Non-Captive Use- "B2' Category

Lease period 5 Years (from the date of lease execution)

(Prepared under rule 41 (3) (i) of Tamil Nadu Minor Mineral Concession Rules, 1959
for a fresh mining lease)

INTRODUCTORY NOTES:

a). **Introduction:** The Mining Plan and progressive quarry closure plan is prepared for **M/s. PCS Industries Limited**, proprietor of **Mr.G.Thiyagarajan** S/O. Mr.Gurumurthi having registered office C-10, Fifth Street, Industrial Estate, Ambattur, Chennai-600 058 and filed with application for new proposals has submitted to Assistant Director of Geology and Mining (ADG & M), Kancheepuram dated 15.10.2018 grant of quarry lease for rough stone and gravel, over an extent of 4.74.50Hectares in S.F.No: 223/1, 223/2, 224, 225/1 and 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kancheepuram District, Tamil Nadu State and the same was received by ADG & M, Kancheepuram dated 15.10.2018.

b). **Lease area particulars:** The District Collector, Kancheepuram has directed to the applicant **M/s. PCS Industries Limited** proprietor of **Mr.G.Thiyagarajan** through his precise area communication letter **Rc.No.588/Q2/2017 Dated: 05.11.2019** before execution of lease deed should submit the mining plan for approval and obtain Environmental Clearance from the competent authority of State Level Environment Impact Assessment Authority-Tamilnadu (SEIAA) as per EIA Notification 2006 and S.O.141 (E) dated 15th January, 2016. Accordingly, the mining plan prepared for a grant of quarrying of rough stone and gravel over an extent of 4.74.50Hectares in S.F.No: 223/1, 223/2, 224, 225/1 and 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kancheepuram District, Tamil Nadu State for a period of 5 years under Rule 19(1), 20 and 33 of Tamil Nadu Minor Mineral Concession Rules, 1959 and granting quarry lease with conditions of safety distance as given below,

Director



1. Prior Environmental clearance should be obtained by the applicant for the grant of quarry lease.
2. A safety distance of 10meters and 7.5 meters should be left out for the adjoining Govt. Poramboke, patta lands and should not cause any hindrance to them while quarrying.
3. The Poondi Lake in village no.132 is situated nearby the applied lease area, 50meters safety distance should be left out and it should not cause any hindrance to while quarrying.
4. The Govt barren land is situated in S.F.No.217 and Viralur Village drainage is situated in S.F.No.87 and Kallankuttu is found in S.F.No.165, therefore, Should not cause any hindrance to while quarrying.

c). **Submission of Mining Plan:** The Mining Plan has been prepared under the provision rule of 41 (3) (i) of Tamil Nadu Minor Mineral Concession Rules, 1959 and also observed the conditions mentioned in the precise area communication letter **Rc.No.588/Q2/2017 Dated**

d). **Geological resources and Minable Reserves:** Geological resource of rough Stone is estimated as **2038071Cbm** and Gravel about **94794Cbm**. Minable reserves of Rough Stone is estimated about **644436Cbm** and Gravel is **61344Cbm** up to depth of 45meters (2m Gravel + 43m rough stone) below ground level after leaving necessary safety distance from the lease boundary.

e). **Proposed Production Schedule:** Total Proposed production of rough stone is **644436Cbm** and Gravel is **61344Cbm** up to a depth of 45meters (2m Gravel + 43m rough stone) below ground level for the 5 years plan period. Average production shall be **128887Cbm** of rough stone for year and **61344Cbm** of Gravel per two years.

- f). **Environmental Sensitivity of the proposed lease area:-**
- a). **Interstate boundary Act, 1979:** There is no interstate boundary found within radius of 10Kms.
 - b). **Wildlife Protection Act, 1972:** There is no wild life animal sanctuary within 10Kms radius from the project site area under the Wildlife (Protection) Act, 1972.


Director



- c). **Indian Reserve forest Act, 1980:** There is no nearest reserve found around 1km radius. The nearest reserve forest is Sittarkadu and Kollattanallur RF situated about 7.5kms, 10kms away on southern and western side as respectively.
- d). **CRZ Notification, 1991/2011:** There is no Sea coastal zone found around 10kms radius and this project site doesn't attract CRZ Notification, 1991/2011.

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

- i) Avoid uneven rat hole mining and follow scientific and systematic mining by safe bench system of open cast mining
- ii) Unnecessary land degradation should be avoided or damaged land should be reclaimed or rehabilitated.
- iii) Dust Control at source while drilling and blasting,
- iv) Dust suppression at loading point and transport haul roads,
- v) Noise Control in blasting, control of fly rock missiles and vibration by doing peak particle velocity with in standard as prescribed by the DGMS and MOEF.
- vi) Mining near major fracture zones if any should be avoided to control ground water fluctuation in the adjacent agricultural lands.
- vii) Emission test of vehicles should be in stack to maintain minimum emission level of flue gases.
- viii) 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	:	M/s. PCS Industries Limited
	Applicant address	:	M/s. PCS Industries Limited, Mr.G.Thiyagarajan S/O. Mr.Gurumurthi C-10, Fifth Street, Industrial Estate, Ambattur, Chennai.
	District	:	Chennai
	State	:	Tamil Nadu
	Pin code	:	600058
	Phone	:	+919444395008, 9444395007.
	Fax	:	Nil

For PCS INDUSTRIES PRIVATE LIMITED

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[Signature]
Director



Gram	:	Nil
Telex	:	Nil
E-mail	:	pcsquarry@gmail.com
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
d. Period for which the mining lease granted /renewed/ proposed to be applied	:	Mining plan proposed for the period of five years from the date of lease execution.
e. Name of the RQP preparing the Mining Plan	:	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	:	04342-232777
Registration Number	:	RQP/MAS/263/2014/A
Date of grant/renewal	:	16.12.2014
Valid upto	:	15.12.2024
f. Name of the prospecting agency	:	Geo Technical Mining Solutions GSR 286(E) No:272, Ministry of Mines Notification 7th April 2022.
Address	:	No: 1/213-B, Natesan Complex, Oddapatti, Collectorate Post office, Dharmapuri-636705.

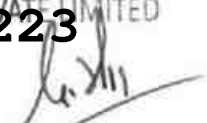

Director



	web site: www.gtmsind.com
Phone	: +91 9443937841, 7010076633.
g. Reference No. and date of consent letter from the state government	: The precise area communication letter was received from the District collector Kancheepuram vide Rc.No.588/Q2/2017 Dated: 05.11.2019

2.0 LOCATION AND ACCESSIBILITY:

a.	Details of the Area	: Refer plate no: I, IA & IB,
	District & State	: Kancheepuram, Tamil Nadu
	Taluk	: Maduranthagam
	Village	: Periyavenmani
	Khasra No./ Plot No./ Block Range/Felling Series etc.	: 223/1(1.45.00), 223/2 (1.31.00), 224 (0.70.00), 225/1(0.61.00) 225/2 (0.67.50)
	Lease area (hectares)	: 4.74.50Hect
	Whether the area is recorded to be in forest (please specify whether protected, reserved etc)	: The proposed lease area is recorded as patta land (Ref. Annexure No: V)
	Ownership / Occupancy	: This is a patta land of S.F.No. 223/1, 223/2, 224, 225/1 and 225/2 is Registered on the name of G.Thiyagarajan S/o Gurumurthi as vide Patta No. 962.
	Existence of Public Road / Railway line if any nearby and approximate distance	: <ul style="list-style-type: none"> * Exploited materials shall be transported through the approach road is situated on the southwestern side. * The SH-115 road is situated about 2kilometers away on south side which is connecting Melmaruvathur - Cheyyur road. * There is no NH-road is situated around 10kms radius. * There is no railway line is situated around 10kms radius from the lease area.


Director



Toposheet No. with latitude and longitude

Toposheet No. **57 P/15**
Latitude : From 12°23'30.04"N
to 12°23'43.89"N
longitude: From 79°59'10.57"E
to 79°59'19.31"E

Geo-Coordinates of the lease boundary

Pillar Id	Latitude (mN)	Longitude(mE)
1	12°23'43.89"N	79°59'12.59"E
2	12°23'42.54"N	79°59'12.54"E
3	12°23'42.47"N	79°59'15.05"E
4	12°23'36.93"N	79°59'16.22"E
5	12°23'30.04"N	79°59'19.31"E
6	12°23'31.61"N	79°59'16.51"E
7	12°23'32.94"N	79°59'13.06"E
8	12°23'33.21"N	79°59'12.45"E
9	12°23'35.18"N	79°59'12.09"E
10	12°23'37.45"N	79°59'11.66"E
11	12°23'38.25"N	79°59'11.66"E
12	12°23'40.20"N	79°59'11.27"E
13	12°23'41.14"N	79°59'10.57"E
14	12°23'42.05"N	79°59'11.05"E
15	12°23'42.08"N	79°59'11.67"E
16	12°23'43.15"N	79°59'11.78"E

Land use pattern (Forest, Agricultural, Grazing, Barren etc.)

It is a barren land

b). *Attach a general location and vicinity map showing area boundaries and existing and proposed access routes. 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


Director



i) INFRASTRUCTURE AND COMMUNICATION:

a.	Nearest post office	:	Post office is available at Periyavenmani about 1.0km away from the site towards northern side.
b.	Nearest police station	:	Police Station is available at Pavunjur about 6.0kms away from the applied area towards Northeastern side.
c.	Nearest fire station	:	Fire Station is available at Cheyyur about 6kms away from the site towards southeastern side.
d.	Nearest Medical facility	:	Primary health center is available at Pavunjur about 6.0kms away from the applied area towards Northeastern side.
e.	Nearest school	:	Primary School Education is available at Onampakkam about 3.0kms away from the site towards Southwestern side.
f.	Nearest Taluk road	:	The Taluk road is situated about 2kms away from south side of the site which is connecting Melmaruvathur - Cheyyur.
g.	Nearest Rail Head	:	The Nearest Railway junction is available at Chegalpattu about 48kms away from north side.
h.	Nearest railway station	:	The Nearest Railway station is available at Melmaruvathur about 18kms away from western side.
i.	Nearest port facility	:	The Nearest Port is available at Chennai about 110kms away from Northern side of the lease area.
j.	Nearest Airport	:	The Nearest Airport is available at Chennai about 86kms away from Northern side of the lease area.
k.	Nearest DSP office	:	The Nearest DSP office is available at Maduranthakam about 28kms away on the Northwestern side.
l.	Nearest Villages	:	i. North - Periyavenmani - 1.0km ii. South - Viralur - 2.0kms iii. East - Poondi - 1.0km iv. West - Venmari - 2.0kms

ii) BOUNDARY OF THE LEASE AREA:

i.	Boundary	i. North-Patta land-S.F.No's.220 & 226 ii. South- Patta land--S.F.No's.166 iii. East- Patta land S.F.No's.2 & 3 PWD tank S.F.No's.1 iv. West-Patta land-S.F.No's.220 & 222
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[Signature]
Director



PART - A

3.0 GEOLOGY AND MINERAL RESERVES:

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

(i)	Topography	:	The lease area exhibits as flat terrain and altitude of 22m from the MSL and falls in Toposheet no. 57 P/15.
-----	------------	---	--

(ii) **a) Geomorphology:** The area exposes crystalline rocks of Archaean age and sedimentary rocks of Gondwana Super group and the Cuddalore Formation belonging to Mio-Pliocene age. Gravel and shingle beds locally known as Kanchipuram Gravels belong to the Pliocene to lower Pleistocene age. The laterite and alluvium are related to Quaternary age.

b) Soils: Alluvial deposits constitute the Geology map of study area youngest formation consisting of clays. There are joints and fractures parallel to foliation as well as perpendicular to it. At places these are out cropped while at other places there are underlain by weathered formation as evinced from the lithology of wells in the area.

c) Lineaments: The general trend of the gneiss is NE-SW direction and the regional trend observed is NNE-SSW to NW-SE direction. The deposition of Gondwana rocks, the sedimentary rocks, in faulted troughs and in the rugged topography of crystalline rocks took place during Jurassic period. The data have been checked by field studies and Survey of India topographical maps at the 1:1,00,000 scale.

Age	Group	Rock Formation
Pliocene - lower Pleistocene	----	Top Soil (1-2m Thick)
Mio-Pliocene	Goundwana formation	Laterite and alluvium , Sandstone and Shale
Archaean	Charnockite Group	Khondalite Group and Charnockites Group,


Director



(iii) **i) Topography of the proposed lease area:**

i) Topography of the proposed lease area:

The lease area exhibits as nearly flat terrain and altitude of 22m from the MSL. Charnockite is applied to any orthopyroxene rock, composed mainly of quartz, perthite or antiperthite and orthopyroxene (usually hypersthene) formed at high temperature and pressure, commonly found in granulite facies metamorphic regions, as an end-member of the charnockite series. Charnockite is extensively quarried for rough stone productivity / which is used as blue metals for construction of building, manufacturing of hollow bricks. In some places, Charnockite is used as grinder stone. Charnockites is exposed as excavated

ii) Mode of origin:

The Charnockite series originally was assumed to have developed by the fractional crystallization of silicate magma. The constituents of the rock suggests 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.

iii) 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.

iv) Chemical composition of rocks:

The compositional characteristics of coexisting orthopyroxene, garnet and biotite have established several petrographic varieties within the charnockites-enderbites such as


Director



		<p>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.</p> <p>Order of superposition of the proposed lease area,</p> <table border="1"> <thead> <tr> <th>Age</th> <th>Group</th> <th>Rock Formation</th> </tr> </thead> <tbody> <tr> <td>Recent to Sub recent</td> <td>----</td> <td>Clay with cotton Soil (2m thick)</td> </tr> <tr> <td>Archaean</td> <td>Charnockite Group</td> <td>Charnockite.</td> </tr> </tbody> </table>	Age	Group	Rock Formation	Recent to Sub recent	----	Clay with cotton Soil (2m thick)	Archaean	Charnockite Group	Charnockite.
Age	Group	Rock Formation									
Recent to Sub recent	----	Clay with cotton Soil (2m thick)									
Archaean	Charnockite Group	Charnockite.									
(iv)	Drainage Pattern	: There is no major river located within a radius of 500m radius. The drainage pattern of the area is dendritic in nature.									

(b)	<i>The topographic plan of the lease area prepared on a scale of 1:1000 or 1: 2000 with contour interval of 3 to 10m depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan:</i>	
	a. Present status	: No exploration carried out. Being a fresh quarry lease covered with boulders with followed by weathered and fresh Charnockite deposit. Hence, RQP personally examined during mining survey.
	b. Surface Plan	: Surface plan is prepared as 1: 2000 Scales with ground level at various places in grid pattern with various lithological factors like length, width and depth.
(c)	Geological sections should be prepared at suitable intervals on a scale of 1: 1000 / 1: 2000:	: Geological plan is prepared as 1: 2000 Scales with ground level at various places in grid pattern with various lithological factors like length, width and depth and sections are prepared boundary to boundary perpendicular to the strike of the rock with proper scale of

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Director



1:2000 is horizontal axis, 1:250 as vertical axis. It is given as plate no's-III & 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
First	N.A	---	---	N.A
Second	N.A	---	---	N.A
Third	N.A	---	---	N.A
Fourth	N.A	---	---	N.A
Fifth	N.A	---	---	N.A

No future exploration programme is proposed in this area. It's a massive Charnockites 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 cross sections on suitably chosen lines across the longitudinal axis of deposit have been drawn. The proposed area fresh quarry lease covered with gravel deposit. The Geological resources have been computed up to depth of 45m from general ground level (Refer Plate No's.III & IIIA). The total Geological resources of gravel are **94794Cbm** and rough stone resources are **2038071Cbm** up to depth of 45m which is 2m Gravel + 43m Rough stone.

GEOLOGICAL RESOURCES							
Section	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Geological Resources in CBM@100 %	Gravel in CBM
XY-AB	I	200	126	2	50400	---	50400
	I	200	126	3	75600	75600	---
	II	200	126	5	126000	126000	---
	III	200	126	5	126000	126000	---
	IV	200	126	5	126000	126000	---
	V	200	126	5	126000	126000	---
	VI	200	126	5	126000	126000	---
VII	200	126	5	126000	126000	---	



	VIII	200	126	5	126000	126000	---
	IX	200	126	5	126000	126000	---
	TOTAL				1134000	1083600	50400
X1Y1-CD	I	151	147	2	44394	---	44394
	I	151	147	3	66591	66591	---
	II	151	147	5	110985	110985	---
	III	151	147	5	110985	110985	---
	IV	151	147	5	110985	110985	---
	V	151	147	5	110985	110985	---
	VI	151	147	5	110985	110985	---
	VII	151	147	5	110985	110985	---
	VIII	151	147	5	110985	110985	---
	IX	151	147	5	110985	110985	---
	TOTAL				998865	954471	44394
	GRAND TOTAL				2132865	2038071	94794

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

The Mineable reserves of Gravel estimated as **61344Cbm** and rough stone estimated as **644436Cbm** up to depth of 45m (2m Gravel + 43m Rough stone) from surface by deducting the reserves blocked under benches from the total Geological resources and the commercially viable rough stone has been prepared on 1: 1000 Scales and sections are prepared as horizontal axis, 1:500 as vertical axis. It is given as plate no's-VI & VIA.

MINEABLE RESERVES							
Section	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Mineable Reserves in CBM@100 %	Gravel in CBM
XY-AB	I	192	93	2	35712	---	35712
	I	192	93	3	53568	53568	---
	II	187	83	5	77605	77605	---
	III	182	73	5	66430	66430	---
	IV	177	63	5	55755	55755	---
	V	172	53	5	45580	45580	---
	VI	167	43	5	35905	35905	---
	VII	162	33	5	26730	26730	---
	VIII	137	23	5	15755	15755	---
	IX	108	13	5	7020	7020	---
	TOTAL				420060	384348	35712
X1Y1-CD	I	144	89	2	25632	---	25632
	I	144	89	3	38448	38448	---
	II	139	79	5	54905	54905	---
	III	134	69	5	46230	46230	---

[Signature]
Director



IV	129	59	5	38055	38055	---
V	124	49	5	30380	30380	---
VI	119	39	5	23205	23205	---
VII	114	29	5	16530	16530	---
VIII	109	19	5	10355	10355	---
IX	44	9	5	1980	1980	---
TOTAL				285720	260088	25632
GRAND TOTAL				705780	644436	61344

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 proposed area fresh quarry lease covered with gravel deposit. The mining operation is open-cost, semi-machined mining methods are adopted and on single shift basis only. Under the regulation 106 (2) (b) of the Metalliferous Mines Regulations, 1961 in all open cost 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.

Year	Pit No.(s)	Topsoil/Overburden (Cbm)	ROM (Cbm)	Saleable rough stone (Cbm) @ 100%	Rough stone rejects(Cbm)	Sub grade/ Weathered rock in (Cbm)	Saleable Gravel (Cbm)	Rough stone to Overburden ratio
First	I	---	164395	128683	---	---	35712	---
Second	I	---	128650	128650	---	---	---	---
Third	II	---	127015	127015	---	---	---	---
Fourth	II	---	156935	131303	---	---	25632	---
Fifth	II	---	128785	128785	---	---	---	---
Total	---	---	705780	644436	---	---	61344	---



c. **Composite plans and Yearwise sections(In case of 'A' class mines):** : Not applicable

Composite plans and Yearwise sections (In case of 'B' class mines):

YEARWISE PRODUCTION								
Section	Year	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Production in CBM@100%	Gravel in CBM
XY-AB	I- YE AR	I	192	93	2	35712	---	35712
		I	192	93	3	53568	128683	---
		II	181	83	5	75115		---
	II- YE AR	II	6	83	5	2490	128650	---
		III	182	73	5	66430		---
		IV	177	63	5	55755		---
		V	15	53	5	3975		---
		V	157	53	5	41605		---
		VI	167	43	5	35905		---
XIV1-CD	III	VII	162	33	5	26730	127015	---
		VIII	137	23	5	15755		---
		IX	108	13	5	7020		---
	IV	I	144	89	2	25632	---	25632
		I	144	89	3	38448	131303	---
		II	139	79	5	54905		---
		III	110	69	5	37950		---
	V- YE AR	III	24	69	5	8280		128785
		IV	129	59	5	38055	---	
V		124	49	5	30380	---		
VI		119	39	5	23205	---		
VII		114	29	5	16530	---		
VIII		109	19	5	10355	---		
IX	44	9	5	1980	---			
TOTAL						705780	644436	61344

d. Attach supporting composite plan and section showing pit layouts, dumps, stacks of sub-grade mineral, if any, etc. : The proposed lease area fresh quarry lease covered with gravel deposit. (Refer Plate No's: III-VI)

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Director



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:**

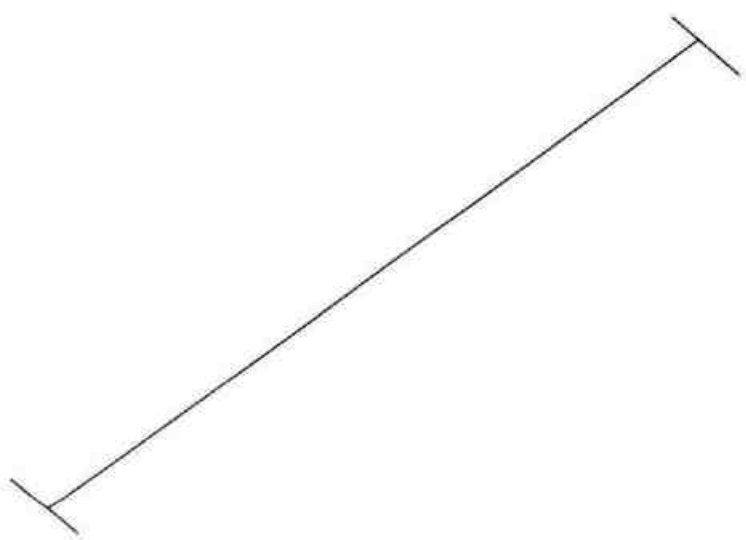
At this rate of production, the expected life of quarry is calculated as given below:-

Minable reserves of Rough stone	=	644436Cbm
Yearly production	=	128887Cbm
Estimated life of mine(644436Cbm/128887Cbm)	=	5 years

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.

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

i) Time frame of completion of mineral exploration program in leasehold area: Give broad description identified potential areas to be covered in the given time frame:	: Exploration program is not proposed in this area. It's a massive Charnockites homogeneous parent rock. Hence, exploration proposal is not required to this mining project.
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Director



ii) Weather 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 mining plan

ULTIMATE PIT LIMIT -1					
Bench	Bench R.L	Overburden/ Mineral	Length (m)	Width (m)	Depth (m)
I	R.L.22-20m	Gravel	192	93	2
I	R.L.20-17m	Rough stone	192	93	3
II	R.L.17-12m	Rough stone	187	83	5
III	R.L.12-07m	Rough stone	182	73	5
IV	R.L.07-02m	Rough stone	177	63	5
V	R.L.02-3m	Rough stone	172	53	5
VI	R.L.-3-8m	Rough stone	167	43	5
VII	R.L.-8-13m	Rough stone	162	33	5
VIII	R.L.-13-18m	Rough stone	137	23	5
IX	R.L.-18-23m	Rough stone	108	13	5
Total					45m

ULTIMATE PIT LIMIT -2					
Bench	Bench R.L	Overburden/ Mineral	Length (m)	Width (m)	Depth (m)
I	R.L.22-20m	Gravel	144	89	2
I	R.L.20-17m	Rough stone	144	89	3
II	R.L.17-12m	Rough stone	139	79	5
III	R.L.12-07m	Rough stone	134	69	5
IV	R.L.07-02m	Rough stone	129	59	5
V	R.L.02-3m	Rough stone	124	49	5
VI	R.L.-3-8m	Rough stone	119	39	5
VII	R.L.-8-13m	Rough stone	114	29	5
VIII	R.L.-13-18m	Rough stone	109	19	5
IX	R.L.-18-23m	Rough stone	44	9	5
Total					45m

<p>iii) Weather 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:-</p>	<p>: There is no mine waste in the form of such as weathered rock or other subgrade mineral will be exploited in the proposed the lease area. If rough stone may be unsold, the materials will be keeping within the lease boundary.</p>
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Director



<p>iv) Weather back filling of pits after recovery of mineral upto technoeconomically feasible depth envisaged. If so, describe the broad features of the proposal:-</p>	<p>: There is no immediate proposal for back filling as the rough stone deposit is still persists at deeper level.</p>
<p>v) Weather post mining land use envisaged:-</p>	<p>: 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.</p>
<p>g. Open cast Mines:</p>	
<p>i). Describe briefly giving salient features of the mode of working (Mechanized, Semi-Mechanized, manual)</p>	<p>: The proposed area fresh quarry lease covered with gravel deposit. The mining operation is open-cost, semi-machined methods of mining are adopted and on single shift basis only. Under the regulation 106 (2) (b) of the Metalliferous Mines Regulations, 1961 in all open cost 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. Machineries like Tractor mounted compressor attached with Jack hammers is proposed to drilling and blasting. Hydraulic Excavators and tipper combination is adopted.</p>
<p>ii) Describe briefly the layout of mine workings, the layout of faces and sites for disposal of</p>	<p>: The rough stone is proposed to quarry at 5m bench height & width conventional opencast semi-mechanized method. It is a semi mechanized quarrying operation</p>

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Director



<p>overburden/waste. A reference to the plans enclosed under 4(b) and 4(d) will suffice</p>	<p>using shot hole drilling with the help of tractor mounted compressor attached with jack hammers, smooth blasting and waste and are removal using Hydraulic excavator and loaded directly to the tippers and transported to the needy customer.</p> <p>Bench height = 5mts. Bench width = 5mts.</p>																					
<p>a. Details of Topsoil/ Overburden</p>	<p>: No separate of topsoil shall be removed</p>																					
<p>b. Rough Stone waste and side burden waste:-</p>	<p>: There is no mine waste/side burden shall be removed.</p>																					
<p>h. Underground Mines:</p>	<p>: It is an open cast quarry operation only.</p>																					
<p>i. Extent of mechanization:</p>																						
<p>Describe briefly including the calculation for adequacy and type of machinery and equipment proposed to be used in different mining operations.</p>																						
<p>(1) Drilling Machines:</p>																						
<p>Drilling of shot holes will be carried out using tractor mounted compressor and jack hammer. Depth of holes shall be 1 to 2m bench height and spacing shall be 0.75m and burden shall be 0.60m from the preface. Details of drilling equipments are given below.</p>																						
<table border="1"> <thead> <tr> <th>Type</th> <th>Nos</th> <th>Dia of hole (mm)</th> <th>Size / Capacity</th> <th>Make</th> <th>Motive power</th> <th>H.P</th> </tr> </thead> <tbody> <tr> <td>Jack Hammer</td> <td>8</td> <td>32 mm</td> <td>Hand held</td> <td>Atlas copco</td> <td>Diesel</td> <td>60</td> </tr> <tr> <td>Compressor</td> <td>2</td> <td>---</td> <td>Air</td> <td>Escorts Formtrac</td> <td>Diesel</td> <td>42</td> </tr> </tbody> </table>		Type	Nos	Dia of hole (mm)	Size / Capacity	Make	Motive power	H.P	Jack Hammer	8	32 mm	Hand held	Atlas copco	Diesel	60	Compressor	2	---	Air	Escorts Formtrac	Diesel	42
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Compressor	2	---	Air	Escorts Formtrac	Diesel	42																
<p>(2) Loading Equipment:</p>																						
<p>Hydraulic excavator (0.90m³ capacities) and attached with rock breaker shall utilized for internal transport sizeable rough stone lumps and deliver to the consumer area.</p>																						
<p>(3) Haulage and Transport Equipment</p>																						
<p>(a) Haulage within the mining leasehold:</p>																						
<table border="1"> <thead> <tr> <th>Type</th> <th>Nos</th> <th>Size / Capacity</th> <th>Make</th> <th>Motive power</th> <th>H.P</th> </tr> </thead> <tbody> <tr> <td>Tipper</td> <td>3</td> <td>15 M.T</td> <td>Ashok Leyland</td> <td>Diesel</td> <td>110</td> </tr> </tbody> </table>		Type	Nos	Size / Capacity	Make	Motive power	H.P	Tipper	3	15 M.T	Ashok Leyland	Diesel	110									
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[Signature]
Director



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

The dumpers are not used in this quarry; hence it's a small B2 category quarry.

(b) Transport from mine head to the destination : 15 M.T capacity of tipper will be use for transport rough stone from the mine head to needy customer.

c. Describe briefly the transport system (please specify) : The hired tipper and excavator will be used for carrying out day to day mining activities on the day basis or hourly basis as per market scenario.

d. Ore transported by : own trucks / hired trucks : Hired trucks

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.
Tipper	3	15 M.T	Ashok Leyland	Diesel	110

(4).Miscellaneous:

Describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

(A) Operations : The mining operation is open-cost, semi-machined 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 is adapted. (refer Part-A- 4 (i))

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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.**

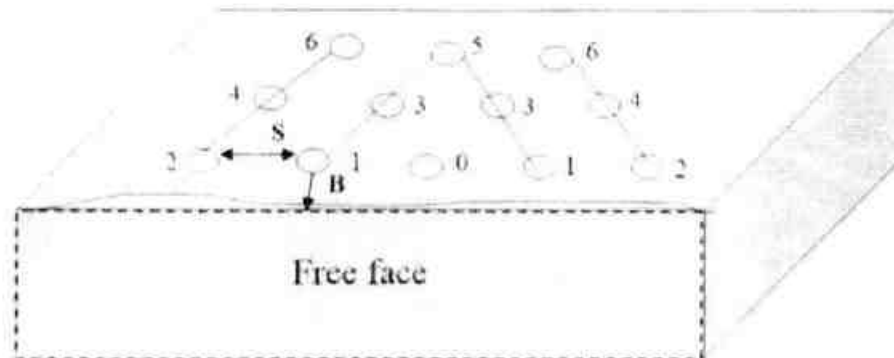
Blasting pattern:

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

Drilling and Blasting parameters are as follows,

Depth of each hole	:	1.5m
Diameter of hole	:	30-32mm
Spacing between hole	:	1.2m
Burden for hole	:	1.0m
Pattern of hole	:	Zigzag -Multi rows
Inclination of hole	:	80° from horizontal
Use of delay detonators	:	25 millisecond relay
Detonating fuse	:	" Detonating" cord
Quantity of rock broken per day	:	430m ³ x 2.6 = 1118MT
Blasting efficiency @95%	:	1.17 x 95% = 1.05MT / hole
Charge per hole	:	140 gms of 25mm dia cartridge
Quantity of rock broken per day	:	1118MT per day
Requirement of explosive per day (6M.T per kg of explosives)	:	186 kg per day
Number of holes per day	:	1118/1.05= 1065 holes per day

BLASTING PATTERN DRAWING





Staggered "V" pattern of blasting design

Spacing	=	1.2m
Burden	=	1.0m
Depth of hole	=	1.5m
No of holes proposed per day	=	1065 holes

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	:	1065holes
Yield	:	1118 tons
Powder factor	:	6 Tons/Kg of explosives
Total explosive required	:	186kg-Slurry explosives
Charge per hole	:	0.5kg
Blasting at day time only	:	12.00-1.00p.m

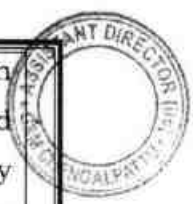
d) Powder factor in ore and overburden / waste / : Powder factor is proposed as 6 tonnes per kg of explosives

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development heading / stope	
e) 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 suitable size for handling by the excavators and crushers.
f) Storage of explosives (like capacity and type of explosive magazine)	: 1. The applicant will engage an authorized explosive agency to carry out the small amount of blasting and it will be supervised by competent and statutory foreman/mines manager. 2. The blasting time at a day is proposed to be 12.0PM to 1.0PM.
6. MINE DRAINAGE	
a) Likely depth of water table based on observations from nearby wells and water bodies	: The ground water table is reported as of 50m in rainy season and 55m in summer from the general ground level in the adjacent bore wells of the area. The Poondi Lake in village no.132 is situated nearby the applied lease area and 50meters safety distance has been provided.
b) Workings expected to be _____ m. above / reach below water table by the year _____.	: Proposed ultimate depth of mining is 45m bgl. Now, the present Mining lease shall be proposed above the water table and hence, quarrying may not affect the ground water.
c) Quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is	: The ground water may not rise immediately in this type of mining. However, the rain water percolation and collection of water

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<p>finally proposed to be discharged</p>	<p>from the seepage shall be less than 300 Lpm and it shall be pumped out periodically by a stand by diesel powered Centrifugal pump motivated with 7.5 H.P. Motor. The quality of water is potable and it is not contaminated with any hazardous things</p>																												
<p>7. STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE:</p>																													
<p>a) Indicate briefly the nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the next five years :</p>																													
<table border="1"> <thead> <tr> <th>Year</th> <th>Topsoil/ Overburden (Cbm)</th> <th>Weathered rock/ Side burden</th> <th>Mineral rejects/Waste</th> </tr> </thead> <tbody> <tr> <td>First</td> <td>---</td> <td>---</td> <td>---</td> </tr> <tr> <td>Second</td> <td>---</td> <td>---</td> <td>---</td> </tr> <tr> <td>Third</td> <td>---</td> <td>---</td> <td>---</td> </tr> <tr> <td>Fourth</td> <td>---</td> <td>---</td> <td>---</td> </tr> <tr> <td>Fifth</td> <td>---</td> <td>---</td> <td>---</td> </tr> <tr> <td>Total</td> <td>---</td> <td>---</td> <td>---</td> </tr> </tbody> </table>		Year	Topsoil/ Overburden (Cbm)	Weathered rock/ Side burden	Mineral rejects/Waste	First	---	---	---	Second	---	---	---	Third	---	---	---	Fourth	---	---	---	Fifth	---	---	---	Total	---	---	---
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Total	---	---	---																										
<p>b) Land chosen for disposal of waste with proposed justification</p>	<p>: No separate of topsoil shall be removed.</p>																												
<p>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 Yearwise.</p>	<p>: There is no mine waste/side burden shall be removed in this proposed lease area.</p>																												
<p>8. USE OF MINERAL:</p>																													
<p>a) Describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)</p>	<p>: The excavated stone materials road metal will be supplied to the consumers like road laying, earth filling, building construction, etc</p>																												
<p>b) Indicate physical and chemical specifications stipulated by buyers</p>	<p>: Basically, the materials produced at this quarry are rough stone (Charnockites) and the same are used for building materials and</p>																												

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Director



		road metal, So there is no chemical specifications are specified. Only physical specifications are involved.																																				
c) Give details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers.	:	Not blending process is involved, after blasting the rough stone boulders will be directly loaded to the needy customer.																																				
9. OTHERS																																						
Describe briefly the following a) Site services	:	Infrastructure required for such mines like office, stores, canteen, first aid station, shelter latrine and booth rooms have been provide as per the Metalliferous Mines Rules, 1961 as a welfare amenities for mine laborers.																																				
<p>b) Employment potential :</p> <p>As per Mines safety under the provisions of 116 (3) (a) Metalliferous Mines Rules, 1961, whenever the workers are employed more than 10, it is preferred to have a qualified Mining Mate and Geologist to keep all the production workers directly under his control and supervision.</p> <p>The following man power is proposed for quarrying Rough Stone during the five years period the same manpower will be utilize for this Mining Plan period to achieve the proposed production and to comply the provisions of as per the norms.</p>																																						
<table border="1"> <tr> <td rowspan="4">1.</td> <td rowspan="4">Highly Skilled</td> <td>Quarry Manger</td> <td>1No.</td> </tr> <tr> <td>Mines Forman</td> <td>---</td> </tr> <tr> <td>Mechanical Engineer</td> <td>---</td> </tr> <tr> <td>Account cum & admin</td> <td>1No.</td> </tr> <tr> <td rowspan="4">2.</td> <td rowspan="4">Skilled</td> <td>Earth moving Operator</td> <td>4 Nos.</td> </tr> <tr> <td>Driver</td> <td>7 Nos.</td> </tr> <tr> <td>Mechanic</td> <td>2 Nos.</td> </tr> <tr> <td>Blaster/Mat</td> <td>1 No.</td> </tr> <tr> <td>3.</td> <td>Semi - skilled</td> <td>Helpers, Greaser's</td> <td>3 Nos</td> </tr> <tr> <td rowspan="3">4.</td> <td rowspan="3">Unskilled</td> <td>Musdoor / Labours</td> <td>16Nos</td> </tr> <tr> <td>Cleaners</td> <td>4Nos</td> </tr> <tr> <td>Attendant's</td> <td>1No</td> </tr> <tr> <td colspan="2"></td> <td>Total =</td> <td>40 Nos</td> </tr> </table>			1.	Highly Skilled	Quarry Manger	1No.	Mines Forman	---	Mechanical Engineer	---	Account cum & admin	1No.	2.	Skilled	Earth moving Operator	4 Nos.	Driver	7 Nos.	Mechanic	2 Nos.	Blaster/Mat	1 No.	3.	Semi - skilled	Helpers, Greaser's	3 Nos	4.	Unskilled	Musdoor / Labours	16Nos	Cleaners	4Nos	Attendant's	1No			Total =	40 Nos
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Director



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 materials shall be directly sale to the needy customer. Also can be used by the applicant in his own crusher for required size (i.e 1/4", 1/2", 1/3" and 1") The recovery of rough stone in this quarry is 100%.
b) Explain the disposal method for tailings or waste from the processing plant (quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailing dam).	: No water shall be used for quarrying or any other processing except drinking water to be drawn from public sources. Some stagnation of rain water in the pit shall be used for drilling and spraying haul roads. Therefore need for tailing dam doesn't arise. But tailing control of rain water flow during rainy season has to be done by decanting the SPM in a pit before passing the water in to natural system.
c) A flow sheet or schematic diagram of the processing procedure should be attached.	: Not applicable.
d) Specify quantity and type of chemicals to be used in the processing plant.	: Not applicable
e) Specify quantity and type of chemicals to be stored on site / plant.	: Not applicable
f) Indicate quantity (cu.m. per day) of water required for mining and processing and sources of supply of water. Disposal of water and extent of recycling.	: Drinking is 0.5KLD, Utilized water is 1.5KLD, Dust suppression is 2.0KLD and Green Belt is 3.0KLD. Minimum quantity of water 7.0KLD per day has to be maintained. It is proposed to make an own borehole for providing uninterrupted supply of RO drinking water, dust suppression and Green belt development.

for PCS INDUSTRIES PRIVATE LIMITED

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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 and proposed land use pattern is given as below.

S.No	Land Use	Present Area (Hect)	Area in use during the quarrying period (Hect)
1.	Area Under Quarrying Pit	---	2.69.43
2.	Infrastructure	Nil	0.01.00
3.	Site Road	0.01.00	0.02.00
4.	Unutilized	4.73.50	0.61.54
5.	Safety & Green Belt	Nil	1.40.53
Total		4.74.50	4.74.50

11.2 Water Regime : Water table in this area is noticed at a depth of 50m in rainy and 55m in summer season from general ground level and presently the quarrying of Rough Stone is proposed up to a depth of 45m. Hence, it will not affect the ground water depletion of this area. It is proposed to make an own borehole for providing uninterrupted supply of RO drinking water, dust suppression and Green belt development.

11.3 Flora and Fauna : There is no major flora found in this area. 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 : Air or dust expected to be generated



	noise level and water	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	: A tropical climate prevails in the region and the annual rainfall varies between 700 and 1600 mm. The northeast monsoon offers the major share of the rainfall when compared to the southwest monsoon. The temperature in the study area varies between 13°C and 43°C with a relative humidity range between 65% and 85%.																									
11.6	Human Settlement:	The nearest villages are found in the buffer zone with population as per 2011 census. The Periyavenmani village as 207 houses of 794 peoples both Male (388) and Female (406).																									
		<table border="1"> <thead> <tr> <th>S.No</th> <th>Village</th> <th>Direction</th> <th>Distance in Kms</th> <th>Population</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Periyavenmani</td> <td>North</td> <td>1.0km</td> <td>794</td> </tr> <tr> <td>2</td> <td>Viralur</td> <td>South</td> <td>2.0km</td> <td>467</td> </tr> <tr> <td>3</td> <td>Poondi</td> <td>East</td> <td>1.0km</td> <td>12</td> </tr> <tr> <td>4</td> <td>Venmari</td> <td>West</td> <td>2.0kms</td> <td>1215</td> </tr> </tbody> </table>	S.No	Village	Direction	Distance in Kms	Population	1	Periyavenmani	North	1.0km	794	2	Viralur	South	2.0km	467	3	Poondi	East	1.0km	12	4	Venmari	West	2.0kms	1215
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3	Poondi	East	1.0km	12																							
4	Venmari	West	2.0kms	1215																							
11.7	Public buildings, places of worship and monuments	: No infrastructure like residential building, places of special interest like archeological monuments, etc., are found around 300m radius.																									
11.8	Attach plans showing the locations of sampling	: The proposed Ambient air quality, Water quality Ambient noise level and																									

For PCS INDUSTRIES PRIVATE LIMITED

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[Signature]
Director



	stations	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)	<p>Land area indicating the area likely to be degraded due to quarrying / pitting, dumping, roads, workshop, processing plant, township etc:</p> <p>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:</p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Land Use</th> <th>Present Area (Hect)</th> <th>Area in use during the quarrying period (Hect)</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Area Under Quarrying Pit</td> <td>---</td> <td>2.69.43</td> </tr> <tr> <td>2.</td> <td>Infrastructure</td> <td>Nil</td> <td>0.01.00</td> </tr> <tr> <td>3.</td> <td>Site Road</td> <td>0.01.00</td> <td>0.02.00</td> </tr> <tr> <td>4.</td> <td>Unutilized</td> <td>4.73.50</td> <td>0.61.54</td> </tr> <tr> <td>5.</td> <td>Safety & Green Belt</td> <td>Nil</td> <td>1.40.53</td> </tr> <tr> <td colspan="2">Total</td> <td>4.74.50</td> <td>4.74.50</td> </tr> </tbody> </table>	S.No	Land Use	Present Area (Hect)	Area in use during the quarrying period (Hect)	1.	Area Under Quarrying Pit	---	2.69.43	2.	Infrastructure	Nil	0.01.00	3.	Site Road	0.01.00	0.02.00	4.	Unutilized	4.73.50	0.61.54	5.	Safety & Green Belt	Nil	1.40.53	Total		4.74.50	4.74.50
S.No	Land Use	Present Area (Hect)	Area in use during the quarrying period (Hect)																										
1.	Area Under Quarrying Pit	---	2.69.43																										
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4.	Unutilized	4.73.50	0.61.54																										
5.	Safety & Green Belt	Nil	1.40.53																										
Total		4.74.50	4.74.50																										
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																											

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[Signature]
Director



		hardness, Salinity, colour, Specific gravity etc.
iv).	Noise levels	Quarrying of Rough Stone will be carried out by drilling and blasting by using low power explosives, and hence, noise will be very minimum. However, periodical noise level monitoring will be carried out every six months around the quarry site.
v).	Vibration levels (due to blasting)	No deep hole blasting envisaged. Small dia shot holes are used for breaking boulders. The maximum peak particles velocity shall be recoded using mini seismograph devises as per the guidance of MoEF and EIA Notification 2006 and also covering DGMS norms.
vi).	Water regime	No major river is found around 500m radius. The Poondi Lake in village no.132 is situated nearby the applied lease area and 50meters safety distance has been provided.
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 found around 10kms 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 shall 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'	:	The present mining is proposed to an ultimate depth of 45m has been envisaged as workable depth for safe & economic mining during the lease

[Signature]
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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 is given.

period. The mined out area will be fenced on top of open cast workings with S1 fencing. 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.

Year	Place	Type of trees	No. of plants	Rate of survival
First	Lease boundary and Village road	Neem, Pungan, Casuarinas and other regional trees	200	80%
Second	Lease boundary and Village road	Neem, Pungan, Casuarinas and other regional trees	200	80%
Third	Lease boundary and Village road	Neem, Pungan, Casuarinas and other regional trees	200	80%
fourth	Lease boundary and Village road	Neem, Pungan, Casuarinas and other regional trees	200	80%
Fifth	Lease boundary and Village road	Neem, Pungan, Casuarinas and other regional trees	200	80%

- iv). Stabilization and vegetation of dumps along with waste dump management Yearwise for the first five years (and upto conceptual plan period for 'A' category mines). : There is no other mine waste shall be proposed.
- v). Measures to control erosion / sedimentation of water courses. : There is no dump are proposed.
- vi). Treatment and disposal of : It will not be harmful and it does not

For PCS INDUSTRIES PRIVATE LIMITED

[Signature]
Director



	water from mine.		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, mine water will be very pure and portable hence it will not affect any water regime surrounding the quarry. Periodical water analysis will be carryout for water quality monitoring.
viii)	Protective measures for ground vibrations / air blast caused by blasting,	:	It is a B2 category open cost, 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 present mining is proposed to an average depth of 45m bgl. The mined out area will be fenced on top of open cast working 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 &	:	Measures will be taken as per the Acts and Rules. The quarried pit will

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	Rules		be fenced by Barbed wire fencing. Green belt development at the rate of 200 trees per year will be proposed. 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
12.4	Mine closure activity	:	The present mining is proposed to an average depth of 45m has been envisaged as workable depth for safe & economic mining during the lease period. The mined out area will be fenced on top of open cast working with S1 fencing. 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.
12.5	Safety and security	:	Safety measures implement to the prevent access to surface opening excavations will be taken as Metalliferous mine rules, 1961, it is a small open cast mining method adopted. Safety provisions like helmet, goggles, safety shoes, Dust mask, Ear muffs etc have to be provided as per the circulars and amendments made for Mine labours under the guidance of DGMS being a mechanized operation.
12.6	Disaster management and Risk Assessment	:	Open cast, semi-mechanized method of mining is adopted in this quarry. If the benches are made with

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Director



		proposed height and with no risk will be there. Even then if any minor 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	: During temporary discontinuance the working place will be fenced completely and 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. 40 labors will be improved.

12.9 Proposed Financial Estimate / Budget for (EMP) Environment Management:

A. Fixed Asset Cost/Investment:		
1. Capital Cost	:	Rs. 43,20,000/-
2. Infrastructure (Labour Shed)	:	Rs. 1,50,000/-
3. Sanitary Facility	:	Rs. 1,00,000/-
4. Fencing	:	Rs. 3,00,000/-
5. Others	:	Rs. 3,00,000/-
Total	:	Rs. 51,70,000/-

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[Signature]
Director



B. Operational cost		
1. Machinery's	:	Rs 1,50,00,000/-
C. EMP Cost: per year (Minimum 2 station * 2 season):		
1. Air quality test	:	Rs. 60,000/-
2. Water quality sampling (2 Nos)	:	Rs. 50,000/-
3. Noise test	:	Rs. 50,000/-
4. Soil analysis	:	Rs. 50,000/-
Total cost		Rs. 2,10,000/- per year
Total cost for 5 Years		Rs. 10,50,000
D. Expenditure cost (for five years)		
1. Drinking Water Facility for the labours	:	Rs. 2,00,000/-
2. Sanitary Maintenance	:	Rs. 1,00,000/-
3. Water Sprinkling	:	----
4. Afforestation and maintained	:	Rs. 1,50,000/-
5. Safety Kits	:	Rs. 2,00,000/-
Total		Rs. 6,50,000/-
E. Total Project Cost(A+B+C+D)		Rs. 2,18,70,000/-

13.0 FINANCIAL ASSURANCE:

Not applicable, it is a small B2 rough stone 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 District collector vide letter **Rc.No. 588/Q2/2017 (Mines) Dated**
- (iv) The proposed production of Rough Stone is **644436Cbm** and gravel is **61344Cbm** for the five years Mining Plan period up to a depth of 45m (2m Gravel + 43m Rough stone) from below the ground level.

[Signature]
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17.0 CSR Expenditure:

CSR (Corporate Social responsibility) shall provide by the lessee @ 2.5% average net profit of the company for the last three financial years to the neighboring villages on the provisions under section 135(1) of the companies Act, 2013 and Rule 3(2) companies CSR Rules, 2014 as circular no.05/01/2014.

Signature of Recognized Qualified Person

Place: Dharmapuri, TN

Date:

Dr. S. KARUPPANNAN, M.Sc., Ph.D.,
RQP/MAS/263/2014/A
GEO TECHNICAL MINING SOLUTIONS
1/213-B, Ground Floor, Natesan Complex,
Collectorate Post Office, Oddepatti,
Dharmapuri - 636 705, Tamil Nadu, India.

This Mining Plan is approved subject to the conditions / stipulations indicated in the Mining Plan approval Letter No. RC.NO. 588/02/2018 Dated. 27.11.2023

This Mining Plan is approved as per the powers conferred Under Rule 41 (2) of Tamil Nadu Minor Mineral Concession Rules, 1959

Assistant Director of Geology and Mining,
Chengalpattu District.

27/11/2023

For PCS INDUSTRIES PRIVATE LIMITED

Director



செயலாண்மை: 588 /ஆடி2 /2017
நாள்: 05.11.2019

மாவுட்ட ஆட்சியர் அலுவலகம்
காஞ்சிபுரம் கலஞ்சிபுரம்.

அறிவிக்கை

செயலாண்மை: கலஞ்சிபுரம் குவார்டிசனும் - காஞ்சிபுரம் மாவுட்டம் - மதுராந்தகம் வட்டம் - பெரிய வெண்மணி கிராமம் - புல எண். 223/1, 223/2, 224, 225/1, 225/2 மொத்தம் 4.74.50 ஹெக்டேர் - மட்டா நிலத்தில் சாதாரண கற்கள் / கிராவல் மண் வெட்டியெடுக்க ஐந்து ஆண்டுகளுக்கு குவாரி குத்தகை உரிமம் கோரிய தி/ள். PCS Industries Limited என்ற நிறுவனத்தினரின் மனு - அங்கீகரிக்கப்பட்ட காய்க்கறிப்பிடம் மற்றும் - மாநில அளவிலான கற்றுச்சுவல் தாக்க மதிக்கீடு ஆணையத்தின் ஒப்புதல் பெற்று அளிக்க தெரிவித்தல் - தொடர்பாக.

- பார்வை
1. தி/ள். PCS Industries Limited, C-10 5வது தெரு. தொழிற் பேட்டை அம்பத்தூர், சென்னை - 600 058 எம்.என். விண்ணப்பம் நாள்: 15.10.2018.
 2. மதுராந்தகம் வருவாய் கோட்டாட்சியர் அறிக்கை எண். நக.5443/2018 /ஆ. நாள். 15.02.2019
 3. மதுராந்தகம் வருவாய் கோட்டாட்சியர் (பொ) அறிக்கை எண். நக.5443/2018 /ஆ. நாள். 05.10.2019.
 4. உதவி இயக்குனர், புவியியல் மற்றும் காய்க்கறிப்பிட கலஞ்சிபுரம் அலுவலரின் இடப்பார்வை அறிக்கை, நாள் 18.10.2019.
 5. அளவான எண். MS.79, தொழில் (எம்.எம்.சி.) துறை, நாள். 05.04.2015

காஞ்சிபுரம் மாவுட்டம், மதுராந்தகம் வட்டம், பெரிய வெண்மணி கிராமம், புல எண். 223/1 (1.45.00), 223/2 (1.31.00), 224 (0.70.00), 225/1 (0.61.00), 225/2 (0.67.50) மொத்தம் 4.74.50 ஹெக்டேர் பரப்பில் சாதாரண கற்கள் / கிராவல் மண் ஐந்து ஆண்டுகளுக்கு வெட்டியெடுக்க சென்னை, அம்பத்தூர், தொழிற் பேட்டை, C-10. 5வது தெரு. தி/ள். PCS Industries Limited என்ற நிறுவனத்தினர் குவாரி குத்தகை உரிமம் கோரி பார்வை 1-ல் கண்டவாறு விண்ணப்பித்தள்ள மனுவின் பேரில் வருவாய் கோட்டாட்சியர், மதுராந்தகம் மற்றும் உதவி இயக்குனர் (கலஞ்சிபுரம்) வருவாய் கோட்டாட்சியர், மதுராந்தகம் (பொ) ஆகியோர் மேற்காணும் விண்ணப்பப் புகளில் ஐந்து ஆண்டுகளுக்கு தமிழ்நாடு சிறுகல்வி சலுகை விதிகள் 1959 விதி எண். 19 (1), 20 & 33 ஆகியவற்றின் கீழ் சாதாரண கற்கள் / கிராவல் மண் குவாரி குத்தகை உரிமம் கீழ்க்கண்ட நிபந்தனைகளுக்குட்பட்டு வழங்கலாம் என பார்வை 2, 3 மற்றும் 4-ல் காணும் அறிக்கையில் பரிந்துரை செய்துள்ளனர்.

For PCS INDUSTRIES PRIVATE LIMITED

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Director

1. விண்ணிடம் புவியகத்தை அநுகரிக்கப்பட்ட அங்கத்திட்டம் மற்றும் மாநில அளவிலான சுற்றுச்சூழல் ஒப்பீடு செய்தாக்கப்பட்ட கோண்டும்.
2. மேற்கூறிய விண்ணிடம் புவியகத்தை அநுகரிக்கின்ற அங்க அனுமோக்கு மற்றும் உட்பு நிலப்பகுதிக்கு முறையே 30 மீட்டர் மற்றும் 7.5 மீட்டர் பாதுகாப்பு இடைவெளி உட்கொள்ளப்பட்டு செய்யப்பட்ட கோண்டும்.
3. விண்ணிடம் புவியகத்தை அநுகரிக்கின்ற பூண்டி கிராம டிஸ்ட்ரிக்ட் 1-ம் அகலத்திற்குள் உள்ள 50 மீட்டர் பாதுகாப்பு இடைவெளி உட்கொண்டு குவார்ட்டர்ஸ் செய்யப்பட்ட கோண்டும்.
4. அங்க பள்ளையூர் தாமிர டிஸ்ட்ரிக்ட் 217, விளாஜி கிராம செயற்கைய அனுமோக்கு டிஸ்ட்ரிக்ட் 87 மற்றும் கல்வாங்குத்து டிஸ்ட்ரிக்ட் 165-ம் அங்கத்தே ஆக்கப்பட்டதும் மேற்கொள்ளப்பட்டது.

இது தொடர்பாக மேற்கூறிய விண்ணிடம் புவியகம் சாதுகாண சுற்றுச்சூழல் மற்றும் சமூகவியல் தொடர்பு கருத்துகள் கருதி அங்கத்திட்டம் அங்கத்தே திட்டத்தை (Approved Mining Plan) மூன்று மாநகத்திற்கும் மாவட்ட ஆட்சியர் முன்பு சமர்ப்பிக்க வேண்டியது. மேலும் மேற்கூறிய விண்ணிடம் புவியகம் சாதுகாண சுற்றுச்சூழல் மற்றும் சமூகவியல் தொடர்பு கருத்து அனுமதி செய்து தொடர்பாக மாநில சுற்றுச்சூழல் தூக்க மதிப்பீட்டு ஆணையம் (SEIAA) ஒப்பீடு செய்து சமர்ப்பிக்க வேண்டியது.

ஓம் x x x
 நாள். 05 11 2019
 மாவட்ட ஆட்சியர் முன்பு
 சமர்ப்பிக்கப்பட்டுள்ளது.

//சுற்றுச்சூழல்//

05/11/19
 மாவட்ட ஆட்சியர் முன்பு சமர்ப்பிக்கப்பட்டுள்ளது.

மேலும்,
 தலைவர், PCS Industries Limited,
 C-10, 5வது தெரு,
 தொழிற்மேட்டை, அம்பத்தூர்,
 சென்னை - 600 058.

நகல்:-
 1) தலைவர், மாநில சுற்றுச்சூழல் தூக்க மதிப்பீட்டு ஆணையம், சென்னை.
 2) ஆணையர், புவியகம் மற்றும் அங்கத்தே, கிண்டி, சென்னை 600 032.

For PCS INDUSTRIES PRIVATE LIMITED

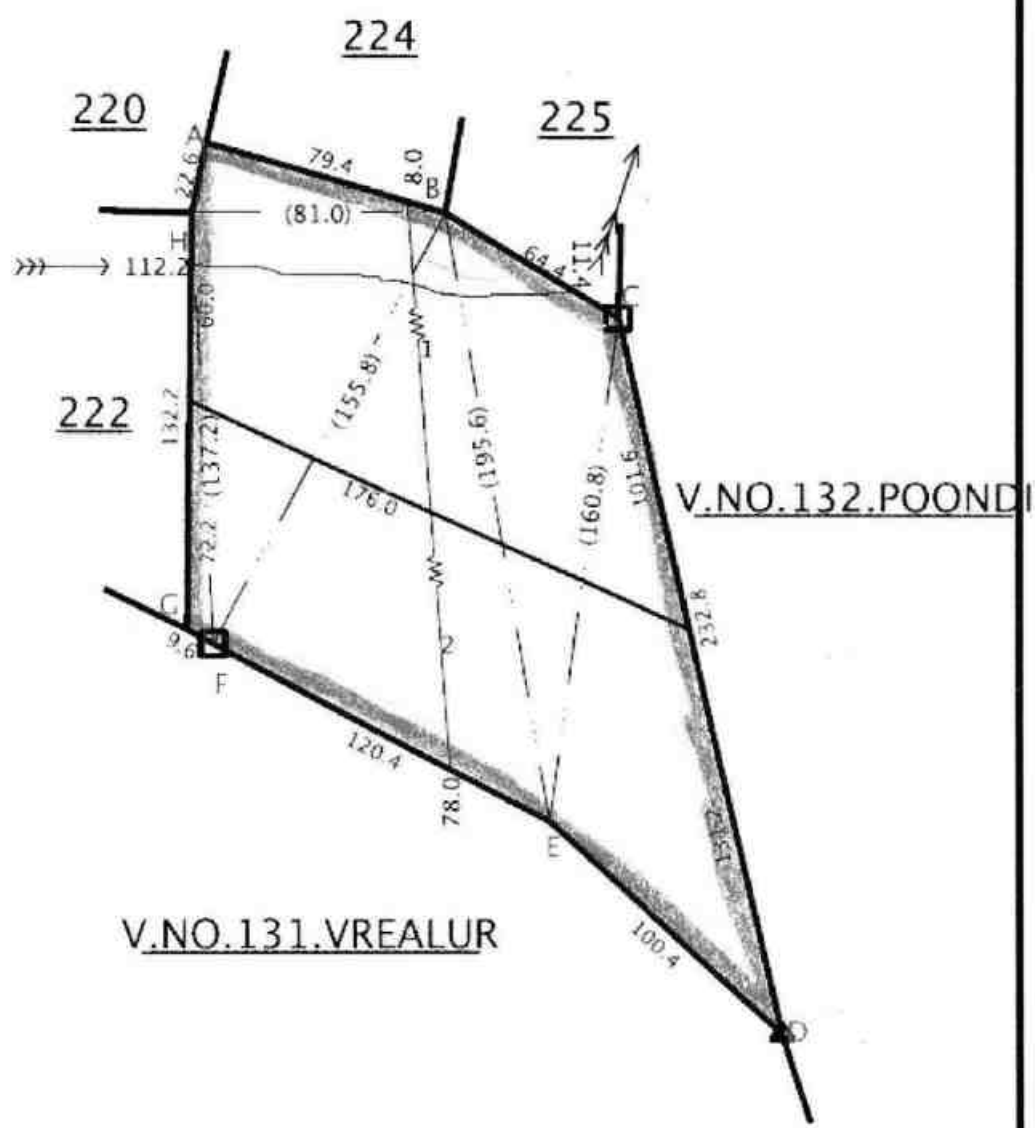
255 
 Director

ANNEXURE II



District : Kancheepuram
Taluk : MADHURANTAKAM
Village : PERIYA VENMANI [184]

Survey No : 223
Area : Hect 02 Ares 76.00
Scale : 1 : 2141



LEASE APPLIED AREA

Director

District : Kancheepuram

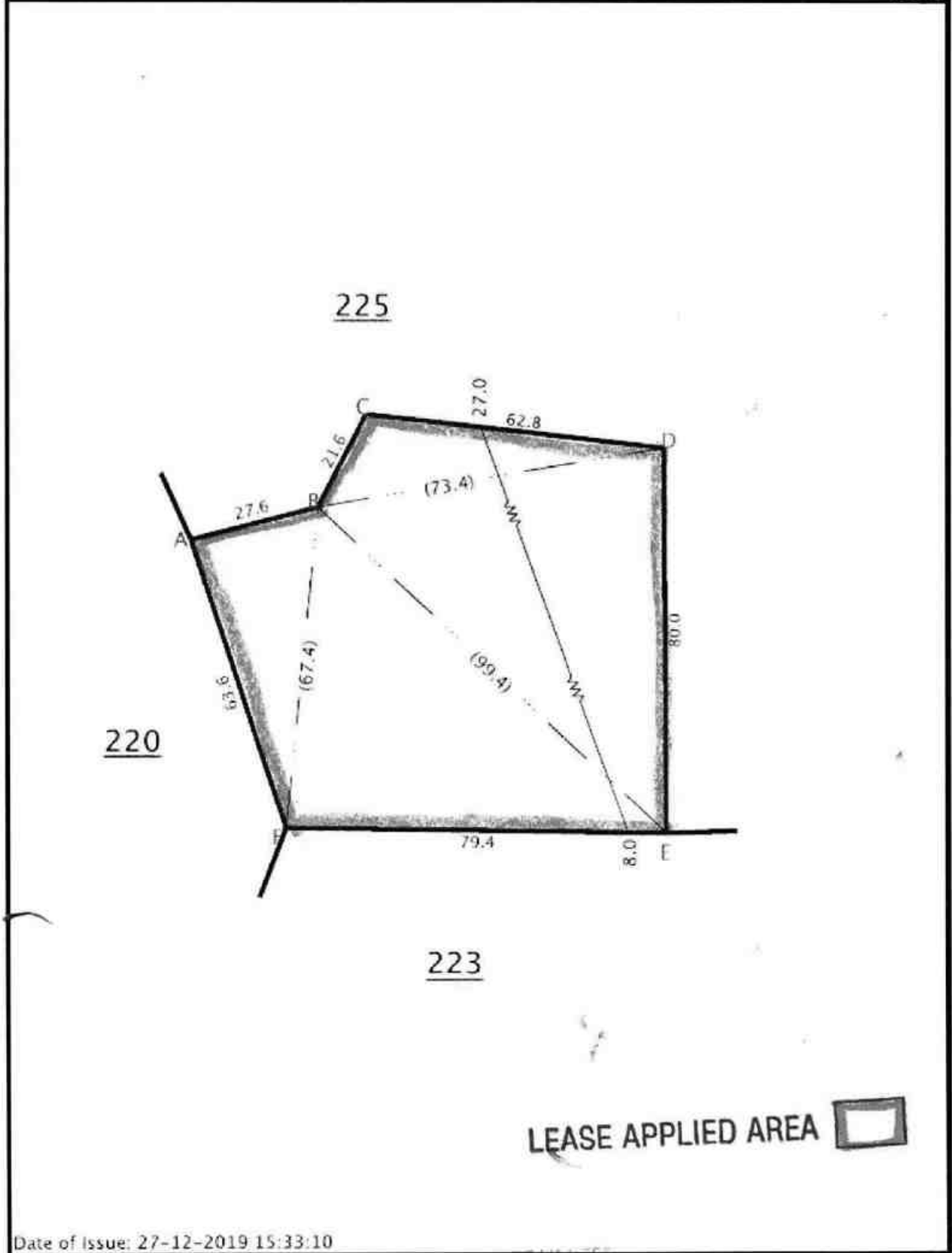
Survey No : 224

Taluk : MADHURANTAKAM

Area : Hect 00 Ares 70.00

Village : PERIYA VENMANI [184]

Scale : 1 : 1057



220

225

223

LEASE APPLIED AREA

Date of Issue: 27-12-2019 15:33:10

Computerized Cartogram Drawn For PCS-INDUSTRIES PRIVATE LIMITED

257

District : Kancheepuram

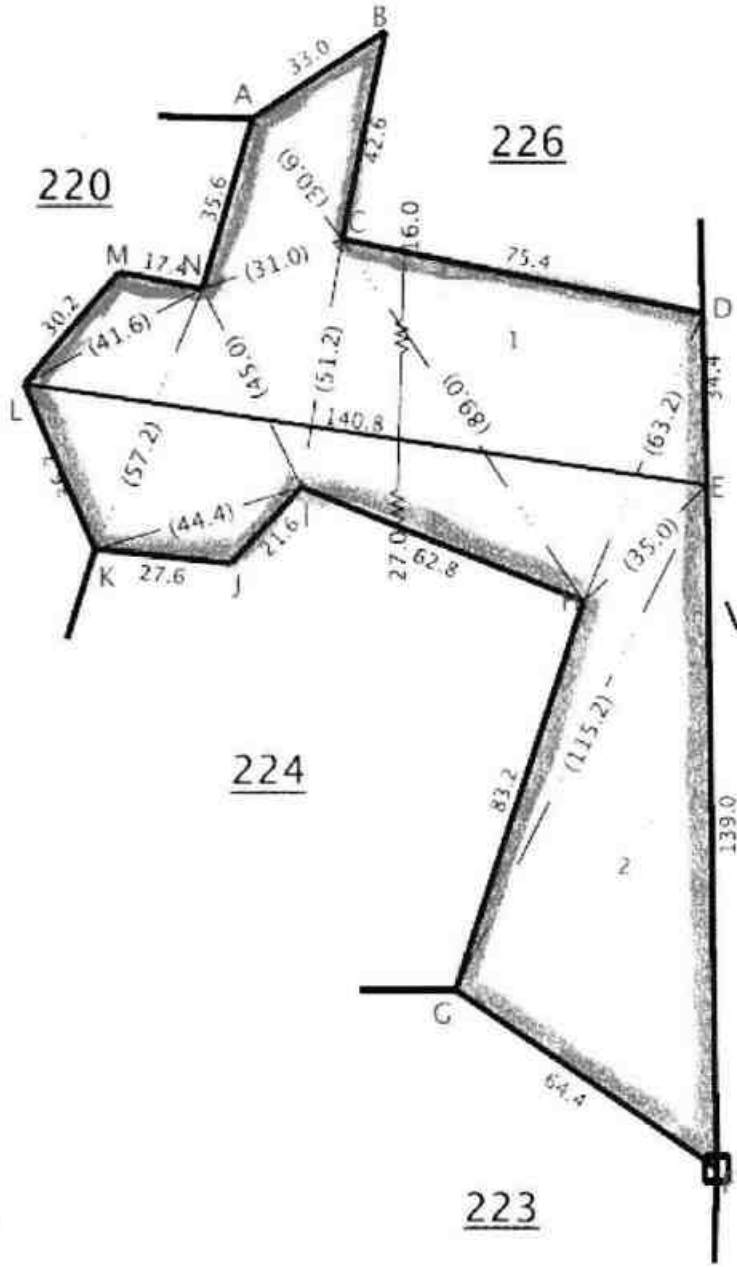
Survey No : 225

Taluk : MADHURANTAKAM

Area : Hect 01 Ares 28.50

Village : PERIYA VENMANI [184]

Scale : 1 : 1382



V.NO.132.POOND

LEASE APPLIED AREA

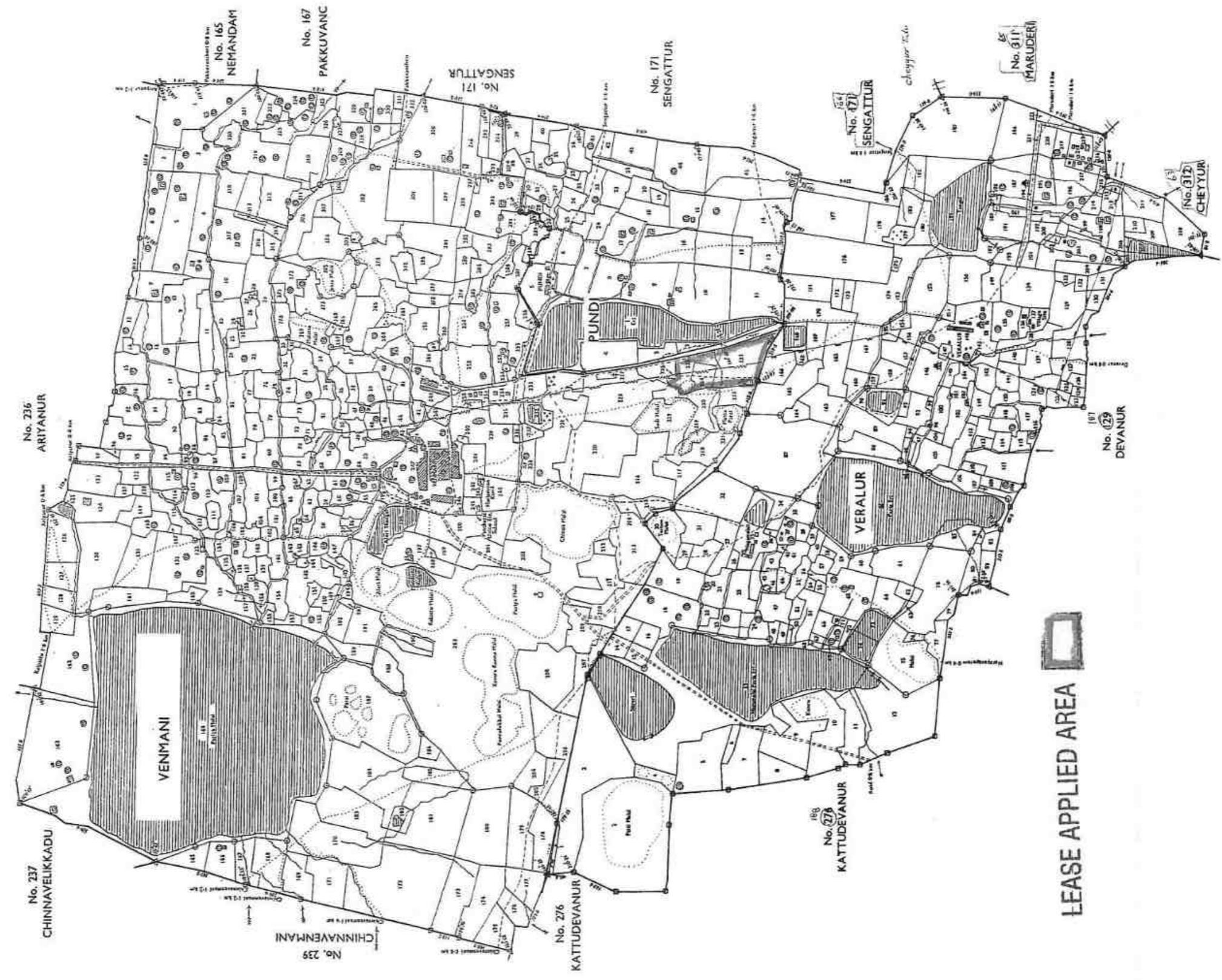
Date of Issue: 27-12-2019 15:36:01

Survey and Settlement Department, Government of Tamil Nadu

For PES INDUSTRIES PRIVATE LIMITED

258

Director



For PCS INDUSTRIES PRIVATE LIMITED

[Signature]
Director



தமிழக அரசு

வருவாய்த் துறை

நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு

மாவட்டம் : காஞ்சிபுரம்

வட்டம் : மதுராந்தகம்

வருவாய் கிராமம் : பெரிய வெண்மணி

பட்டா எண் : 962

உரிமையாளர்கள் பெயர்

1. குறவர்த்தி மகன் சியாகராஜன்

புல எண்	உட்பிரிவு	புன்செய்		நுன்செய்		மற்றவை		குறிப்புரைகள்
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை	
		ஹெக்ட - ஏர்	ரூ - பை	ஹெக்ட - ஏர்	ரூ - பை	ஹெக்ட - ஏர்	ரூ - பை	
223	1	1 - 45.00	2.69	--	--	--	--	2018/0103 /03/110779--- 06-09-2018
223	2	1 - 31.00	2.43	--	--	--	--	2018/0103 /03/110779--- 06-09-2018
224	-	0 - 70.00	1.30	--	--	--	--	2018/0103 /03/110779--- 06-09-2018
225	1	0 - 61.00	1.13	--	--	--	--	2018/0103 /03/110779--- 06-09-2018
225	2	0 - 67.50	1.25	--	--	--	--	2018/0103 /03/110779--- 06-09-2018
226	2	0 - 46.00	0.85	--	--	--	--	2018/0103 /03/110779--- 06-09-2018
231	4A1	0 - 33.70	0.62	--	--	--	--	2019/0103 /03/135748--2016 /03/07/000012SD -- 26-06-2019
231	4A2	0 - 13.40	0.25	--	--	--	--	2019/0103 /03/135748--2016 /03/07/000012SD -- 26-06-2019
231	4A3	0 - 13.40	0.25	--	--	--	--	2019/0103 /03/135748--2016 /03/07/000012SD -- 26-06-2019
		5 - 81.00	10.77					

குறிப்பு2 :

CS INDUSTRIES PRIVATE LIMITED

260

[Signature]
Director

SF: 223/1, 2, 234, 225/1, 2
21/5 2018
TP/38436688/2018



தமிழ்நாடு தமில்நாடு TAMILNADU



10864
29.8.18

சியாக்ராக்ஷம்
செய்யுள்

V. S. Mohanraj
AP 319207
V. S. Mohanraj, மு.நா.கி.
உ.மு. 10096/88 துறை 24 செ.நா. 9
செய்யுள் - 603 302

SALE DEED

THIS DEED OF ABSOLUTE SALE is executed at Cheyyur on this 30th day of August 2018.

M/s. ALPS BLUE METALS INC, a Partnership firm incorporated under Indian Partnership Act 1932 represented by its Partners Mr. K. MOHANRAJ (PAN No. AAIPM4548F) (ADHAAR No. 8281 6126 5530) (Cell: 9444083492) Son of Late Kandasamy, aged about 64 years, and Mr. T.K. MOHAMED SHAGEE (PAN No. AFTPM4934M) (ADHAAR No. 2869 2592 3594) (Cell: 9600000450) Son of T.S. T. Kaznavi, aged about 29 years, both having their office at Door No. A 220/352, Lloyds Road, Gopalapuram, Chennai - 600.086, hereinafter called the 'VENDORS' of the ONE PART.

The terms the VENDOR shall wherever the context so requires or admits always mean and include the VENDOR their heirs, legal representatives executors, administrators and assigns of the ONE PART

[Signature]

For ALPS BLUE METALS INC

[Signature]
Partner



For PCS INDUSTRIES PRIVATE LIMITED

261

[Signature]
Director



TO AND IN FAVOUR OF

Mr. G. THYAGARAJAN (PAN No. ACDPT1690E) (ADHAAR No.4603 4819 9140) (Cell : 9444395008) Son of Mr. V Gurumurthy, aged about 58 years residing at Plot No.921, 66th Street, 11th Sector, K.K.Nagar, Chennai - 600 078, hereinafter called the PURCHASER of the OTHER PART.

The terms VENDOR and PURCHASER shall mean and include all their respective heirs, executors, administrators, legal representative and assigns.

WHEREAS the VENDOR herein absolute owner of the property morefully described in the SCHEDULE hereunder as the VENDOR K.Mohanraj and T.K.Mohamed Shagee (Partners of ALPS BLUE METALS INC) are jointly purchased Acre 12.86 cents from Mr. B.Ramesh and Mr. B.Pavankumar vide sale deed dated 26.11.2012 registered as Book No.1, Document No.5098 of 2012 of Sub-Registrar Office at Cheyyur.

WHEREAS the VENDOR herein is the absolute owner of the property being agricultural dry land comprised S.No. 223/1, measuring an extent of Acre 3.58 cents, S.No. 223/2, measuring an extent of Acre 3.24 cents, S.No. 224, measuring an extent of Acre 1.73 cents, S.No. 225/1, measuring an extent of Acre 1.50 cents, S.No. 225/2, measuring an extent of Acre 1.67 cents, S.No. 226/2, measuring an extent of Acre 1.14 cents, comprised Patta No. 648, Situated at No.184, PERIYAVENMANI Village, Madurantakam Taluk, Kancheepuram District.

[Handwritten signature]

For ALPS BLUE METALS INC
[Handwritten signature]
Partner

0119 2018
[Handwritten mark]

For PCS INDUSTRIES PRIVATE LIMITED





WHEREAS, now the VENDOR is the full and absolute owner of the land measuring **Acre 12.86 cents** situated in No.184 PERIYAVENMANI Village, Madurantakam Taluk, Kancheepuram District, within the Sub Registration District of Cheyyur and Registration District of Kanchipuram as offered to sell **Acre 12.86 cents** morefully described in the schedule hereunder infavour of the PURCHASER for a sale consideration of **Rs.43,20,000/-**, free from all encumbrances and the PURCHASER has agreed to purchase the same for said consideration of **Rupees Forty three Lakhs and twenty thousand only**.

NOW THIS DEED OF SALE WITNESSETH:

1) That in consideration of a sum of **Rs. 43,20,000/- (Rupees Forty three Lakhs and twenty thousand only)** paid by way of DD No.488605, dt. 28.8.2018, Rs.28,80,000, in the name of **Mohanraj**, drawn in Canara Bank, Egmore, Chennai - 8 and DD No.488604, dt. 28.8.2018, Rs.14,40,000, in the name of **Mohamed Shagee**, drawn in Canara Bank, Egmore, Chennai - 8, to the PURCHASER, the VENDOR doth hereby convey, grant, sell, transfer and assign to the PURCHASER all that piece and parcel of land of an **extent of Acre 12.86 cents** situated at No.184, PERIYAVENMANI Village, Madurantakam Taluk, Kancheepuram District morefully described in the schedule hereunder together with all the estate, right, title, property, claim and demand of the VENDOR unto and upon the said land To Have and To Hold the same unto and to the use of the PURCHASER absolutely and forever.

The VENDOR hereby covenant with the PURCHASER that the property hereby conveyed belonged to the VENDOR absolutely and no one else other than the VENDOR, have any right, title or interest whatsoever in the said property hereby conveyed.

3] The VENDOR doth hereby covenant with the PURCHASER that the VENDOR have good title, right, power and authority to convey the said property by way absolute sale to the PURCHASER and the VENDOR have not done, committed or suffered, any act, deed or thing whereby the said property shall or may be encumbered or affected in the estate, title or otherwise or whereby shall or may be prevented from conveying the said property to the PURCHASER in case of any defect in the Title at any point of time.

[Handwritten signature]
21/9/2018
[Handwritten initials]



[Handwritten signature]
K. Mohanraj
Partner



4] The VENDOR doth hereby covenant with the PURCHASER that the PURCHASER shall, at all times hereafter peaceable and quietly possess and enjoy the said property and receive rents and profits thereof without any let or hindrances or suit, eviction, claim or demand whatsoever from or by the VENDOR or any other person/s.

5] The VENDOR hereby declares and covenant with the PURCHASER that there are not suits, appeals, or any legal proceedings pending in any court in which any question relating to the schedule property is in issue and that there are no attachments, proclamations or orders on the schedule mentioned property, which in anyway prevents its alienation and the VENDOR have not entered into any prior agreement of sale with anybody else which is in force and that the VENDOR have not done any act or thing and have not offered the schedule mentioned property as security, whereby the said property shall and will be in any way affected in title, estate, possession and enjoyment of the PURCHASER.

6] The VENDOR hereby declares and covenant with the PURCHASER that the said property is not subject to any mortgage (legal or equitable), charge or attachment, lien, acquisition, encumbrances in favour of any person and the VENDOR declares that there are no defects of any kind in its title to the property hereby conveyed, that the VENDOR will indemnify the PURCHASER against all the loss and damage that the PURCHASER may sustain by reason of any representations contained in this deed to be found to be incorrect or false.

7] The VENDOR hereby agrees and undertake to indemnify and save harmless the PURCHASER herein at all times free from all litigations, claims and demands whatsoever and to indemnify the PURCHASER against the loss, liability, expenses or damages that may be incurred by the PURCHASER by reason of any defect or deficiency in title.

[Handwritten signature]

For ALPS BLUE METALS INC

[Handwritten signature]

[Handwritten signature]
Partner

8119 2018
[Handwritten signature]

For PCS INDUSTRIES PRIVATE LIMITED



264

Director



8) The VENDOR hereby further covenants with the PURCHASER that the VENDOR and all persons lawfully and equitably claiming through or under them, shall and will from time to time and at all times hereafter execute and register or cause to be done executed and registered at the cost of the PURCHASER all such acts, deeds or things for further and more perfectly assuring to the said property and every part thereof unto the PURCHASER by way of absolute sale as by the PURCHASER shall reasonably be required.

9) The VENDOR have signed an application for the transfer of registry of the property, morefully described in the schedule hereto, to the name of the PURCHASER in the revenue records of rights maintained by the Government and the VENDOR hereby undertake to support the said application at any enquiry in connection with mutation proceedings.

10) The PURCHASER is entitled to all easements, privileges and rights by the prescription that are possessed and enjoyed by the VENDOR in connection with the schedule property or belonging thereto and in respect of all such rights the PURCHASER shall possess and exercise all rights, that have been exercised by the VENDOR hereto.

11) The VENDOR hereby assure the PURCHASER that the VENDOR have paid all assessments, public charges, taxes, rents and other outgoings up to date payable to any public body or government in respect of the said property hereby conveyed and that, if any of the said outgoing, rents etc., now due are found to have been paid, the PURCHASER may pay the same and they will be entitled to recover the same from the VENDOR.

12) The PURCHASER shall pay all public charges, taxes etc., in respect of the schedule mentioned property from this day onwards.

13) The VENDOR have today delivered to the PURCHASER full and complete vacant possession to the schedule mentioned property hereby conveyed and the VENDOR shall not make any claim in future date from the PURCHASER. The VENDOR has this day also handed over to the PURCHASER copy of the my original document of title and had retained the originals of the schedule property since the same forms a part of larger extent of land and the same would be available for inspection.

[Handwritten signature]

For ALPS BLUE METALS INC
[Handwritten signature]

0119 8018
81 5
[Handwritten initials]



For PCS INDUSTRIES PRIVATE LIMITED

[Handwritten signature]
Director

SCHEDULE 'PROPERTY



All that piece and parcel of Agricultural Dry land comprised in S.No. 223 measuring an extent of **Acre 3.58 cents** (Hectare 1.45.0), S.No. 223/2, measuring an extent of **Acre 3.24 cents** (Hectare 1.31.0), S.No. 224, measuring an extent of **Acre 1.73 cents** (Hectare 0.70.0), S.No. 225/1, measuring an extent of **Acre 1.50 cents** (Hectare 0.61.0), S.No. 225/2, measuring an extent of **Acre 1.67 cents** (Hectare 0.67.5), S.No. 226/2, measuring an extent of **Acre 1.14 cents** (Hectare 0.46.0)

in all measuring to a **total extent of Acre 12.86 cents**, comprised in **Patta No.648**, situated in No. 184, **PERIYAVENMANI** Village, Periyavenmani Panchayat, Madurantakam Taluk, Kancheepuram District, within the limits of Madurantakam Panchayat Union and situated within the Registration District of Chengalpattu and in the Sub-Registration District of Cheyyur.

The Guideline Value of the property is **Rs. 43,20,000/-**

IN WITNESS WHEREOF THE VENDORS AND PURCHASER ABOVENAMED HAVE HEREINTO SET THEIR HAND IN THIS DEED OF SALE, ON THE DAY, MONTH AND YEAR FIRST ABOVE WRITTEN.

PURCHASER

VENDORS

For **ALPS BLUE METALS INC**

Partner

WITNESSES :

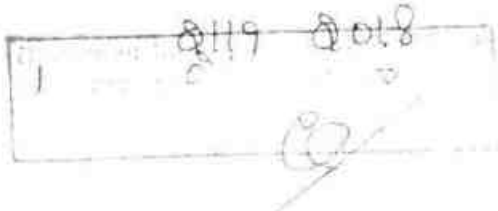
IRSATH ALI, S/O A.M. AIRBAR ALI, SHANANAI, 303, D.12, PALLAPALLE, KARUR.

M. MANICHANAN S/O. G. MANUHAIRAN, No. 44/B.S.I, CRYSTAL COURT, MADURAIKAM, CHENNAI-91

Drafted by

M. Sekar, Cheyyur
License No. C12/CGL/1984
Cell No 9442968110

AT, 220/352, LLOYDS ROAD, GOPALAPURAI, CHENNAI-600050



For **PCS INDUSTRIES PRIVATE LIMITED**

266

Director



RULE(3) STATEMENT

Village : 184, Periyavenmani
Sub-Registrar Office : Cheyyur

Taluk : Madurantakam
District : Kancheepuram

1.	223/1	3.58	Dry Land	Rs.	11,99,300
2.	223/2	3.24	Dry Land	Rs.	10,85,400
3.	224	1.73	Dry Land	Rs.	5,79,550
4.	225/1	1.50	Dry Land	Rs.	5,02,500
5.	225/2	1.67	Dry Land	Rs.	5,59,450
6.	226/2	1.14	Dry Land	Rs.	3,93,800
Total Extent		<u>12.86 cents</u>	Total Amount	Rs.	<u>43,20,000</u>

[Handwritten signature]

For ALPS BLUE METALS INC

[Handwritten signature]

[Handwritten signature]
Partner

~~2119 2018~~



For PCS INDUSTRIES PRIVATE LIMITED

[Handwritten signature]
Director



தமிழக அரசு

வருவாய்த் துறை

நில உரிமை விபரங்கள் : இ. எண் 10(1) பிரிவு

மாவட்டம் : காஞ்சிபுரம்

வட்டம் : மதுராந்தகம்

வருவாய் கிராமம் : பெரிய வெண்மணி

பட்டா எண் : 648

உரிமையாளர்கள் பெயர்

1. ஏ.எல்.பி.எஸ். புளூ மெட்டல்ஸ் ஐ.என்.சி

	நன்செய்		புன்செய்		மற்றவை		
	பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை	
புல எண்	உட்பிரிவு	ஹெக்ட - ஏர்	ரூ - பை	ஹெக்ட - ஏர்	ரூ - பை	ஹெக்ட - ஏர்	ரூ - பை
223	1	--	-	1 - 45.00	2.69	--	--
223	2	--	-	1 - 31.00	2.43	--	--
224	-	--	--	0 - 70.00	1.30	--	--
225	1	--	--	0 - 61.00	1.13	--	--
225	2	--	--	0 - 67.50	1.25	--	--
226	2	--	--	0 - 46.00	0.85	--	--
			5 - 20.50	9.65			

குறிப்பு 2 :



1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. துவற்றை தாங்கள் <http://eservices.tn.gov.in> என்ற இணைய தளத்தில் 03/07/184/00648/90458 என்ற குறிப்பு எண்ணை உள்ளிடு செய்து உறுதி செய்துகொள்ளவும்.
2. இது தகவல்கள் 30-08-2016 அன்று 10:41:41 AM நேரத்தில் அச்சடிக்கப்பட்டது.
3. சைப்பேசி கேமராவின் 2D barcode படப்பாள் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்.

Handwritten signature and stamp area with a rectangular stamp containing the number 268.



For PCS INDUSTRIES PRIVATE LIMITED

Handwritten signature and the title Director.



Original
R/Cheyzur/Book-1/2119/2018

CERTIFICATE UNDER SECTION 42 OF THE INDIAN STAMP ACT 1899

S.No 824 of 2018

I hereby certify that a sum of ₹ 3,01,400/- (Rupees Three Lakh One Thousand Four Hundred only) on account of deficit stamp duty has been levied under section 41 of the Stamp Act in respect of this instrument from Mr. G. THYAGARAJAN residing at Plot No.921 56th Street, 11th Sector, K.K.Nagar, Chennai, Chennai, Tamil Nadu, India 600078.

Sub Registrar Cheyyur
Date 30/08/2018

Signature of Sub Registrar and Collector
41 of the Indian Stamp Act



Presented in the office of the Sub Registrar of Cheyyur and fee of ₹ 1,73,075/- paid at 12:11 PM on the 30/08/2018 by

Left Thumb



John

94443 95008

Additions as per recitals of document

Execution admitted by
Left Thumb



Moharaj

Additions as per recitals of document

Execution admitted by
Left Thumb



[Signature]

Additions as per recitals of document

2119 2018
269


For PCS INDUSTRIES PRIVATE LIMITED

John
Director



Original
R/Cheyyur/Book-1/2119/2018.

Claim admitted by Left, Thumb			 Additions as per recitals of document
----------------------------------	---	---	---

Identified By	
1. 	Mr MANOHARAN Son of MURUGAIYAN 44 B Block, Flat S1, Crystal Court, Medavakkam Main road, Ganesh Nagar, Madipakkam, Chennai, Kancheepuram, Tamil Nadu, India, 600091.
2. 	Mr IRSHATH ALI Son of AKBAR ALI 198E, 13th Cross, Shanagar East, Pallapatti Bazaar, Karur, Karur, Tamil Nadu, India, 639207.

30 th day of August 2018	 SUB-REGISTRAR CHEYYUR Sub Registrar Cheyyur
-------------------------------------	---

No of Copies Registered with the Original: 1	 SUB-REGISTRAR CHEYYUR Sub Registrar Cheyyur
--	---

Registered as Number R/Cheyyur/Book-1/2119/2018	
Date 30/08/2018 Cheyyur	  BALAJIV Sub Registrar

2119 2018




270

For PCS INDUSTRIES PRIVATE LIMITED


Director



आयकर विभाग
INCOME TAX DEPARTMENT
GURUMURTHY THYAGARAJAN

भारत सरकार
GOVT OF INDIA

आयकर विभाग, चण्डीगढ़
आयकर विभाग, चण्डीगढ़
आयकर विभाग, चण्डीगढ़
आयकर विभाग, चण्डीगढ़
आयकर विभाग, चण्डीगढ़

VADIVEL GURUMURTHY

01/06/1960

ACDPT1690E

l.s.
Signature



Income Tax PAN Services : 11 NSDL
114, 1st Floor, Market Street,
Plot No. 31, Survey No. 9912,
Middel Chavay, Near Deep Bunglow Chowk,
Pune - 411 016
Tel: 91-20-2721 8080, Fax: 91-20-2721 8081
e-mail: taxinfo@ndl.com

l.s.

For ALPS BLUE METALS INC
l.s.
Partner

8119 8018
10/06/2019
10/06/2019



for PCS INDUSTRIES PRIVATE LIMITED

l.s.
Director



भारत सरकार
GOVERNMENT OF INDIA

கனகசபை
Moharaj
பிறந்த நாள் / DOB : 20/06/1952
பால / MALE

8281 6126 5530

உள்ள - அரசாங்க மையத்தில் அளிக்கப்படும்

भारतीय विशिष्ट पहचान प्राधिकरण
UNIQUE IDENTIFICATION AUTHORITY OF INDIA

Address:
S/O. Kandasawmy, 239, *
LLOYDS ROAD, G G SPRINGS
1B, Gopalapuram, Chennai,
Tamil Nadu, 600086

1947
1800 300 1947
help@uidai.gov.in
www.uidai.gov.in
P.O. Box No 1947
Bangalore-560 001

Handwritten signature

For ALPS BLUE METALS INC
Handwritten signature
Partner

8/19 2018
1



For PCS INDUSTRIES PRIVATE LIMITED

Handwritten signature
Director



राज्य विभाग
 METALS DEPARTMENT

भारत सरकार
 GOVT. OF INDIA

KANDASWAMY MOHANRAJ
 BYANAN KANDASWAMY
 20/06/1952
 Permanent Account Number
 AAIPM4548F

Signature

Handwritten signature

For ALPS BLUE METALS INC

K Mohanraj
Partner

8119 8018
21 14



For PCS INDUSTRIES PRIVATE LIMITED

Handwritten signature
Director



भारत सरकार
GOVERNMENT OF INDIA



भारतीय विश्व पहचान प्राधिकरण
UNIQUE IDENTIFICATION AUTHORITY OF INDIA



முஹமது ஷகீஸ்
Mohamed Shagee
பிறந்த நாள் / DOB - 25/03/1983
ஆண் / MALE

முகவரி
S/O: கழனி, 7, சூலிவான்
சுரேஷ், 24 சூலிவான், மயிலாபுரம்,
சென்னை, தமிழ்நாடு, 600004

Address
S/O: Kazum, 7, SULLIVAN
STREET, SANTHOMÉ,
Mylapore, Chennai, Tamil Nadu,
600004

2869 2592 3594



சென்னை மாவட்டத்தின் குடிசைகள்
www.aha.gov.in

Handwritten signature

For ALPS BLUE METALS INC

Handwritten signature: Mohanraj

Handwritten signature
Partner

8119 3018
15



For PCS INDUSTRIES PRIVATE LIMITED

Handwritten signature
Director



आयकर विभाग
INCOME TAX DEPARTMENT



भारत सरकार
GOVT. OF INDIA




स्थायी लेखा संख्या कार्ड
Permanent Account Number Card

AFTPM4934M

नाम/ Name
MOHAMED SHAGEE

पिता का नाम/ Father's Name
THULKARUNAI KAZNAVI


जन्म की तारीख/ Date of Birth
25/03/1983


हस्ताक्षर/ Signature



27062017



For ALPS BLUE METALS INC

Partner

Scanned by CamScanner

1 0119 0018
51 16

275



For PCS INDUSTRIES PRIVATE LIMITED


Director



Handwritten signature

For ALPS BLUE METALS INC
Handwritten signature
Partner

8119 8018
17
1



For PCS INDUSTRIES PRIVATE LIMITED

Handwritten signature
Director



भारत सरकार
GOVERNMENT OF INDIA



மனோரம முருகையன்
Manoharan Murugayan
தேய்தல் எண் / DOB : 06/05/1954
பாலம் / MALE

3681 7577 9392



உள்ளூர் அலுவலகம் (மதுரை) உ.க.ச.ப.இ



भारतीय विनिष्पत्ति पहचान प्राधिकरण
MINISTRY OF INFORMATION & PUBLIC RELATIONS OF INDIA

தகவல்
S/O முருகையன், அண் 44/65A B
பிளாக் ஫்ளாட் என் 1,
கிரிஸ்டல் கோர்ட், மெடவாகம்
கிரிஸ்டல் கோர்ட், கானேசு நகர்,
மதுரை, கர்நாடகம், இந்தியா
பி.சி. 600091

Address:
S/O: Murugayan, NO 44/65A B
BLOCK FLAT-S1, CRYSTAL
COURT, MEDAVAKKAM MAIN
ROAD, GANESH NAGAR,
Madipakkam, Kancheepuram,
Tamil Nadu, 600091



1827 1827 1827 1827 1827 1827 1827 1827 1827 1827
1827 1827 1827 1827 1827 1827 1827 1827 1827 1827

Handwritten signature

For ALPS BLUE METALS INC

Handwritten signature: K. Mohanraj

Handwritten signature
Partner

8119 2018
21 12
Handwritten signature



For PCS INDUSTRIES PRIVATE LIMITED

Handwritten signature
Director



PHOTOCOPY OF THE APPLIED LEASE AREA

Filed photos in respect of **M/s. PCS Industries Limited**, Rough Stone and Gravel quarry over an extent of 4.74.50 hectares of Patta Land in S.F.No: 223/1, 223/2, 224, 225/1 and 225/2 of Periyavenmani Village, Maduranthagam Taluk, Kancheepuram District, Tamil Nadu State.



Photographs showing general view of the proposed lease area



Photographs showing GPS coordinates of the pillar reading of the proposed lease area

For PCS INDUSTRIES PRIVATE LIMITED


Director



For PCS INDUSTRIES PRIVATE LIMITED

[Handwritten Signature]
Director

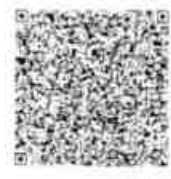


आयकर विभाग
INCOME TAX DEPARTMENT

भारत सरकार
GOVT OF INDIA

स्थायी लेखा संख्या कार्ड
Permanent Account Number Card

AAECP2879H



उत्पन्न नाम
PCS INDUSTRIES PRIVATE LIMITED

संस्था/संस्था की तिथि
Date of Incorporation/Formation
08/08/2007

18122018

PCS INDUSTRIES PRIVATE LIMITED

[Signature]
Director



भारतीय विशिष्ट पहचान प्राधिकरण
UNIQUE IDENTIFICATION AUTHORITY OF INDIA



भारत सरकार
GOVERNMENT OF INDIA



பெயர்:

VO: குருமூர்த்தி, சுதேவ் வன்
பிளாட்: வன் 921, 66வது தெரு
11வது சেক்டர், கலாிஙர் நகர்,
கலாிஙர் கரூரனிட்ளி நகர்,
சென்னை, தமிழ் நாடு, 600078

Address:

S/O: Gurusurthi, DOOR NO 6
PLOT NO 921, 66TH STREET
11TH SECTOR, KALAINGAR
NAGAR, Kalaignar Karunanidhi
Nagar, Chennai, Tamil Nadu,
600078



கு தியாகராஜன்
G Thiyagarajan
பிறந்த நாள் / DOB : 01/06/1960
ஆண் / MALE

4603 4819 9140



1947
1800 300 1947

help@uidai.gov.in

www.uidai.gov.in

P.O. Box No. 1947,
Bengaluru-560 001

ஆதாரம் - சாதாரண மனிதனின் அதிகாரம்

PCS INDUSTRIES PRIVATE LIMITED

Director



[Handwritten Signature]

अर्हता प्राप्त व्यक्ति के रूप में मान्यता प्रमाण पत्र
(खनिज रियायत नियमावली, 1960 के नियम 22सी के तहत)
CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON
(Under Rule 22C of Mineral Concession Rules, 1960)

श्री एस. करुपण्ण, मॉगनीकाडू, मुत्तमंपट्टी पोस्ट, बोम्मीडी वर्यो, ओमलूर तालुक, सेलम डीस्टीक्ट, तमिलनाडू - 635 301, जिनका फोटो और हस्ताक्षर ऊपर दिया हुआ है, तथा जिनहोंने अपनी अर्हता और अनुभव का संतोष जनक साक्ष्य दिया है, को खनन योजना तैयार करने हेतु खनिज रियायत नियमावली 1960 के नियम 22सी के तहत अर्हता प्राप्त व्यक्ति के रूप में मान्यता प्रदान की जाती है।

Shri S. Karuppannan, Manganikadu, Muthampatty (Post), Bommididi (Via), Omalur Taluk, Salem District, Tamilnadu - 635 301, whose **Photograph and signature** is affixed herein above, having given satisfactory evidence of his qualifications & experience hereby **RECOGNISED** under Rule 22C of the Mineral Concession Rule, 1960 as a Qualified Person to prepare Mining Plans.

उनकीपंजीयन संख्या है

His registration number is

RQP / MAS / 263 / 2014 / A

यह मान्यता 10 वर्षों की अवधि के लिए मान्यता है जो दिनांक 15.12.2024 को समाप्त होगी।
This recognition is valid for a period of 10 years ending on 15.12.2024.

उनके द्वारा प्रस्तुत खनन योजना में गलत जानकारी / दस्तावेज पाए जाने की स्थिति में यह प्रमाण पत्र वापस लिया जाएगा / निरस्त किया जाएगा।

This certificate will liable to be withdrawn / cancelled in the event of furnishing the wrong information / documents in the Mining Plan submitted by him.

स्थान/ Place : Chennai

दिनांक/ Date : 16.12.2014.

For F... INDUSTRIES PRIVATE LIMITED

282

[Handwritten Signature]
Director

[Handwritten Signature]

क्षेत्रीय खाननियंत्रक / Regional Controller of Mines
भारतीय खानब्यूरो/ Indian Bureau of Mines

Chennai Region

KEY MAP

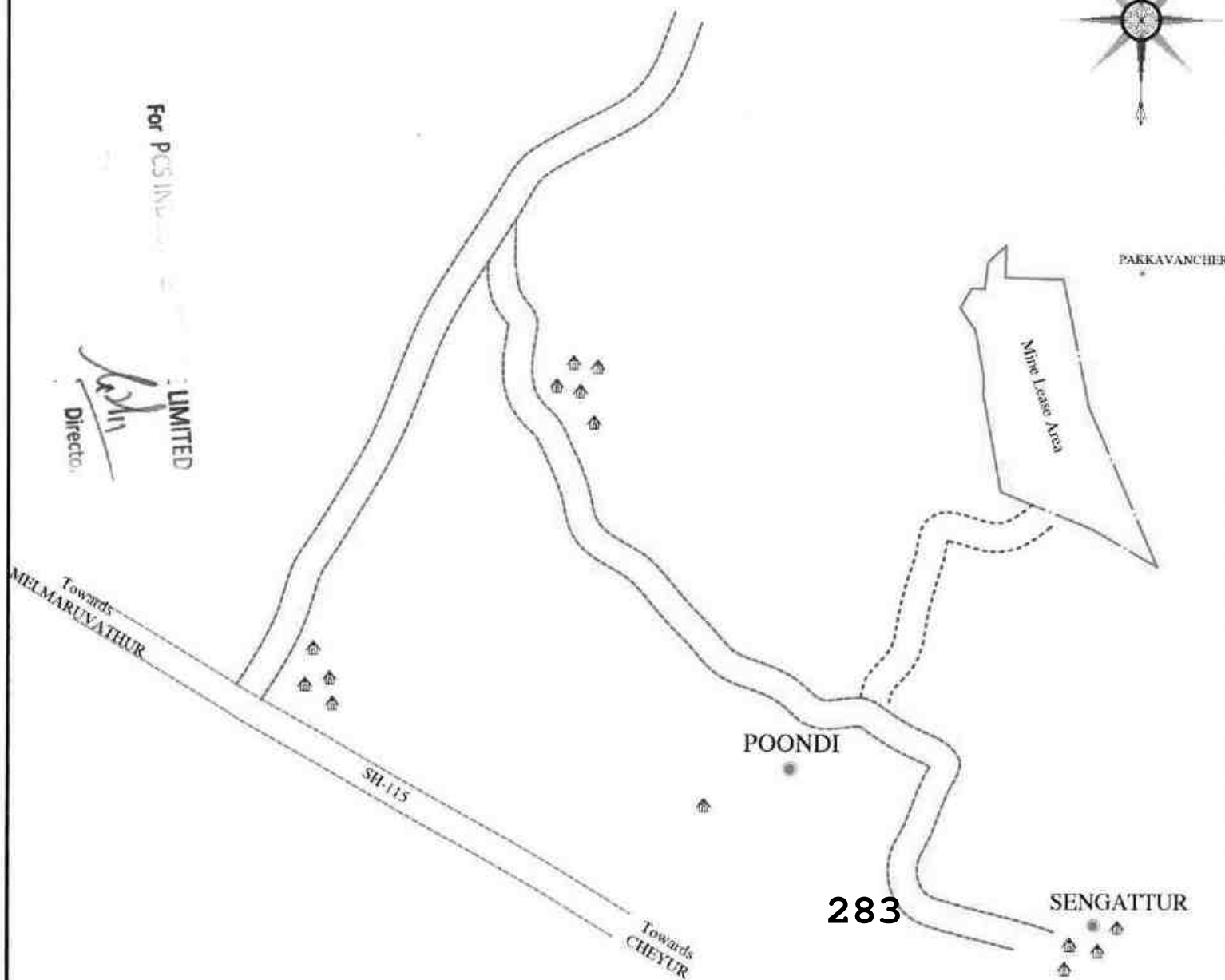
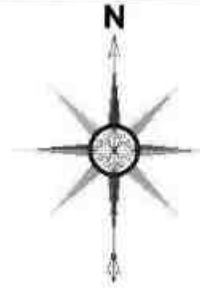


PLATE NO-I

APPLICANT:
M/s. PCS INDUSTRIES LIMITED,
C-10, FIFTH STREET,
INDUSTRIAL ESTATE,
AMBATTUR,
CHENNAI-600 058.

LEASE APPLIED AREA:
S.F.NO : 223/1, 223/2, 224,
225/1 & 225/2
EXTENT : 4.74.50 Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

INDEX

MINE LEASE AREA	
APPROACH ROAD	
SH -115 ROAD	
VILLAGE ROAD	

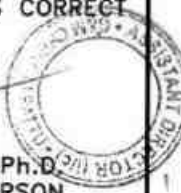
KEY MAP

Not to Scale

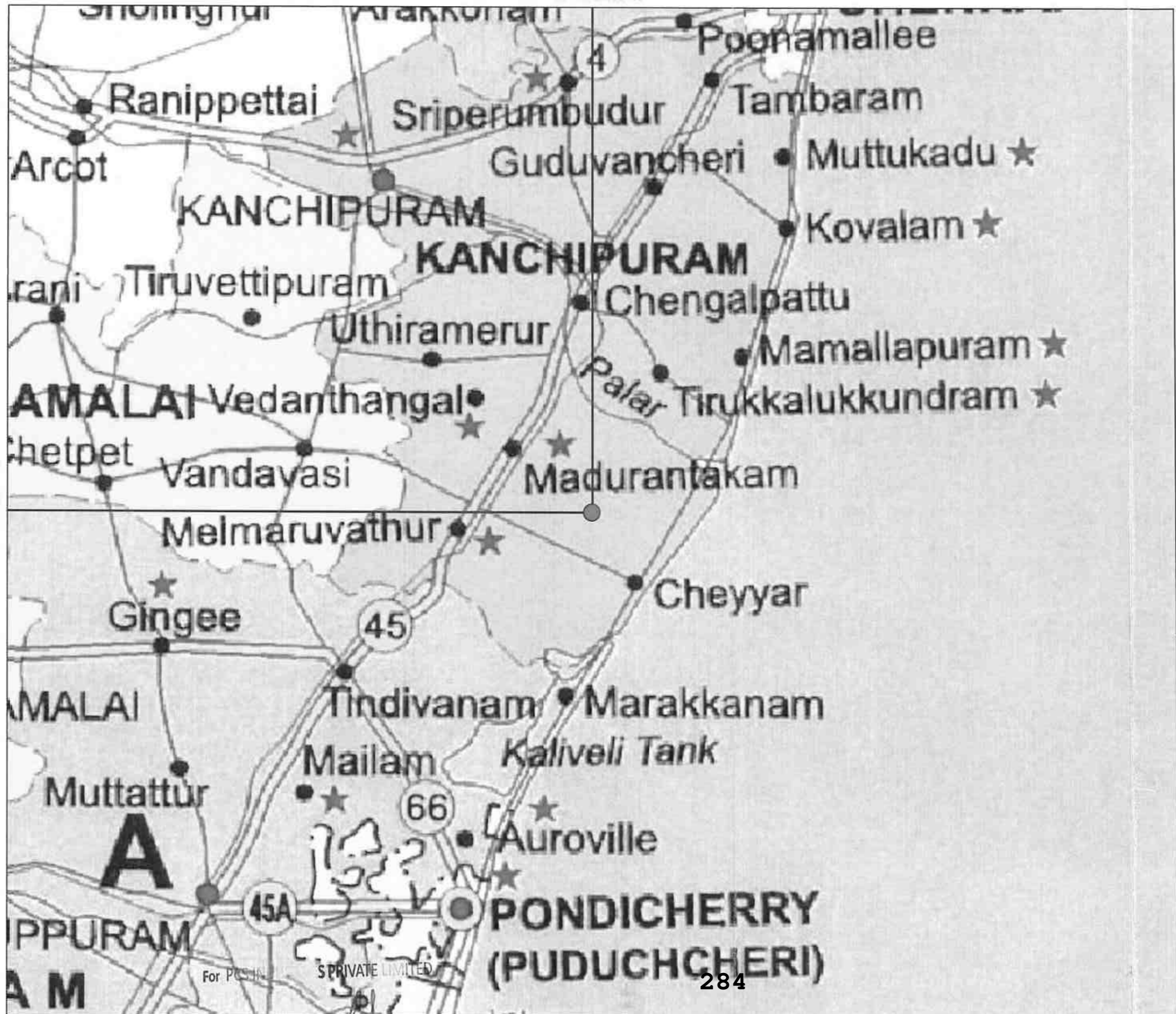
Prepared By:

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.
RECOGNIZED QUALIFIED PERSON
RQP/MAS/263/2014/A



12°23'43.89"N



79°59'10.57"E

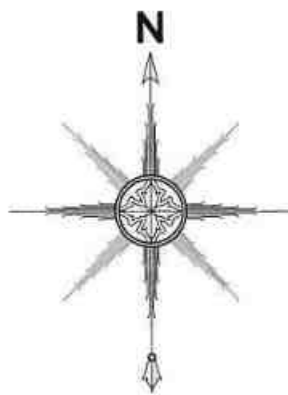


PLATE NO-IA

APPLICANT:
 M/s. PCS INDUSTRIES LIMITED.
 C-10, FIFTH STREET,
 INDUSTRIAL ESTATE,
 AMBATTUR,
 CHENNAI-600 058.

LEASE APPLIED AREA:
 S.F.NO : 223/1,223/2, 224,
 225/1 & 225/2
 EXTENT : 4.74.50Hect,
 VILLAGE : PERIYAVENMANI,
 TALUK : MADURANTHAGAM,
 DISTRICT : KANCHEEPURAM.

INDEX

MINE LEASE AREA: ●
 TOPO SHEET NO : 57-P/15
 LATITUDE : 12°23'30.04"N to 12°23'43.89"N
 LONGITUDE : 79°59'10.57"E to 79°59'19.31"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.
 RECOGNIZED QUALIFIED PERSON
 RQP/MAS/263/2014/A

For PCS INDUSTRIES PRIVATE LIMITED
 Director

12°23'43.89"N

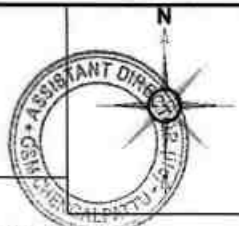


PLATE NO-IB

APPLICANT:
M/s. PCS INDUSTRIES LIMITED,
C-10, FIFTH STREET,
INDUSTRIAL ESTATE,
AMBATTUR,
CHENNAI-600 058.

LEASE APPLIED AREA:
S.F.NO : 223/1,223/2, 224,
225/1 &225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

TOPO SHEET NO : 57-P/15
LATITUDE : 12°23'30.04"N to 12°23'43.89"N
LONGITUDE : 79°59'10.57"E to 79°59'19.31"E

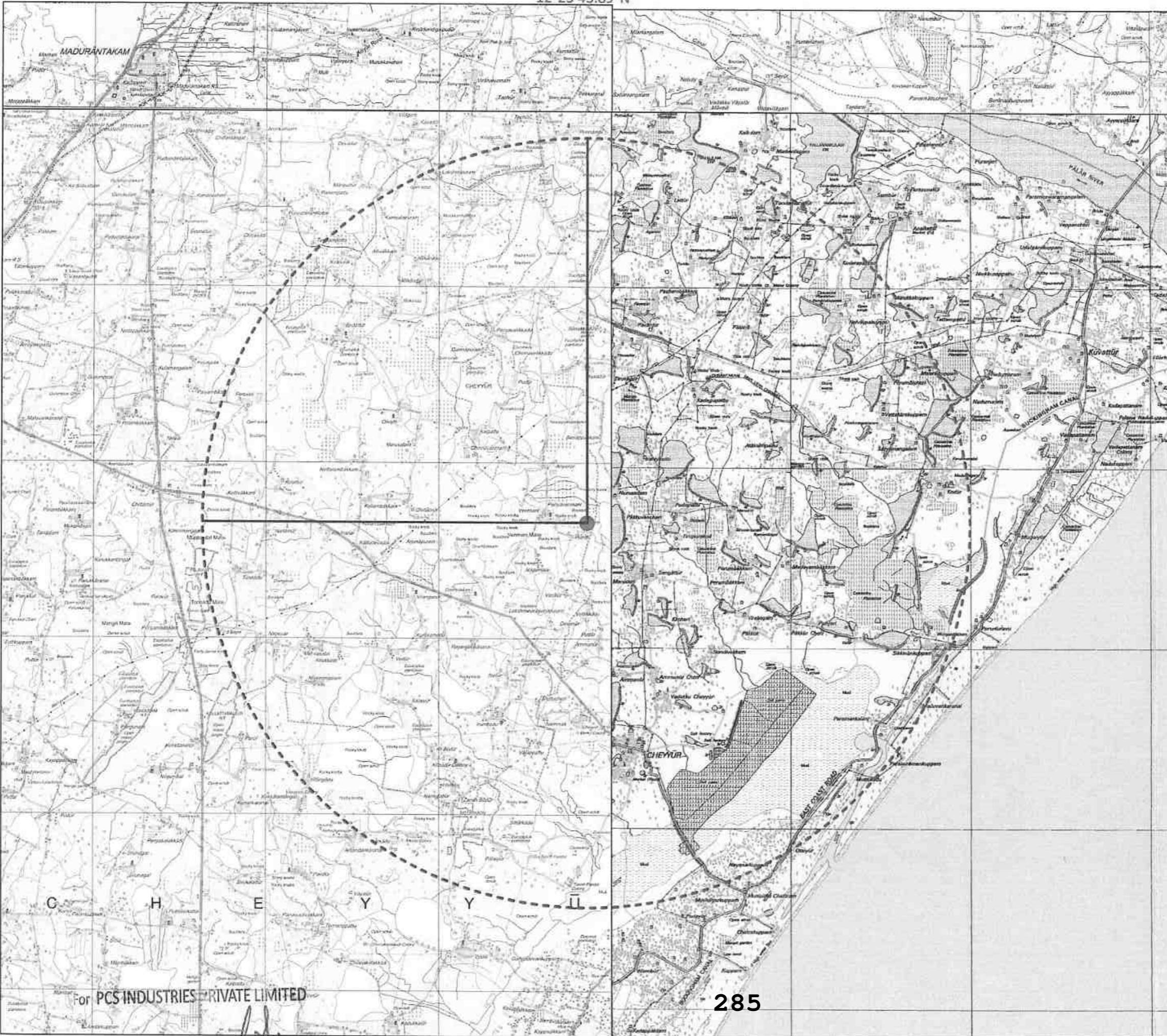
MINE LEASE AREA 
10KM RADIUS 

CONVENTIONAL SYMBOLS table with various symbols and their descriptions for topographic features like roads, rivers, and buildings.

TOPO SHEET 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.
RECOGNIZED QUALIFIED PERSON
ROP/MAS/263/2014/A



79°59'10.57"E

For PCS INDUSTRIES PRIVATE LIMITED

Director

12°23'43.89"N

79°59'10.57"E

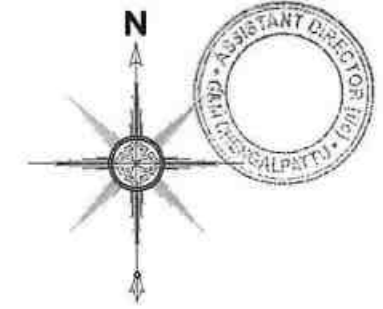






PLATE NO-IC

APPLICANT:
 M/s. PCS INDUSTRIES LIMITED.
 C-10, FIFTH STREET,
 INDUSTRIAL ESTATE,
 AMBATTUR,
 CHENNAI-600 058.

LEASE APPLIED AREA:

S.F.NO : 223/1,223/2, 224,
 225/1 & 225/2
 EXTENT : 4.74.50Hect,
 VILLAGE : PERIYAVENMANI,
 TALUK : MADURANTHAGAM,
 DISTRICT : KANCHEEPURAM.

INDEX

MINE LEASE AREA	
SAFETY DISTANCE	
APPROACH ROAD	
CART ROAD	
300m RADIUS	
500m RADIUS	
EXISTING QUARRY	

TOPO SHEET NO : 57-P/15
 LATITUDE : 12°23'30.04"N to 12°23'43.89"N
 LONGITUDE : 79°59'10.57"E to 79°59'19.31"E

SATELLITE IMAGERY MAP

SCALE- 1:6000

Prepared By:

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 HAS BEEN CHECKED BY ME AND IS CORRECT
 TO THE BEST OF MY KNOWLEDGE

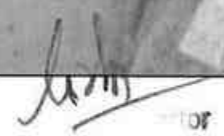


Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
 RECOGNIZED QUALIFIED PERSON
 RQP/MAS/263/2014/A

For PCS INL

286

Sengattur



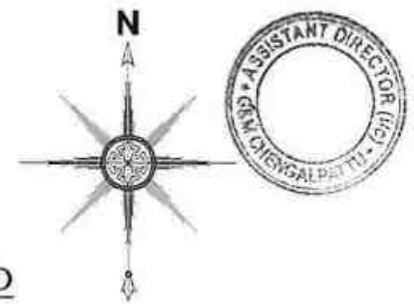


PLATE NO-ID

APPLICANT:
M/s. PCS INDUSTRIES LIMITED.
C-10, FIFTH STREET,
INDUSTRIAL ESTATE,
AMBATTUR,
CHENNAI-600 058.

LEASE APPLIED AREA:
S.F.NO : 223/1,223/2, 224,
225/1 &225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

INDEX

MINE LEASE AREA	
SAFETY DISTANCE	
APPROACH ROAD	
CART ROAD	
300m RADIUS	
500m RADIUS	
EXISTING QUARRY	
TREES & SHRUB	
WIND DIRECTION	

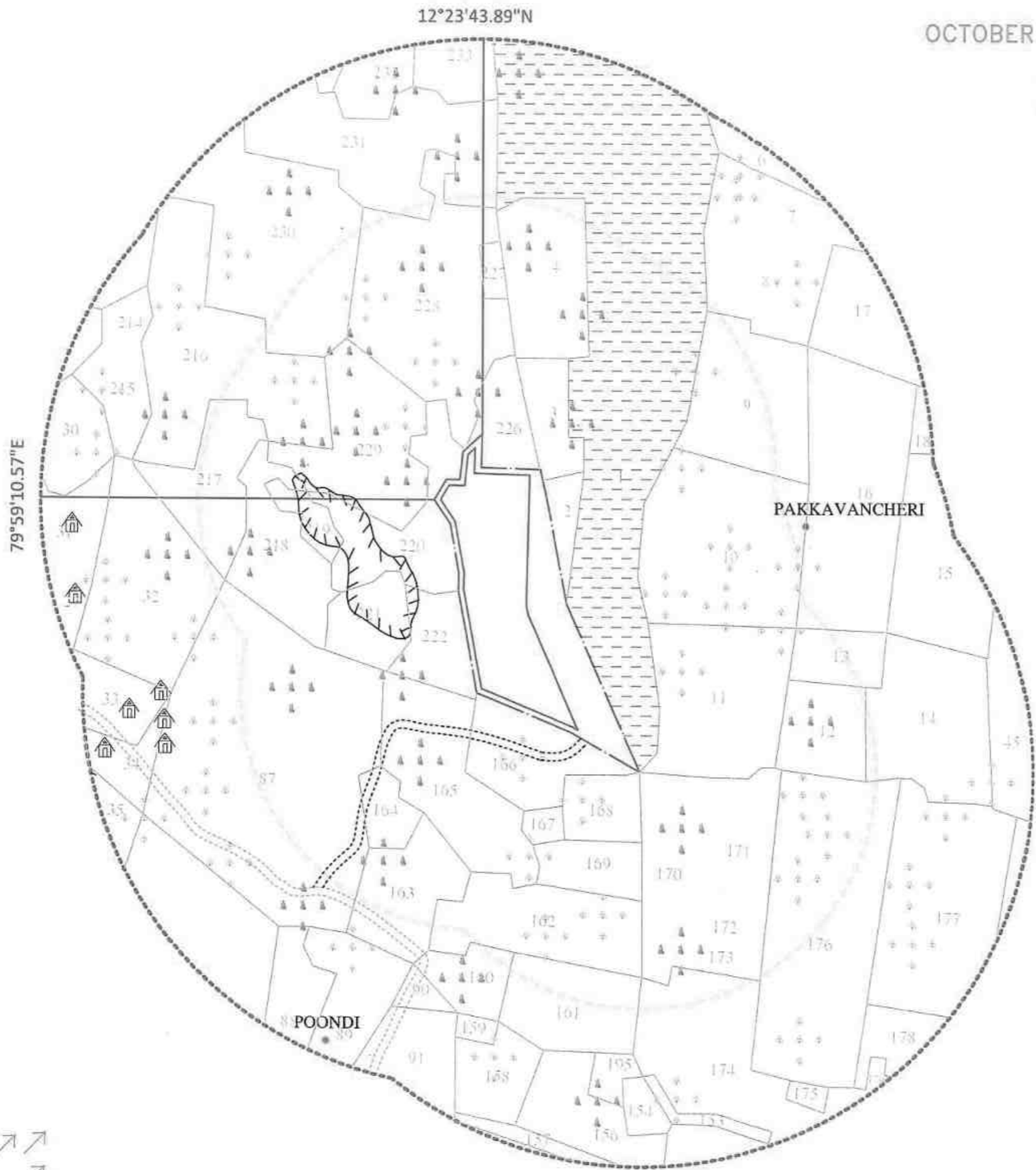
TOPO SHEET NO : 57-P/15
LATITUDE : 12°23'30.04"N to 12°23'43.89"N
LONGITUDE : 79°59'10.57"E to 79°59'19.31"E

ENVIRONMENTAL PLAN
SCALE- 1:6000

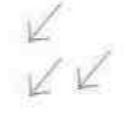
Prepared By:

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.
RECOGNIZED QUALIFIED PERSON
RQP/MAS/263/2014/A



OCTOBER TO DECEMBER



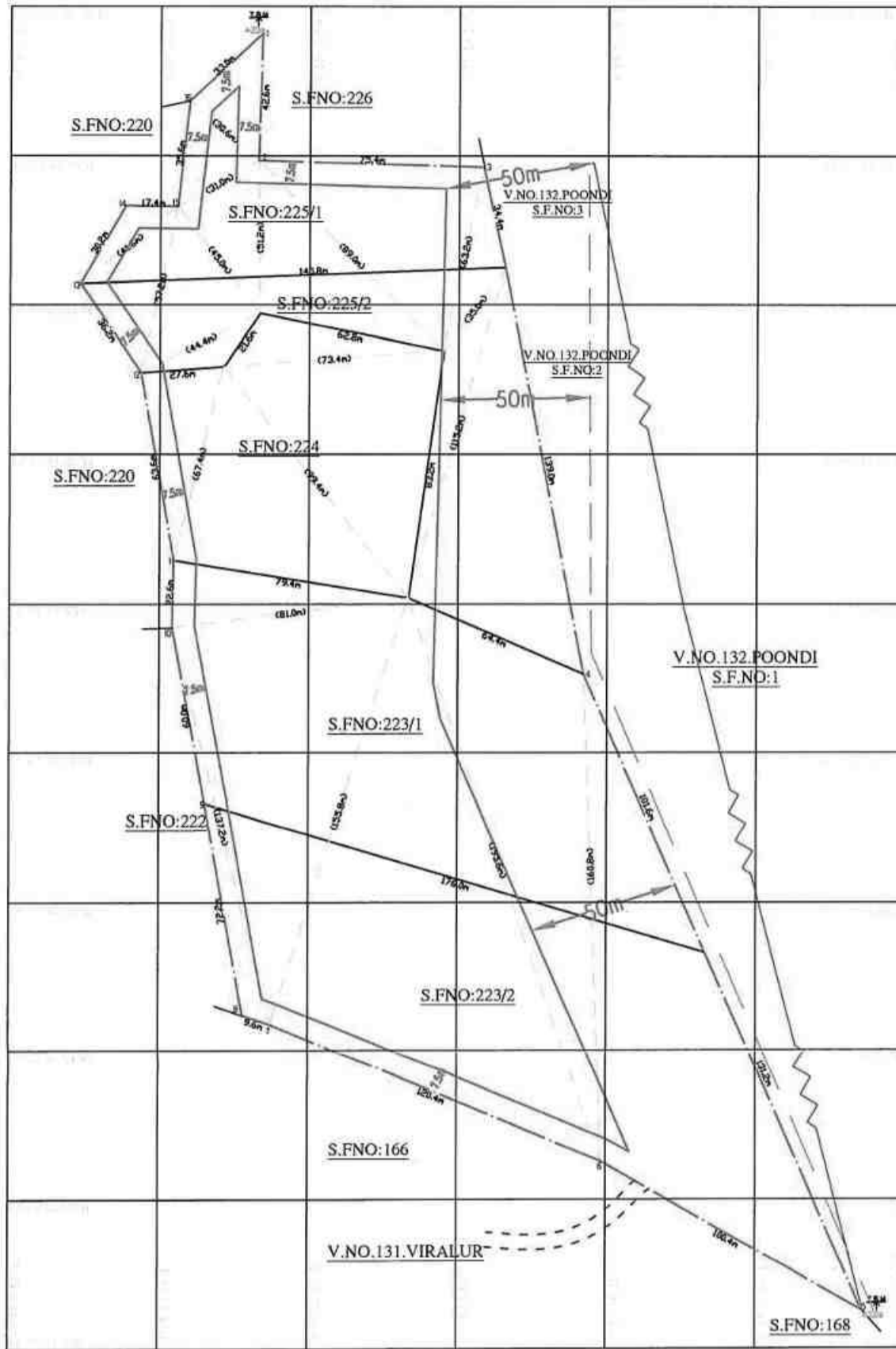
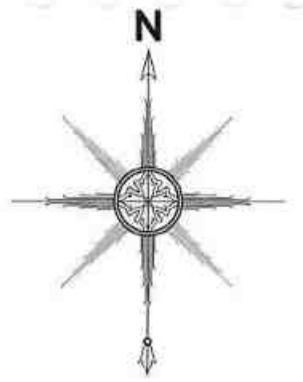
79°59'10.57"E

12°23'43.89"N

PAKKAVANCHERI

POONDI

For PCS INDUSTRIES LIMITED
JULY TO SEPTEMBER



288

Lable	Latitude	Longitude
1	12°23'43.89"N	79°59'12.59"E
2	12°23'42.54"N	79°59'12.54"E
3	12°23'42.47"N	79°59'15.05"E
4	12°23'36.93"N	79°59'16.22"E
5	12°23'30.04"N	79°59'19.31"E
6	12°23'31.61"N	79°59'16.51"E
7	12°23'32.94"N	79°59'13.06"E
8	12°23'33.21"N	79°59'12.45"E
9	12°23'35.18"N	79°59'12.09"E
10	12°23'37.45"N	79°59'11.66"E
11	12°23'38.25"N	79°59'11.66"E
12	12°23'40.20"N	79°59'11.27"E
13	12°23'41.14"N	79°59'10.57"E
14	12°23'42.05"N	79°59'11.05"E
15	12°23'42.08"N	79°59'11.67"E
16	12°23'43.15"N	79°59'11.78"E

For PCS INDUSTRIES PRIVATE LIMITED

[Signature]
Director

PLATE NO-II

APPLICANT:
M/s. PCS INDUSTRIES
LIMITED.
C-10, FIFTH STREET,
INDUSTRIAL ESTATE,
AMBATTUR,
CHENNAI-600 058.

LEASE APPLIED AREA:
S.F.NO : 223/1,223/2, 224,
225/1 & 225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

INDEX

- MINE LEASE BOUNDARY
- SAFETY AREA
- TEMPORARY BENCH MARK
- APPROACH ROAD
- EB LINE
- LAKE

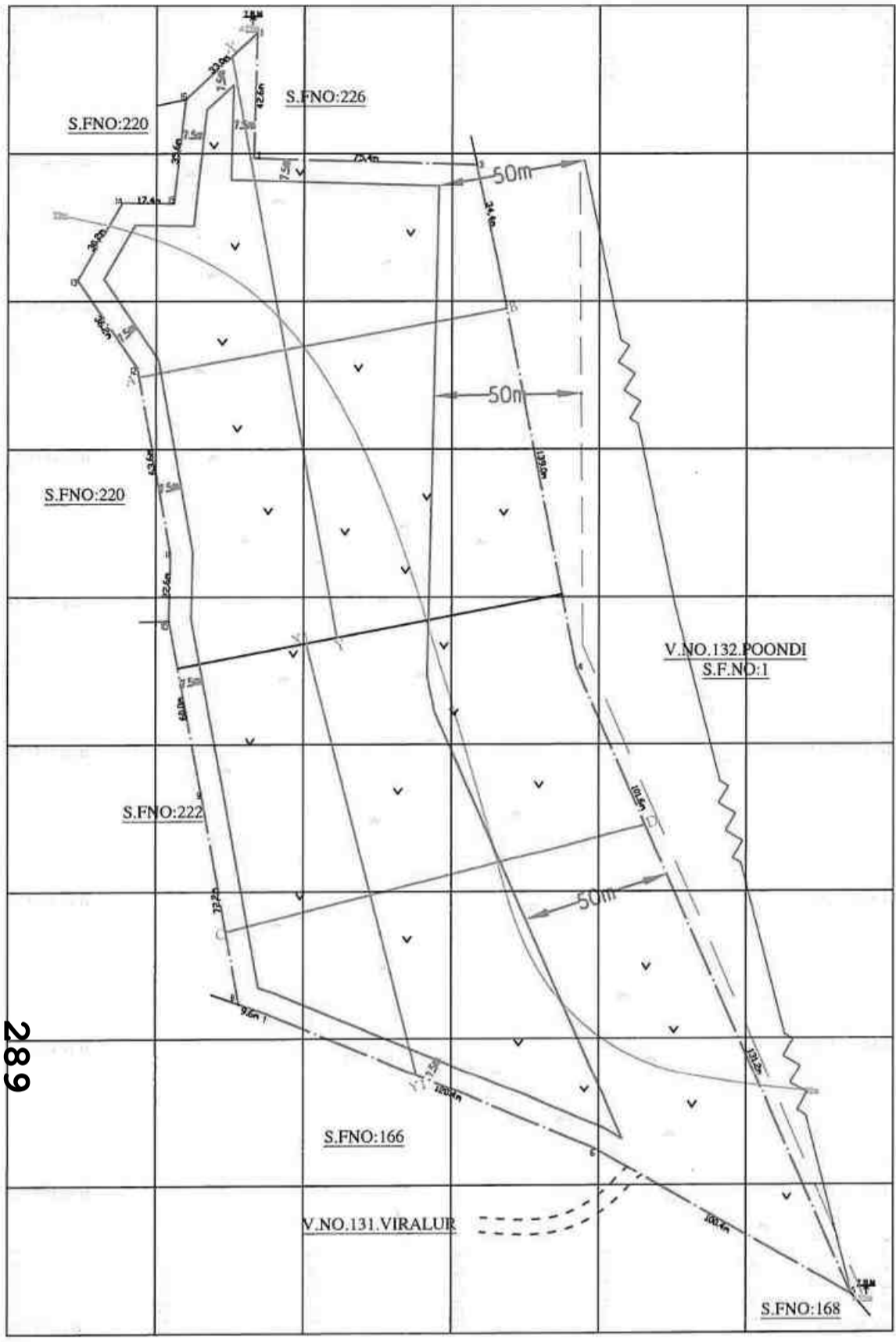
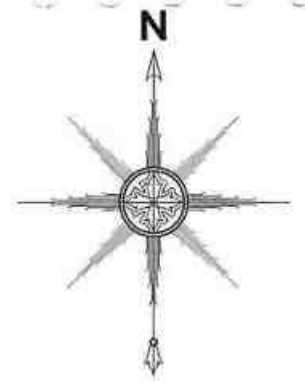
MINE LEASE PLAN
SCALE 1 : 2000

Prepared By:

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

[Signature]
Dr.S.KARUPANNAN,M.Sc.,Ph.D.
RECOGNIZED QUALIFIED PERSON
RQP/MAS/263/2014/A

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GEOLOGICAL RESOURCES							
Section	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Geological Resources in CBM	Gravel in CBM
XY-AB	I	200	126	2	50400		50400
	I	200	126	3	75600	75600	
	II	200	126	5	126000	126000	
	III	200	126	5	126000	126000	
	IV	200	126	5	126000	126000	
	V	200	126	5	126000	126000	
	VI	200	126	5	126000	126000	
	VII	200	126	5	126000	126000	
	VIII	200	126	5	126000	126000	
IX	200	126	5	126000	126000		
TOTAL					1134000	1083600	50400
X1Y1-CD	I	151	147	2	44394		44394
	I	151	147	3	66591	66591	
	II	151	147	5	110985	110985	
	III	151	147	5	110985	110985	
	IV	151	147	5	110985	110985	
	V	151	147	5	110985	110985	
	VI	151	147	5	110985	110985	
	VII	151	147	5	110985	110985	
	VIII	151	147	5	110985	110985	
IX	151	147	5	110985	110985		
TOTAL					998865	954471	44394
GRAND TOTAL					2132865	2038071	94794

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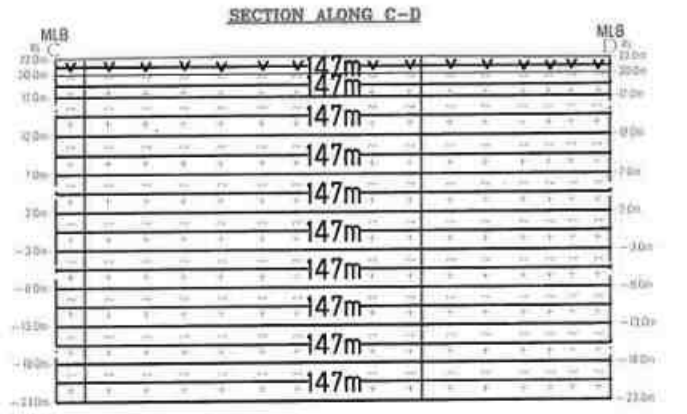
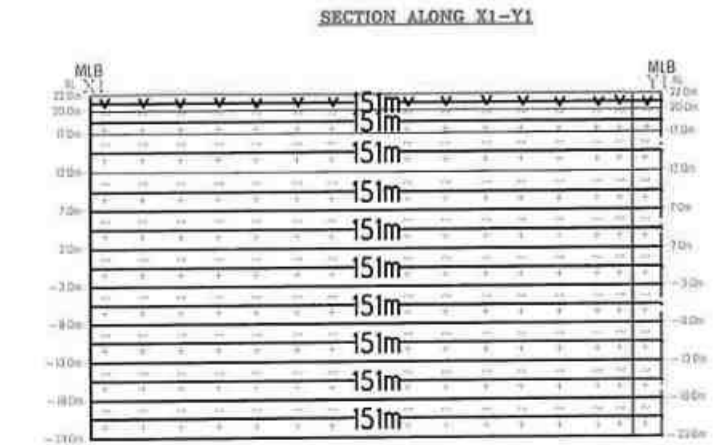
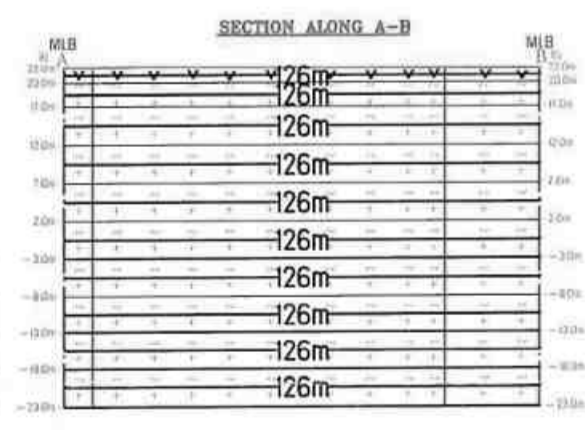
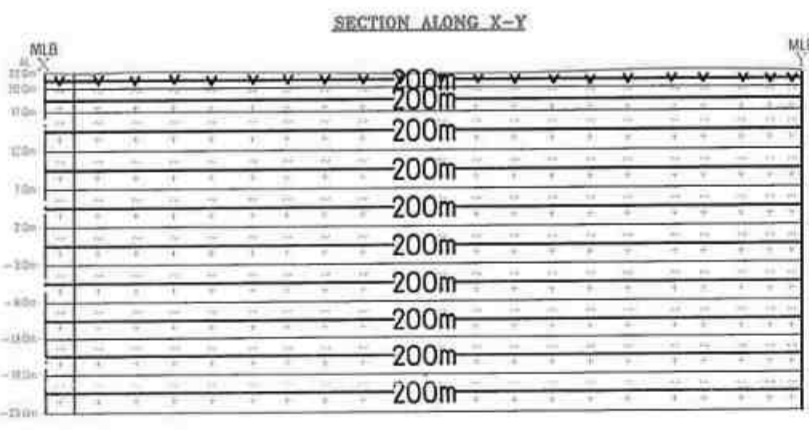
PLATE NO-III

APPLICANT:
 M/s. PCS INDUSTRIES LIMITED.
 C-10, FIFTH STREET,
 INDUSTRIAL ESTATE,
 AMBATTUR,
 CHENNAI-600 058.

LEASE APPLIED AREA:
 S.F.NO : 223/1,223/2, 224,
 225/1 & 225/2
 EXTENT : 4.74.50Hect,
 VILLAGE : PERIYAVENMANI,
 TALUK : MADURANTHAGAM,
 DISTRICT : KANCHEEPURAM.

INDEX

MINE LEASE BOUNDARY	
SAFETY AREA	
TEMPORARY BENCH MARK	
APPROACH ROAD	
SCRUP	
GRAVEL	
CONTOUR LINE	
EB LINE	
LAKE	



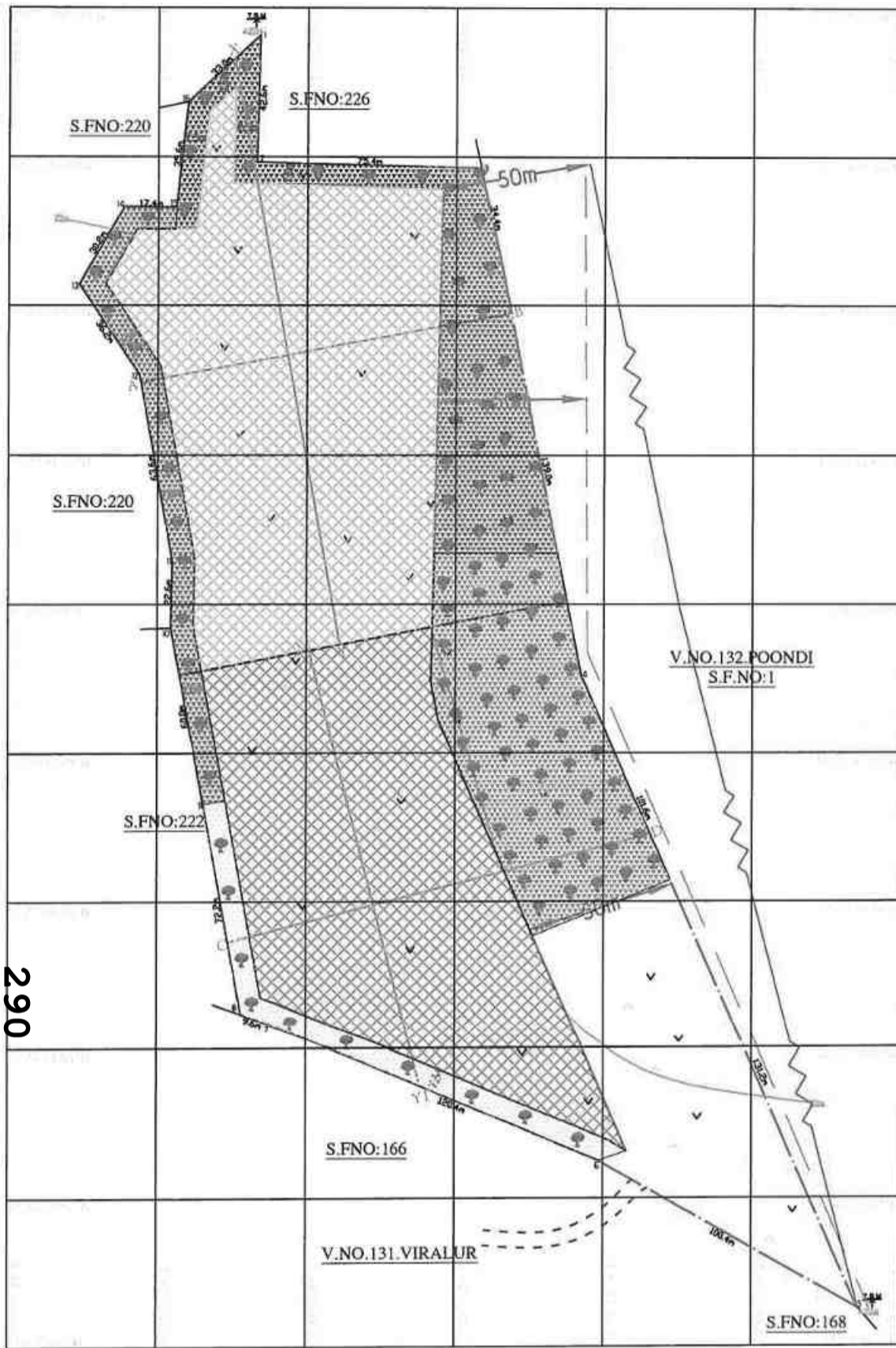
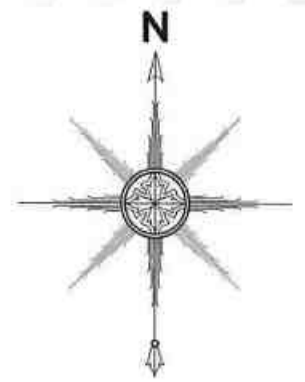
For PCS INDUSTRIES PRIVATE LIMITED

[Signature]
 Director

**SURFACE, GEOLOGICAL
 PLAN AND SECTION
 PLAN SCALE 1 : 2000
 SECTION HOR 1 : 2000 & VER 1 : 1000**

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

[Signature]
 Dr.S.KARUPPANNAN, M.Sc., Ph.D.
 RECOGNIZED QUALIFIED PERSON
 RQP/MAS/263/2014/A



YEARWISE PRODUCTION								
Section	Year	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Mineable Recoverable Reserves in CBM@100%	Gravel in CBM
XY-AB	I-YEAR	I	192	93	2	35712		35712
		I	192	93	3	53568	53568	
		II	181	83	5	75115	75115	
	II-YEAR	II	6	83	5	2490	2490	
		III	182	73	5	66430	66430	
		IV	177	63	5	55755	55755	
		V	15	53	5	3975	3975	
		V	157	53	5	41605	41605	
	III-YEAR	VI	167	43	5	35905	35905	
VII		162	33	5	26730	26730		
VIII		137	23	5	15755	15755		
IX		108	13	5	7020	7020		
XIYI-CD	IV-YEAR	I	144	89	2	25632		25632
		I	144	89	3	38448	38448	
		II	139	79	5	54905	54905	
	V-YEAR	III	110	69	5	37950	37950	
		III	24	69	5	8280	8280	
		IV	129	59	5	38055	38055	
		V	124	49	5	30380	30380	
		VI	119	39	5	23205	23205	
		VII	114	29	5	16530	16530	
TOTAL	VIII	109	19	5	10355	10355		
	IX	44	9	5	1980	1980		
TOTAL						705780	644436	61344

- A - OFFICE
- B - STORE
- C - FIRST AID
- D - REST ROOM
- E - TOILET

- 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
- II - Year Proposed area to be Planted
- III - Year Proposed area to be Planted
- IV - Year Proposed area to be Planted
- V - Year Proposed area to be Planted

PLATE NO-IV

APPLICANT:
 M/s. PCS INDUSTRIES LIMITED.
 C-10, FIFTH STREET,
 INDUSTRIAL ESTATE,
 AMBATTUR,
 CHENNAI-600 058.

LEASE APPLIED AREA:
 S.F.NO : 223/1,223/2, 224,
 225/1 & 225/2
 EXTENT : 4.74.50Hect,
 VILLAGE : PERIYAVENMANI,
 TALUK : MADURANTHAGAM,
 DISTRICT : KANCHEEPURAM.

INDEX

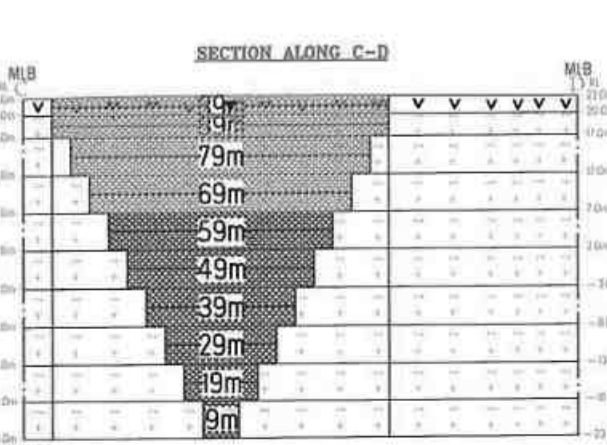
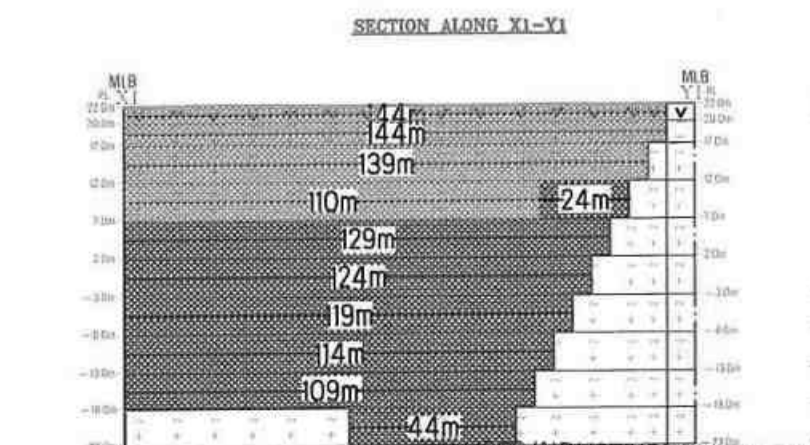
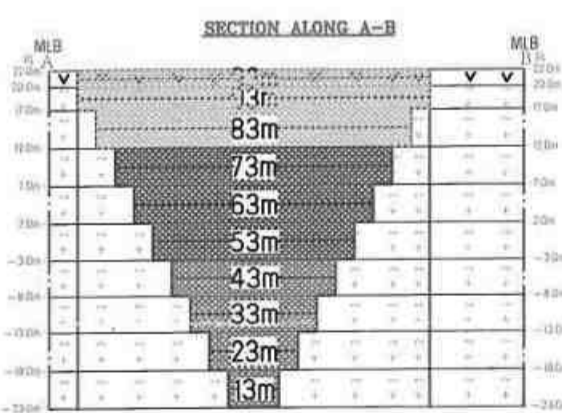
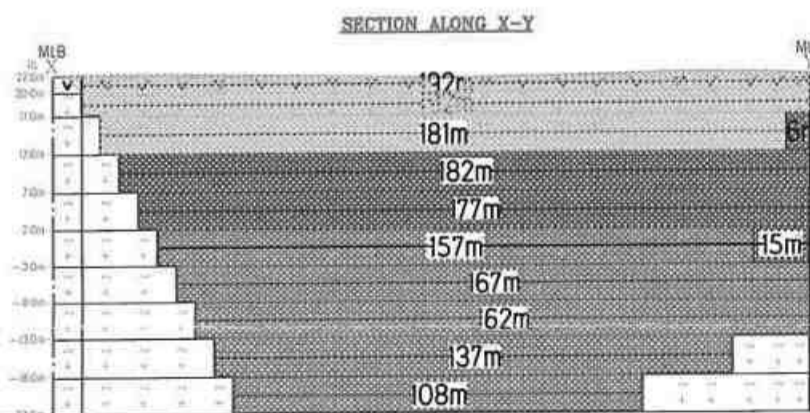
- MINE LEASE BOUNDARY
- SAFETY AREA
- TEMPORARY BENCH MARK
- APPROACH ROAD
- SCRUP
- GRAVEL
- CONTOUR LINE
- EB LINE
- LAKE

**YEARWISE DEVELOPMENT,
 PRODUCTION PLAN AND SECTION
 PLAN SCALE 1 : 2000
 SECTION HOR 1 : 2000 & VER1: 1000**

Prepared By:
 I DO HEREBY CERTIFY THAT THE PLAN HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE



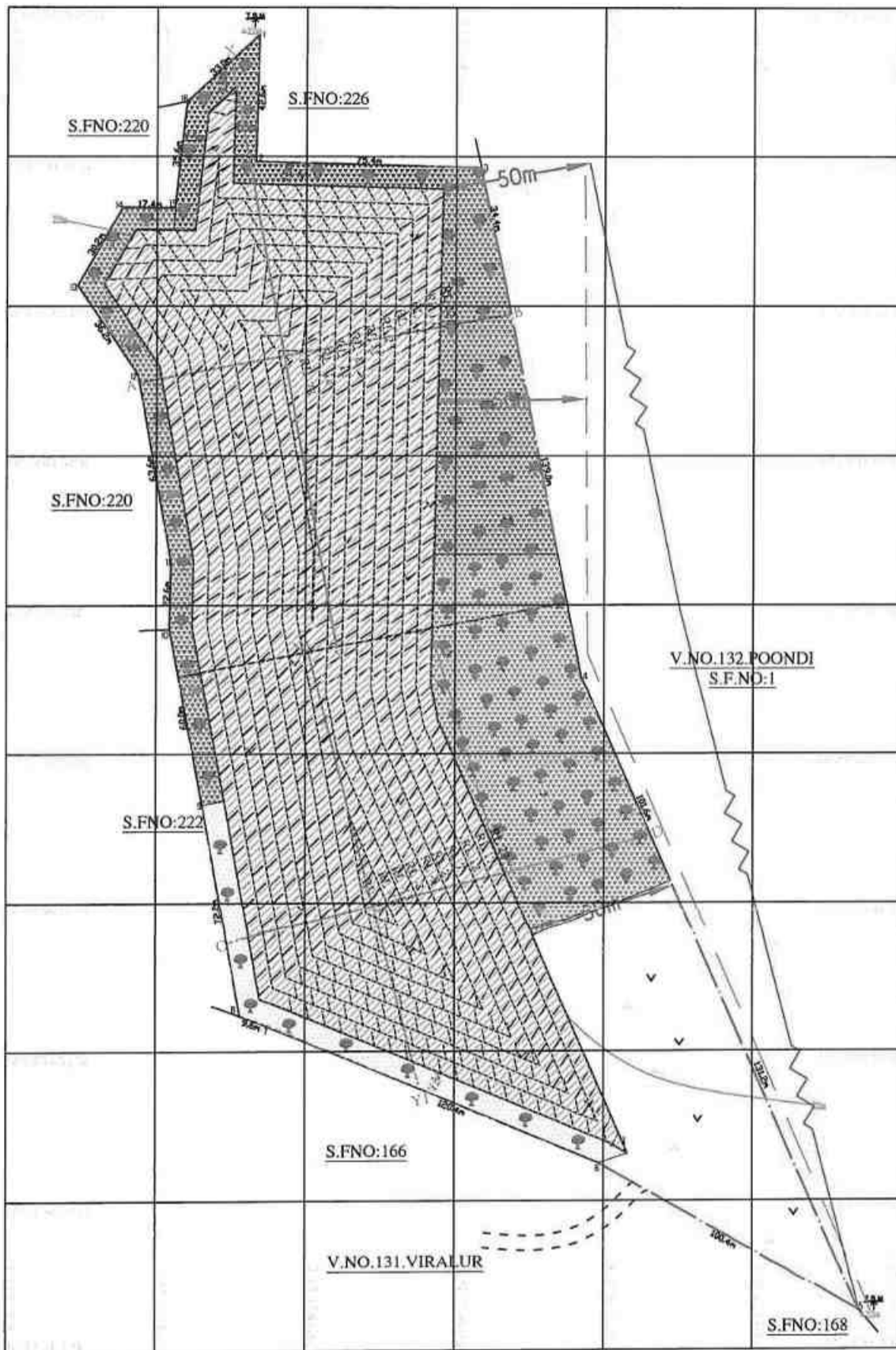
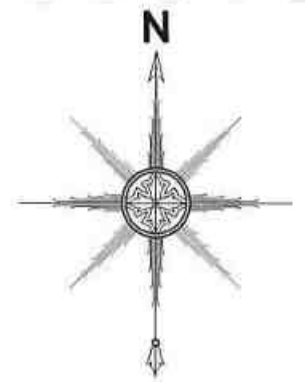
Dr.S.KARUPPANNAN,M.Sc.,Ph.D.
 RECOGNIZED QUALIFIED PERSON
 RQP/MAS/263/2014/A



For PCS INDUSTRIES PRIVATE LIMITED

[Signature]
 Director

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I - Year Proposed area to be Quarried		A - OFFICE	I - Year Proposed area to be Planted	
II - Year Proposed area to be Quarried		B - STORE	II - Year Proposed area to be Planted	
III - Year Proposed area to be Quarried		C - FIRST AID	III - Year Proposed area to be Planted	
IV - Year Proposed area to be Quarried		D - REST ROOM	IV - Year Proposed area to be Planted	
V - Year Proposed area to be Quarried		E - TOILET	V - 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	2.69.43	
INFRASTRUCTURE	NIL	0.01.00	
ROADS	0.01.00	0.02.00	
UN-UTILIZED AREA	4.73.50	0.61.54	
SAFETY&GREEN BELT	NILL	1.40.53	
GRAND TOTAL	4.74.50Hect	4.74.50Hect	

For PCS INDUSTRIES PRIVATE LIMITED

Director

PLATE NO-V

APPLICANT:
M/s. PCS INDUSTRIES LIMITED.
C-10, FIFTH STREET,
INDUSTRIAL ESTATE,
AMBATTUR,
CHENNAI-600 058.

LEASE APPLIED AREA:
S.F.NO : 223/1, 223/2, 224,
225/1 & 225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

INDEX

MINE LEASE BOUNDARY	
SAFETY AREA	
TEMPORARY BENCH MARK	
APPROACH ROAD	
SCRUP	
GRAVEL	
CONTOUR LINE	
EB LINE	
LAKE	
BENCH	

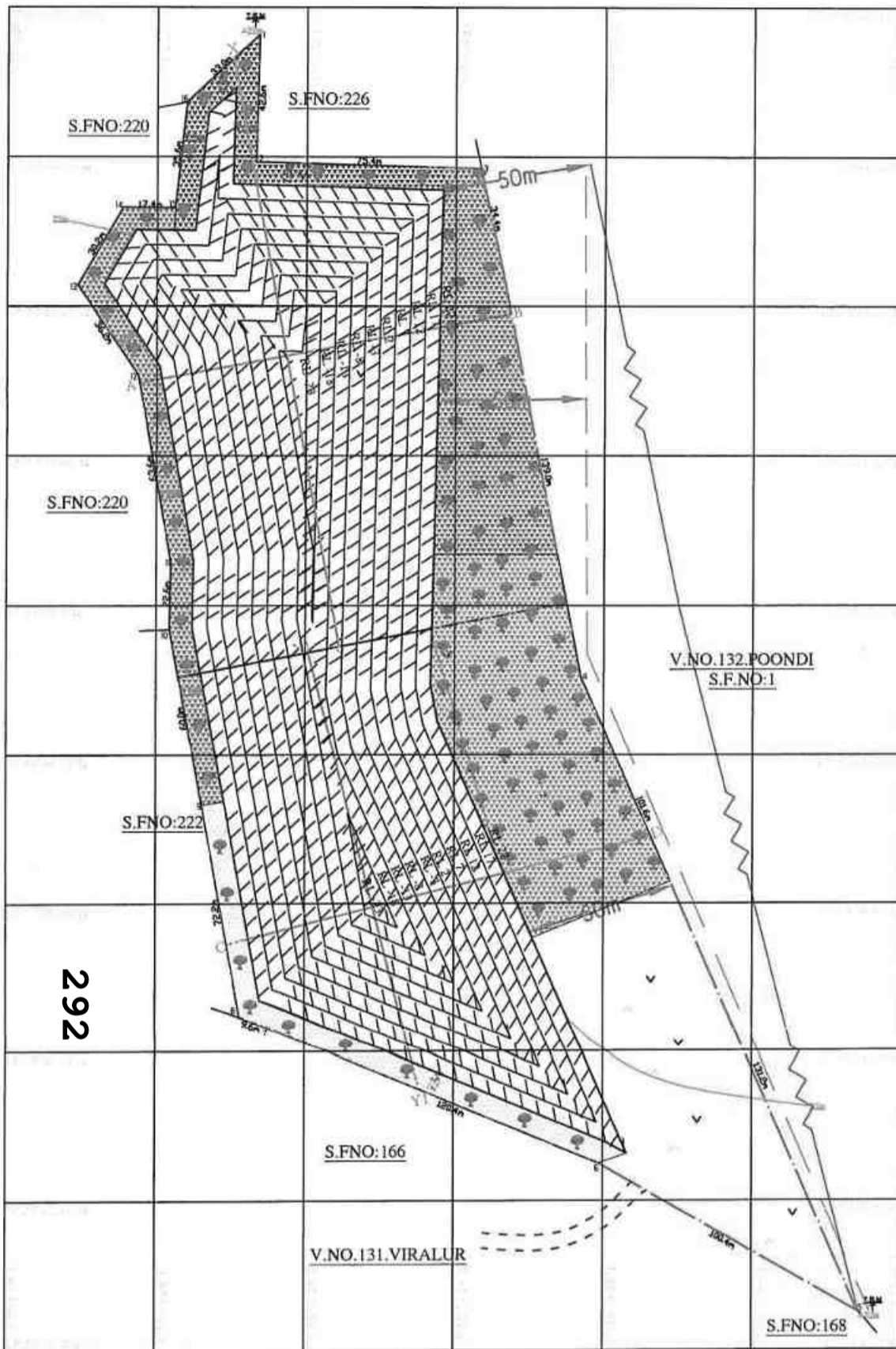
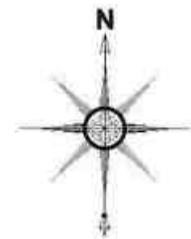
**MINE LAYOUT PLAN AND
LAND USE PATTERN
SCALE 1 : 2000**

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.
RECOGNIZED QUALIFIED PERSON
RQP/MAS/263/2014/A

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MINEABLE RESERVES							
Section	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Mineable Reserves in CBM@10 0%	Gravel in CBM
XY-AB	I	192	93	2	35712		35712
	I	192	93	3	53568	53568	
	II	187	83	5	77605	77605	
	III	182	73	5	66430	66430	
	IV	177	63	5	55755	55755	
	V	172	53	5	45580	45580	
	VI	167	43	5	35905	35905	
	VII	162	33	5	26730	26730	
	VIII	137	23	5	15755	15755	
IX	108	13	5	7020	7020		
TOTAL					420060	384348	35712
X1Y1-CD	I	144	89	2	25632		25632
	I	144	89	3	38448	38448	
	II	139	79	5	54905	54905	
	III	134	69	5	46230	46230	
	IV	129	59	5	38055	38055	
	V	124	49	5	30380	30380	
	VI	119	39	5	23205	23205	
	VII	114	29	5	16530	16530	
	VIII	109	19	5	10355	10355	
IX	44	9	5	1980	1980		
TOTAL					285720	260088	25632
GRAND TOTAL					705780	644436	61344

- A - OFFICE
- B - STORE
- C - FIRST AID
- D - REST ROOM
- E - TOILET

- I - Year Proposed area to be Quarried
- II - Year Proposed area to be Quarried
- III - Year Proposed area to be Quarried
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- I - Year Proposed area to be Planted
- II - Year Proposed area to be Planted
- III - Year Proposed area to be Planted
- IV - Year Proposed area to be Planted
- V - Year Proposed area to be Planted

PLATE NO-VI

APPLICANT:
M/s. PCS INDUSTRIES LIMITED.
C-10, FIFTH STREET,
INDUSTRIAL ESTATE,
AMBATTUR,
CHENNAI-600 058.

LEASE APPLIED AREA:
S.F.NO : 223/1,223/2, 224,
225/1 &225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

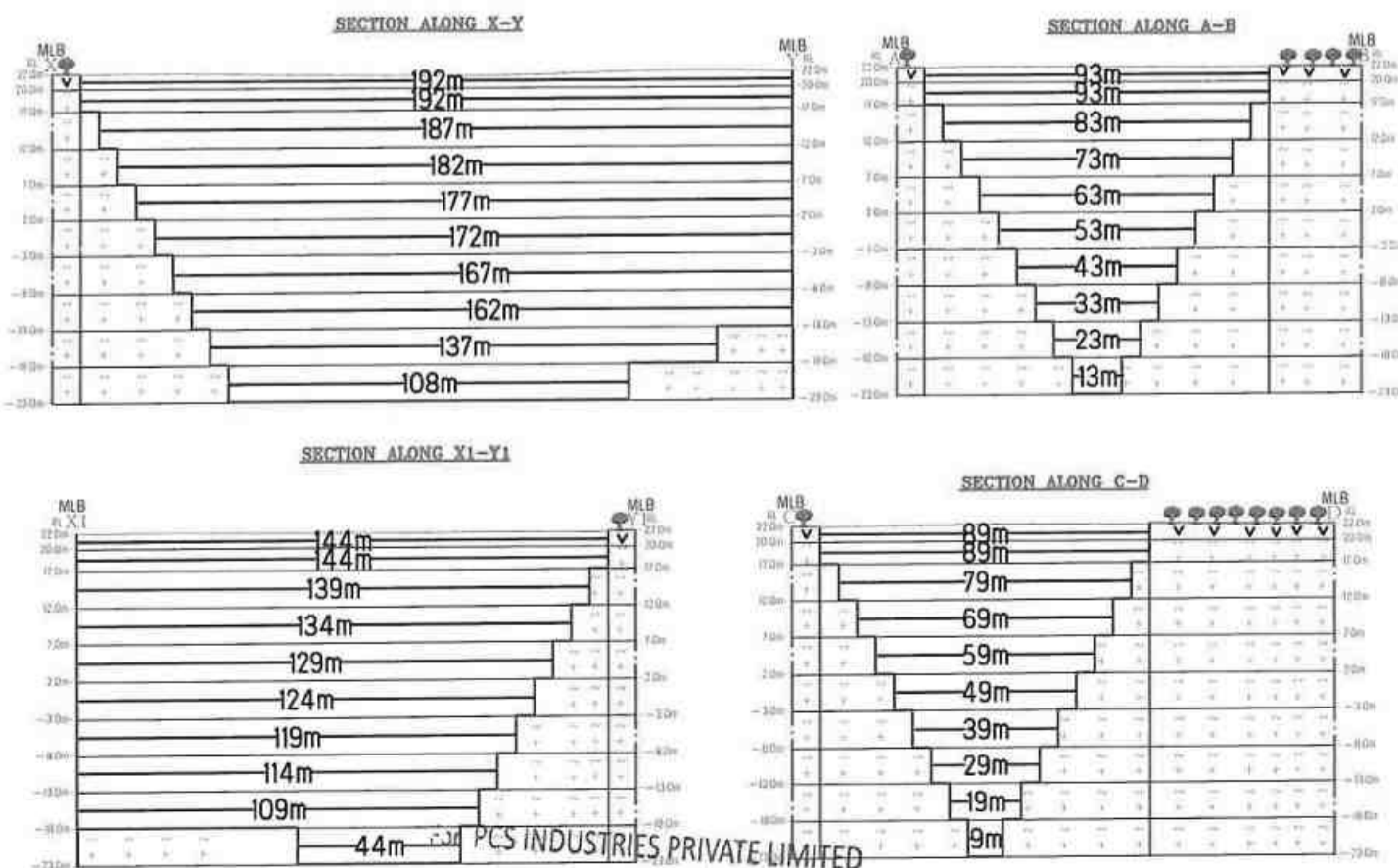
INDEX

- MINE LEASE BOUNDARY
- SAFETY AREA
- TEMPORARY BENCH MARK
- APPROACH ROAD
- SCRUP
- GRAVEL
- CONTOUR LINE
- EB LINE
- LAKE
- ULTIMAE BENCH

CONCEPTUAL PLAN & SECTION
SCALE 1:2000
SECTION HOR 1 : 2000 & VER 1:1000

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

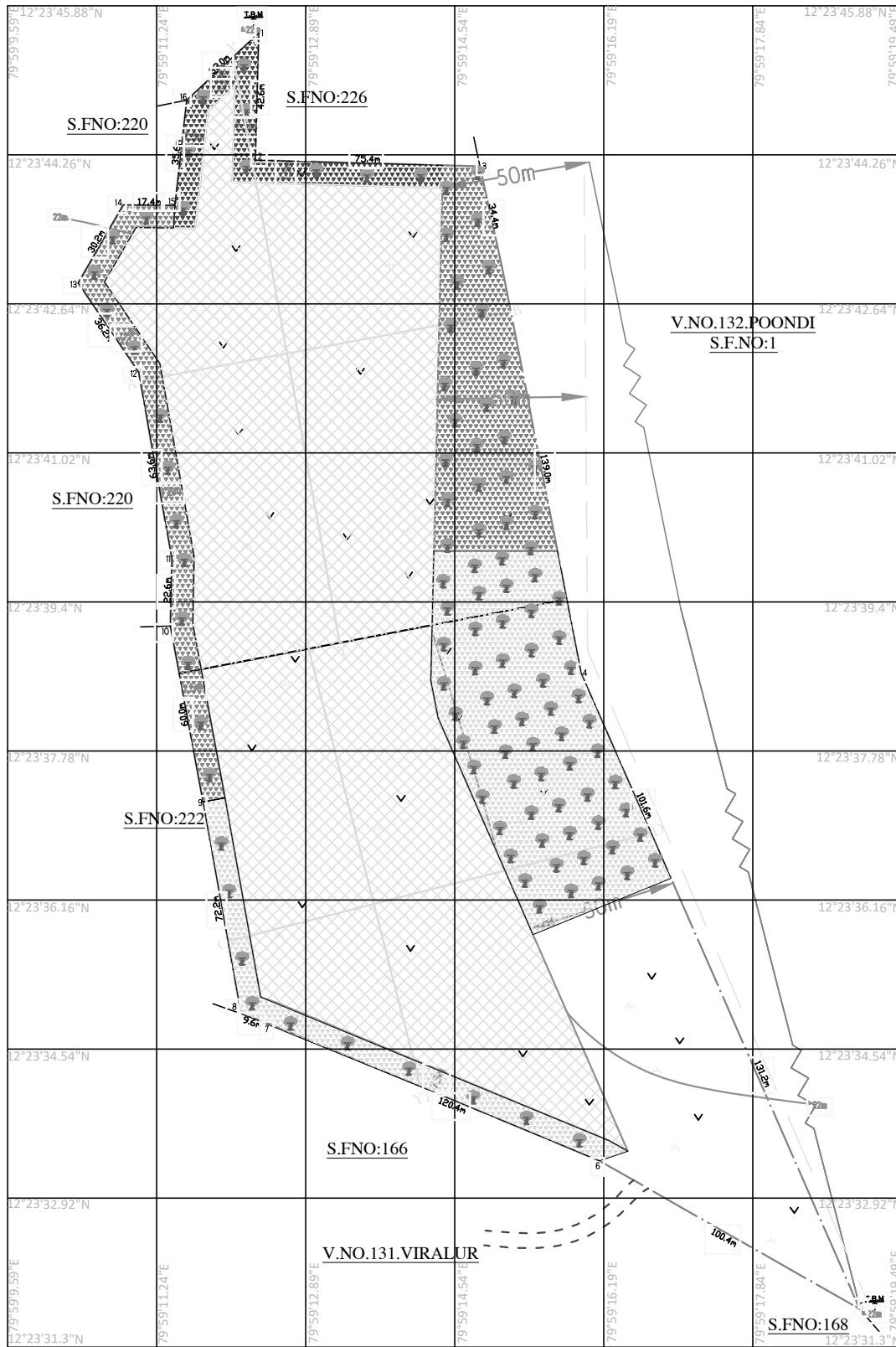
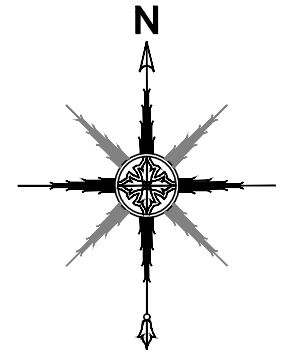
[Signature]
Dr. S.KARUPPANNAN, M.Sc., Ph.D.
RECOGNIZED QUALIFIED PERSON
RQP/MAS/263/2014/A



PCS INDUSTRIES PRIVATE LIMITED

[Signature]

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YEARWISE PRODUCTION								
Section	Year	Bench	length in (m)	Width in (m)	Depth in (m)	Volume in CBM	Mineable Recoverable Reserves in CBM@100%	Gravel in CBM
XY-AB	I-YEAR	I	192	93	2	35712		35712
		II	192	93	3	51368	51368	
	II-YEAR	II	181	83	5	75115	75115	
		III	6	83	5	2490	2490	
		IV	182	73	5	66430	66430	
	III-YEAR	V	177	63	5	55755	55755	
		V	15	53	5	3975	3975	
VI		157	53	5	41605	41605		
VII		167	43	5	35905	35905		
VIII		162	33	5	26730	26730		
XIV1-C1	IV-YEAR	I	144	89	2	25632		25632
		II	141	80	3	38448	38448	
	V-YEAR	III	139	79	5	54905	54905	
		IV	110	69	5	37950	37950	
		V	24	69	5	8280	8280	
	VI-YEAR	VI	129	59	5	38055	38055	
		VII	124	49	5	30380	30380	
VIII		119	39	5	23205	23205		
TOTAL						670670	609326	61344

- A - OFFICE
- B - STORE
- C - FIRST AID
- D - REST ROOM
- E - TOILET

- I - Year Proposed area to be Quarried
- II - Year Proposed area to be Quarried
- III - Year Proposed area to be Quarried
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- I - Year Proposed area to be Planted
- II - Year Proposed area to be Planted
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- V - Year Proposed area to be Planted

PLATE NO-IV

APPLICANT:
 M/s. PCS INDUSTRIES LIMITED.
 C-10, FIFTH STREET,
 INDUSTRIAL ESTATE,
 AMBATTUR,
 CHENNAI-600 058.

LEASE APPLIED AREA:
 S.F.NO : 223/1,223/2, 224,
 225/1 & 225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

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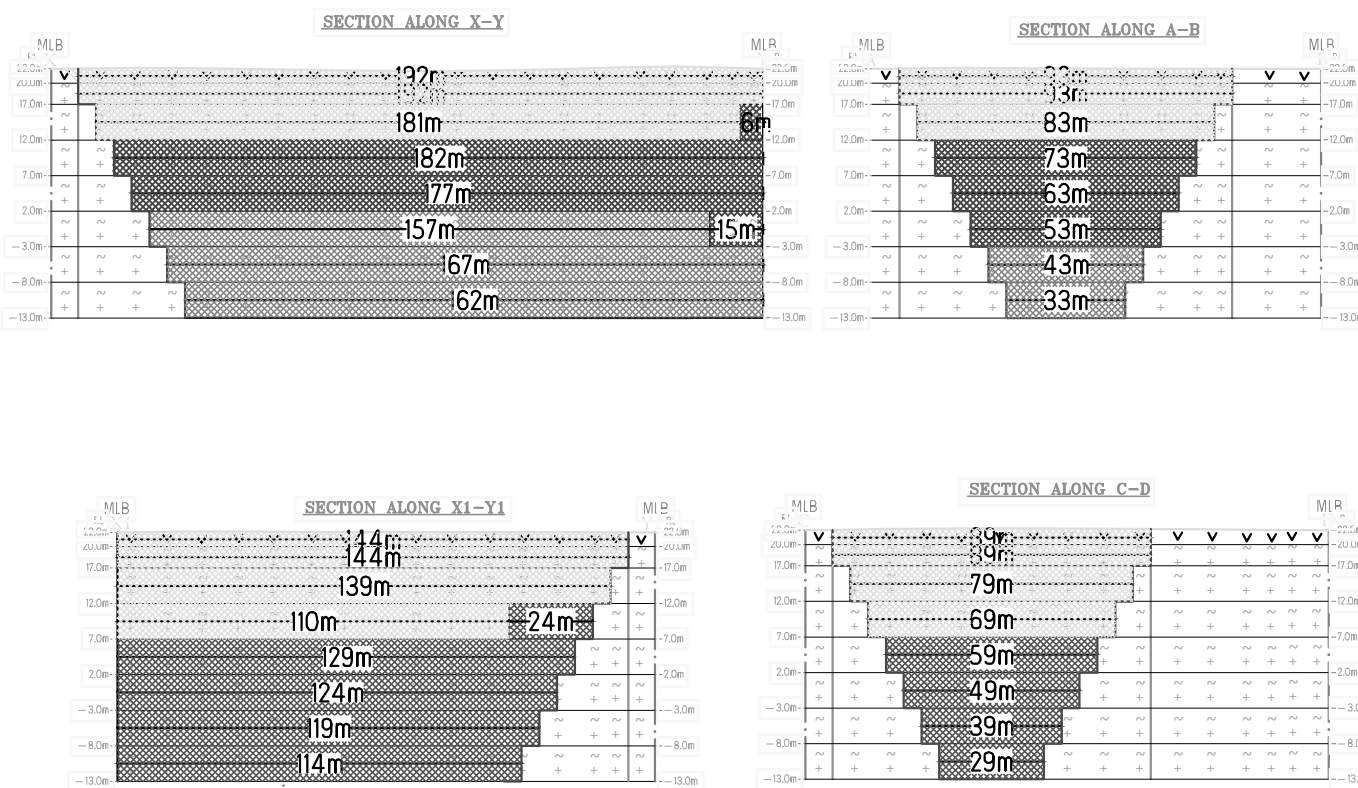
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- SAFETY AREA
- TEMPORARY BENCH MARK
- APPROACH ROAD
- SCRUP
- GRAVEL
- CONTOUR LINE
- EB LINE
- LAKE

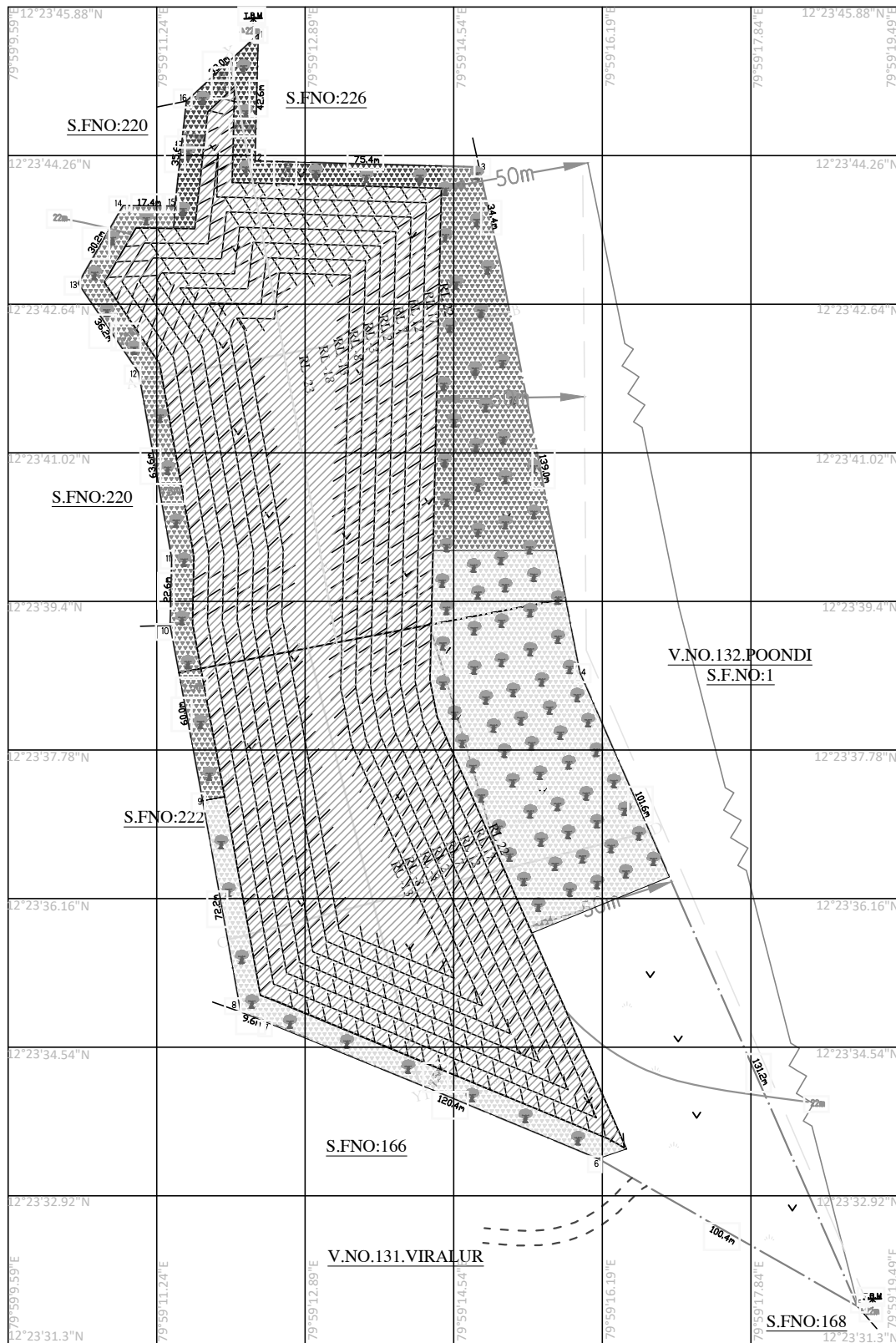
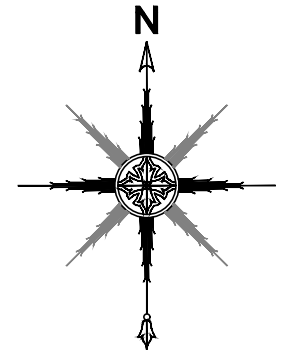
**YEARWISE DEVELOPMENT,
 PRODUCTION PLAN AND SECTION
 PLAN SCALE 1 : 2000
 SECTION HOR 1 : 2000 & VER1: 1000**

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.
 RECOGNIZED QUALIFIED PERSON
 RQP/MAS/263/2014/A





- 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

- A - OFFICE
- B - STORE
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- E - TOILET

- I - Year Proposed area to be Planted
- II - Year Proposed area to be Planted
- III - Year Proposed area to be Planted
- IV - Year Proposed area to be Planted
- V - 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	2.69.43	[Pattern]
INFRASTRUCTURE	NIL	0.01.00	[Pattern]
ROADS	0.01.00	0.02.00	[Pattern]
UN-UTILIZED AREA	4.73.50	0.61.54	[Pattern]
SAFETY&GREEN BELT	NILL	1.40.53	[Pattern]
GRAND TOTAL	4.74.50Hect	4.74.50Hect	

PLATE NO-V

APPLICANT:
M/s. PCS INDUSTRIES LIMITED.
C-10, FIFTH STREET,
INDUSTRIAL ESTATE,
AMBATTUR,
CHENNAI-600 058.

LEASE APPLIED AREA:
S.F.NO : 223/1,223/2, 224,
225/1 &225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

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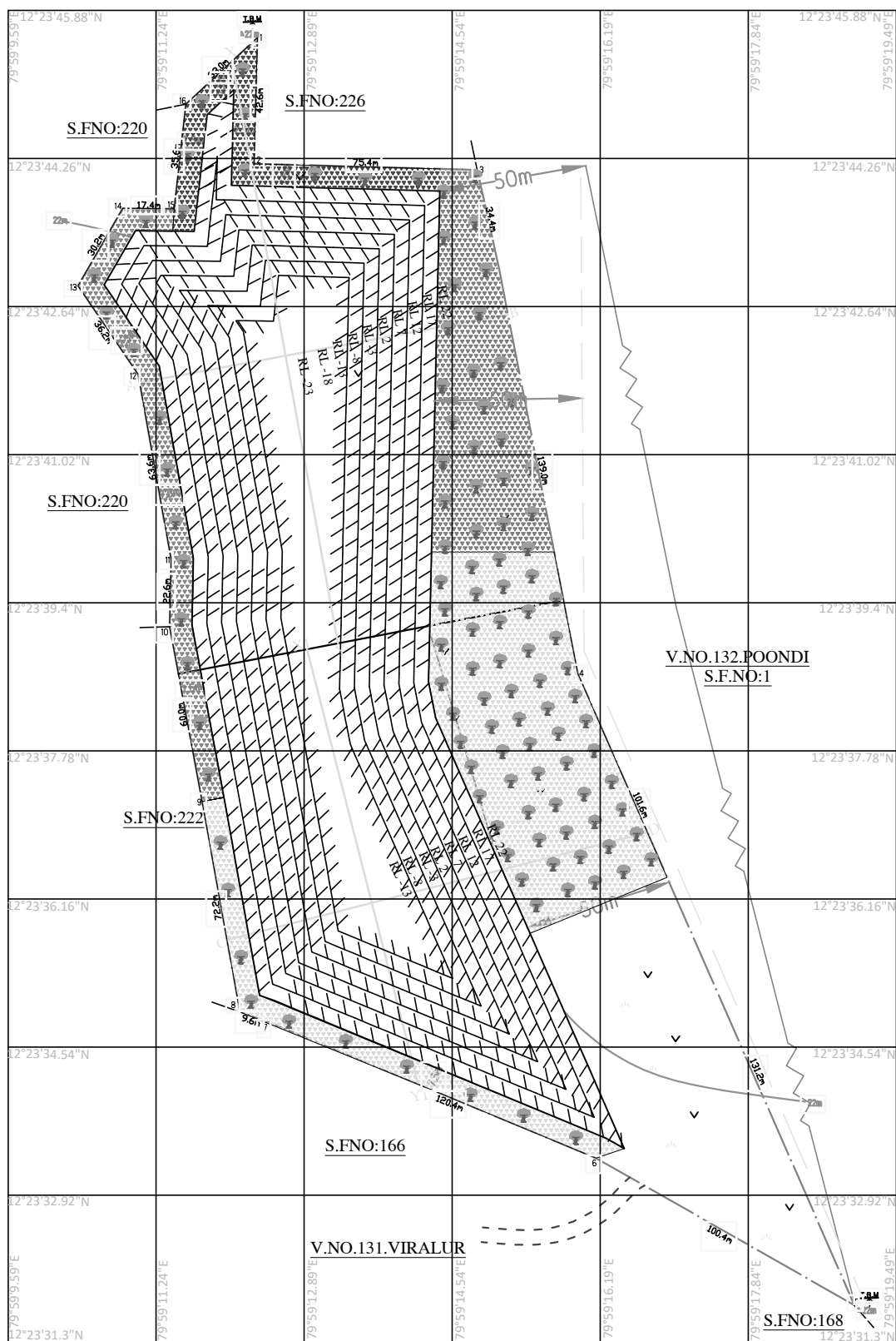
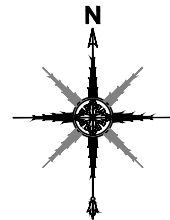
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- TEMPORARY BENCH MARK [Symbol]
- APPROACH ROAD [Symbol]
- SCRUP [Symbol]
- GRAVEL [Symbol]
- CONTOUR LINE [Symbol]
- EB LINE [Symbol]
- LAKE [Symbol]
- BENCH [Symbol]

**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.
RECOGNIZED QUALIFIED PERSON
RQP/MAS/263/2014/A



MINEABLE RESERVES							
Section	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Mineable Reserves in CBM@10 0%	Gravel in CBM
XY-AB	I	192	93	2	35712		35712
	I	192	93	3	53568	53568	
	II	187	83	5	77605	77605	
	III	182	73	5	66430	66430	
	IV	177	63	5	55755	55755	
	V	172	53	5	45580	45580	
	VI	167	43	5	35905	35905	
VII	162	33	5	26730	26730		
TOTAL					397285	361573	35712
X1Y1-CD	I	144	89	2	25632		25632
	I	144	89	3	38448	38448	
	II	139	79	5	54905	54905	
	III	134	69	5	46230	46230	
	IV	129	59	5	38055	38055	
	V	124	49	5	30380	30380	
	VI	119	39	5	23205	23205	
VII	114	29	5	16530	16530		
TOTAL					273385	247753	25632
GRAND TOTAL					670670	609326	61344

- 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
- II - Year Proposed area to be Planted
- III - Year Proposed area to be Planted
- IV - Year Proposed area to be Planted
- V - Year Proposed area to be Planted

PLATE NO-VI

APPLICANT:
 M/s. PCS INDUSTRIES LIMITED.
 C-10, FIFTH STREET,
 INDUSTRIAL ESTATE,
 AMBATTUR,
 CHENNAI-600 058.

LEASE APPLIED AREA:
 S.F.NO : 223/1,223/2, 224,
 225/1 &225/2
EXTENT : 4.74.50Hect,
VILLAGE : PERIYAVENMANI,
TALUK : MADURANTHAGAM,
DISTRICT : KANCHEEPURAM.

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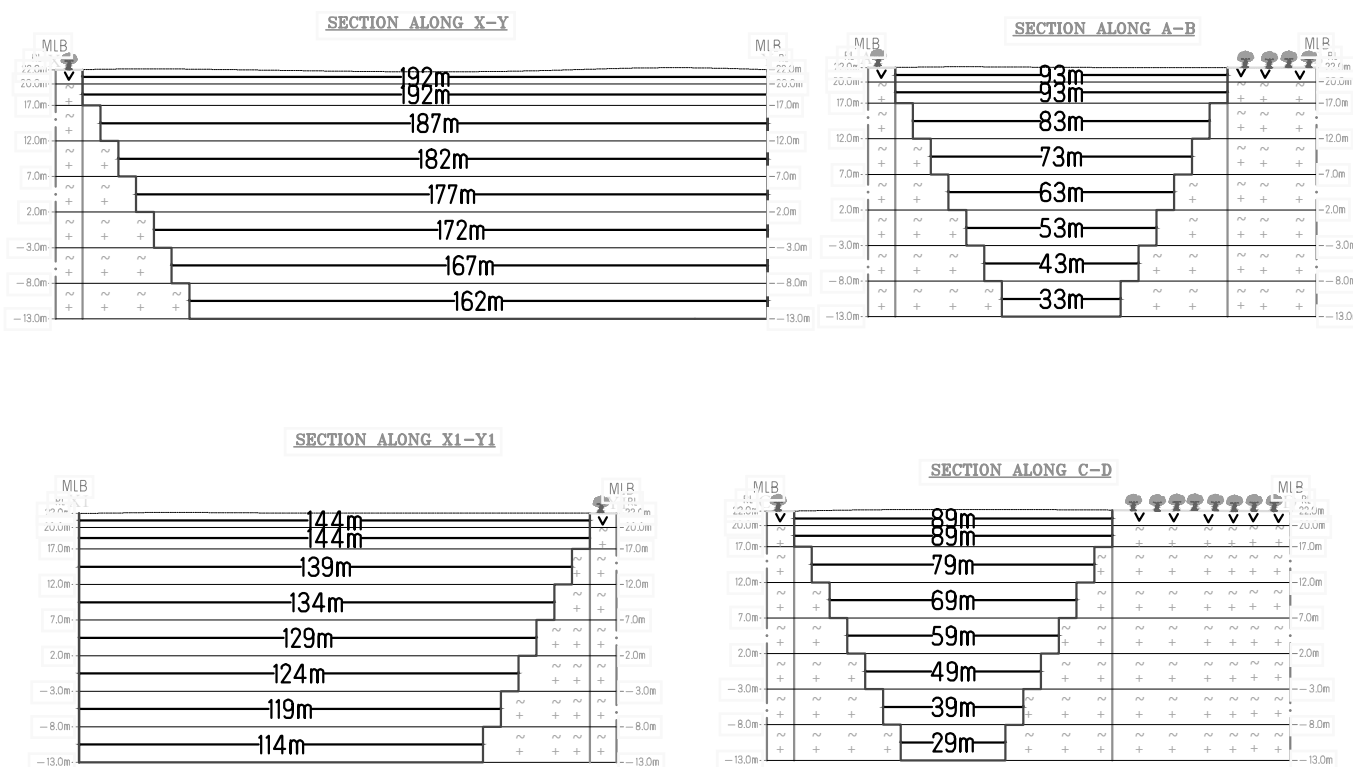
- MINE LEASE BOUNDARY
- SAFETY AREA
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- APPROACH ROAD
- SCRUP
- GRAVEL
- CONTOUR LINE
- EB LINE
- LAKE
- ULTIMAE BENCH

CONCEPTUAL PLAN & SECTION
 SCALE 1:2000
 SECTION HOR 1 : 2000 & VER1: 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.
 RECOGNIZED QUALIFIED PERSON
 RQP/MAS/263/2014/A



2. கருசா 3/0 சிபியாணி
3. S. சிபியாணி 3/0 சி. சிபியாணி
4. சிபியாணி 3/0 சிபியாணி
5. சிபியாணி 3/0 சி. சிபியாணி
6. 3/0 3/0 சிபியாணி
7. E. சிபியாணி 3/0 சிபியாணி
8. சிபியாணி 3/0 சிபியாணி
9. P. சிபியாணி 3/0 சிபியாணி
10. m. சிபியாணி - சிபியாணி
11. D. சிபியாணி சிபியாணி
12. P. சிபியாணி 3/0 சிபியாணி
13. சிபியாணி 3/0 சிபியாணி
14. S. சிபியாணி 3/0 சிபியாணி
15. P. சிபியாணி 3/0 சிபியாணி
16. சிபியாணி 3/0 சிபியாணி
17. சிபியாணி 3/0 சிபியாணி
18. D. சிபியாணி 3/0 சிபியாணி
19. V. சிபியாணி 3/0 சிபியாணி



**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.

