DRAFT ENVIRONMENTAL IMPACT ASSESSMENT` AND ENVIRONMENT MANAGEMENT PLAN

FOR OBTAINING

Environmental Clearance under EIA Notification – 2006

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

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

CLUSTER EXTENT = 09.07.40hectares

At

Kurumbapalayam Village, Sathyamangalam Taluk,
Erode District, Tamil Nadu

ToR Identification No. TO24B0108TN5662384N Dated:20.08.2024, File No.11022

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and Address	Extent & S.F.No.	Mineral Production
S. Vineesh S/o. Sundararaj, 115A, Somaiyanur, Chinnatadagam, Coimbatore, Tamil Nadu-641108.	2.96.50 Ha &178	Rough Stone-530256m^3 Gravel-48024m^3

ENVIRONMENTAL CONSULTANT

GEO TECHNICAL MINING SOLUTIONS

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Valid till: 31.12.2026

ENVIRONMENTAL LAB

GREENLINK ANALYTICAL AND RESEARCH LABORATORY (INDIA) PRIVATE LTD

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Coimbatore, Tamil Nadu 641014

Valid till: 18.05.2025

Baseline study period-October through December 2024

JAN-2025

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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 Identification No. TO24B0108TN5662384N Dated: 20.08.2024 File No.11022, this EIA report has been prepared for the project proponent, Thiru.S. Vineesh applied for rough stone and gravel quarry lease in the Patta land falling in S.F.No.178 over an extent of 2.96.5. ha of Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu. This EIA report takes into account the Rough stone and Gravel quarry within the cluster of 500 m radius from the periphery of the proposed project site. The cluster contains three proposed projects known as P1, P2 and P3 and one Existing project E1. All the projects mentioned above have been taken for cluster extent calculation as per MoEF & CC Notification S.O. 2269 (E) Dated 1st July 2016the total extent of all the quarries is 9.07.40ha, also known as the cluster extent. The quarries involved in the calculation of cluster extent are shown in Figure 1.1.

Table 1.1 Details of Quarries within the cluster area of 500 m radius

Proposed Quarries					
Code	**Name of the Owner**	**S.F. No**	**Village**	**Extent (ha)**	**Status**
P1	S. Veenish	178	Kurumbapalayam	2.96.50	Proposed Area
P2	Thirunavukarasu	148/1, 148/11, 148/12, 148/13 and 157/1	Kurumbapalayam	2.18.0	Applied Area
P3	N.T. Saisada	151 (part) and 152/4	Kurumbapalayam	2.28.40	Applied Area
Existing Quarry					
E1	N.T. Saisada	152/2 and 152/3	Kurumbapalayam	1.64.5	23.12.2021 to 22.12.2026
Total Cluster Extent				**9.07.40**	

Source: *AD Letter - Rc.No. 717/Mines/2023 dated 11.06.2024.*

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 **October-December 2024** 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/481390/2024, Dated:18.06.2024) 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: 25.06.2024.

Scoping

The proposal was placed in the 487th meeting of SEAC on 01.08.2024. 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 submitted in the final EIA report.

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 Identification No. TO24B0108TN5662384N Dated: 20.08.2024, File No. 11022.

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).

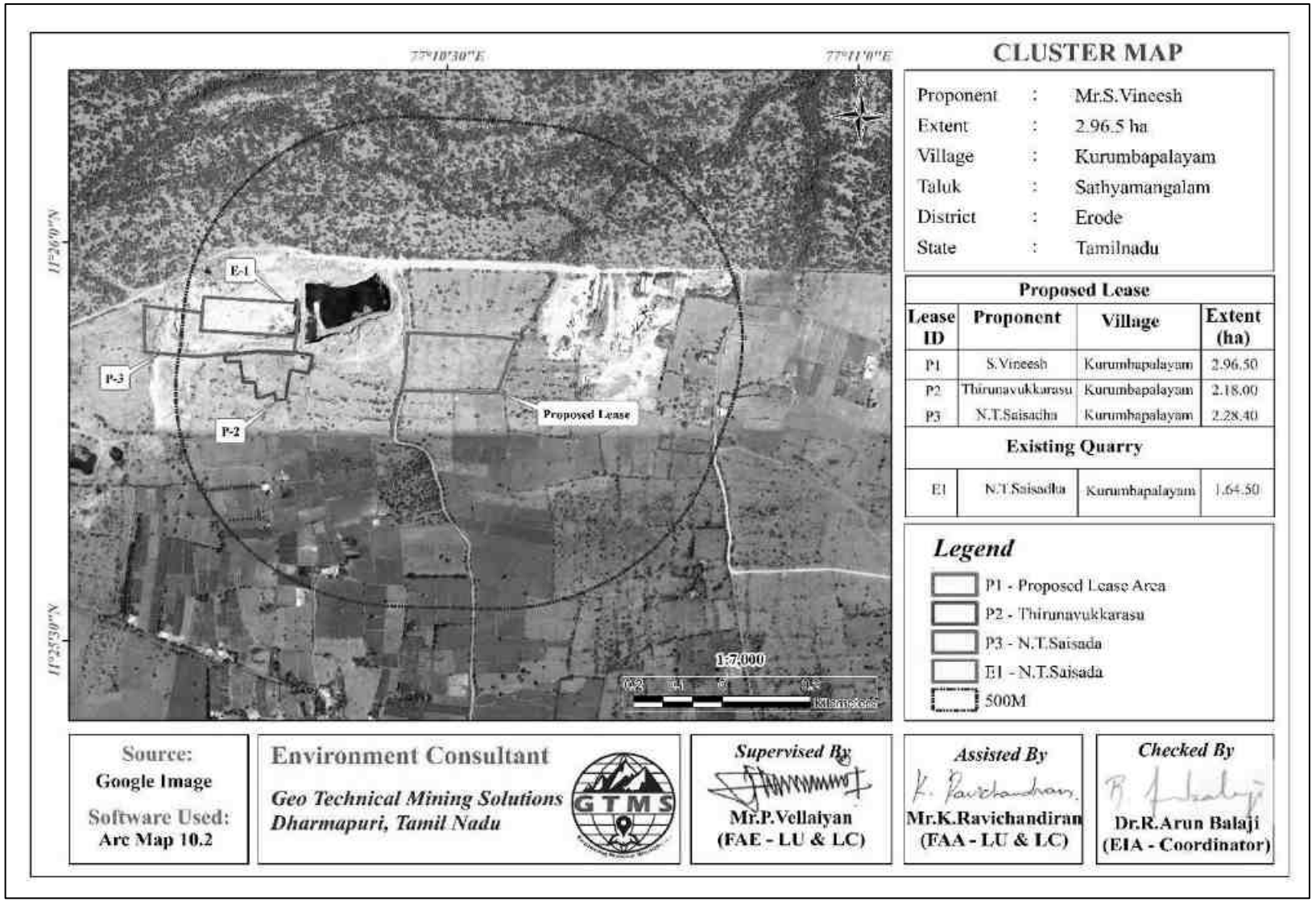


Figure 1.1 Location of the proposed and existing rough stone and gravel quarries in the cluster of 500m radius

1.6 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.

Table 1.2 Details of Project Proponent

Name of the Project Proponent	**S. Vineesh**
Address	S/o. Sundararaj, 115A, Somaiyanur, Chinnatadagam, Coimbatore-641108.
Status	Proprietor

1.7 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 Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu State. Some of the important features of the proposed project have been provided in Table 1.3.

Table 1.3 Salient Features of the Proposed Project

Name of the Quarry	**S. Vineesh,** Rough stone and gravel quarry	
Type of Land	Patta Land	
Extent	2.96.5ha	
Toposheet No	58-E/03	
Location of Project Site	11°25'48.65745"N to 11°25'53.20359"N 77°10'26.66416"E to 77°10'35.04812"E	
Highest Elevation	321m AMSL	
Proposed depth of Mining	40m BGL	
Geological Resources	Rough Stone in m^3	Gravel in m^3
	1414800	58950
Mineable Reserves	Rough Stone in m^3	Gravel in m^3
	568326	48024
Proposed reserves for five years	Rough Stone in m^3	Gravel in m^3
	530256	48024
Method of Mining	Open-Cast Mechanized mining	
Topography	Flat Topography	
Machinery proposed	Jack Hammer	3
	Compressor	1
	Tipper	9
	Hydraulic Excavator	1

Blasting Method	The quarrying operation is proposed to carried out by open cast mining in conjunction with conventional method using jack hammer drilling and blasting for shattering effect and loosen the rough stone.
Proposed Manpower Deployment	23 Nos
Project Cost	Rs.76,45,000
CER Cost	Rs. 5,00,000
Proposed Water Requirement	4.0 KLD

1.8 SCOPE OF THE STUDY

The main scope of the EIA study is to quantify the cumulative impact of the quarries in the cluster 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 **October-December 2024** 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.

1.9 Legislation Applicable to Mining of Mineral Sector

A few important legislations are given below:

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

CHAPTER II
PROJECT DESCRIPTION

2.0 GENERAL INTRODUCTION

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

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

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

2.1 DECSCRIPTION OF THE PROJECT

The proponent, **Mr.S.Vineesh** 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 and gravel. Therefore, the proponent had applied for quarry lease on 27.12.2023 to extract rough stone and gravel. The precise area communication letter was issued by Department of Geology and Mining, Erode vide Rc.No.717/Mines/2023 Dated:06.06.2024. Based on the precise area communication letter, mining plan was prepared. The mining plan thus prepared was approved by Assistant Director Department of Geology and Mining, Erode Rc.No.717/Mines/2023 Dated:11.06.2024 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 Kurumbapalayam Village, Sathyamangalam Taluk, Erode District Tamil Nadu as shown in Figure 2.2. The area lies between Latitudes from 11°25'48.65745"N to 11°25'53.20359"N and Longitudes from 77°10'26.66416"E to 77°10'35.04812"E. The maximum altitude of the project area is 321m AMSL. Accessibility details to the proposed project site have been given in Table 2.1.

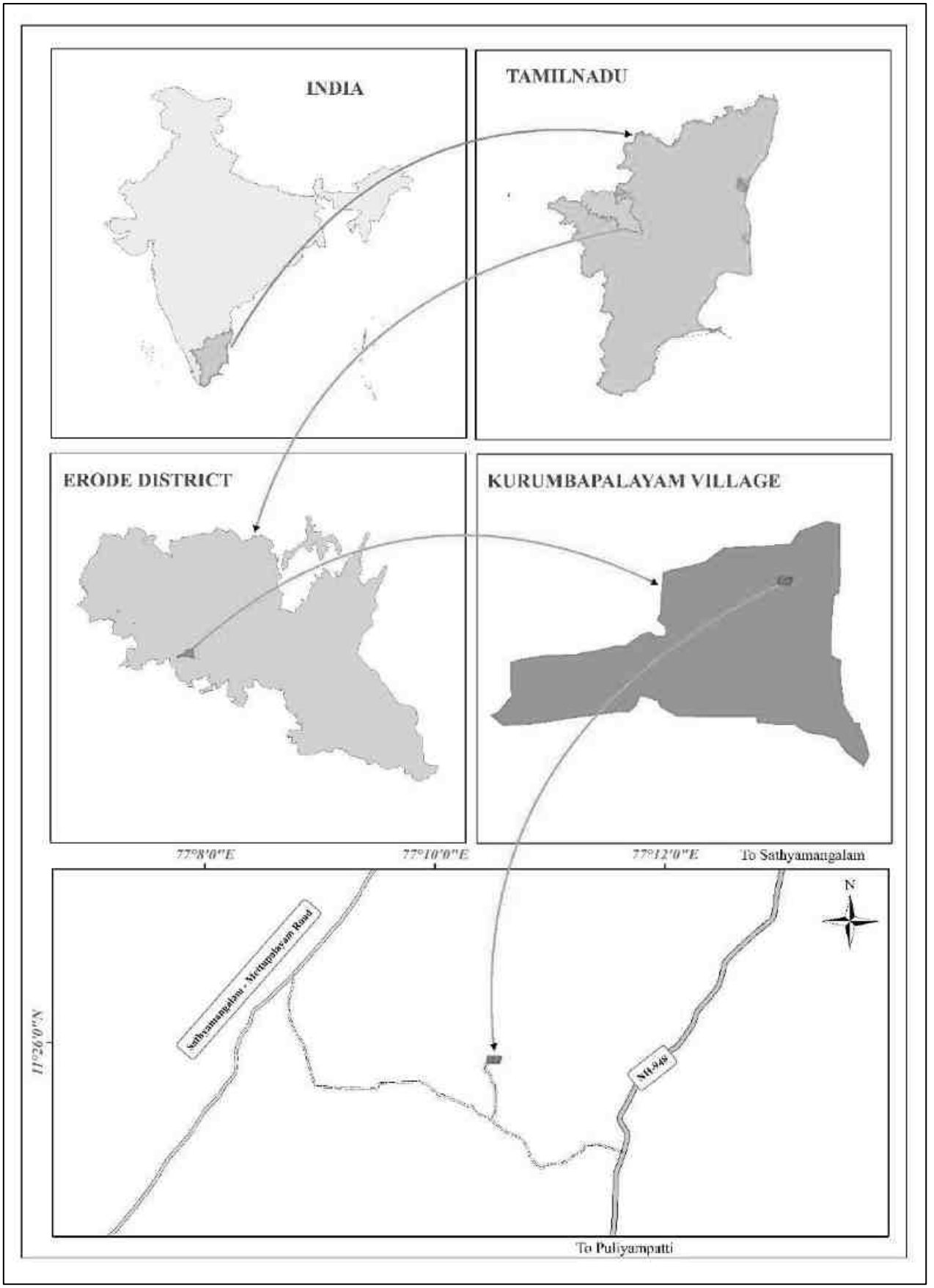


Figure 2.2 Location Map Showing the Project Site

Table 2.1 Site Connectivity to the Project Area

Nearest Roadways	NH-948 Bengaluru - Coimbatore	2.15 km E
	SH -15 Mettupalayam - Sathyamangalam	3.18 km W
Nearest Town	Punjai Puliampatti	8.5 km S
Nearest Railway Station	Mettupalayam	29.2 km SW
Nearest Airport	Coimbatore	50.0 km SW
Nearest Seaport	Cochin	191 km SW
Nearest Village	Karidoddapalayam	1.6km NW
	Puduroad	3.1km E
	Vinnappalli	2.3km SE
	Kurumbapalaiyam	0.9km S

2.3 LEASEHOLD AREA

- The extent of the proposed project site is 2.96.5ha.
- 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 2.3 & 2.4.

Table 2.2 Corner Coordinates of Proposed Project

Pillar ID	Latitude	Longitude
1	11°25'52.66538"N	77°10'35.04812"E
2	11°25'48.65745"N	77°10'33.61684"E
3	11°25'48.83956"N	77°10'26.66416"E
4	11°25'50.34902"N	77°10'26.93753"E
5	11°25'53.20359"N	77°10'27.08801"E
6	11°25'52.86053"N	77°10'33.57957"E

2.4 GEOLOGY

The lease area geologically occurs over Garnet gneiss. The Garnet gneiss, commercially called as rough stone occurs within the migmatite rock. Also, the lease area geomorphologically occurs pediment pediplain complex.

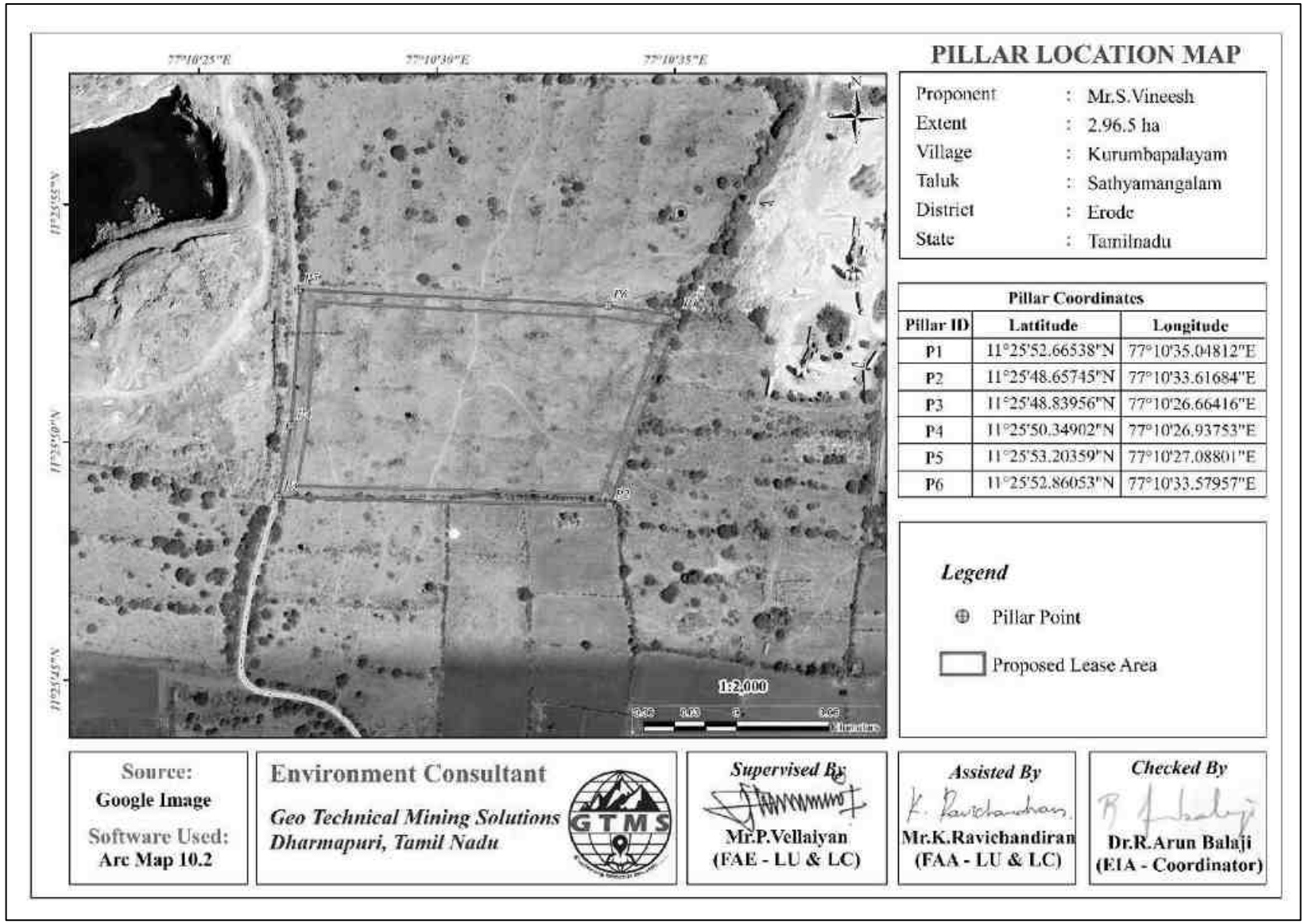


Figure 2.3 Google Earth Image Showing Lease Area with Pillars

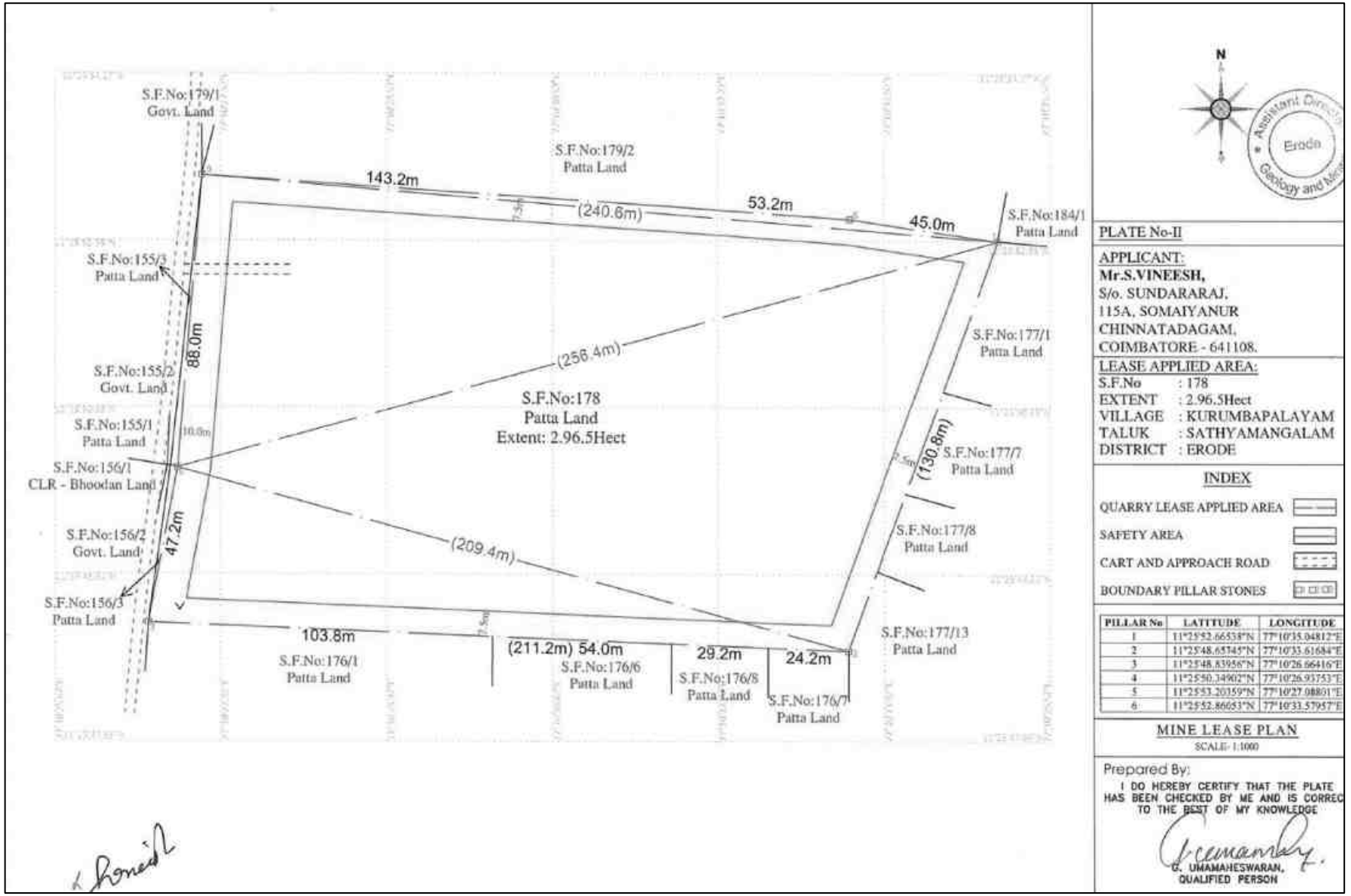


Figure 2.4 Mine Lease Plan

2.5 QUANTITY OF RESERVES

The Resources and Reserves of Rough Stone and Gravel were calculated based on cross-section method by plotting sections to cover the maximum lease area for the proposed project. Based on the availability of geological resources, the mineable reserves are calculated by considering excavation system of bench formation and leaving essential safety distance of 7.5 m and 10m 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 40m below the ground level considering there is no waste / overburden / side burden (100% Recovery anticipated) for the proposed project. The plate used for reserve estimation has been attached in approved mining plan 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	1414800	58950
Mineable Reserves in m^3	568326	48024
Proposed production for 5 years in m^3	530256	48024

Based on the year wise development and production plan and sections, the year wise production results have been given in Table 2.4, Year-Wise Production plan has been shown in Figure 2.5

Table 2.4 Year-Wise Production Details

Year	Rough Stone in (m^3)	Gravel in (m^3) / 3 year
I	104512	17168
II	121236	15544
III	116568	15312
IV	115270	0
V	72670	0
Total	**530256**	**48024**

Source: Approved Mining Plan & Tord

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.

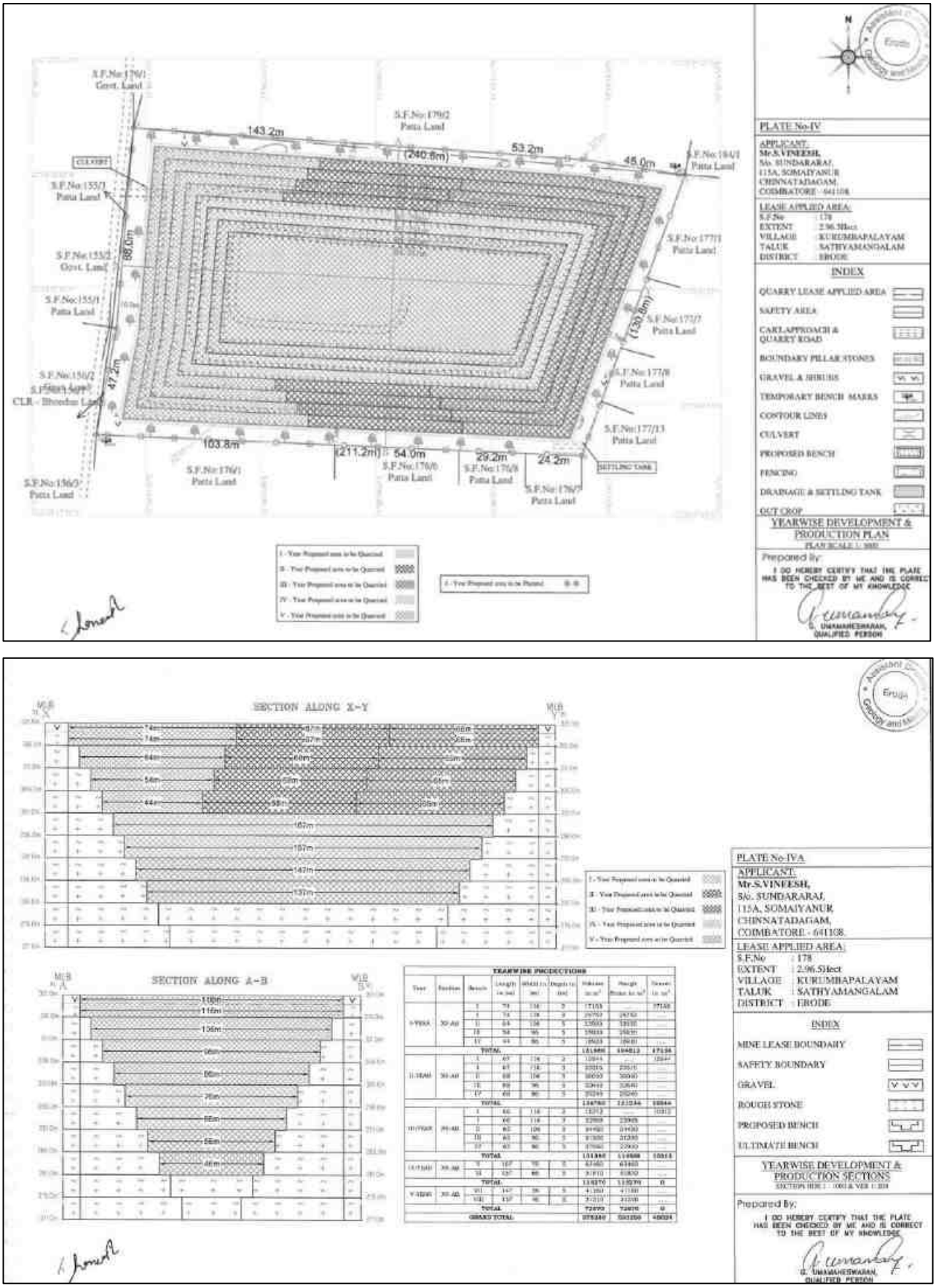


Figure 2.5 Year-Wise Production Plan & Section

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 (Chapter 8 (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 m3	4.16
Production of rough stone/day in m3	393
Number of blastholes/day	94
Blasthole pattern	Staggered
Mass of explosive /day in kg	37.80
Powder factor in kg/m3	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 in m^3/ 5 years	Gravel in m^3/3 years
Proposed production for 5 years	530256	48024
Number of Working Days /Annum	270	270
Production of /Day (m^3)	393	59
No. of Lorry Loads	66	10

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	Size /Capacity	Make	Motive Power
1	Jack Hammers	3	Hand held	--	Diesel
2	Compressor	1	Air	--	Diesel
3	Hydraulic Excavator	1	3.0 m^3	--	Diesel
4	Tipper	9	---	--	Diesel

2.6.3 Progressive Quarry Closure Plan

The progressive quarry closure plan 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 2.96.50ha of land is unutilized. Whereas, at the end of the mine life, about 2.41.96ha of land is used for area under quarry, about 0.39.64ha of land is used for green belt, 0.05.0ha will be used for roads, 0.03.0ha is used for infrastructure and about 0.06.9ha of land is used for drainage & settling tank.

Table 2.8 Land use data at present, 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	2.41.96
Infrastructure	Nil	0.03.0
Roads	Nil	0.05.0
Green Belt & Dump	Nil	0.39.64
Drainage & Settling Tank	Nil	0.06.9
Unutilized area	2.96.5	Nil
Total	**2.96.5**	**2.96.5**

2.6.4 Progressive 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
593 plants inside the lease area	1,18,600
890 plants outside the lease area	2,66,850
Wire Fencing	5,93,000
Renovation of Garland Drain	29,650
Total	**10,08,100**

Source: Environment Management Plan

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. Conceptual Plan has been shown in Figure 2.6

Table 2.10 Ultimate Pit Dimension

Pit	Length (m)	Width (m) (Max)	Depth (m)
I	207	116	40

Source: Approved Mining Plan & ToR

2.6.6 Infrastructures

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

2.6.6.1 Other Infrastructure Requirement

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

2.6.7 Water Requirement

Detail of water requirement in 4.0 KLD is given in Table 2.11.

Table 2.11 Water Requirement for the Project

Purpose	Quantity	Source
Dust Suppression	1.5 KLD	Existing bore wells nearby the lease area
Green Belt development	1.5 KLD	Existing bore wells nearby the lease area
Drinking & Domestic	1.0 KLD	Existing bore wells and approved water vendors
Total	**4.0KLD**	

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 2410569 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 (530256 m^3)**	**Gravel (48024 m^3)**	**Total Diesel (litre)**
Average Rate of Fuel Consumption (l/hr)	16	10	---
Working Capacity (m^3/hr)	20	60	---
Time Required (hours)	26513	800	---
Total Diesel Consumption for 5 years (litre)	424205	8004	**432209**
Fuel Requirement for Compressor			
Average Rate of Fuel Consumption/hole (litre)	0.4	**---**	**---**
Number of Drillholes/day	94	**---**	**---**
Total Diesel Consumption for 5 years (litre)	50760	**---**	**50760**
Fuel Requirement for Tipper			
Average Rate of Fuel Consumption/Trip (litre)	20	20	---
Carrying Capacity in m^3	6	6	---
Number of Trips / days	65	10	---
Number of Trips / 5 years	88376	8004	---
Total Diesel Consumption for 5 years (litre)	1767520	160080	**1927600**
Total Diesel Consumption by Excavator, Compressor and Tipper			**2410569**

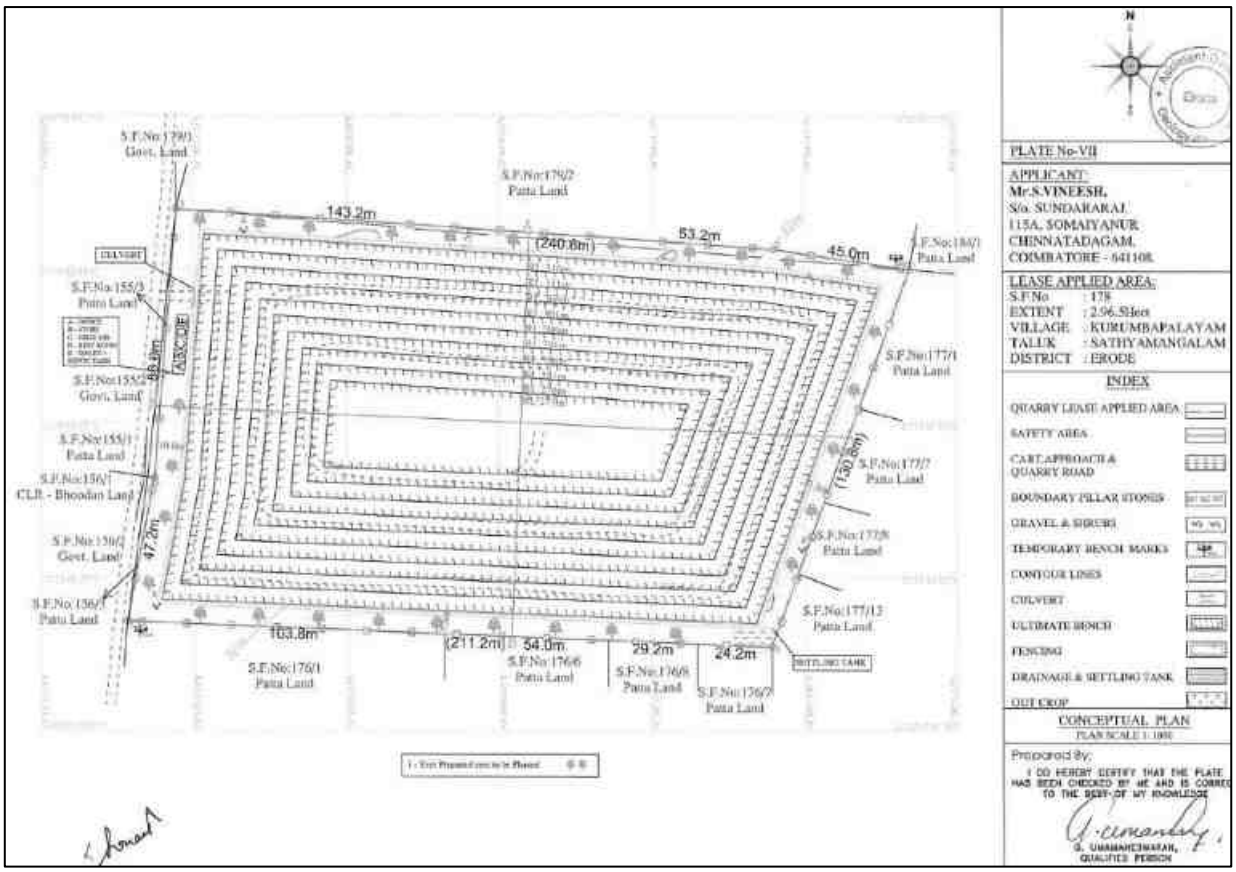
2.6.9 Capital Requirement

The project proponent will invest **Rs. 76,45,000/-** 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	18,00,000/-
2	Machinery cost	25,00,000/-
3	EMP Cost	33,45,000/-
Total Project Cost		**76,45,000/-**

Source: Approved Mining Plan



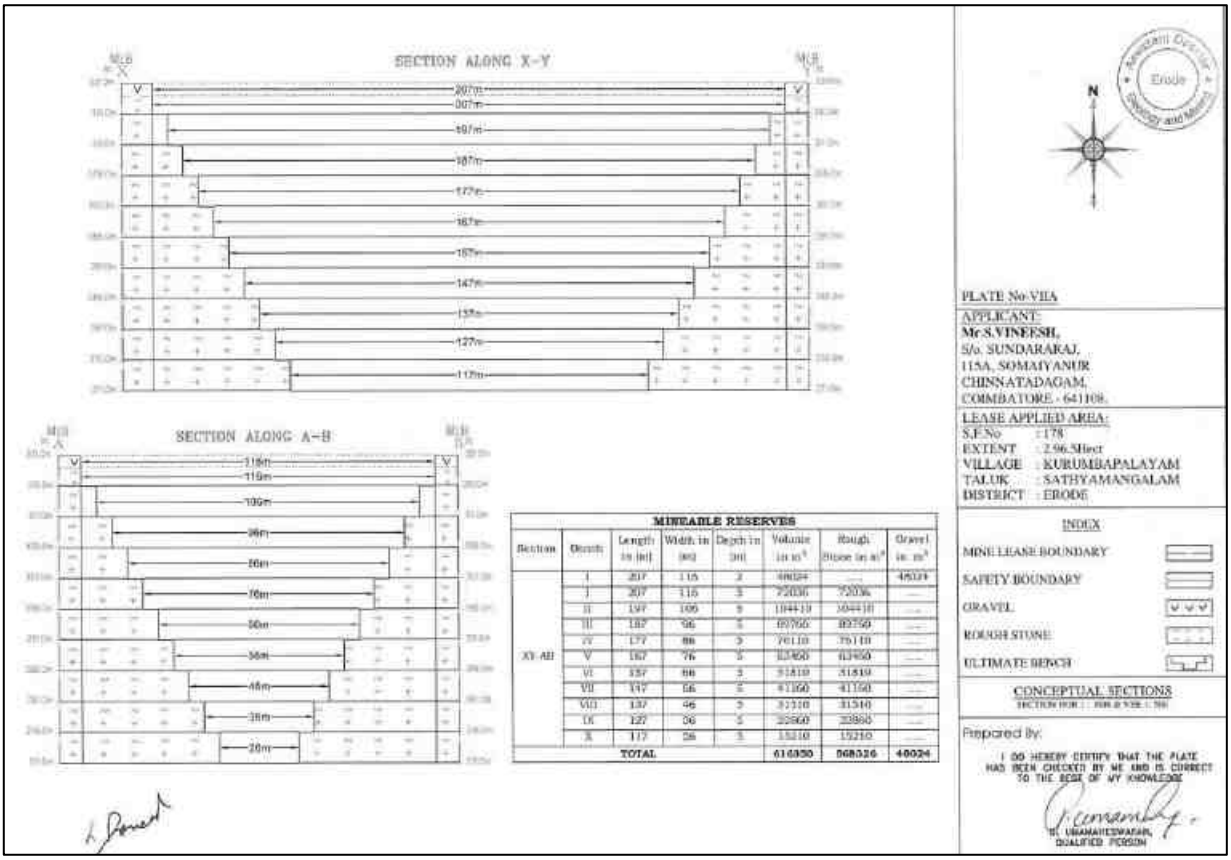


Figure 2.6 Conceptual Plan & Sections

2.7 MANPOWER REQUIREMENT

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

Table 2.14 Employment Potential for the proposed project

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

Source: Prefeasibility Report

2.8 PROJECT IMPLEMENTATION SCHEDULE

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

Table 2.15 Expected Time Schedule

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

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

CHAPTER III
DESCRIPTION OF THE ENVIRONMENT

3.0 GENERAL

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad-spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as land, water, air, noise, biological and socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering **October through December 2024 with CPCB** guidelines. Environmental baseline data were collected by an NABL accredited and MoEF notified **Greenlink Analytical and Research Laboratory (India) Private Ltd** for the environmental attributes including soil, water, air, and noise and by FAEs for ecology and biodiversity, traffic, and socio-economy.

Study Area

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

Table 3.1 Monitoring Attributes and Frequency of Monitoring

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land Use/ Land Cover	Land-use Pattern within 5 km radius of the study area	Once during the study period	Study Area	Satellite Imagery & Primary Survey
*Soil	Physico-Chemical characteristics	Once during the study period	6 (1 in core & 5 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	5 (2 surface water & 3 ground water)	IS 10500& CPCB Standards
Meteorology	Wind speed Wind direction Temperature Cloud cover Dry bulb temperature Rainfall	1 hourly continuous mechanical/automatic weather station	1	Site specific primary data & secondary data from IMD Station
*Ambient Air Quality	PM_{10} $PM_{2.5}$ SO_2 NO_X	24 hours, twice a week	6 (1 core & 5buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient noise	Hourly observation for 24 hours per location	6 (1 core & 5 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing flora and fauna	Through field visit during the study period	Study area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio-economic characteristics, Population statistics and existing infrastructure in the study area	Site visit & Census Handbook, 2011	Study area	Primary Survey, census handbook & need based assessments.

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

3.1 LAND ENVIRONMENT

3.1.1 Geology and Geomorphology

Study area is mainly composed of Garnet gneiss, as shown in Figure 3.1. Among the geomorphic units, pediment and pediplain complex dominate the study area, as shown in Figure 3.2. The lease area occurs in pediment pediplain terrain.

3.1.2 Land Use/ Land Cover

Land Use and Land Cover (LULC) map, as shown in Figure 3.3 was prepared using Sentinel II image for the study area of 5 km radius to provide a baseline status of the study area covering 5 km radius around the proposed mine site. Totally, 7 LULCs were mapped. The areal extent of each LULC is provided in Table 3.2. Of the total area, mining area covers only 91.14 ha accounting for 1.06 %, of which lease area of 2.96.5 ha contributes only about 0.034 %. 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 lands	5850.58	66.70
2	Built area	955.7	11.07
3	Water bodies	70.2	0.81
4	Mining Industrial area	91.14	1.06
5	Plantation	103.11	1.19
6	Bare ground	36.2	0.42
7	Rangeland	1619.5	18.75
Total		**8726.43**	**100.0**

Source: Sentinel II Satellite Imagery

3.1.3 Topography

The proposed lease area Exhibits flat topography the height elevation in 327m AMSL observed in North Side of the lease area the Slope is towards South Side and falls in Toposheet No 58-E/03.

3.1.4 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 dendritic drainage pattern indicating uniform lithology beneath the surface, as shown in Figure 3.4.

3.1.5 Seismic Sensitivity

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

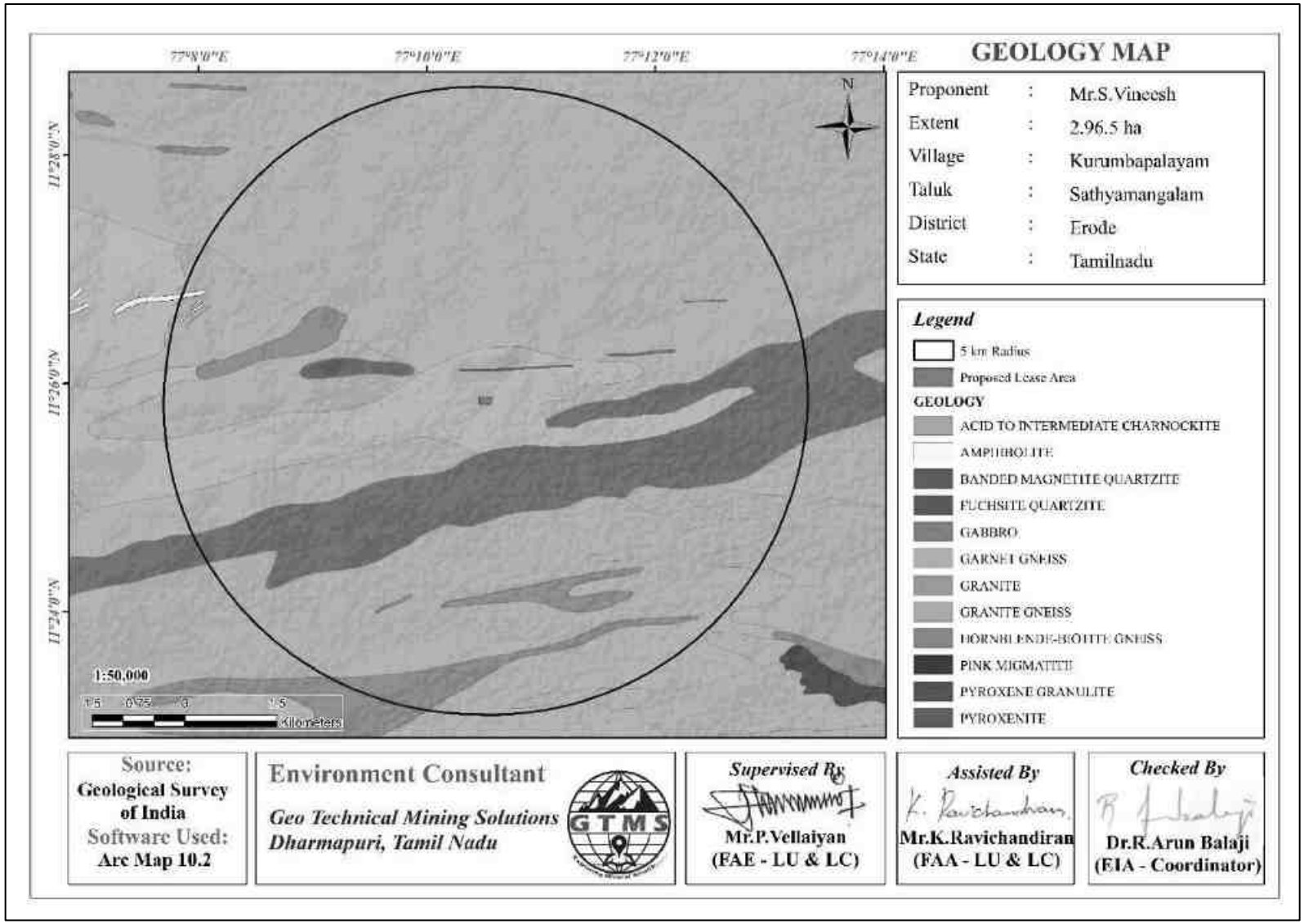


Figure 3.1 Geology Map of 5 km Radius from Proposed Project Site

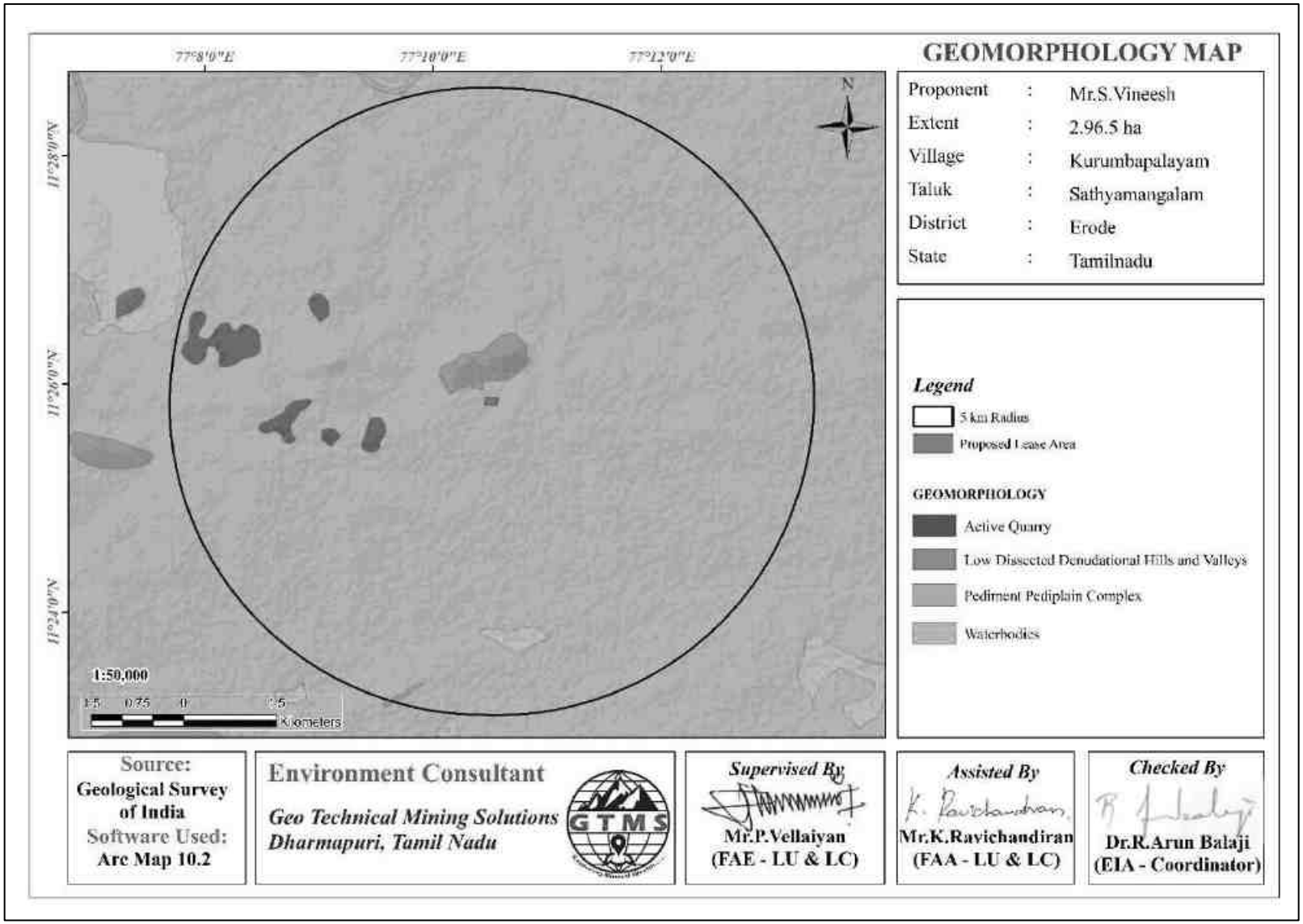


Figure 3.2 Geomorphology Map of 5 km Radius from Proposed Project Site

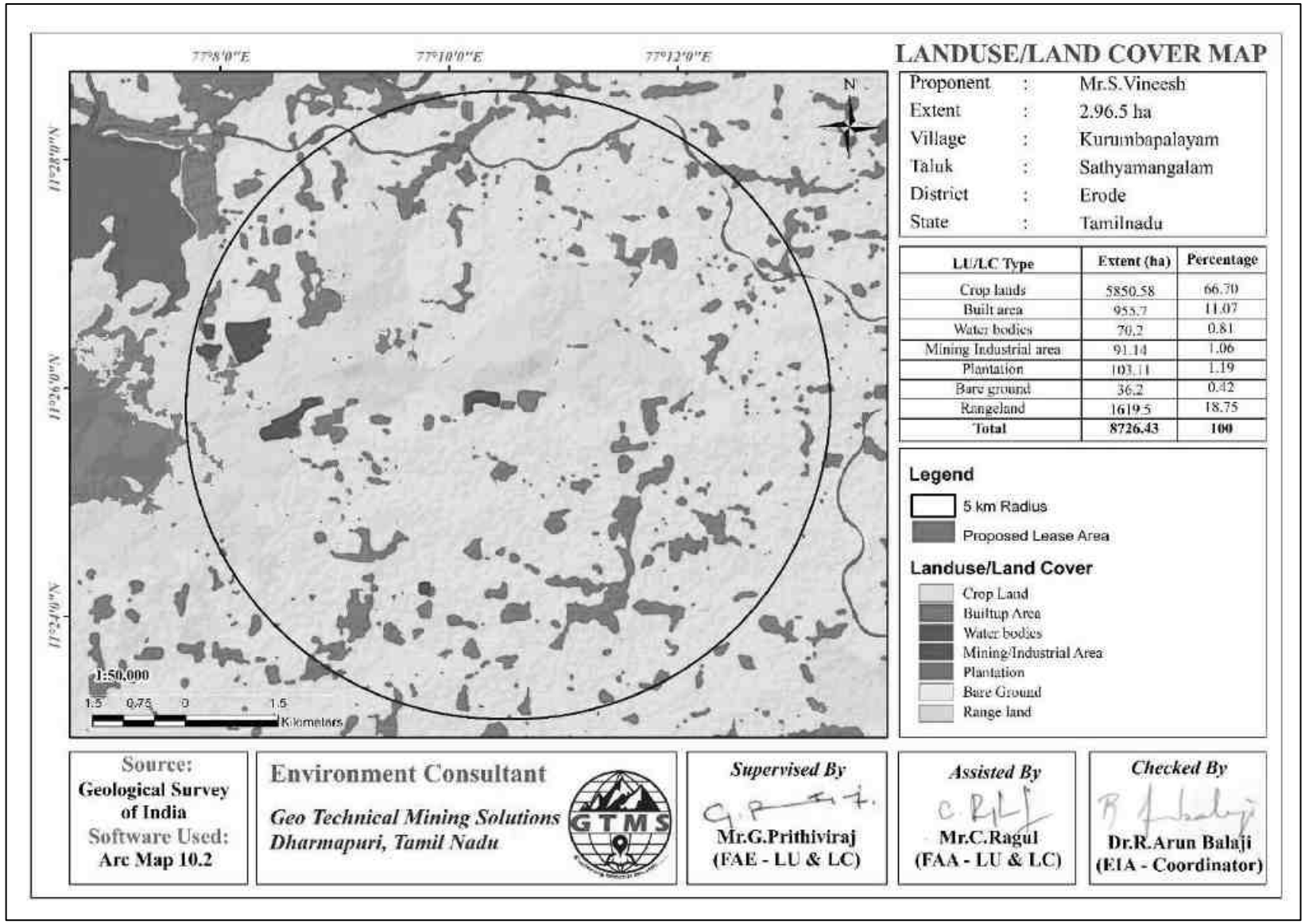


Figure 3.3 LULC Map of 5 km Radius from Proposed Project Site

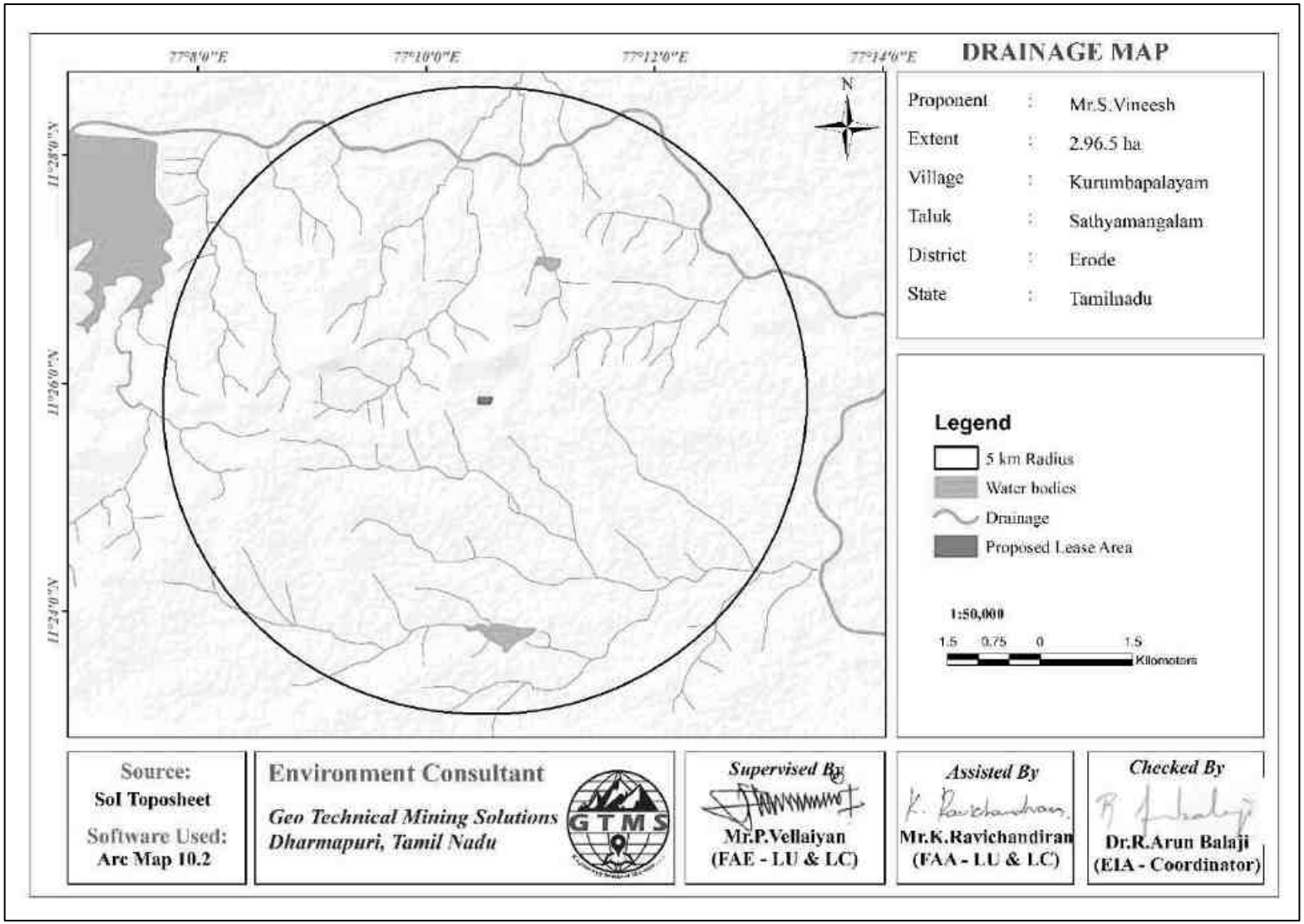


Figure 3.4 Drainage Map of 5 km Radius from Proposed Project Site

3.1.6 Soil

Composite soil samples were collected from 6 locations of the study area to determine the baseline soil characteristics of the soil. The locations were selected for soil sampling based on soil types, vegetative cover, and industrial & residential activities including infrastructure facilities. Soil samples were collected up to 90 cm depth, filled in polythene bags, coded and sent to laboratory for analysis. The locations of the sampling sites are shown in Table 3.3 and Figure 3.5. The samples thus collected were analysed for physical and chemical characteristics. The physical and chemical characteristic results of soil samples are provided in Table 3.5.

Table 3.3 Soil Sampling Locations

Sampling ID	Location	Distance (km)	Direction	Coordinates
S01	Core zone	---	---	11°25'52.26"N, 77°10'28.96"E
S02	Near Ganapathi nagar	1.29	SW	11°25'36.82"N, 77° 9'45.70"E
S03	Kurumbapalayam	0.75	S	11°25'24.34"N, 77°10'31.84"E
S04	Anna Nagar	2.74	W	11°25'37.27"N, 77° 8'56.92"E
S05	Karuthottampalayam	1.43	NNW	11°26'33.68"N, 77°10'3.72"E
S06	Pungampalli	3.09	SSE	11°24'22.30"N, 77°11'25.70"E

*Source: On-site monitoring/sampling **Greenlink Analytical and Research Laboratory (India) Private Ltd,** in association with GTMS.*

Physical Characteristics & Chemical Characteristics

The soil samples in the study area show loamy textures varying between Silt Loam and sandy loam. pH of the soil varies from 6.85 to 7.01 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 188 to 264µS/cm. The physical and chemical properties of soil is shown in the Table 3.5.

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 3.4 Water Sampling Locations

Sampling ID	Location	Distance (km)	Direction	Coordinates
SW 01	Alampalayam Lake	3.35	N	11°27'40.04"N, 77°10'6.68"E
SW 02	Sungai Lake	3.83	S	11°23'44.53"N, 77°10'49.55"E
BW 01	Anna Nagar	2.72	W	11°25'41.60"N, 77° 8'57.17"E
BW 02	Kurumbapalayam	1.04	S	11°25'14.91"N, 77°10'28.23"E
OW 01	Chinnvaiputhur	3.98	NE	11°26'44.65"N, 77°12'35.29"E

Source: On-site monitoring/sampling Greenlink Analytical and Research Laboratory Private Ltd, in association with GTMS.

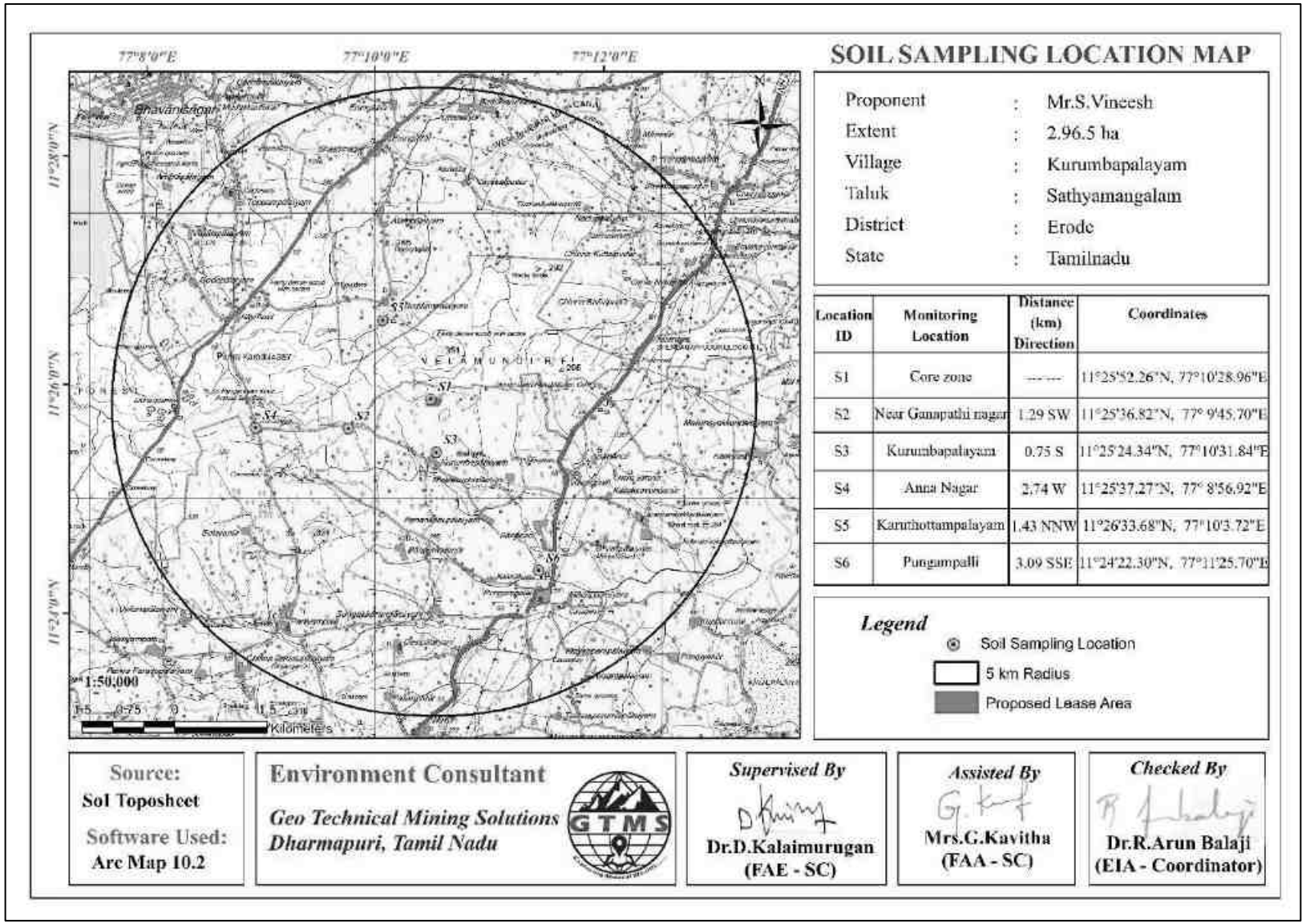


Figure 3.5 Map Showing Soil Sampling Locations within 5 km Radius around Proposed Project Site

Table 3.5 Soil Quality of the Study Area

S. No	Parameters	Unit	Results					
			Core	Ganapathy Nagar	Kurumba palayam	Anna Nagar	Karuthottam Palayam	Pungampalli
1	pH value @ 25°C	-	6.85	6.92	6.98	7.01	6.91	6.78
2	Specific EC@25°C	µS/cm	211.0	218.0	226.0	264.0	240.0	188.0
3	Total Organic Carbon	%	0.62	0.65	0.69	0.78	0.71	0.58
4	Available Nitrogen	kg/ha	166.0	152.0	158.0	174.0	160.0	174.0
5	Available Potassium	kg/ha	144.0	138.0	141.0	155.0	142.0	140.0
6	Available Phosphorous	mg/kg	62.0	60.0	62.0	68.0	70.0	66.0
7	Available Calcium as Ca	mg/kg	830.0	804.0	816.0	836.0	918.0	878.0
8	Available Magnesium as Mg	mg/kg	628.0	618.0	624.0	648.0	704.0	696.0
9	Moisture	%	14.8	15.9	16.8	14.1	16.8	17.2
10	Total Organic matter	%	1.22	1.05	1.12	1.38	1.48	1.51
11	Chloride	mg/100g	77.2	79.1	78.4	81.7	85.7	81.8
12	Bulk Density	kg/cm^3	1440.0	1410.0	1280.0	1340.0	1190.0	1540.0
13	Porosity	%	42.0	45.0	40.0	41.0	44.0	46.0
14	Copper as Cu	ppm	36.8	38.1	39.2	37.2	41.8	34.20
15	Nickel as Ni	ppm	1.448	1.496	1.540	1.482	1.284	1.325
16	Zinc as Zn	ppm	24.10	24.84	25.12	24.32	26.88	22.89
17	Iron as Fe	ppm	3450.0	3880.0	4150.0	3720.0	4460.0	3880.0
18	Texture	-	Silt Loam	Silt Loam	Loam	Loam	Sandy Loam	Clay Loam
19	Sand	%	19.60	19.53	34.50	46.20	56.20	23.00
20	Silt	%	67.87	62.57	23.00	12.60	7.00	32.00
21	Clay	%	12.53	17.90	42.50	41.20	36.80	45.00

Source: On-site monitoring/Sampling Results by Green link Analytical and Research Laboratory (India) Private Ltd in association with GTMS.

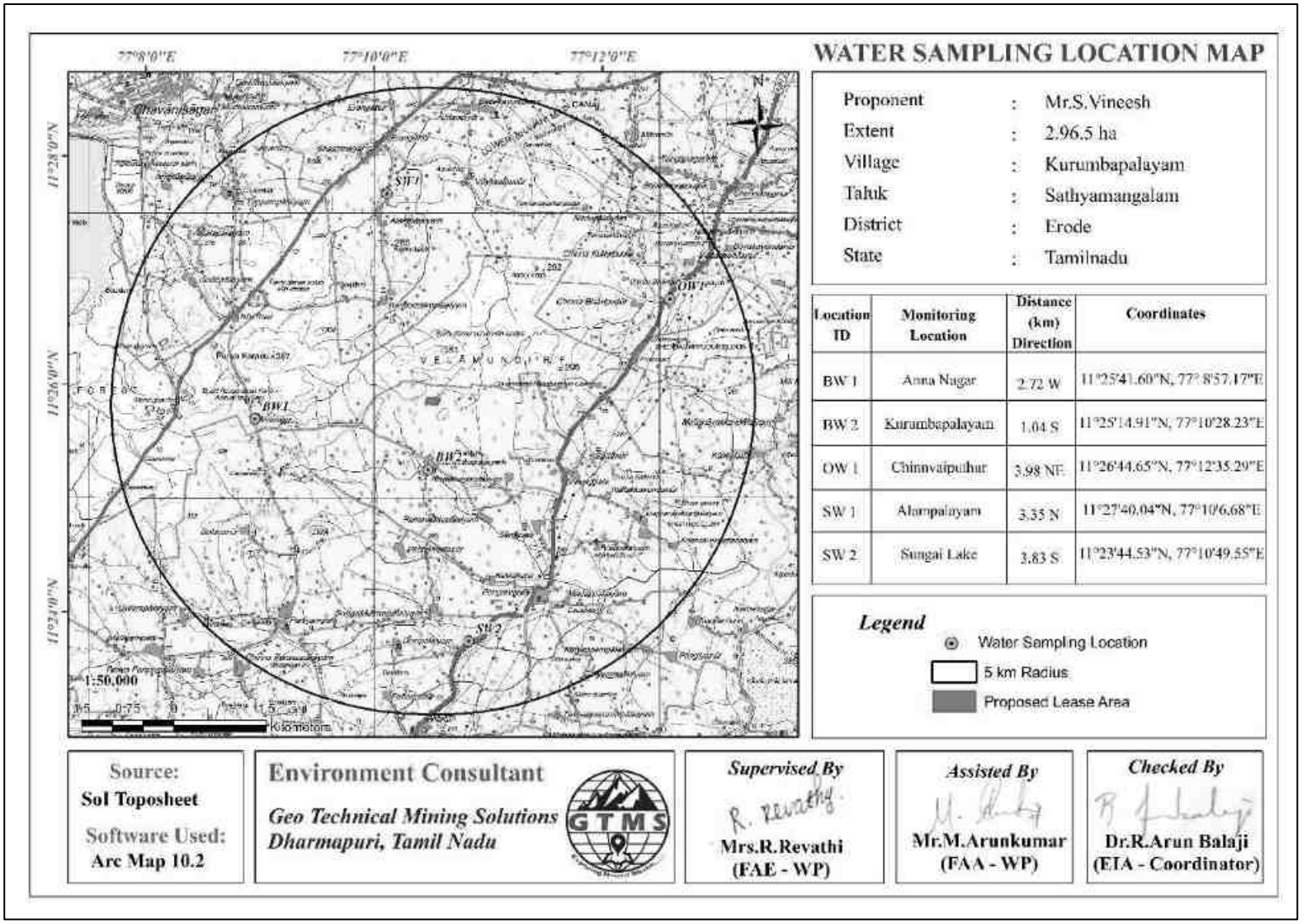


Figure 3.6 Map Showing Water Sampling Locations within 5 km Radius around Proposed Project Site

Table 3.6 Surface and Ground Water Quality Result

S. No.	Parameters	Units	Results					Permissible Limits as Per IS 10500:2012
			SW1	SW2	BW1	BW2	OW1	
1	pH value @ 25°C	No	7.88	8.05	7.75	7.44	8.34	6.5 – 8.5
2	TDS	mg/l	115.0	142.0	970.0	1300.0	560.0	2000
3	EC @ 25°C	µS/cm	187.0	218.0	1560.0	2000.0	910.0	---
4	Turbidity	NTU	<0.1	<0.1	<0.1	<0.1	<0.1	5
5	Colour	Hazen	<1.0	<1.0	<1.0	<1.0	<1.0	15
6	Calcium (Ca)	mg /l	11.20	12.20	134.6	187.6	89.77	200
7	Magnesium (Mg)	mg/l	11.60	11.80	49.36	46.8	33.70	100
8	Chlorides (Cl)	mg /l	25.50	28.10	137.0	287.0	21.0	1000
9	Sulphates (SO_4)	mg/l	6.81	6.40	65.0	135.0	7.89	400
10	Silica (as SiO_2)	mg/l	6.81	8.10	19.77	40.6	2.41	---
11	Total Residual Chlorine	mg/l	BDL(DL-0.1)	BDL(DL-0.1)	BDL(DL-0.1)	BDL(DL-0.1)	BDL(DL-0.1)	0.2
12	Sodium (Na)	mg/l	3.15	2.96	48.9	74.8	16.8	---
13	Total Hardness ($CaCO_3$)	mg/l	74.0	70.0	539.0	710.0	262.0	600
14	Total Alkalinity ($CaCO_3$)	mg/l	70.0	78.0	300.0	360.0	315.0	600
15	Fluoride (F)	mg/l	<0.1	<0.1	0.65	0.81	0.49	1
16	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
17	Taste	-	Agreeable	Agreeable	Disagreeable	Disagreeable	Agreeable	Agreeable
18	Total Solids	mg/l	124.0	178.0	982.0	1324.0	608.0	---
19	Dissolved Oxygen	mg/l	5.2	5.6	5.4	5.8	6.2	---
20	Phosphorous	mg/l	0.16	0.18	2.09	2.32	1.49	---
21	Potassium	mg/l	0.64	0.60	11.2	525.8	2.37	---
22	Nitrite (NO_2)	mg/l	BDL(DL-0.1)	BDL(DL-0.1)	BDL(DL-0.1)	BDL(DL-0.1)	BDL(DL-0.1)	---
23	Phenolphthalein Alkalinity	mg/l	Nil	Nil	32.0	60.0	10.0	200
24	*Total Coliform*	CFU/ml	Absent	Absent	Absent	Absent	Absent	Absent
25	*Escherichia Coli*	CFU/ml	Absent	Absent	Absent	Absent	Absent	Absent

Source: Sampling Results by Greenlink Analytical and Research Laboratory in association with GTMS.

3.2.1 Surface and Ground Water Quality Resources and Result

Alampalayam lake and Sungai lake are two prominent surface water resources present in the study area. This lake was ephemeral in nature, which convey water only after rainfall events. Two surface water sample, known as SW1 were collected from the Alampalayam lake (3.35 km N) and SW2 were collected from the Sungai lake (3.83 km S) to assess the baseline water quality, as shown in Table 3.4 and Figure 3.6.

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. Three groundwater samples, known as BW1, BW2 and OW1 were collected from bore wells and open well were analysed for physico-chemical conditions and bacteriological contents in order to assess baseline quality of ground water.Table 3.6 summarizes surface and ground water quality data of the collected sample. Result for surface and ground water sample in the Table 3.6 indicate that the physical, chemical and biological parameters are within permissible limits except BW2 the total Hardness was slightly increased in compared with standards of IS10500:2012.

Table 3.6a Weighted Arithmetic Water Quality Index (WAWQI) of surface and ground water as per Method of Brown et al., 1972

S. No.	Water Quality Index (WQI)					WQI Range	Classification	Grading
	SW1	SW2	BW1	BW2	OW1			
1	18.40	19.56			21.78	0 – 25	Excellent	A
2			48.34			25 – 50	Good	B
3				60.12		50 – 75	Poor	C
4						75 – 100	Very Poor	D
5						> 100	Unsuitable	E

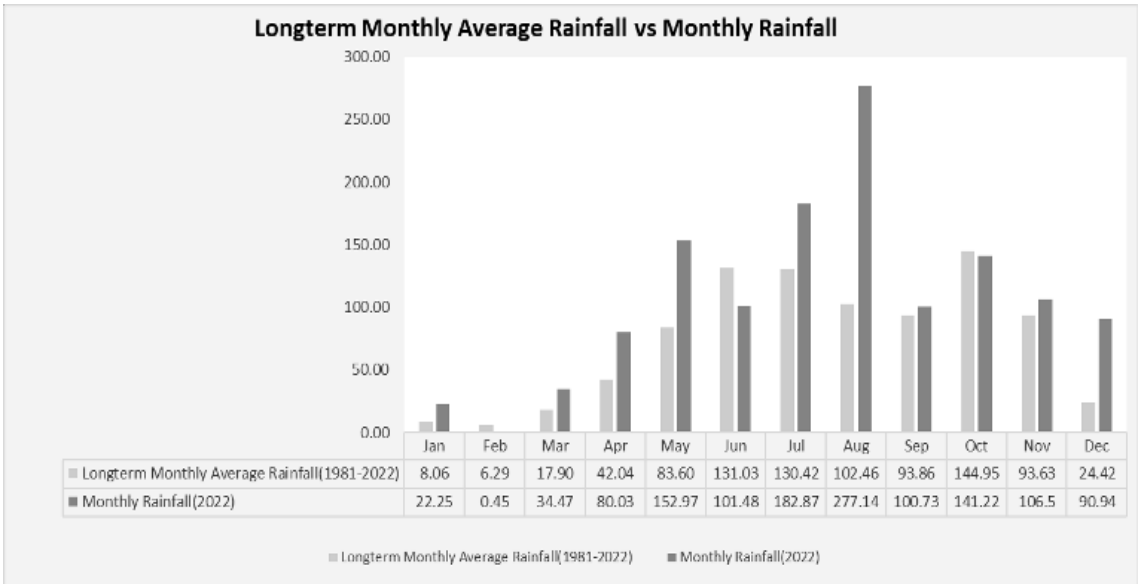
The WQI is a unique digital rating expression that expresses overall water quality status viz: excellent, good, poor, very poor and unsuitable based on various water quality parameters. It is used as an important tool to compare the quality of water and their management in a particular region. The WQI of the surface and ground water, as shown Table 3.6a indicates that two surface water (SW1 & SW2) and one groundwater (OW1) samples are Excellent quality and one groundwater (BW1) sample are good and one groundwater (BW2) sample are poor quality. The WQI of ground water samples fall under Excellent, good and suitable for drinking, domestic and agriculture purpose. Poor quality indicating they are not suitability for drinking and suitable for domestic and agriculture purpose.

3.2.2 Hydrogeological Studies

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

Rainfall

Rainfall data for the study area were collected for the period of 1981-2021(POWER | Data Access Viewer (nasa.gov)**)**. Long term monthly average rainfall was estimated from the data of 1981-2022 and compared with the monthly rainfall for the year 2022, shown in Figure 3.10. The Figure 3.7 shows that rainfall is generally high in the months of June through October in every year. Particularly, rainfall in May, July and August of 2022 is higher than the previous years.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Longterm Monthly Average Rainfall(1981-2022)	8.06	6.29	17.90	42.04	83.60	131.03	130.42	102.46	93.86	144.95	93.63	24.42
Monthly Rainfall(2022)	22.25	0.45	34.47	80.03	152.97	101.48	182.87	277.14	100.73	141.22	106.5	90.94

Figure 3.7 Long-Term Monthly Average Rainfall Vs Monthly Rainfall

3.2.3.1 Groundwater Levels and Flow Direction

Data regarding depth to groundwater levels are essential to infer the direction of groundwater movement within the study area. Knowledge of groundwater flow direction is must in choosing location for background groundwater quality monitoring well and in locating recharge and discharge areas. Therefore, data regarding groundwater elevations were collected from 8 open wells and 8 bore wells at various locations within 2 km radius around the proposed project sites for the period from March through May 2024 (Pre-Monsoon Season) and from October through December 2023, (Post Monsoon Season).

The open well water level data thus collected onsite are provided in Tables 3.7 and 3.8. According to the data, average depths to the static water table in open wells range from 10.61 to 12.96m BGL in pre monsoon and 10.77 to 12.57m BGL in post monsoon. The bore well

data thus collected onsite are provided in Tables 3.9 and 3.10. The average depths to static potentiometric surface in bore wells for the period of October through December (Post-Monsoon Season) vary from 52.53 to 55.14m and from 55.51 to 59.30m for the period of March through May, (Pre-Monsoon Season). Data on the depths to static water table and potentiometric surface were used to draw contour lines connecting groundwater elevation (also known as equipotential hydraulic head) to determine the groundwater flow direction perpendicular to the contour lines. From the maps of open well groundwater flow direction shown in Figures 3.8-3.9, it is understood that most of the open well groundwater for the post- and pre-monsoon seasons flows towards the open well number 3 located in Southeast direction of the proposed project site. The groundwater flow maps in Figures 3.10-3.11 show that most of the bore well groundwater for the post- and pre-monsoon seasons flow towards the bore well number 4. It is located in South 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 3.7 Pre-Monsoon Water Level of Open Wells within 2 km Radius

Station ID	Depth to Static Water Table BGL (m)				Latitude	Longitude
	Mar-2024	Apr-2024	May- 2024	Average		
OW01	11.8	13.3	13.6	12.90	11°25'54.68"N	77°10'35.05"E
OW02	12.5	12.8	13.2	12.83	11°25'14.35"N	77°10'20.21"E
OW03	12.22	12.14	14.52	12.96	11°25'14.77"N	77°11'17.39"E
OW04	9.6	10.9	11.6	10.70	11°25'55.27"N	77°11'29.95"E
OW05	10.6	11.2	10.8	10.87	11°26'46.14"N	77°10'4.18"E
OW06	10.1	10.6	11.12	10.61	11°26'14.15"N	77° 9'47.72"E
OW07	10.4	10.8	11.3	10.83	11°24'47.58"N	77°10'32.77"E
OW08	11.1	11.8	12.3	11.73	11°25'23.51"N	77° 9'27.58"E

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

Station ID	Depth to Static Water Table BGL(m)				Latitude	Longitude
	Oct-2024	Nov- 2024	Dec-2024	Average		
OW01	12.37	11.88	9.35	11.20	11°25'54.68"N	77°10'35.05"E
OW02	13.65	12.55	10.11	12.10	11°25'14.35"N	77°10'20.21"E
OW03	14.85	12.62	10.25	12.57	11°25'14.77"N	77°11'17.39"E
OW04	12.12	10.98	9.21	10.77	11°25'55.27"N	77°11'29.95"E

OW05	12.22	11.02	9.55	10.93	11°26'46.14"N	77°10'4.18"E
OW06	12.65	11.42	10.08	11.38	11°26'14.15"N	77° 9'47.72"E
OW07	13.01	11.89	10.08	11.66	11°24'47.58"N	77°10'32.77"E
OW08	12.44	11.35	10.02	11.27	11°25'23.51"N	77° 9'27.58"E

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

Station ID	Depth to Static Potentiometric Surface BGL(m)				Latitude	Longitude
	Mar-2024	Apr-2024	May- 2024	Average		
BW01	55.95	58.48	61.84	58.76	11°25'51.21"N	77°10'42.43"E
BW02	56.45	58.23	62.12	58.93	11°25'14.91"N	77°10'28.18"E
BW03	54.18	55.85	59.94	56.66	11°25'40.26"N	77°11'30.88"E
BW04	56.2	57.22	61.22	58.21	11°24'49.06"N	77°10'56.92"E
BW05	57.82	57.98	62.11	59.30	11°25'5.02"N	77° 9'40.41"E
BW06	55.55	57.22	61.35	58.04	11°25'41.29"N	77° 9'48.73"E
BW07	55.48	57.18	61.31	57.99	11°26'16.21"N	77° 9'47.11"E
BW08	52.22	55.11	59.2	55.51	11°26'49.30"N	77°10'7.77"E

Source: Onsite monitoring data

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

Station ID	Depth to Static Potentiometric Surface BGL(m)				Latitude	Longitude
	Oct-2024	Nov-2024	Dec-2024	Average		
BW01	58.85	55.12	51.45	55.14	11°25'51.21"N	77°10'42.43"E
BW02	57.33	53.22	51.12	53.89	11°25'14.91"N	77°10'28.18"E
BW03	56.95	53.08	51.55	53.86	11°25'40.26"N	77°11'30.88"E
BW04	55.22	52.15	50.22	52.53	11°24'49.06"N	77°10'56.92"E
BW05	56.12	54.95	52.85	54.64	11°25'5.02"N	77° 9'40.41"E
BW06	58.23	55.58	51.56	55.12	11°25'41.29"N	77° 9'48.73"E
BW07	56.98	53.98	51.32	54.09	11°26'16.21"N	77° 9'47.11"E
BW08	56.22	53.33	51.12	53.56	11°26'49.30"N	77°10'7.77"E

Source: Onsite monitoring data

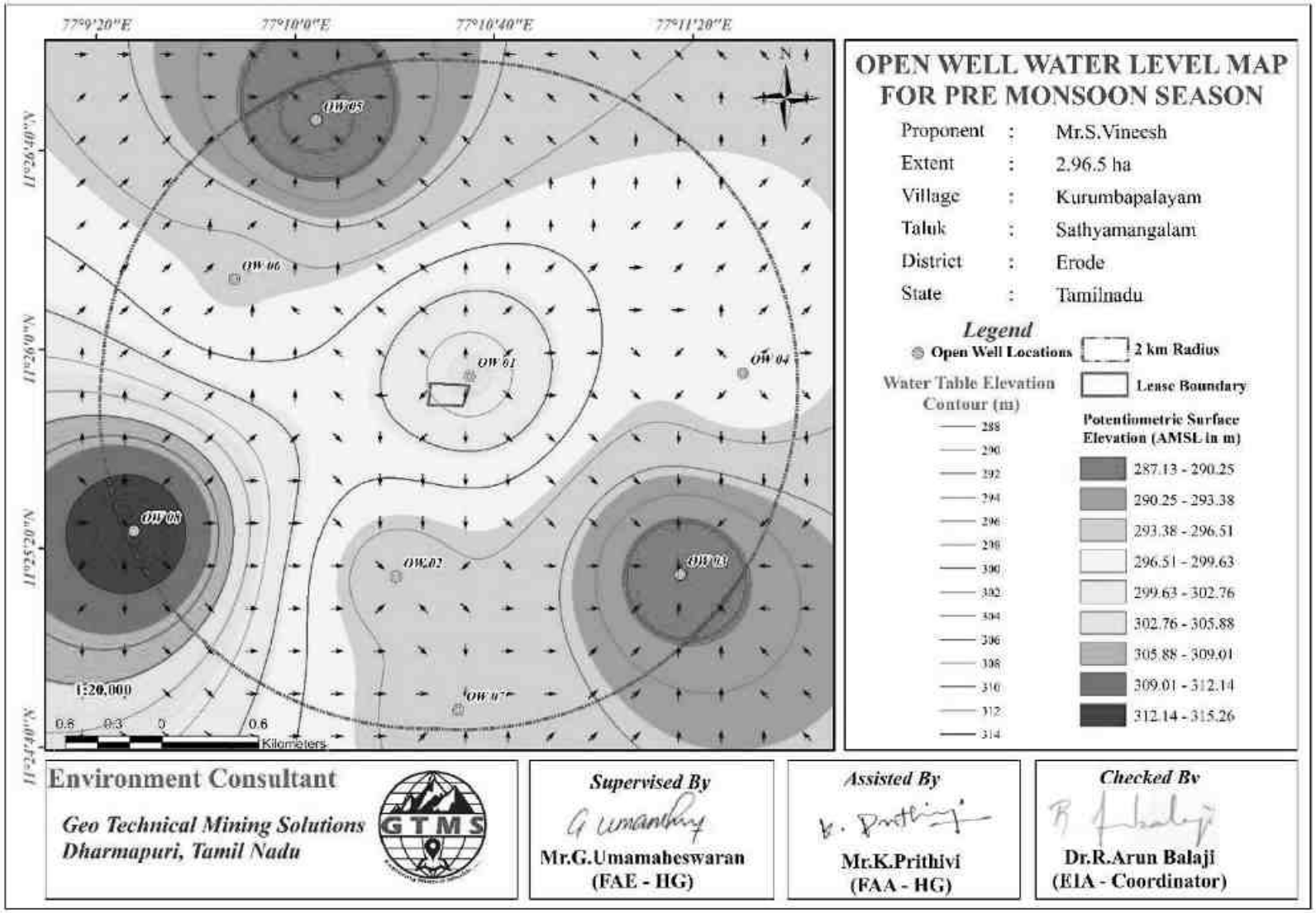


Figure 3.8 Open Well Static Groundwater Elevation Map Showing Direction of Groundwater Flow during Pre-Monsoon Season

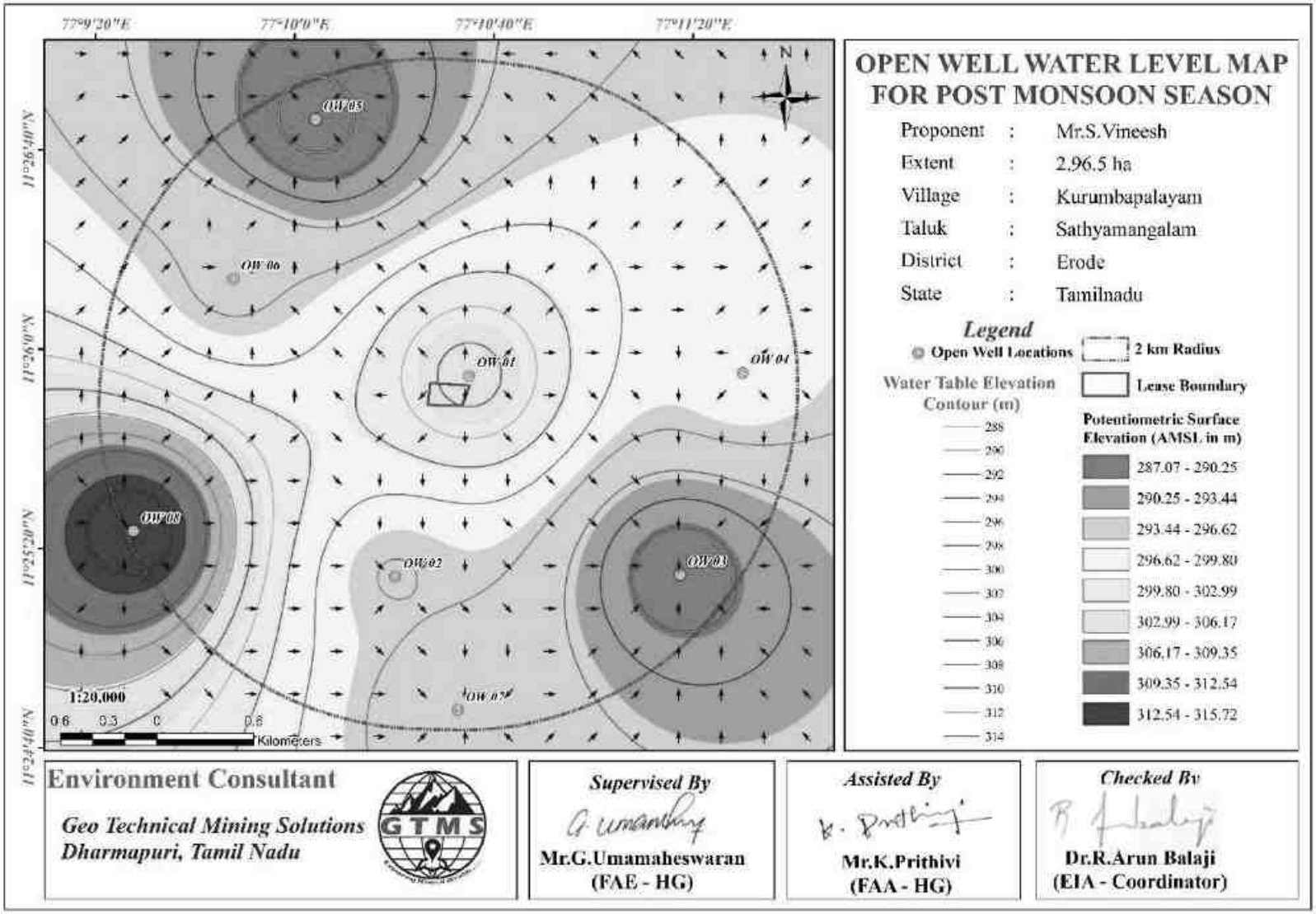


Figure 3.9 Open Well Static Groundwater Elevation Map Showing Direction of Groundwater Flow during Post-Monsoon Season

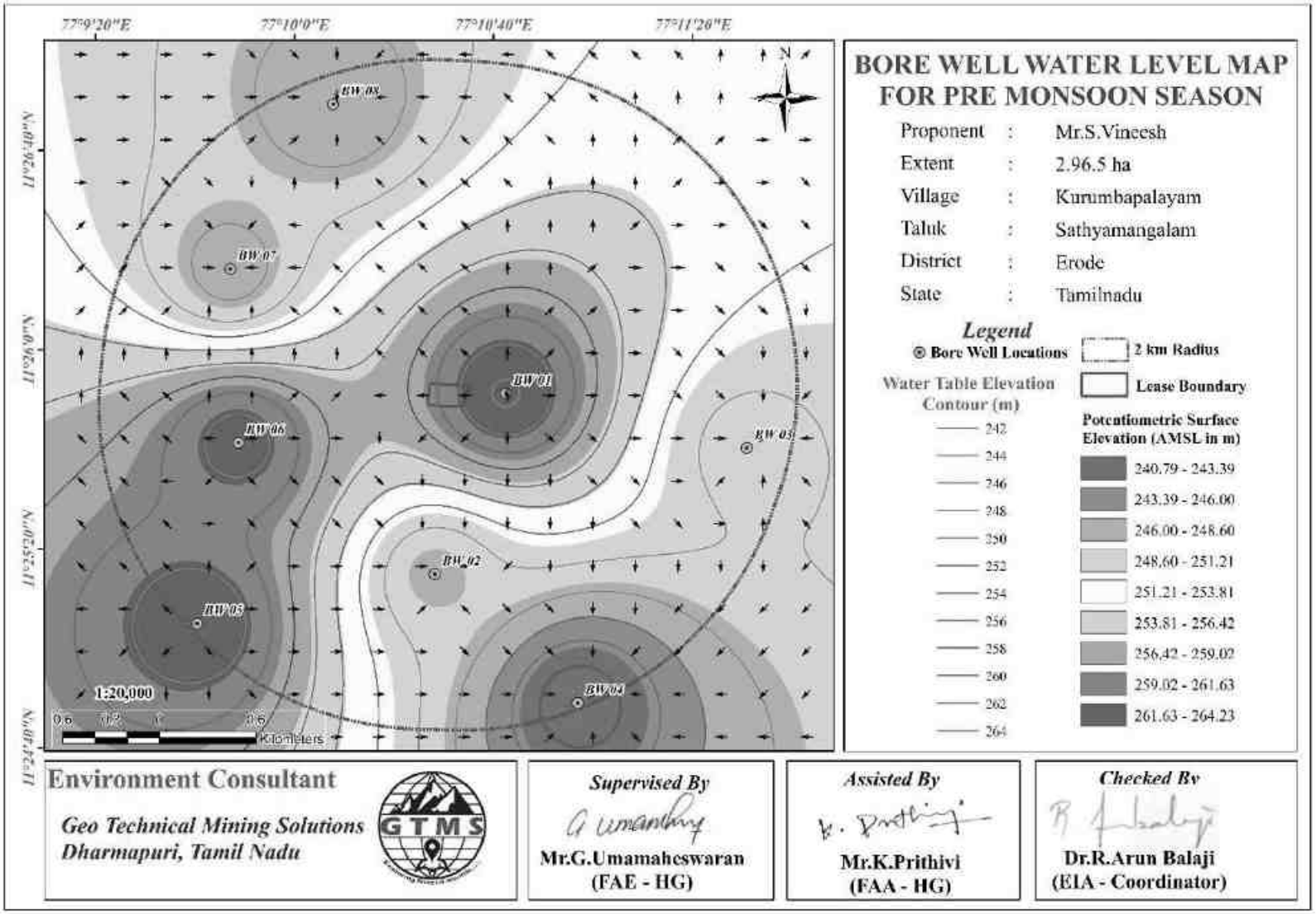


Figure 3.10 Borewell Static Groundwater Elevation Map Showing Direction of Groundwater Flow during Pre-Monsoon Season

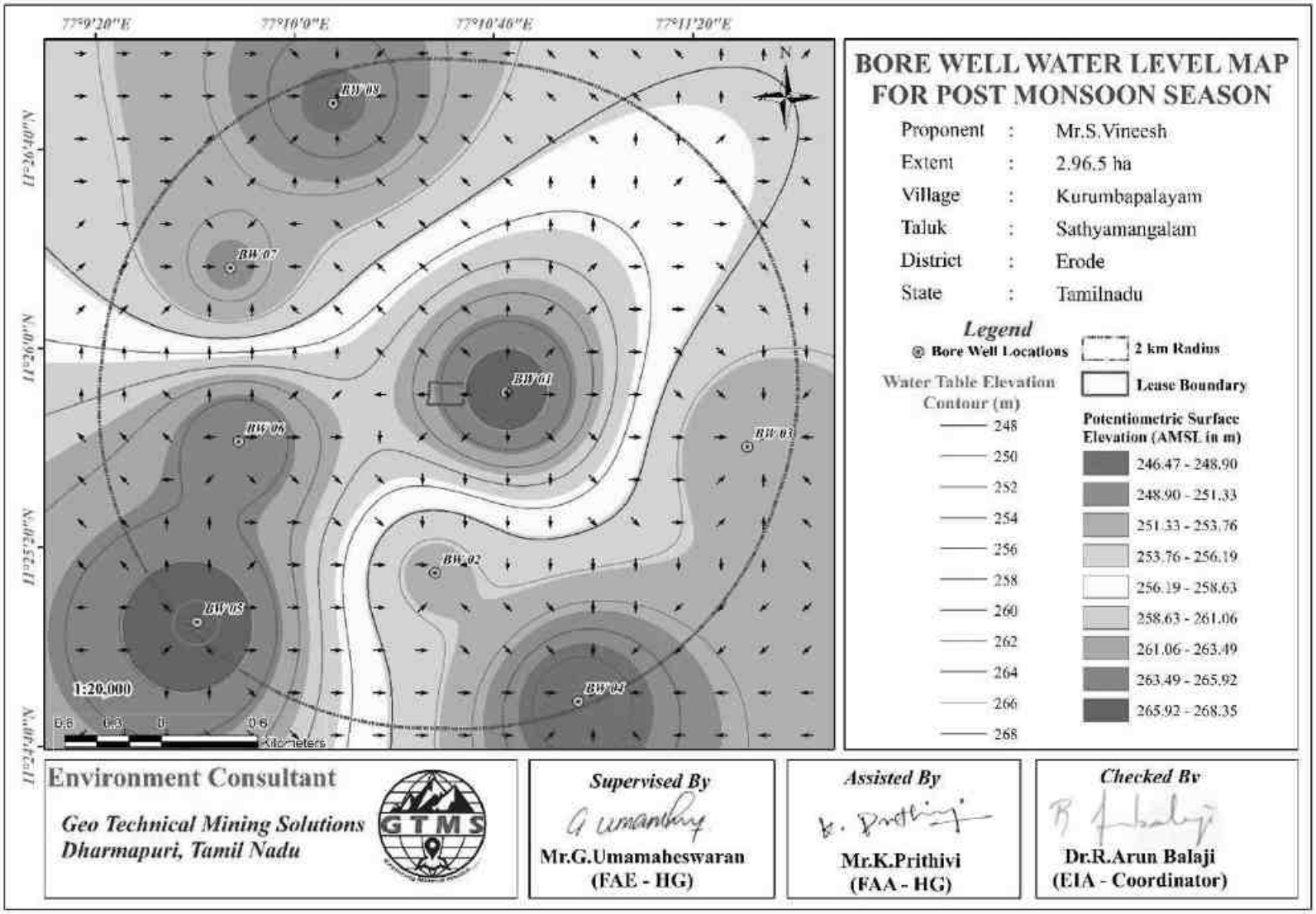


Figure 3.11 Borewell Static Showing Direction of Groundwater Flow during Post-Monsoon Season

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 3.11. The field data obtained from a detailed geophysical investigation were plotted using excel spreadsheet for interpretation. The plot for the purpose of interpretation has been shown in Figure 3.12.

Table 3.11 Vertical Electrical Sounding Data

Location Coordinates - 11°25'50.88"N 77°10'28.73"E					
S. No.	**AB/2 (m)**	**MN/2 (m)**	**Geometrical Factor (G)**	**Resistance in Ω**	**Apparent Resistivity in Ωm**
1	2	1	4.71	19.91	93.90
2	4	1	23.57	7.71	181.91
3	6	1	55.00	4.33	238.61
4	8	1	99.00	2.45	243.40
5	10	2	75.43	5.38	406.18
6	12	2	110.01	3.63	400.25
7	14	2	150.86	2.66	402.68
8	16	2	198.01	2.09	414.07
9	18	2	251.44	1.83	460.20
10	20	2	311.16	1.62	505.74
11	25	5	188.58	2.64	499.21
12	30	5	275.01	2.15	592.50
13	35	5	377.16	1.88	712.85
14	40	5	495.02	1.63	811.52
15	45	5	628.60	1.46	919.66
16	50	5	777.89	1.28	999.95
17	60	10	550.03	2.25	1210.06
18	70	10	754.32	1.76	1327.04

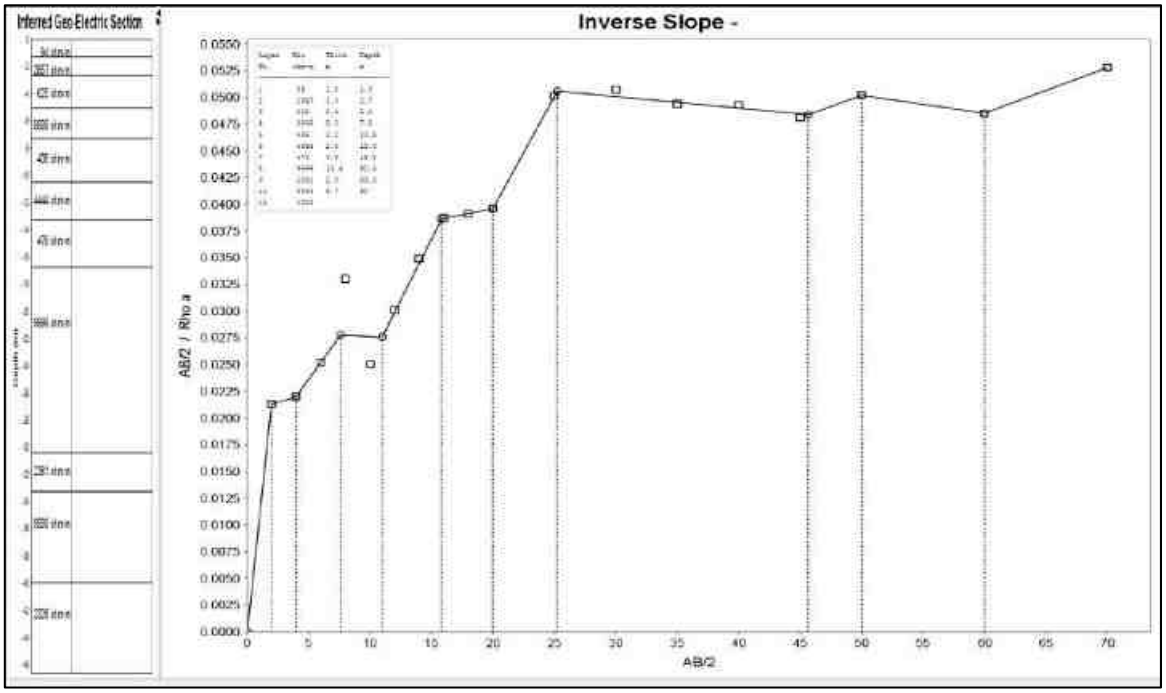


Figure 3.12 Graph Showing Occurrence of Water Bearing Fracture Zones at the Depth of 60-65m Below Ground Level in Proposed Project

The rock formation of low resistivity values indicates occurrence of water at the depth of about 55-60m below ground level. The ultimate depth of proposed project is 50m 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 3m above the ground level as there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature. Meteorological data obtained from the onsite monitoring station are provided in Table 3.12.

Table 3.12 Onsite Meteorological Data

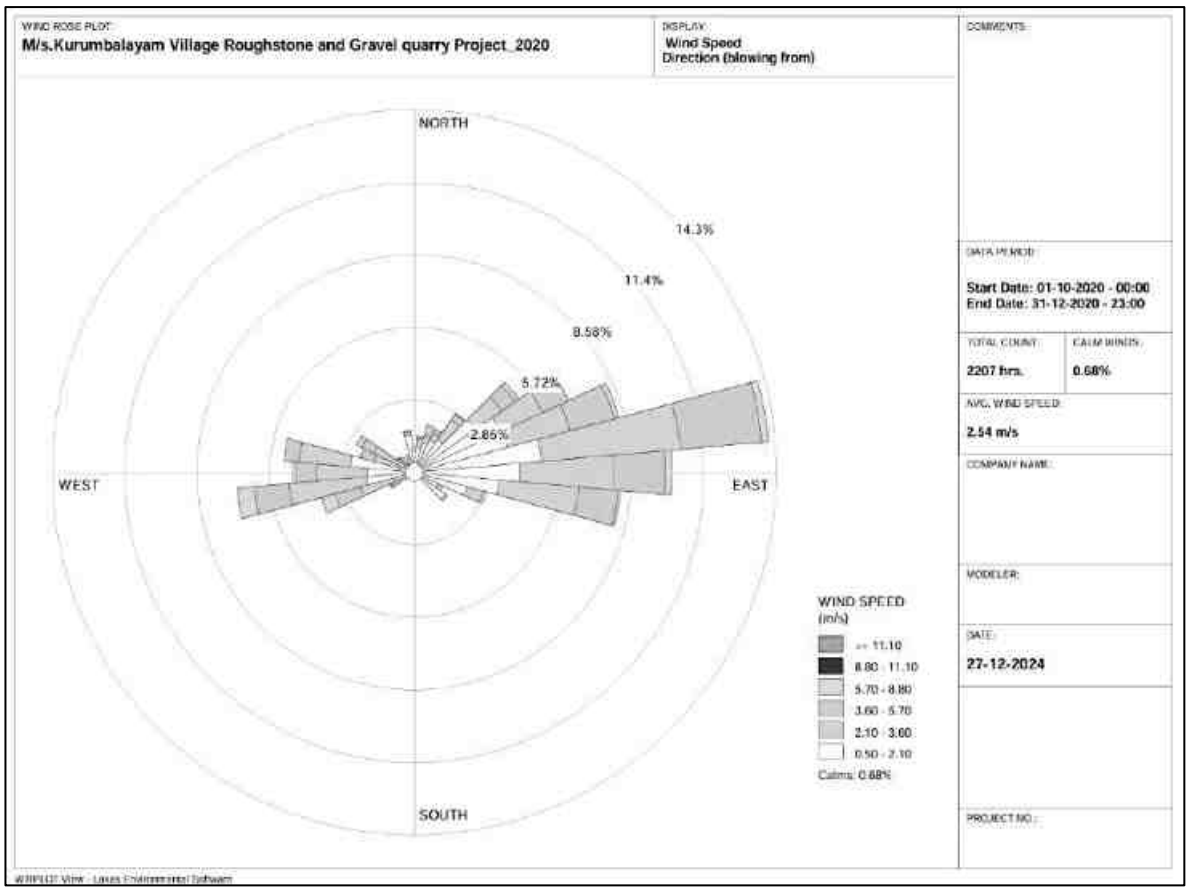
S. No.	Parameters		OCT,2024	NOV,2024	DEC,2024
1	Temperature (^{0}C)	Min	18.45	16.30	14.40
		Max	28.55	27.05	28.63
		Avg	22.90	21.64	21.64
2	Relative Humidity (%)	Min	62.12	63.62	38.50
		Max	100.00	100.00	100.00
		Avg	88.96	87.62	85.03
3	Wind Speed (m/s)	Min	0.08	0.35	0.15
		Max	4.10	4.78	5.52
		Avg	1.62	2.15	2.12
4	Wind Direction (degree)	Min	6.01	0.00	0.68
		Max	358.97	359.42	358.19
		Avg	214.80	96.47	135.27
5	Surface Pressure(kPa)	Min	91.94	91.82	91.72
		Max	92.63	92.73	92.93
		Avg	92.29	92.38	92.41

Source: On-site monitoring/sampling by ***Greenlink Analytical and Research Laboratory (India) Private Ltd*** *in association with GTMS*

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 October to December of the years from 2020 to 2023 and the seasonal wind rose for the study period of October through December 2024. The wind rose diagrams thus produced are shown in Figures 3.13-3.13a. Figure 3.14 reveals that:

- The measured average wind velocity during the study period is 1.94 m/s.
- Predominant wind was dominant in the directions ranging from Northeast to Southwest.



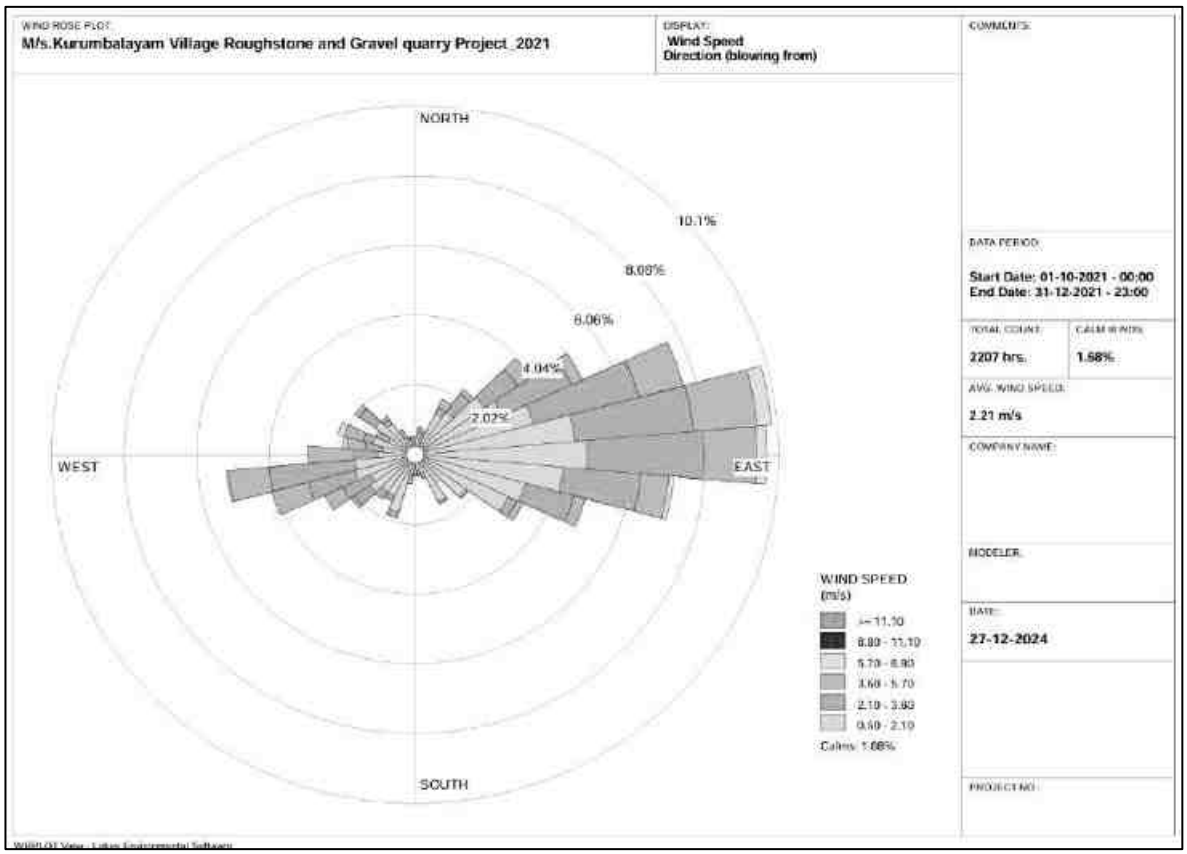


Figure 3.13 Windrose Diagram for 2020 and 2021 (October to December)

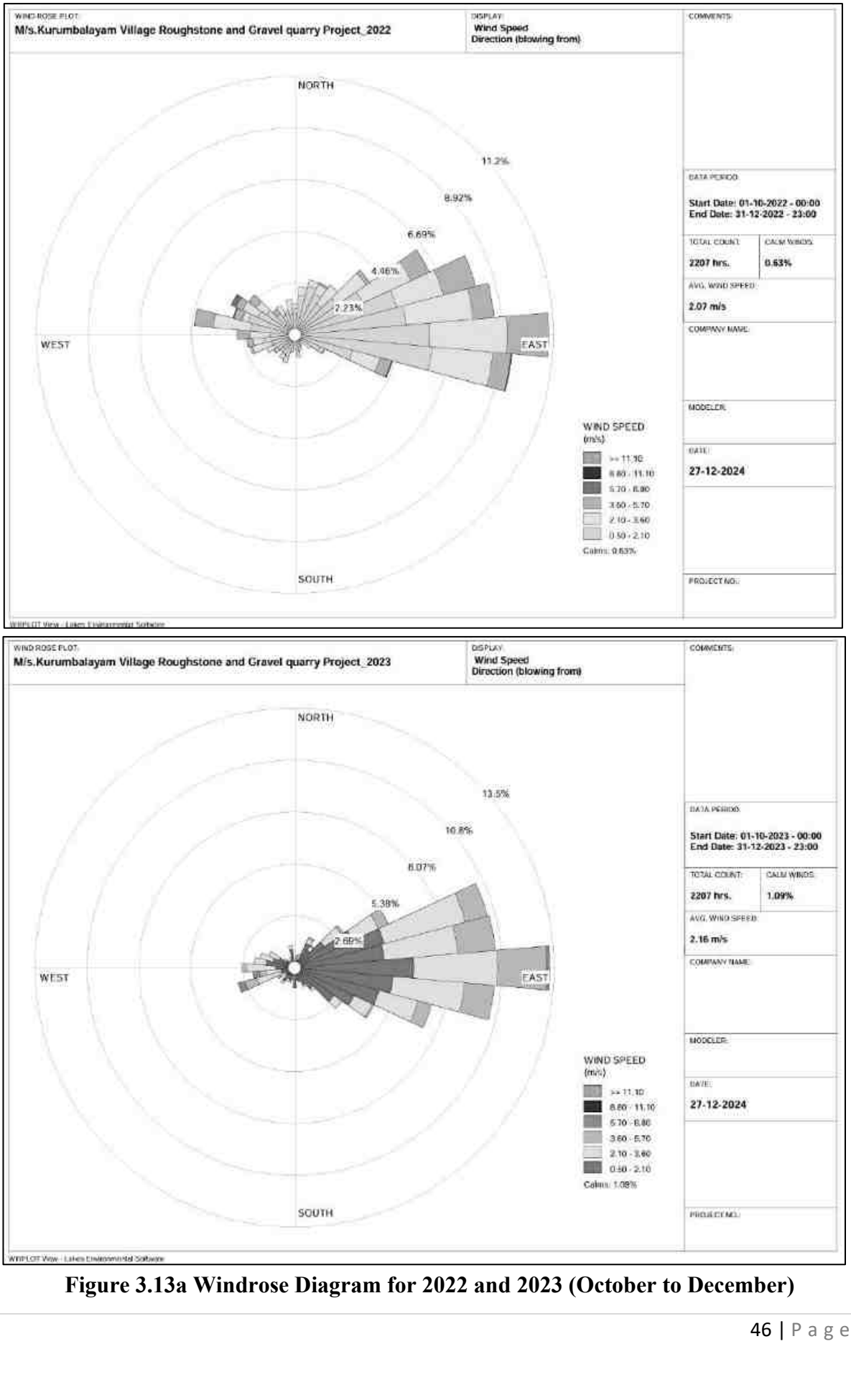


Figure 3.13a Windrose Diagram for 2022 and 2023 (October to December)

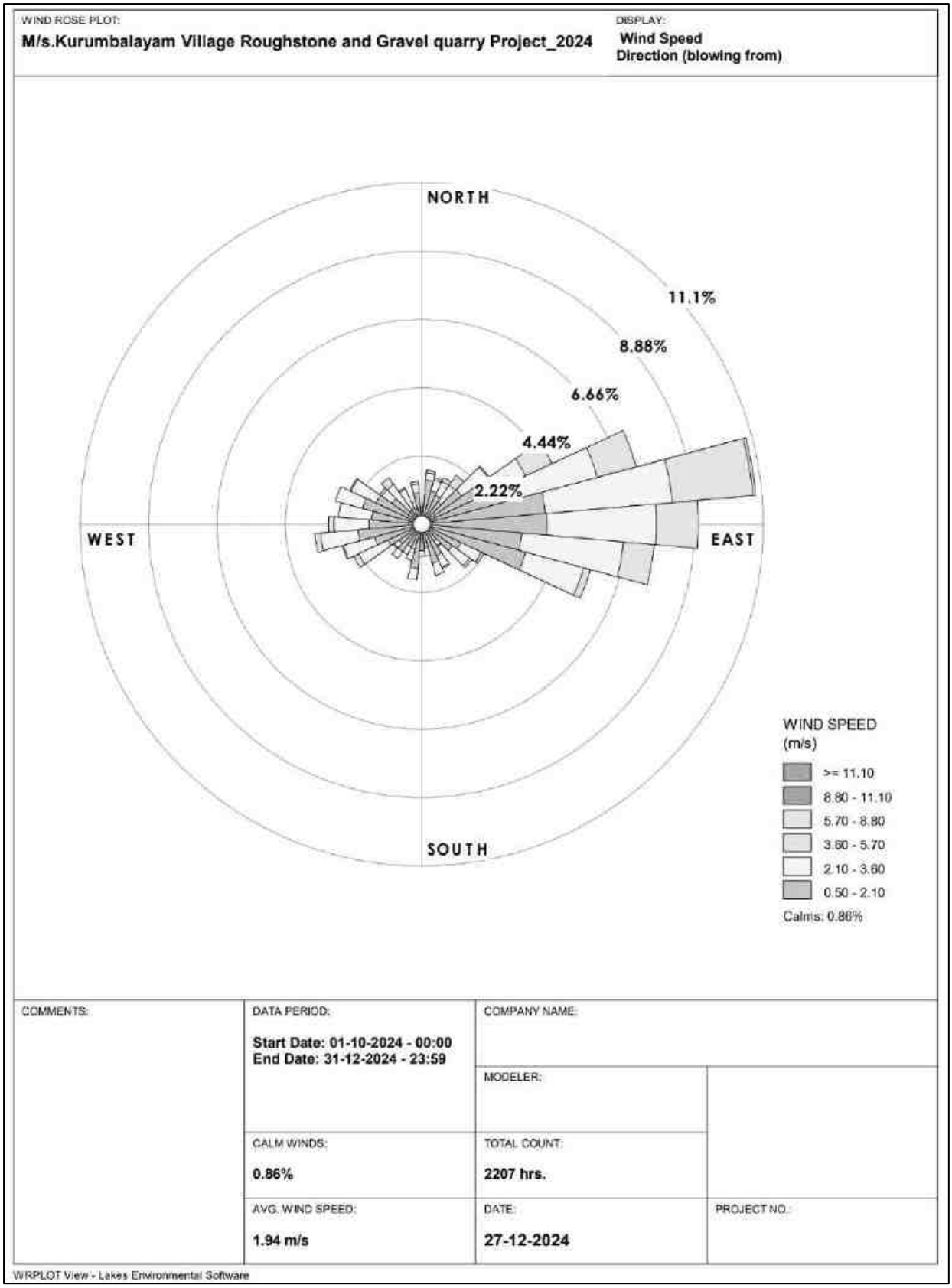


Figure 3.14 Onsite Wind Rose Diagram

3.3.2 Ambient Air Quality Study

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

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

Table 3.13 Methodology and Instrument Used for AAQ Analysis

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

Source: Sampling Methodology based ***Greenlink Analytical and Research Laboratory (India) Private Ltd*** *& CPCB* Notification

Table 3.14 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 ($\mu g/m^3$)	Annual Avg.* 24 hours**	50.0 80.0	20.0 80.0
2	NO_x ($\mu g/m^3$)	Annual Avg. 24 hours	40.0 80.0	30.0 80.0
3	PM_{10} ($\mu g/m^3$)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
4	$PM_{2.5}$ ($\mu g/m^3$)	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 Six (06) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period October to December, 2024 as per the CPCB, MoEF guidelines and notifications.

It was ensured that the equipment was placed preferably at a height of at least 3 ± 0.5m above the ground level at each monitoring station for negating the effects of wind-blown ground dust. The equipment was placed at space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results. The baseline data of ambient air were generated for $PM_{2.5}$, PM_{10}, sulphur dioxide (SO_2) and nitrogen dioxide (NO_x). The sampling locations are shown in Figure 3.15 and average concentrations of air pollutants are summarized in Tables 3.15 and are shown in Figures 3.16-3.20.

Table 3.15 Ambient Air Quality (AAQ) Monitoring Locations

Location Code	Monitoring Locations	Distance (km)	Direction	Coordinates
AAQ1	Nearby Core	0.06	E	11°25'51.19"N, 77°10'36.65"E
AAQ2	Kurumbapalayam	0.79	S	11°25'23.24"N, 77°10'24.49"E
AAQ3	Pungampalli	3.30	SE	11°24'14.07"N, 77°11'25.04"E
AAQ4	Panayampalli	3.68	SW	11°24'9.64"N, 77° 9'18.70"E
AAQ5	Anna Nagar	2.65	W	11°25'36.16"N, 77° 9'0.20"E
AAQ6	Karuthottampalayam	1.64	NNW	11°26'42.79"N, 77°10'7.23"E

Source: On-site monitoring/sampling ***Greenlink Analytical and Research Laboratory (India) Private Ltd*** *in association with GTMS*

Results

As per the monitoring data, $PM_{2.5}$ ranges from 15.4µg/m^3 to 17.5µg/m^3; PM_{10} from 37.0µg/m^3 to 41.9µg/m^3; SO_2 from 3.0µg/m^3 to 4.7µg/m^3; NO_x from 10.0µg/m^3 to 16.1g/m^3. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

Air quality Index

The AQI shows that the air quality of the study area falls within good category 40 causing minimal impact to human health.

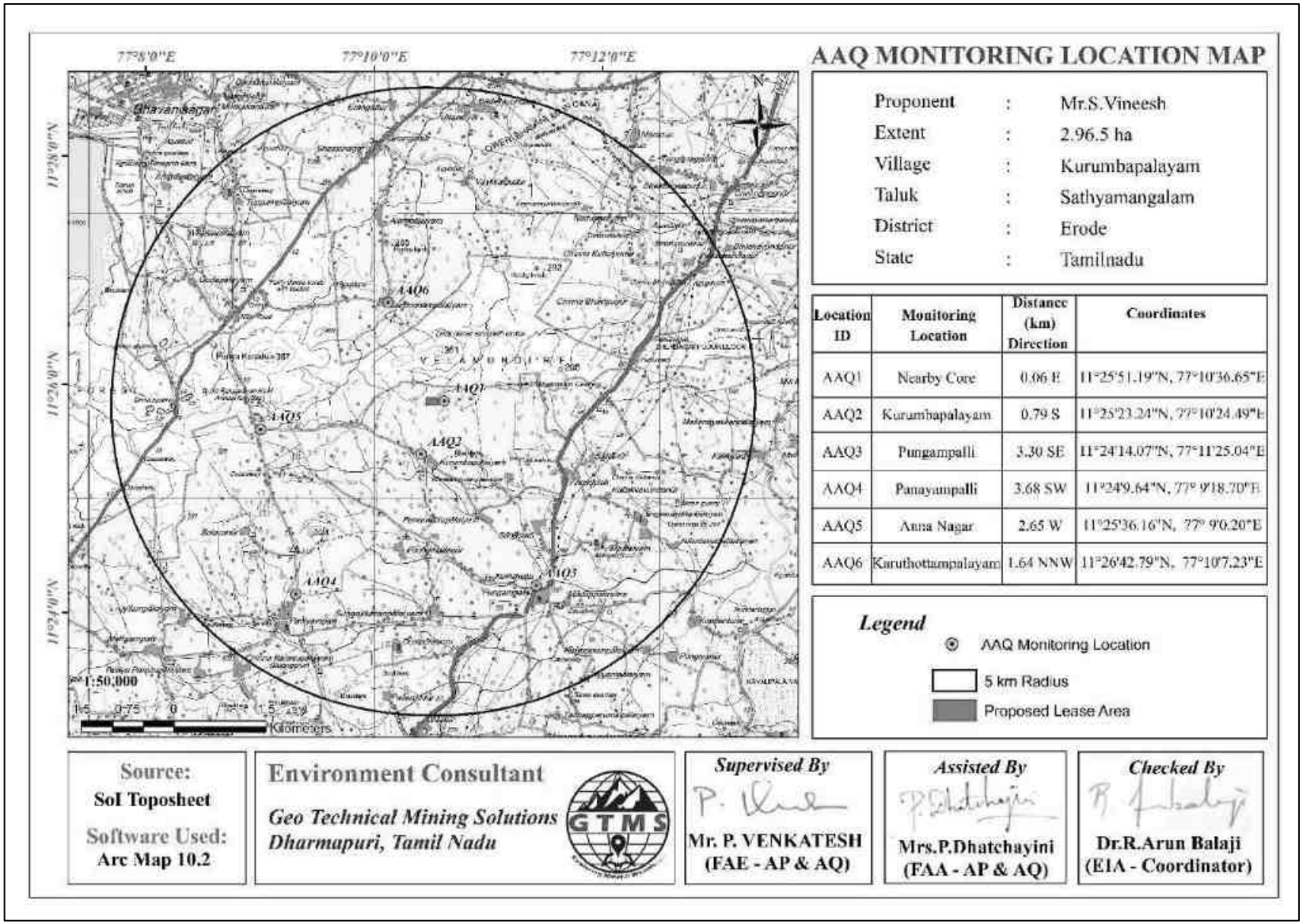


Figure 3.15 Map Showing Ambient Air Quality Monitoring Station Locations Around 5 km Radius from Proposed Project Site

Table 3.16 Summary of AAQ Result

	$PM_{2.5}$				PM_{10}			
Station ID	**Max**	**Min**	**Mean**	**98th Percentile**	**Max**	**Min**	**Mean**	**98th Percentile**
AAQ1	16.6	13.8	15.8	16.6	41.5	36.4	39.9	41.5
AAQ2	16.9	14.0	15.6	16.9	42.3	35.9	39.5	42.0
AAQ3	23.4	22.1	22.7	23.1	48.6	43.8	46.1	48.3
AAQ4	15.6	13.5	14.7	15.5	39.0	33.8	36.8	38.7
AAQ5	16.3	13.9	15.2	16.2	40.2	35.0	38.0	39.9
AAQ6	15.9	14.8	15.3	15.8	39.8	37.0	38.3	39.6
AAQ7	16.6	13.8	15.8	16.6	41.5	36.4	39.9	41.5
	SO_2				NO_x			
AAQ1	4.8	3.2	4.1	4.8	18.7	12.5	17.1	18.7
AAQ2	4.5	3.0	3.6	4.4	15.8	10.5	11.7	15.6
AAQ3	6.2	3.9	5.1	6.1	21.7	15.4	19.7	21.7
AAQ4	3.9	2.2	3.2	3.9	10.9	6.2	9.5	10.7
AAQ5	4.9	3.4	4.0	4.9	14.6	9.1	11.7	14.5
AAQ6	4.1	2.1	3.1	4.0	15.1	6.5	11.2	15.0
AAQ7	4.8	3.2	4.1	4.8	18.7	12.5	17.1	18.7

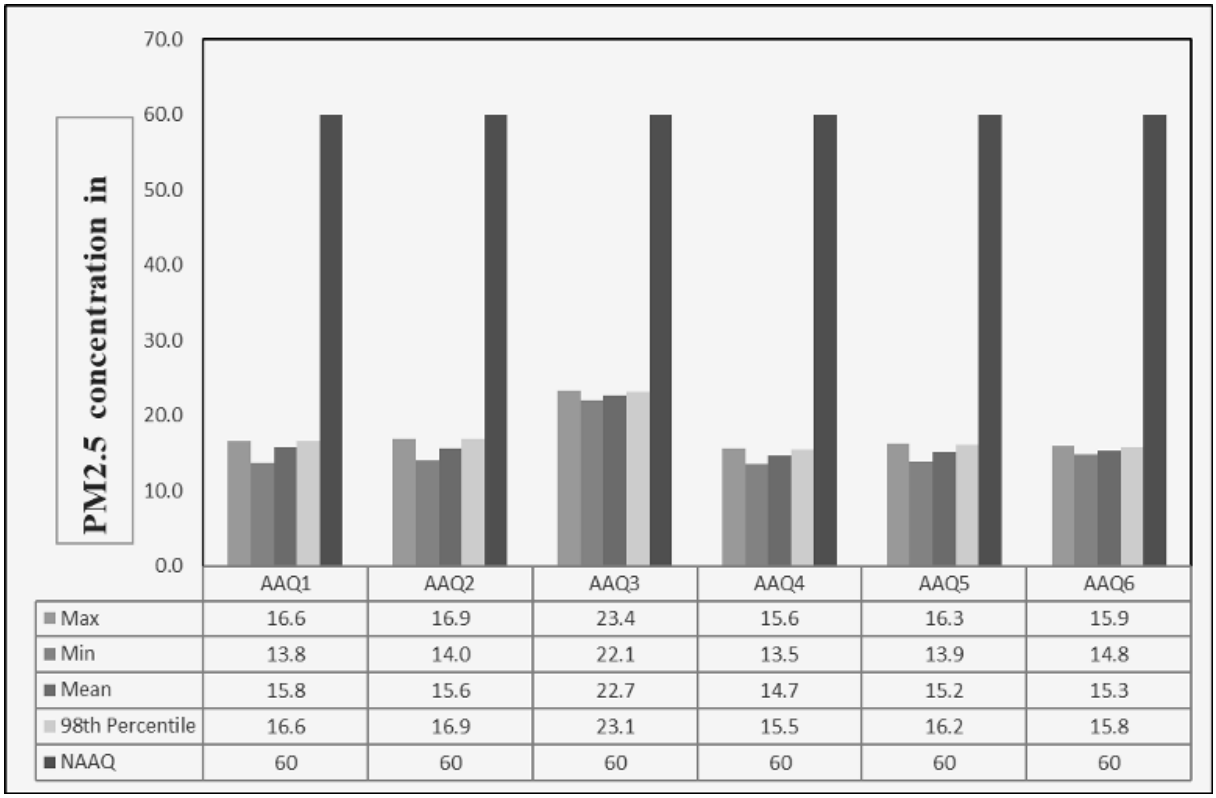
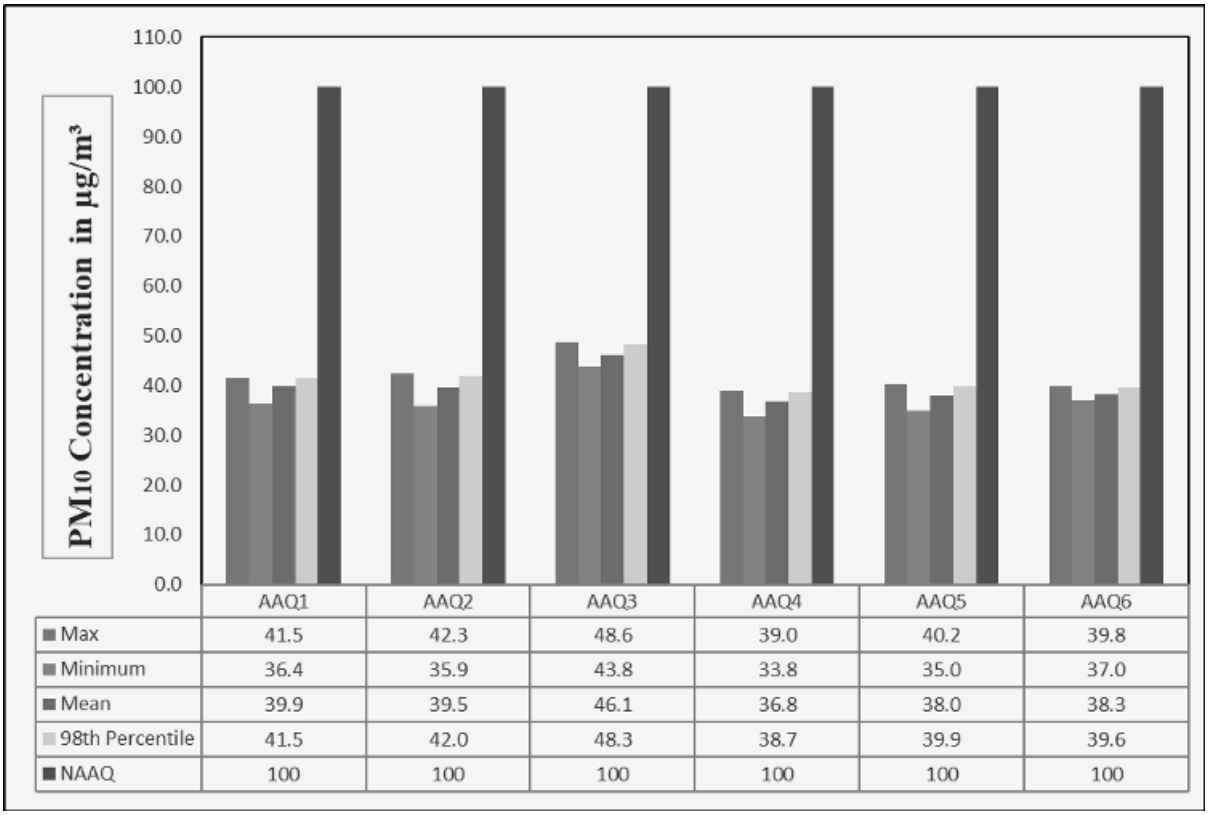
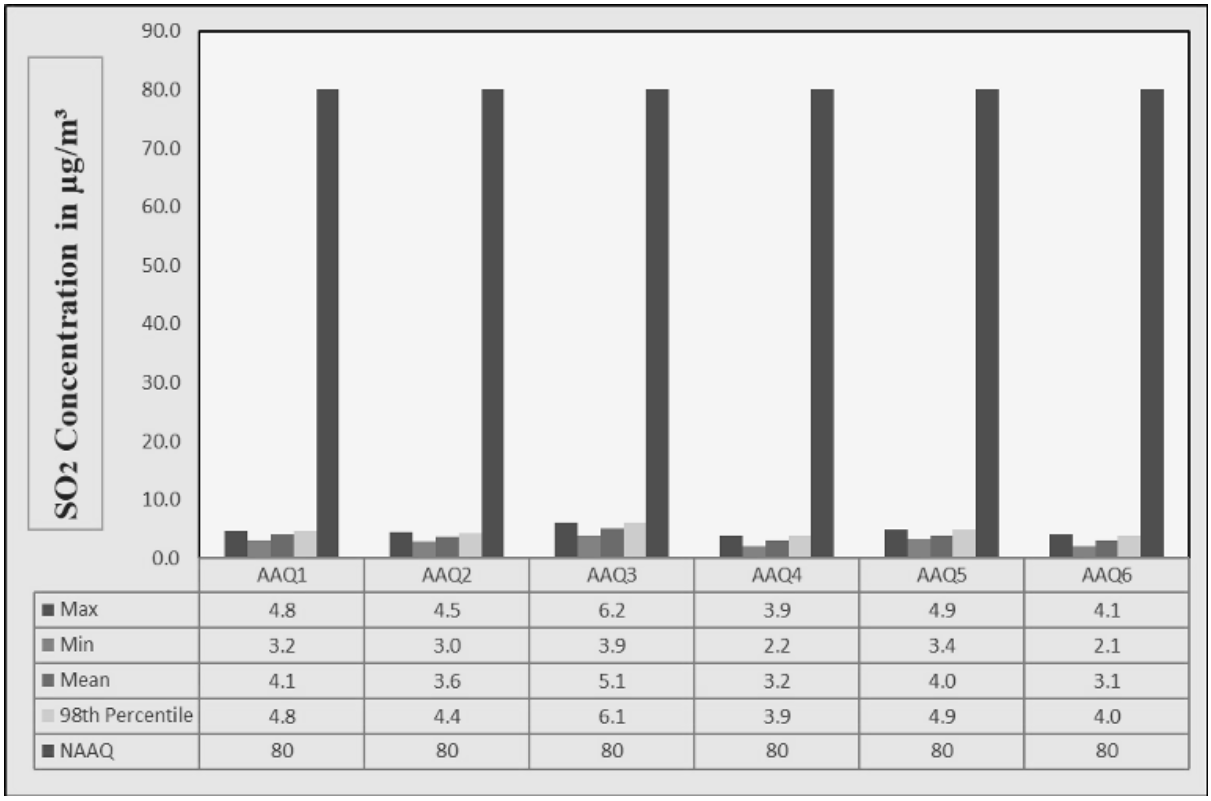


Figure 3.16 Bar Chart Showing Maximum, Minimum, and Average Concentrations of $PM_{2.5}$ Measured from 6 Air Quality Monitoring Stations within 5 km Radius



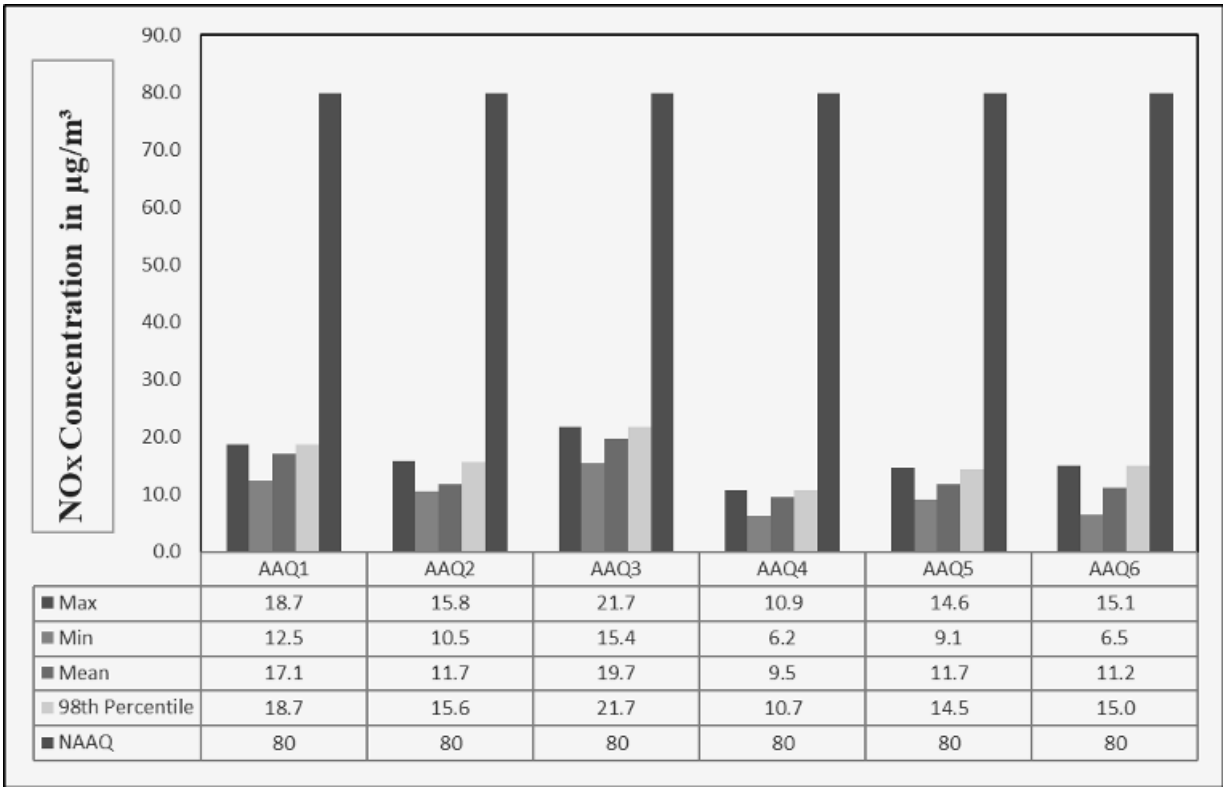
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6
Max	41.5	42.3	48.6	39.0	40.2	39.8
Minimum	36.4	35.9	43.8	33.8	35.0	37.0
Mean	39.9	39.5	46.1	36.8	38.0	38.3
98th Percentile	41.5	42.0	48.3	38.7	39.9	39.6
NAAQ	100	100	100	100	100	100

Figure 3.17 Bar Chart Showing Maximum, Minimum, and Average Concentrations of PM_{10} Measured from 6 Air Quality Monitoring Stations within 5 km Radius



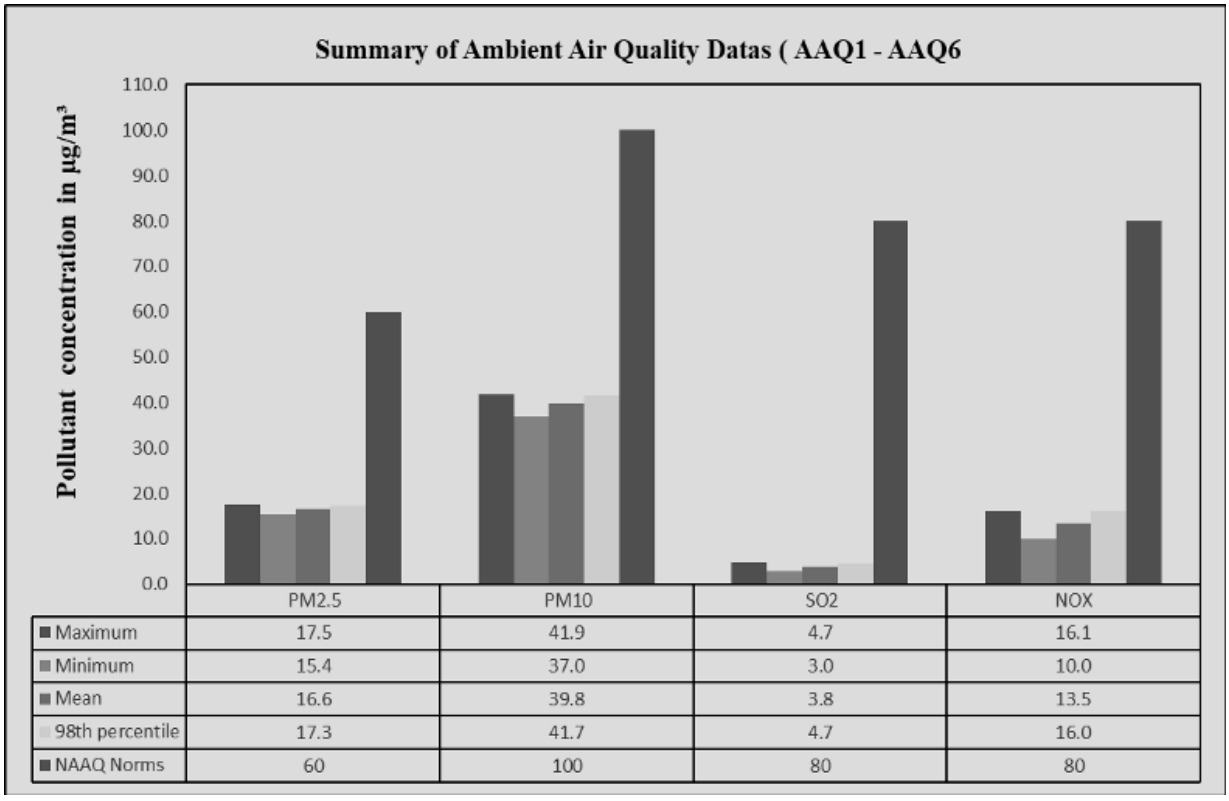
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6
Max	4.8	4.5	6.2	3.9	4.9	4.1
Min	3.2	3.0	3.9	2.2	3.4	2.1
Mean	4.1	3.6	5.1	3.2	4.0	3.1
98th Percentile	4.8	4.4	6.1	3.9	4.9	4.0
NAAQ	80	80	80	80	80	80

Figure 3.18 Bar Chart Showing Maximum, Minimum, and Average Concentrations of SO_2 Measured from 6Air Quality Monitoring Stations within 5 km Radius



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6
Max	18.7	15.8	21.7	10.9	14.6	15.1
Min	12.5	10.5	15.4	6.2	9.1	6.5
Mean	17.1	11.7	19.7	9.5	11.7	11.2
98th Percentile	18.7	15.6	21.7	10.7	14.5	15.0
NAAQ	80	80	80	80	80	80

Figure 3.19 Bar Chart Showing Maximum, Minimum, and Average Concentrations of NO_x Measured from 6 Air Quality Monitoring Stations within 5km Radius



	PM2.5	PM10	SO2	NOX
Maximum	17.5	41.9	4.7	16.1
Minimum	15.4	37.0	3.0	10.0
Mean	16.6	39.8	3.8	13.5
98th percentile	17.3	41.7	4.7	16.0
NAAQ Norms	60	100	80	80

Figure 3.20 Bar Chart Showing Maximum, Minimum, And Average Concentrations of Pollutants in 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 Six (06) locations covering commercial, residential, rural areas within the radius of 5 km. Details of noise monitoring locations are provided in Table 3.17 and spatial occurrence of the locations are shown in Figure 3.21.

Table 3.17 Noise Monitoring Locations

S. No	Location Code	Monitoring Locations	Distance in km	Direction	Coordinates
1	N1	Core	---	---	11°25'51.92"N, 77°10'31.21"E
2	N2	Kurumbapalayam	0.87	S	11°25'20.47"N, 77°10'29.72"E
3	N3	Pungampalli	3.35	SE	11°24'12.41"N, 77°11'25.29"E
4	N4	Panayampalli	3.91	SW	11°24'4.18"N, 77° 9'13.35"E
5	N5	Anna Nagar	2.68	W	11°25'34.83"N, 77° 8'59.13"E
6	N6	Karuthottampalayam	1.58	NNW	11°26'40.96"N, 77°10'7.67"E

Table 3.18 Ambient Noise Quality Result

Station ID	Location	Environmental setting	Average day noise level (dB(A))	Average night noise level (dB(A))	Day time (6.00 AM – 10.00 PM)	Night time (10.00 PM – 6.00 AM)
					Standard (L_{eq} in dB (A))	
N1	Core	Industrial Area	50.7	46.3	75	70
N2	Kurumbapalayam	Residential Area	40.5	39.1	55	45
N3	Pungampalli		41.2	40.9		
N4	Panayampalli		39.4	38		
N5	Anna Nagar		40.1	38.4		
N6	Karuthottampalayam		38.5	37		

Source: On-site monitoring/sampling by ***Greenlink Analytical and Research Laboratory (India) Private Ltd*** *in association with GTMS*

The Table 3.18 shows that noise level in core zone was 50.7 dB (A) Leq during day time and 46.3dB(A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 38.5 to 41.2dB (A) Leq and during night time from 37.0 to 40.9dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB. The results are also depicted below in Figures 3.22 and 3.23.

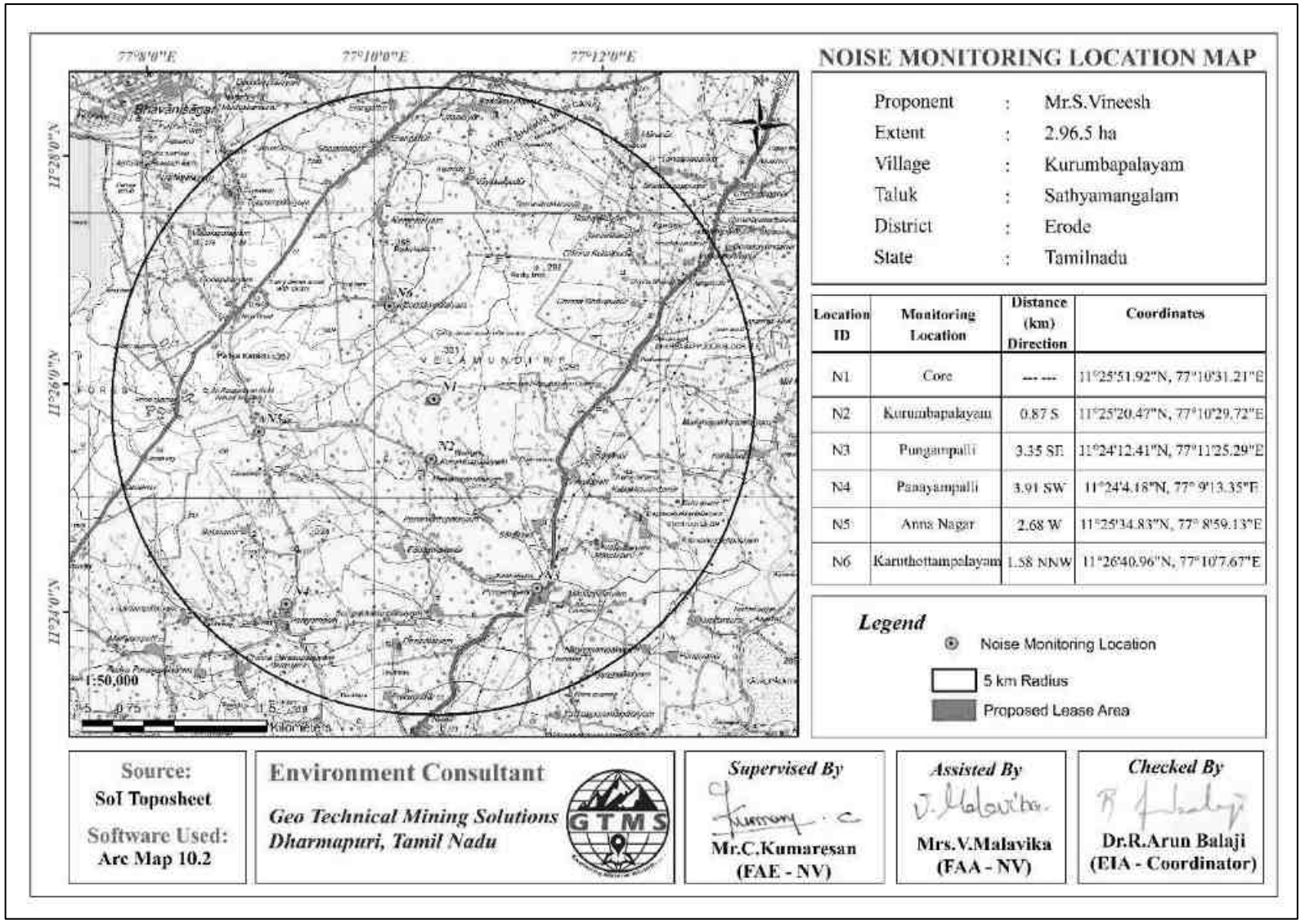


Figure 3.21 Map Showing Noise Level Monitoring Station Locations around 5 km Radius from Proposed Project Site

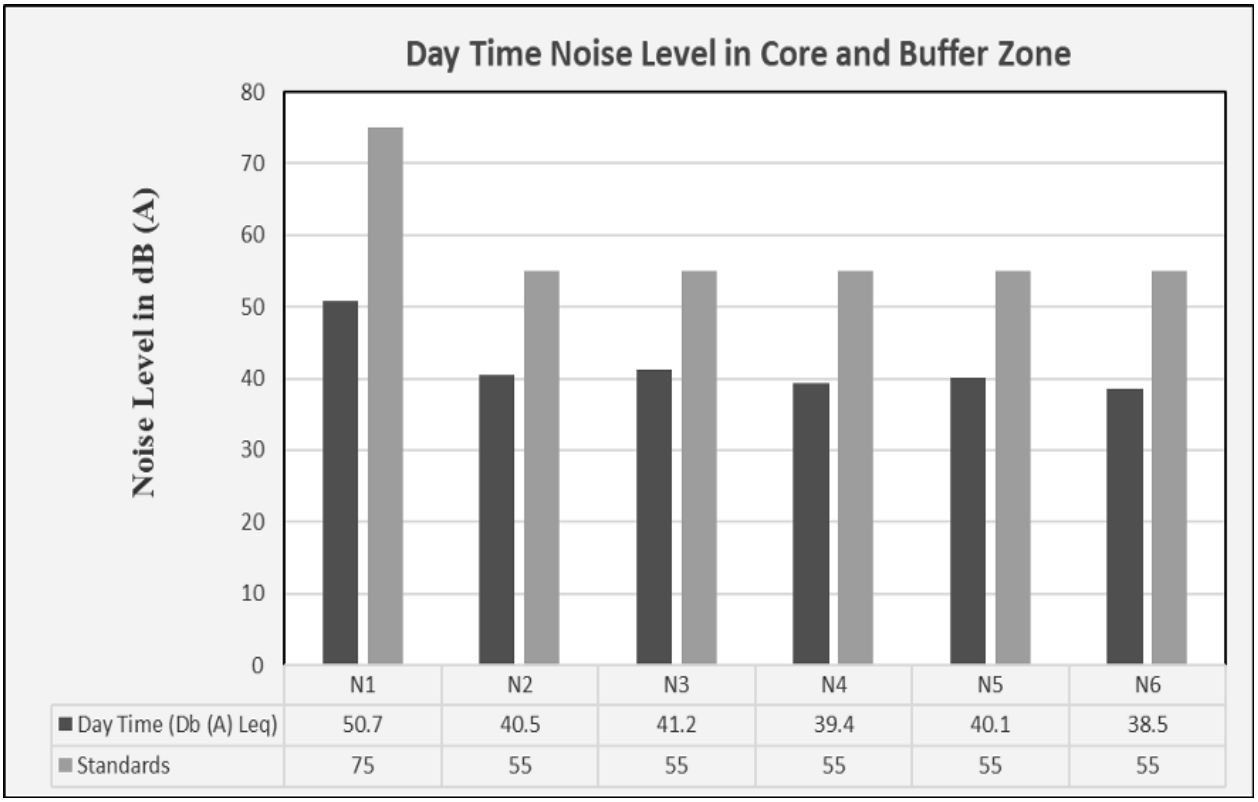


Figure 3.22 Bar Chart Showing Day Time Noise Levels Measured in Core and Buffer Zones

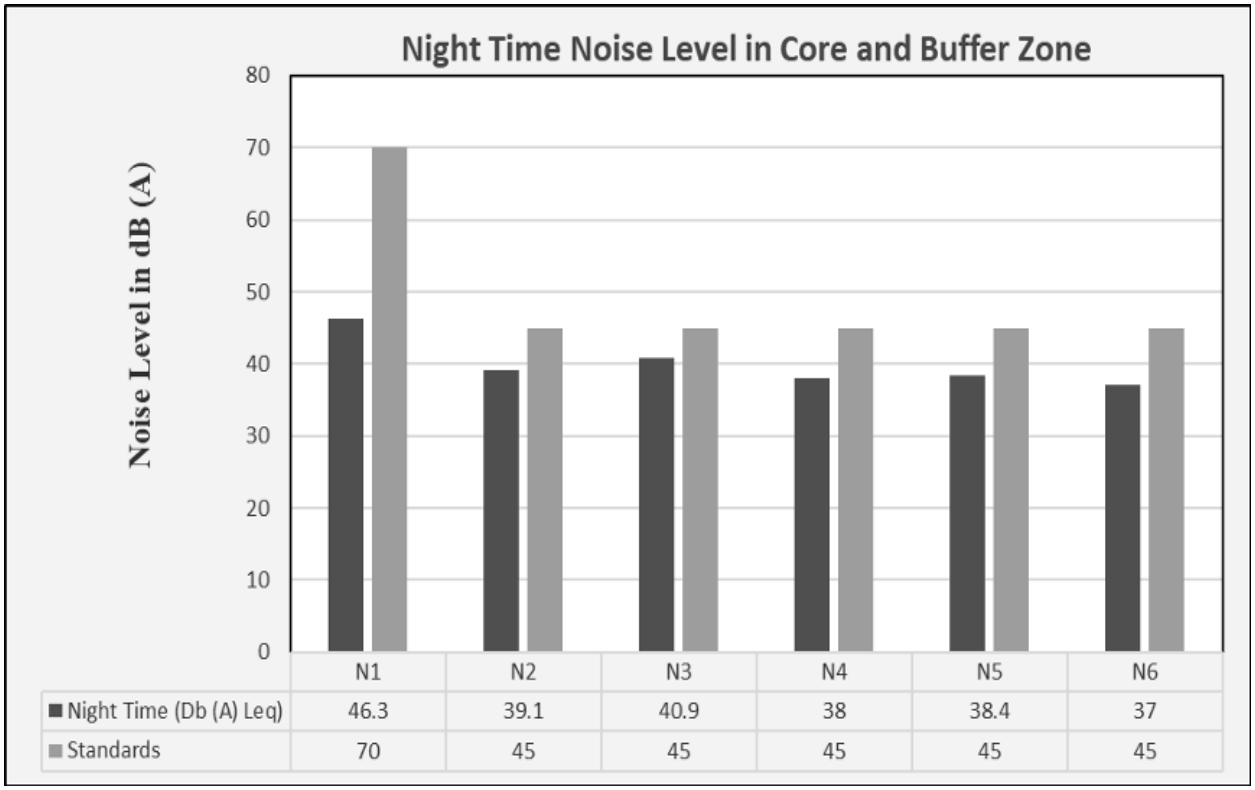


Figure 3.23 Bar Chart Showing Night Time Noise Levels Measured in Core and Buffer Zones

3.5 BIOLOGICAL ENVIRONMENT

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

Nested quadrat sampling method was used for the study of community structure of the vegetation. The sampling consisted of randomly placed quadrats of 10m × 10m were laid down to assess trees, and sub quadrats of 5 m × 5 m were laid down for shrubs, 1m x 1m were laid done for herbs. The size and number of quadrats needed were determined using the species-area curve (Misra, 1968). The data on vegetation were quantitatively analysed for abundance, density, frequency as per Curtis & McIntosh (1950). The Important Value Index (IVI) for trees was determined as the sum of relative density, relative frequency and relative dominance (Curtis, 1959).

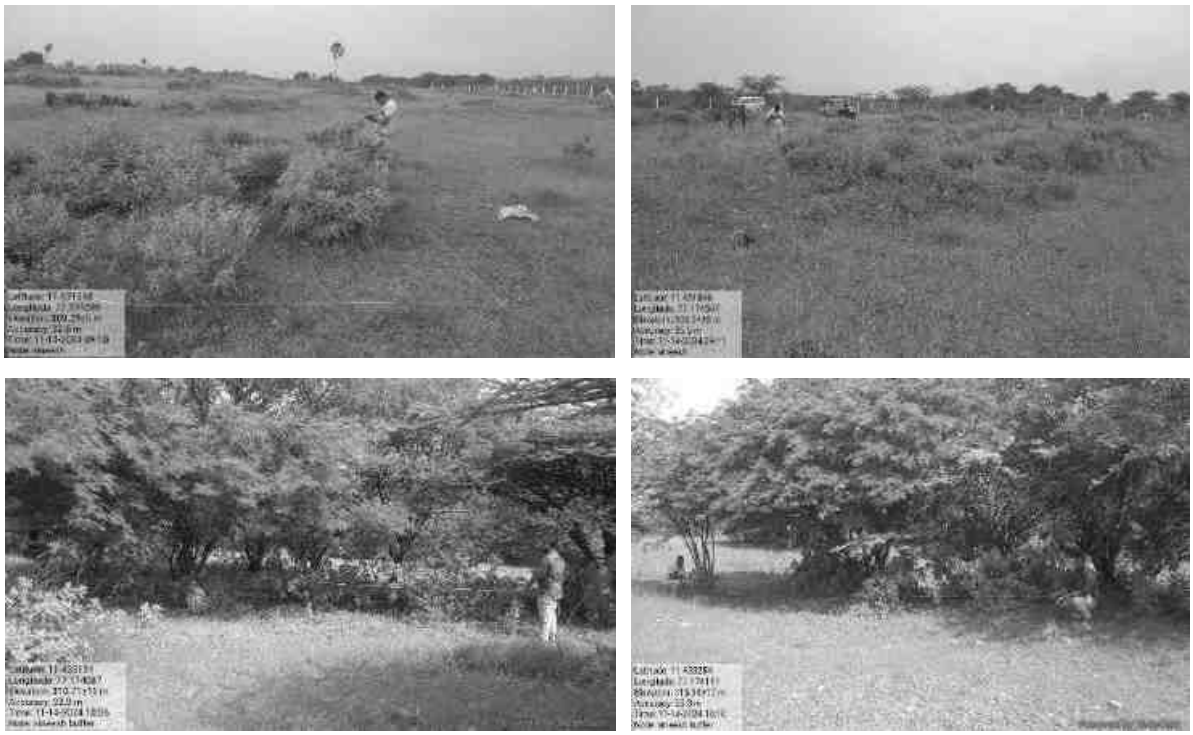


Figure 3.24 Quadrates Sampling Methods of Flora

Important Value Index (IVI)

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

IVI = Relative frequency + Relative abundance + Relative density [RF + RA + RD]

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

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

Shannon – Wiener Index, Evenness and Richness

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

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

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

$$\mathbf{H = - \Sigma (ni/n) \times \ln (ni/n)}$$

- Where, ni is individual density of a species and n is total density of all the species
- The Evenness Index (E) is calculated by using Shannon's Evenness formula (Magurran, 2004).
- The higher the value of H, the higher the diversity of species in a particular community

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

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

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

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

3.5.1 Floral diversity Analysis

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

Flora in core zone

There are no trees in the quarry lease area, only shrubs, herbs and grasses. Taxonomically total of 28 species belonging to 16 families were recorded. Amongthem are herbs (23) and shrubs (5). Majority of the species belongs to the family of Fabaceae and Poaceae. The species richness (Margalef index) and plant details are given in Table 3.19-3.21. There are no endangered or threatened plant species in the quarry lease area.

Flora in 300m radius

The vegetation habit analysis indicates that the flora of the 300m radius of the study area consists of 60 species belonging to 31 families. Among the 60 species, 22 herbs, 24 shrubs and 14 trees. the highest number of species were from the Poaceae family (7), followed by Fabaceae (6), Malvaceae (4), and Mimosaceae (4). Three species were recorded from the Amaranthaceae, Apocynaceae, and Asteraceae families, while two species each were recorded from the Arecaceae, Boraginaceae, Convolvulaceae, Cucurbitaceae, Euphorbiaceae, and Lamiaceae families. The endangered or threatened and Species Richness (margalef Index) in the study area it mentioned in Table 3.22-3.24. The Velamundi Reserve Forest is located 170 meters north of the quarry lease area. The reserve forest is predominantly populated with *Albizia amara, Vachellia leucophloea, Vachellia karroo, Chloroxylon swietenia*, and *Ziziphus mauritiana*. The classification of plants in the reserve forest is given in Table 3.22-3.24.

Flora in 10 km radius zone

The 10km radius A total of 107 species of invasive alien species belonging to 82 genera and 39 families were recorded in 10km radius (Table 3.25). Herbs (73.83%) formed the predominant life form followed by shrubs (10.28%), climbers (8.41%), trees (4.67%) and grasses (2.80%).

Table 3.19. Flora in Mine Lease Area

S. No	Local Name	Scientific name	Family name	Total No. of species	Total of Quadrants with	Total No. of Quadrants	Density	Frequency (%)	Abundance	Relative Density	Relative Frequency	IVI	UCN Conservation Status
SHRUBS													
1	Avaram chedi	*Senna auriculata*	Fabaceae	10	4	5	2.0	80	2.5	19.61	19.05	38.66	LC
2	Earuku	*Calotropis gigantea*	Apocynaceae	8	3	5	1.6	60	2.7	15.69	14.29	29.97	NL
3	communist pacha	*Chromolaena odorata*	Asteraceae	13	5	5	2.6	100	2.6	25.49	23.81	49.30	NL
4	Sundaikkai chedi	*Solanum torvum*	Solanaceae	11	5	5	2.2	100	2.2	21.57	23.81	45.38	NL
5	Kattamanakku	*Jatropha gossypiifolia*	Euphorbiaceae	9	4	5	1.8	80	2.3	17.65	19.05	36.69	LC
HERBS & CLIMBERS													
1	Perandai	*Cissus quadrangularis*	Vitaceae	6	4	5	1.2	80	1.5	1.99	4.04	6.03	NL
2	Thathapondu	*Tridax procumbens*	Asteraceae	16	5	5	3.2	100	3.2	5.32	5.05	10.37	NL
3	Kolunji chedi	*Tephrosia purpurea*	Fabaceae	23	5	5	4.6	100	4.6	7.64	5.05	12.69	NL
4	Nayuruvi	*Achyranthes aspera*	Amaranthaceae	18	5	5	3.6	100	3.6	5.98	5.05	11.03	NL
5	Nearunji mull	*Tribulus zeyheri*	Zygophyllaceae	13	5	5	2.6	100	2.6	4.32	5.05	9.37	NL
6	Pulapoo	*Aerva lanata*	Amaranthaceae	7	4	5	1.4	80	1.8	2.33	4.04	6.37	NL

7	American mint	*Hyptis suaveolens*	Lamiaceae	11	5	5	2.2	100	2.2	3.65	5.05	8.70	NL
8	Mukkirattai	*Boerhaavia diffusa*	Nyctaginaceae	12	4	5	2.4	80	3.0	3.99	4.04	8.03	NL
9	Kuppaimeni	*Acalypha indica*	Euphorbiaceae	9	5	5	1.8	100	1.8	2.99	5.05	8.04	NL
10	Kovaikodi	*Coccinia grandis*	Cucurbitaceae	8	3	5	1.6	60	2.7	2.66	3.03	5.69	NL
11	Arivalmanaipondu	*Sida acuta*	Malvaceae	13	5	5	2.6	100	2.6	4.32	5.05	9.37	NL
12	Nilatutti	*Sida cordifolia*	Malvaceae	25	5	5	5	100	5.0	8.31	5.05	13.36	NL
13	Korai grass	*Cyperus sesquiflorus*	Poaceae	28	5	5	5.6	100	5.6	9.30	5.05	14.35	LC
14	Seppu nerinji	*Indigofera linnaei*	Fabaceae	17	4	5	3.4	80	4.3	5.65	4.04	9.69	NL
15	Amman pacharisi	*Euphorbia hirta*	Euphorbiaceae	16	4	5	3.2	80	4.0	5.32	4.04	9.36	NL
16	Karaikai	*Canthium coromandelicum*	Rubiaceae	2	2	5	0.4	40	1.0	0.66	2.02	2.68	NL
17	Keelanelli	*Phyllanthus amarus*	Phyllanthaceae	15	4	5	3	80	3.8	4.98	4.04	9.02	NL
18	Chevvarakupul	*Chloris barbata*	Poaceae	11	4	5	2.2	80	2.8	3.65	4.04	7.69	NL
19	Mullukkeerai	*Amaranthus spinosus*	Amaranthaceae	9	5	5	1.8	100	1.8	2.99	5.05	8.04	NL
20	Vishnukarandi	*Evolvulus alsinoides*	Convolvulaceae	12	4	5	2.4	80	3.0	3.99	4.04	8.03	NL
21	Thulasi	*Ocimum sanctum*	Lamiaceae	8	3	5	1.6	60	2.7	2.66	3.03	5.69	NL
22	Natthai choori	*Spermacoce hispida L*	Rubiaceae	13	5	5	2.6	100	2.6	4.32	5.05	9.37	NL
23	Thuthi	*Abutilon indicum*	Malvaceae	9	4	5	1.8	80	2.3	2.99	4.04	7.03	NL

Table 3.20 Calculation of Species Diversity in mine lease area

S.No	Scientific name	No. of Species	Pi	In (Pi)	Pi x in (Pi)
Shrubs					
1	*Senna auriculata*	10	0.20	-1.63	-0.32
2	*Calotropis gigantea*	8	0.16	-1.85	-0.29
3	*Chromolaena odorata*	13	0.25	-1.37	-0.35
4	*Solanum torvum*	11	0.22	-1.53	-0.33
5	*Jatropha gossypiifolia*	9	0.18	-1.73	-0.31
H (Shannon Diversity Index) = 1.60					
Herbs and Climbers					
1	*Cissus quadrangularis*	6	0.02	-3.92	-0.08
2	*Tridax procumbens*	16	0.05	-2.93	-0.16
3	*Tephrosia purpurea*	23	0.08	-2.57	-0.20
4	*Achyranthes aspera*	18	0.06	-2.82	-0.17
5	*Tribulus zeyheri*	13	0.04	-3.14	-0.14
6	*Aerva lanata*	7	0.02	-3.76	-0.09
7	*Hyptis suaveolens*	11	0.04	-3.31	-0.12
8	*Boerhaavia diffusa*	12	0.04	-3.22	-0.13
9	*Acalypha indica*	9	0.03	-3.51	-0.10
10	*Coccinia grandis*	8	0.03	-3.63	-0.10
11	*Sida acuta*	13	0.04	-3.14	-0.14
12	*Sida cordifolia*	25	0.08	-2.49	-0.21
13	*Cyperus sesquiflorus*	28	0.09	-2.37	-0.22
14	*Indigofera linnaei*	17	0.06	-2.87	-0.16
15	*Euphorbia hirta*	16	0.05	-2.93	-0.16
16	*Canthium coromandelicum*	2	0.01	-5.01	-0.03
17	*Phyllanthus amarus*	15	0.05	-3.00	-0.15
18	*Chloris barbata*	11	0.04	-3.31	-0.12
19	*Amaranthus spinosus*	9	0.03	-3.51	-0.10
20	*Evolvulus alsinoides*	12	0.04	-3.22	-0.13
21	*Ocimum sanctum*	8	0.03	-3.63	-0.10
22	*Spermacoce hispida L*	13	0.04	-3.14	-0.14
23	*Abutilon indicum*	9	0.03	-3.51	-0.10
H (Shannon Diversity Index) = 3.03					

Table 3.21 Calculation of Species Diversity in mine lease area

Details	H	H max	Evenness	Species Richness
Herbs	3.08	3.18	0.97	4.08
Shrubs	1.60	1.61	0.99	1.02

Table 3.22. Flora in 300m Radius

S.No.	Scientific Name	Family Name	Common Name	Habit	Total No of Counts	Quadrats with species	Total No of Quadrats	Density	Frequency	Abundance	Relative Density (RD)	Relative Frequency (RF)	IUCN Conservation
Trees													
1	*Ailanthus excelsa*	Simaroubaceae	Tree of heaven	Tree	6	5	10	0.6	50	1.2	8.8	8.5	DD
2	*Albizia amara*	Mimosaceae	Unjai maram	Tree	6	6	10	0.6	60	1.0	8.8	10.2	LC
3	*Albizia lebbeck*	Mimosaceae	Vaagai	Tree	2	2	10	0.2	20	1.0	2.9	3.4	LC
4	*Azadirachta indica*	Meliaceae	Vembu	Tree	3	3	10	0.3	30	1.0	4.4	5.1	LC
5	*Borassus flabellifer*	Arecaceae	Panai maram	Tree	7	6	10	0.7	60	1.2	10.3	10.2	LC
6	*Vachellia karroo*	Fabaceae	Mullu maram	Tree	8	7	10	0.8	70	1.1	11.8	11.9	LC
7	*Chloroxylon swietenia*	Rutaceae	Poruchai maram	Tree	2	1	10	0.2	10	2.0	2.9	1.7	VU
8	*Commiphora berryi*	Burseraceae	Mul-kiluvai	Tree	7	6	10	0.7	60	1.2	10.3	10.2	LC
9	*Ficus benghalensis*	Moraceae	Banyan	Tree	2	2	10	0.2	20	1.0	2.9	3.4	NE
10	*Leucaena leucocephala*	Fabaceae	Soundal	Tree	3	2	10	0.3	20	1.5	4.4	3.4	NE
11	*Prosopis juliflora*	Mimosaceae	Velikathan maram	Tree	6	4	10	0.6	40	1.5	8.8	6.8	LC
12	*Tamarindus indica*	Caesalpinioideae	Puliyamaram	Tree	2	2	10	0.2	20	1.0	2.9	3.4	LC
13	*Vachellia leucophloea*	Mimosaceae	Velvelam	Tree	9	8	10	0.9	80	1.1	13.2	13.6	LC
14	*Ziziphus mauritiana*	Rhamnaceae	Elanthai	Tree	5	5	10	0.5	50	1.0	7.4	8.5	LC
Herbs													
1	*Achyranthes aspera*	Amaranthaceae	Nayuruvi	Herb	4	3	10	0.4	30	1.3	1.0	2.2	NE
2	*Allmania nodiflora*	Amaranthaceae	Kumattikkirai	Herb	4	2	10	0.4	20	2.0	1.0	1.5	NE
3	*Aloe vera*	Asphodelaceae	Sodru Kathalai	Herb	10	5	10	1.0	50	2.0	2.5	3.7	NE
4	*Boerhavia diffusa*	Nyctaginaceae	Mukuratthai	Herb	21	8	10	2.1	80	2.6	5.3	6.0	NE
5	*Cenchrus ciliaris*	Poaceae	Buffel Grass	Herb	37	8	10	3.7	80	4.6	9.3	6.0	NE
6	*Cenchrus pedicellatus*	Poaceae	Annaul Mission Grass	Herb	75	10	10	7.5	100	7.5	18.8	7.5	LC
7	*Chloris barbata*	Poaceae	Chevvarakupul	Herb	12	6	10	1.2	60	2.0	3.0	4.5	NE
8	*Commelina benghalensis*	Commelinaceae	Kanamvazhalai	Herb	5	4	10	0.5	40	1.3	1.3	3.0	LC
9	*Croton bonplandianum*	Euphorbiaceae	Rail poondu	Herb	11	6	10	1.1	60	1.8	2.8	4.5	NE
10	*Cymbopogon flexuosus*	Poaceae	Kanampul	Herb	14	8	10	1.4	80	1.8	3.5	6.0	NE
11	*Cynodon dactylon*	Poaceae	Arugampul	Herb	49	9	10	4.9	90	5.4	12.3	6.7	NE
12	*Euphorbia hirta*	Euphorbiaceae	Amman Paccharisi	Herb	17	7	10	1.7	70	2.4	4.3	5.2	NE
13	*Ocimun sanctum*	Lamiaceae	Tulasi	Herb	12	3	10	1.2	30	4.0	3.0	2.2	NE

14	*Parthenium hysterophorus*	Asteraceae	Parttiniyam	Herb	24	8	10	2.4	80	3.0	6.0	6.0	NE
15	*Sorghum vulgaris*	Poaceae	Solam	Herb	10	1	10	1.0	10	10.0	2.5	0.7	NE
16	*Spermacoce hispida*	Rubiaceae	Natthai choori	Herb	9	6	10	0.9	60	1.5	2.3	4.5	NE
17	*Tephrosia pumila*	Fabaceae	Kolunji	Herb	8	6	10	0.8	60	1.3	2.0	4.5	LC
18	*Tephrosia purpurea*	Fabaceae	Kolunji chadi	Herb	4	7	10	0.4	70	0.6	1.0	5.2	NE
19	*Tragus sp.*	Poaceae	Pill	Herb	6	4	10	0.6	40	1.5	1.5	3.0	NE
20	*Tribulus terrestris*	Zygophyllaceae	Nerunji mull	Herb	16	10	10	1.6	100	1.6	4.0	7.5	LC
21	*Trichodesma indicum*	Boraginaceae	Kavil Thumbai	Herb	31	9	10	3.1	90	3.4	7.8	6.7	NE
22	*Tridax procumbens*	Asteraceae	Veetukaayapoondu	Herb	20	4	10	2.0	40	5.0	5.0	3.0	NE
Shrubs and Climbers													
1	*Abutilon indicum*	Malvaceae	Thuthi	Undershrub	13	5	10	1.3	50	2.6	4.7	3.5	NE
2	*Aerva javanica*	Amaranthaceae	Periya Pulapoo	Shrub	10	6	10	1.0	60	1.7	3.6	4.2	NE
3	*Agave americana*	Asparagaceae	Century Plant	Shrub	11	4	10	1.1	40	2.8	3.9	2.8	LC
4	*Anisomeles malabarica*	Lamiaceae	Aruvaachadachi	Undershrub	13	6	10	1.3	60	2.2	4.7	4.2	NE
5	*Calotropis gigantea*	Apocynaceae	Erukku	Shrub	7	5	10	0.7	50	1.4	2.5	3.5	NE
6	*Capparis zeylanica*	Capparaceae	Suduthorat	Liana	2	1	10	0.2	10	2.0	0.7	0.7	NE
7	*Chromolaena odorata*	Asteraceae	Communist pacha	Shrub	6	5	10	0.6	50	1.2	2.2	3.5	NE
8	*Cissus quadrangularis*	Vitaceae	Perandai	Climber	5	5	10	0.5	50	1.0	1.8	3.5	NE
9	*Coccinia grandis*	Cucurbitaceae	Kovai	Climber	7	6	10	0.7	60	1.2	2.5	4.2	NE
10	*Crotalaria juncea*	Fabaceae	India hemp	Undershrub	10	7	10	1.0	70	1.4	3.6	4.9	NE
11	*Cucumis maderaspatanus*	Cucurbitaceae	Musumuskkai	Climber	5	4	10	0.5	40	1.3	1.8	2.8	NE
12	*Datura innoxia*	Solanaceae	Oomathai	Undershrub	12	3	10	1.2	30	4.0	4.3	2.1	NE
13	*Heliotropium indicum*	Boraginaceae	Thael Kodukkupoondu	Undershrub	14	7	10	1.4	70	2.0	5.0	4.9	NE
14	*Ipomoea pes-tigridis*	Convolvulaceae	Punaikkirai	Climber	14	6	10	1.4	60	2.3	5.0	4.2	NE
15	*Ipomoea staphylina*	Convolvulaceae	Onaankodi	Liana	19	6	10	1.9	60	3.2	6.8	4.2	NE
16	*Martynia annua*	Martyniaceae	Kakka Muku Chedi	Undershrub	18	7	10	1.8	70	2.6	6.5	4.9	NE
17	*Opuntia dillenii*	Cactaceae	Sappathikalli	Shrub	9	5	10	0.9	50	1.8	3.2	3.5	LC
8	*Passiflora foetida*	Passifloraceae	Siruppunaikkali	Climber	19	7	10	1.9	70	2.7	6.8	4.9	NE
19	*Pergularia daemia*	Apocynaceae	Veli Paruthi	Climber	11	7	10	1.1	70	1.6	3.9	4.9	NE
20	*Senna auriculata*	Fabaceae	Avaarai	Shrub	10	8	10	1.0	80	1.3	3.6	5.6	LC
21	*Senna occidentalis*	Fabaceae	Coffee Senna	Undershrub	10	6	10	1.0	60	1.7	3.6	4.2	LC
22	*Sida acuta*	Malvaceae	Arival manai poondu	Undershrub	14	10	10	1.4	100	1.4	5.0	7.0	NE
23	*Sida cordifolia*	Malvaceae	Nilatutti	Undershrub	23	9	10	2.3	90	2.6	8.2	6.3	NE
24	*Waltheria indica*	Malvaceae	Sengalipundu	Undershrub	17	7	10	1.7	70	2.4	6.1	4.9	LC

LC- Least Concern - [Species categorized as Least Concern (LC) is a taxon when it has been evaluated against the Red List criteria and does not qualify for Endangered Near Threatened.]. DD – Data Deficient [Species categorized as DD is a taxon when there is no inadequate information to make a direct, VU- Vulnerable indirect assessment of its risk of extinction based on its distribution and/or population status].

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

Table 3.23 Calculation of Species Diversity in 300m Radius

S. No	Scientific name	No. of Species	Pi	In (Pi)	Pi x in (Pi)
Tree					
1	*Ailanthus excelsa*	6	0.09	-2.43	-0.21
2	*Albizia amara*	6	0.09	-2.43	-0.21
3	*Albizia lebbeck*	2	0.03	-3.53	-0.10
4	*Azadirachta indica*	3	0.04	-3.12	-0.14
5	*Borassus flabellifer*	7	0.10	-2.27	-0.23
6	*Vachellia karroo*	8	0.12	-2.14	-0.25
7	*Chloroxylon swietenia*	2	0.03	-3.53	-0.10
8	*Commiphora berryi*	7	0.10	-2.27	-0.23
9	*Ficus benghalensis*	2	0.03	-3.53	-0.10
10	*Leucaena leucocephala*	3	0.04	-3.12	-0.14
11	*Prosopis juliflora*	6	0.09	-2.43	-0.21
12	*Tamarindus indica*	2	0.03	-3.53	-0.10
13	*Vachellia leucophloea*	9	0.13	-2.02	-0.27
14	*Ziziphus mauritiana*	5	0.07	-2.61	-0.19
H (Shannon Diversity Index) = 2.51					
Herbs					
1	*Achyranthes aspera*	4	-4.60	-0.05	0.01
2	*Allmania nodiflora*	4	-4.60	-0.05	0.01
3	*Aloe vera*	10	-3.69	-0.09	0.03
4	*Boerhavia diffusa*	21	-2.94	-0.15	0.05
5	*Cenchrus ciliaris*	37	-2.38	-0.22	0.09
6	*Cenchrus pedicellatus*	75	-1.67	-0.31	0.19
7	*Chloris barbata*	12	-3.50	-0.11	0.03
8	*Commelina benghalensis*	5	-4.38	-0.05	0.01
9	*Croton bonplandianum*	11	-3.59	-0.10	0.03
10	*Cymbopogon flexuosus*	14	-3.35	-0.12	0.04
11	*Cynodon dactylon*	49	-2.10	-0.26	0.12
12	*Euphorbia hirta*	17	-3.16	-0.13	0.04
13	*Ocimun sanctum*	12	-3.50	-0.11	0.03
14	*Parthenium hysterophorus*	24	-2.81	-0.17	0.06
15	*Sorghum vulgaris*	10	-3.69	-0.09	0.03
16	*Spermacoce hispida*	9	-3.79	-0.09	0.02
17	*Tephrosia pumila*	8	-3.91	-0.08	0.02
18	Tephrosia purpurea	4	-4.60	-0.05	0.01
19	*Tragus sp.*	6	-4.20	-0.06	0.02
20	*Tribulus terrestris*	16	-3.22	-0.13	0.04
21	*Trichodesma indicum*	31	-2.55	-0.20	0.08
22	*Tridax procumbens*	20	-2.99	-0.15	0.05
H (Shannon Diversity Index) = 2.72					
Shrubs and Climbers					
1	*Abutilon indicum*	13	-3.07	-0.14	0.05
2	*Aerva javanica*	10	-3.33	-0.12	0.04
3	*Agave americana*	11	-3.23	-0.13	0.04
4	*Anisomeles malabarica*	13	-3.07	-0.14	0.05
5	*Calotropis gigantea*	7	-3.69	-0.09	0.03
6	*Capparis zeylanica*	2	-4.94	-0.04	0.01
7	*Chromolaena odorata*	6	-3.84	-0.08	0.02
8	*Cissus quadrangularis*	5	-4.02	-0.07	0.02
9	*Coccinia grandis*	7	-3.69	-0.09	0.03
10	*Crotalaria juncea*	10	-3.33	-0.12	0.04
11	*Cucumis maderaspatanus*	5	-4.02	-0.07	0.02
12	*Datura innoxia*	12	-3.15	-0.14	0.04
13	*Heliotropium indicum*	14	-2.99	-0.15	0.05
14	*Ipomoea pes-tigridis*	14	-2.99	-0.15	0.05

15	*Ipomoea staphylina*	19	-2.69	-0.18	0.07
16	*Martynia annua*	18	-2.74	-0.18	0.06
17	*Opuntia dillenii*	9	-3.43	-0.11	0.03
18	*Passiflora foetida*	19	-2.69	-0.18	0.07
19	*Pergularia daemia*	11	-3.23	-0.13	0.04
20	*Senna auriculata*	10	-3.33	-0.12	0.04
21	*Senna occidentalis*	10	-3.33	-0.12	0.04
22	*Sida acuta*	14	-2.99	-0.15	0.05
23	*Sida cordifolia*	23	-2.50	-0.21	0.08
24	*Waltheria indica*	17	-2.80	-0.17	0.06
H (Shannon Diversity Index) = 3.08					

Table 3.24. Species Richness (Index) in 300m Radius

Details	H	H max	Evenness	Species Richness
Tree	2.51	2.64	0.95	3.08
Herbs	2.76	3.09	0.89	3.51
Shrubs	3.08	3.18	0.97	4.08

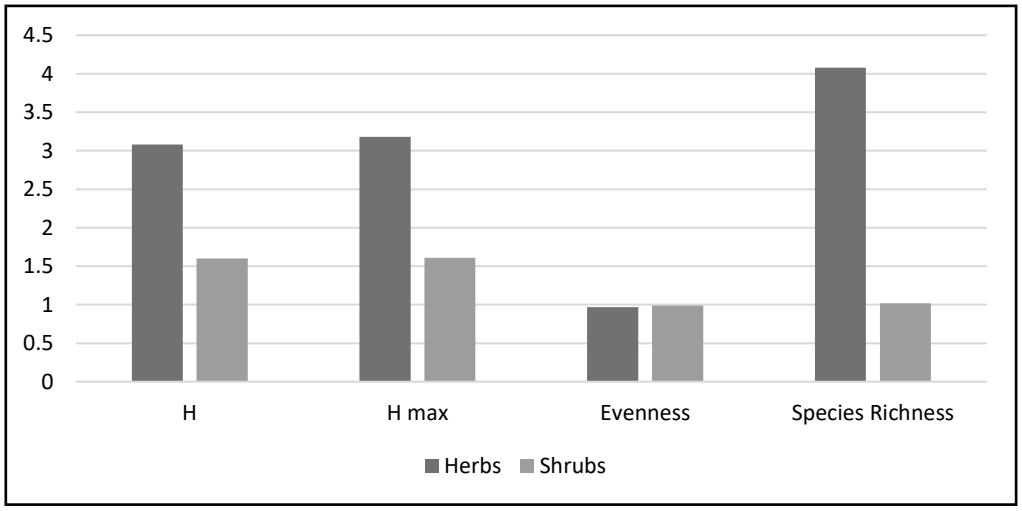


Figure 3.25 Floral Diversity Species Richness (Index) in mine lease area

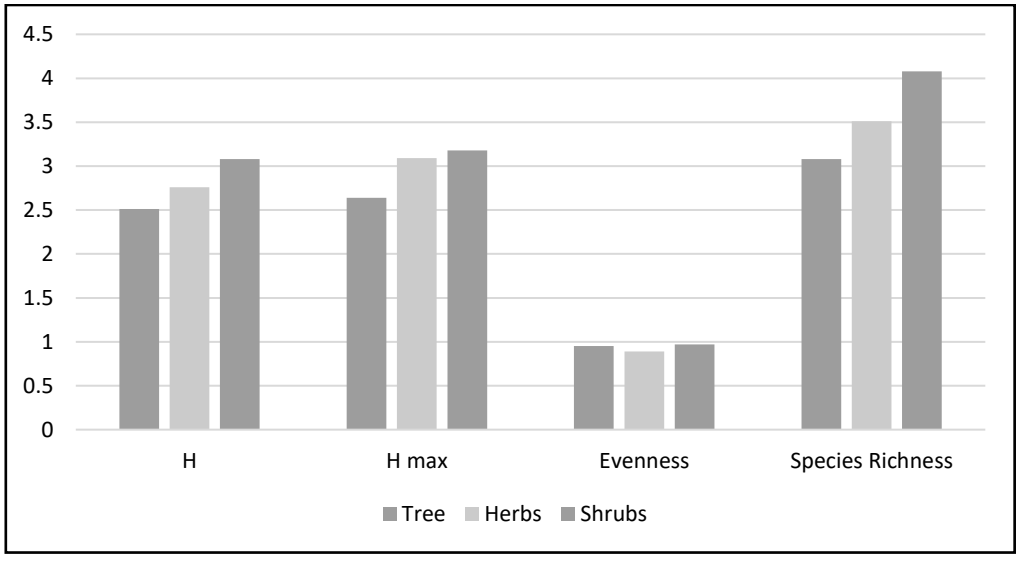


Figure 3.26 Floral Diversity Species Richness (Index) in 300m radius

Table 3.25 Flora in 10km radius

S.No.	Species Name	Family	Habitat	Uses
1	*Acacia auriculiformis L.*	Mimosaceae	Tree	Fuel wood, Timber
2	*Acanthospermum hispidum DC*	Asteraceae	Herb	Medicinal
3	*Aerva javanica (Burm. f.)*	Amaranthaceae	Herb	Medicina
4	*Ageratina adenophora (Spreng.*	Asteraceae	Herb	Fodder
5	*Ageratum conyzoides L*	Asteraceae	Herb	Medicinal
6	*Alternanthera pungens Humb*	Amaranthaceae	Herb	Fodder
7	*Alternanthera pungens Humb*	Amaranthaceae	Herb	Medicinal
8	*Alternanthera tenella Colla.*	Amaranthaceae	Herb	Fodder, Vegetable
9	*Amaranthus spinosus L.*	Amaranthaceae	Herb	Vegetable, Medicinal
10	*Antigonon leptopus*	Polygonaceae	Climber	Ornamental
11	*Argemone mexicana L.*	Papaveraceae	Herb	Medicinal
12	*Asclepias curassavica L.*	Asclepiadaceae	Herb	Medicinal
13	*Bidens pilosa L.*	Asteraceae	Herb	Fodder
14	*Blainvillea acmella (L.) Philipson*	Asteraceae	Herb	None
15	*Borassus flabellifer L.*	Arecaceae	Tree	Fruit edible, Timber
16	*Calotropis gigantea (L.) R. Br.*	Asclepiadaceae	Shrub	Medicinal, Ornamental
17	*Cassia alata L.*	Caesalpiniaceae	Shrub	Medicinal
18	*Cassia hirsuta L.*	Caesalpiniaceae	Herb	Medicinal
19	*Cassia obtusifolia L*	Caesalpiniaceae	Herb	Medicinal
20	*Cassia occidentalis L.*	Caesalpiniaceae	Herb	Medicinal
21	*Cassia tora L.*	Caesalpiniaceae	Herb	Medicinal
22	*Cassia uniflora Miller*	Caesalpiniaceae	Herb	Medicinal
23	*Catharanthus pusillus*	Apocynaceae	Herb	Fodder
24	*Catharanthus roseus L.*	Apocynaceae	Herb	Medicinal, Ornamental
25	*Celosia argentea L.*	Amaranthaceae	Herb	Fodder, Vegetable
26	*Chenopodium ambrosioides L.*	Chenopodiaceae	Herb	Fodder
27	*Chloris barbata (L.) Sw.*	Poaceae	Grass	Fodder, Medicinal
28	*Chromolaena odorata L*	Asteraceae	Shrub	Fuel wood
29	*Chrozophora rottleri (Geis.) Spreng*	Euphorbiaceae	Herb	Fodder
30	*Cleome gynandra L.*	Cleomaceae	Herb	Medicinal
31	*Cleome monophylla L.*	Cleomaceae	Herb	Vegetable
32	*Cleome rutidosperma DC.*	Cleomaceae	Herb	Fodder
33	*Cleome viscosa L.*	Cleomaceae	Herb	Medicinal
34	*Corchorus aestuans L.*	Tiliaceae	Herb	Medicinal
35	*Corchorus tridens L.*	Tiliaceae	Herb	Fodder, Fibre
36	*Corchorus trilocularis L.*	Tiliaceae	Herb	Fibre, Fodder
37	*Crotalaria pallida Dryand*	Fabaceae	Herb	Fodder
38	*Crotalaria retusa L.*	Fabaceae	Herb	Ornamental
39	*Croton bonplandianum Baill.*	Euphorbiaceae	Herb	Fodder, Medicinal
40	*Cuscuta reflexa Roxb.*	Cuscutaceae	Climber	None
41	*Cyperus difformis L.*	Cyperaceae	Herb	Fodder
42	*Datura innoxia Mill.*	Solanaceae	Herb	Medicinal
43	*Datura metel L.*	Solanaceae	Shrub	Medicinal
44	*Digera muricata (L.) Mart*	Amaranthaceae	Herb	Medicinal, Vegetable
45	*Echinochloa colona (L.) Link.*	Poaceae	Grass	Fodder
46	*Eclipta prostrata (L.) Mant.*	Asteraceae	Herb	Medicinal
47	*Eichornia crassipes (C. Martius)*	Pontederiaceae	Herb	Medicinal
48	*Emilia sonchifolia (L.) DC.*	Asteraceae	Herb	Medicinal
49	*Euphorbia cyathophora Murray*	Euphorbiaceae	Herb	Ornamental
50	*Euphorbia heterophylla L.*	Euphorbiaceae	Herb	Ornamental
51	*Euphorbia hirta L*	Euphorbiaceae	Herb	Medicinal
52	*Gnaphalium polycaulon Pers.*	Asteraceae	Herb	Fodder
53	*Gomphrena serrata L.*	Amaranthaceae	Herb	Fodder
54	*Hyptis suaveolens (L.) Poit.*	Lamiaceae	Herb	Medicinal

55	*Imperata cylindrica (L.) Raeusch*	Poaceae	Grass	Fodder
56	*Indigofera linifolia (L.f.) Retz.*	Fabaceae	Herb	Fodder
57	*Indigofera linnaei Ali*	Fabaceae	Herb	Fodder
58	*Indigofera trita L.*	Fabaceae	Shrub	Fodder
59	*Ipomoea carnea Jacq*	Convolvulaceae	Shrub	Manure
60	*Ipomoea hederifolia L.*	Convolvulaceae	Climber	Medicinal
61	*Ipomoea obscura (L.) Ker. - Gawal.*	Convolvulaceae	Climber	Fodder
62	*Ipomoea pes-tigridis L*	Convolvulaceae	Climber	Medicinal
63	*Ipomoea quamoclit L.*	Convolvulaceae	Climber	Ornamental
64	*Ipomoea staphylina Roem. & Schult*	Convolvulaceae	Climber	Fodder
65	*Lagascea mollis Cav.*	Asteraceae	Herb	Medicinal
66	*Lantana camara L.*	Verbenaceae	Shrub	Ornamental
67	*Leonotis nepetiifolia (L.) R.Br.*	Lamiaceae	Herb	Medicinal
68	*Leucaena leucocephala (L.) de Wit*	Mimosaceae	Tree	Fodder, Fuel wood
69	*Ludwigia adscendens (L.) Hara*	Onagraceae	Herb	Medicinal
70	*Malvastrum coromandelianum (L.)*	Malvaceae	Herb	Fibre
71	*Martynia annua L.*	Pedaliaceae	Herb	Medicinal
72	*Mikania micrantha Kunth*	Asteraceae	Climber	None
73	*Mimosa pudica L.*	Mimosaceae	Herb	Medicinal
74	*Mirabilis jalapa L.*	Nyctaginaceae	Herb	Ornamental
75	*Monochoria vaginalis Burm. f.*	Pontederiaceae	Herb	None
76	*Ocimum americanum L.*	Lamiaceae	Herb	Medicinal
77	*Opuntia stricta Haw.*	Cactaceae	Shrub	Fruit edible
78	*Oxalis corniculata L.*	Oxalidaceae	Herb	Vegetable
79	*Parthenium hysterophorus L.*	Asteraceae	Herb	Fodder
80	*Passiflora foetida L.*	Passifloraceae	Climber	Medicinal
81	*Cactaceae*	Pedaliaceae	Herb	Medicinal
82	*Oxalidaceae*	Piperaceae	Herb	None
83	*Asteraceae*	Acanthaceae	Herb	Fodder
84	*Physalis minima L.*	Solanaceae	Herb	Medicinal
85	*Pilea microphylla (L.) Liebm.*	Urticaceae	Herb	Medicinal
86	*Pistia stratiotes L.*	Araceae	Herb	Medicinal
87	*Portulaca oleracea L*	Portulacaceae	Herb	Vegetable
88	*Prosopis juliflora (Sw.) DC.*	Mimosaceae	Herb	Fuel wood
89	*Ruellia tuberosa L.*	Acanthaceae	Herb	Ornamental
90	*Scoparia dulcis L.*	Scrophulariaceae	Herb	Medicinal
91	*Sesbania bispinosa (Jacq.) Wight.*	Fabaceae	Shrub	Fibre
92	*Sida acuta Burm. f.*	Malvaceae	Herb	Medicinal
93	*Solanum nigrum L.*	Solanaceae	Herb	Vegetable
94	*Solanum torvum Sw.*	Solanaceae	Shrub	Vegetable
95	*Spermacoce hispida L.*	Rubiaceae	Herb	Medicinal
96	*Spilanthes acmella (L.) Murr.*	Asteraceae	Herb	Fodder
97	*Stachytarpheta jamaicensis (L.) Vahl*	Verbenaceae	Herb	Ornamental
98	*Stylosanthes hamata L.*	Fabaceae	Herb	Fodder
99	*Sy adenium grantii Hook. f.*	Euphorbiaceae	Shrub	Ornamental
100	*Synedrella nodiflora (L.) Gaertn.*	Asteraceae	Herb	Ornamental
101	*Tamarindus indica L.*	Caesalpiniaceae	Tree	Vegetable
102	*Tribulus terrestris L.*	Zygophyllaceae	Herb	Medicinal
103	*Tridax procumbens L.*	Asteraceae	Herb	Medicina
104	*Triumfetta rhomboidea Jacq.*	Tiliaceae	Herb	Medicinal
105	*Typha angustata Bory & Chaup.*	Typhaceae	Herb	Ornamental
106	*Waltheria indica L.*	Sterculiaceae	Herb	Medicinal
107	Xanthium indicum Koeing	Asteraceae	Herb	Medicinal

3.5.2 Funa

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

Table 3.26 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 Composition in the Core Zone

The faunal species observed in the study area are listed in Table 3.27. A total of 39 species were recorded in core zone of the project area. The core zone exhibited fewer species, with only a small number of insects, mammals, and reptiles, whereas the buffer zone showed greater species diversity. Among the 39 species recorded, the distribution was as follows: (13) 33% birds, (15) 39% insects, (04)10% reptiles, and (07)18% mammals. These species were cross-checked against the IUCN Red List Database version 3.1 to identify any threatened species. Data analysis revealed that 21 species are categorized as Least Concern on the Red List, while 18 species were not listed. The analysis indicates that there are no REET species in the core zone of the proposed quarry site.

Fauna Composition in the buffer Zone

The faunal species observed in the study area are listed in Table 3.28. Taxonomically a total of 48 species belonging to 34 families have been recorded from the buffer zone area. Based on habitat classification the majority of species were Birds 19 (40%), followed by Insects 15 (31%), Reptiles 7 (15%), Mammals 4 (8%) and amphibians 3 (6%). There are 4 schedule II species and 24 schedule IV species according to Indian wild life Act 1972. Totally, 19 species of bird were sighted in the study area.

Table 3.27 Fauna in the Core zone

S.No	Local Name	Scientific name	Family Name	IUCN Status
Mammals				
1	Buffalo	*Bubalus bubalis*	Bovidae	NE
2	Cow	*Bos taurus*	Bovidae	NL
3	Dog	*Canis lupus familiaris*	Canidae	NL
4	Goat	*Capra hircus*	Bovidae	NL
5	Cat	*Felis catus*	Felidae	NL
6	Indian hare	*Lepus nigricollis*	Leporidae	LC
7	Sheep	*Ovis aries*	Bovidae	NL

Aves				
8	Indian myna	*Acridotheres tristis*	Sturnidae	LC
9	Rose-ringed Parakeet	*Alexandrinus krameri*	Psittacidae	LC
10	Rock Pigeon	*Columba livia*	Columbidae	LC
11	Indian robin	*Copsychus fulicatus*	Muscicapidae	LC
12	Indian Roller	*Coracias benghalensis*	Coraciidae	LC
13	House Crow	*Corvus splendens*	Corvidae	LC
14	Black drongo	*Dicrurus macrocercus*	Dicruridae	LC
15	Asian koel	*Eudynamys scolopaceus*	Cuculidae	LC
16	Yellow Wagtail	*Motacilla flava*	Motacillidae	LC
17	White browed Wagtail	*Motacilla maderaspatensis*	Motacillidae	LC
18	Gray francolin	*Ortygornis pondicerianus*	Phasianidae	LC
19	House Sparrow	*Passer domesticus*	Passeridae	LC
20	Spotted dove	*Spilopelia chinensis*	Columbidae	LC
Insects				
21	Tawny coster	*Acraea terpsicore*	Nymphalidae	NL
22	Grasshopper	*Acrotylus humbertianus*	Acrididae	NL
23	Lemon emigrant	*Catopsilia pomona*	Pieridae	NL
24	Mottled emigrant	*Catopsilia pyranthe*	Pieridae	NL
25	Grasshopper	Chrotogonus sp.	Pyrgomorphidae	NL
26	Plaina tiger butterfly	*Danaus chrysippus*	Nymphalidae	LC
27	Potter wasps	*Delta esuriens*	Vespidae	NL
28	Chocolate pansy	*Junonia iphita*	Nymphalidae	NL
29	Lemon pansy	*Junonia lemonias*	Nymphalidae	NL
30	Black-and-red-bug	*Lygaeus equestris*	Lygaeidae	NL
31	Slender skimmer	*Orthetrum sabina*	Libellulidae	LC
32	Lime swallowtail	*Papilio demoleus*	Papilionidae	NL
33	Common Mormon`	*Papilio polytes*	Papilionidae	NL
34	Silvandu	*Platypleura kaempferi*	Cicadidae	NL
35	Crimson dropwing	*Trithemis aurora*	Libellulidae	LC
Reptiles				
36	Oriental garden lizard	*Calotes versicolor*	Agamidae	LC
37	Indian palm squirrel	*Funambulus palmarum*	Sciuridae	LC
38	Common skink	*Mabuya carinatus*	Scincidae	LC
39	Fan-Throated Lizard	*Sitana ponticeriana*	Agamidae	LC

Table 3.28 Fauna in the buffer zone

S. No	Common Name/English Name	Family Name	Scientific Name	IUCN Red List Data
INSECTS				
1	Blue tiger	Nymphalidae	*Tirumala limniace*	LC
2	Milkweed butterfly	Nymphalidae	*Danainae*	LC
3	Tawny coster	Nymphalidae	*Danaus chrysippus*	LC
4	Indian honey bee	Apidae	*Apis cerana*	LC
5	Grasshopper	Acrididae	*Hieroglyphus sp*	LC

6	Red-veined darter	Libellulidae	*Sympetrum fonscolombii*	LC
7	Lime butterfly	Papilionidae	*Papilio demoleus*	LC
8	Ant	Formicidae	*Camponotus Vicinus*	NL
9	Dragonfly	Gomphidae	*Ceratogomphus pictus*	LC
10	Common Tiger	Nymphalidae	*Danaus genutia*	LC
11	Common Indian crow	Nymphalidae	*Euploea core*	LC
12	Praying mantis	Mantidae	*mantis religiosa*	NL
13	Striped tiger	Nymphalidae	*Danaus plexippus*	LC
14	Lesser grass blue	Lycaenidae	*Zizina Otis indica*	LC
15	Jewel beetle	Buprestidae	*Eurythyrea austriaca*	NA
REPTILES				
16	Garden lizard	Agamidae	*Calotes versicolor*	LC
17	Common house gecko	Gekkonidae	*Hemidactylus frenatus*	LC
18	Indian chameleon	Chamaeleonidae	*Chamaeleo zeylanicusAtretium schistosum*	LC
19	Olive keelback water snake	Natricidae	*Atretium schistosum*	LC
20	Brahminy skink	Scincidae	*Eutropis carinata*	LC
21	Rat snake	Colubridae	*Ptyas mucosa*	LC
22	Common skink	Scincidae	*Mabuya carinatus*	LC
MAMMALS				
23	Indian palm squirrel	Sciuridae	*Funambulus palmarum*	LC
24	Indian hare	Leporidae	*Lepus nigricollis*	LC
25	Indian Field Mouse	Muridae	*Mus booduga*	LC
26	Asian Small Mongoose	Herpestidae	*Herpestes javanicus*	LC
AVES				
27	Indian pond heron	Ardeidae	*Ardeola grayii*	LC
28	Black drongo	Dicruridae	*Dicrurus macrocercus*	LC
29	Asian green bee-eater	Meropidae	*Meropsorientalis*	LC
30	Red-breasted parakeet	Psittaculidae	*Psittacula alexandri*	LC
31	Common Coot	Rallidae	*Fulica atra*	LC
32	Common myna	Sturnidae	*Acridotheres tristis*	LC
33	Shikra	Accipitridae	*Accipiter badius*	LC
34	Koel	Cucalidae	*Eudynamys*	LC
35	Common Quail	Phasianidae	*Coturnix coturnix*	LC
36	Red-vented Bulbul	Pycnonotidae	*Pycnonotuscafer*	LC
37	Brahminy starling	Sturnidae	*Sturnia pagodarum*	LC
38	Indian golden oriole	Oriolidae	*Oriolus kundoo*	LC
39	Rose-ringed parkeet	Psittaculidae	*Psittacula krameri*	LC
40	Cattle egret	Ardeidae	*Bubulcus ibis*	LC
41	Common quail	Phasianidae	*Coturnix coturnix*	LC
42	White-breasted waterhen	Rallidae	*Amaurornis phoenicurus*	LC

43	Two-tailed Sparrow	Dicruridae	*Dicrurus macrocercus*	LC
44	Grey Francolin	Phasianidae	*Francolinus pondicerianus*	LC
45	House crow	Corvidae	*Corvussplendens*	LC
AMPHIBIANS				
46	Indian Burrowing frog	Dicroglossidae	*Sphaerotheca breviceps*	LC
47	Green Pond Frog	Ranidae	*Rana hexadactyla*	LC
48	Tiger Frog	Chordata	*Hoplobatrachus tigerinus (Rana tigerina)*	LC

Aquatic Vegetation

The Field Survey for Assessing the Aquatic Vegetation Was Also Undertaken During the Study Period. The List of Aquatic Plants Observed in The Study Area Is Given in Table 3.29.

Table 3.29 Aquatic Vegetation

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

*Lc- Least Concern, Na-Not Yet Assessed

Food chain

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

Ex: Phytoplankton→Zooplankton→small fish→large fish

Endangered and endemic species as per the IUCN Red List

There are no rare, endangered and endemic species found in the study area. There are no biosphere reserves or wildlife sanctuaries or National parks or Important Bird Areas (IBAs), ecologically sensitive zone in 10km radius.

Agriculture & Horticulture in Erode district:

Erode district total area under cultivation is 1,69,815ha. In that, Horticultural crops have been cultivated in about 55,030ha and the prominent crops under cultivation are Turmeric, Jack, Banana, Mango, Guava, Tapioca, Tomato, Bhendi, Brinjal and other vegetables. Among the major three fruits Mukkani (Mango, Jack and Banana), Banana is grown in this district for

12,000ha. Erode district is also known for Turmeric for its extensive cultivation and Market. Erode Turmeric Market is second best in India next to Nizamabad.

Major Agricultural Crops

Major horticulture crops cultivated in this district are vegetables crops like tomato, brinjal, chillies, onion and turmeric. Details of major field crops and horticulture in 1km radius is given in Table. 3.30.

Table 3.30 Major Crops in 1km radius

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

Major Horticulture Crops

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

Horticulture

Major horticulture crops cultivated in Erode district are fruit crops like mango, banana, Sapota and guava, vegetables like tomato, brinjal, ladies finger, chillies, onion and tapioca, spices like turmeric. Details of major field crops and horticulture cultivation in 1km radius is given in Table 3.31.

Table 3.31 Major Field Crops & Horticulture cultivation in 1km radius

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

Results

The biodiversity assessment of the proposed project site has identified no ecologically sensitive areas within the core or buffer zones. The flora and fauna observed in the study area are commonly occurring species, with no IUCN-listed rare, endangered, endemic, or threatened (REET) species present, except for some species classified as of least concern. Additionally, the site is not located on any migratory routes for fauna. Operations at the stone and gravel quarry may generate dust particles. Implementing a green belt composed of native trees could help mitigate the dust effect on nearby flora and fauna. Key recommendations from the assessment include adopting green mining strategies to minimize environmental impact and developing a green belt with native trees to reduce dust movement from mining activities. this small mining operation over short period of time will not have any significant impact on the surrounding flora and fauna.

3.6 SOCIO ECONOMIC ENVIRONMENT

The major developmental activities in mining/Industrial sector are required for economic development as well as creation of employment opportunities (direct and indirect) and to meet the basic/modern needs of the society, which ultimately results in overall improvement of the quality of life through upliftment of social, economic, health, education and nutritional status in the project region, state as well as the country. In this manner all developmental projects have direct as well as indirect relationships with socioeconomic aspects, which also include public acceptability for new developmental projects. Thus, the study of socioeconomic component incorporating various facets related to prevailing social and cultural conditions and economic status of the rough stone and granite quarry project region is an important part of EIA study. The study of these parameters helps in identification, prediction and evaluation of the likely impacts on the socio economics and parameters of human interest due to the project.

3.6.1 Objectives of the Study

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

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

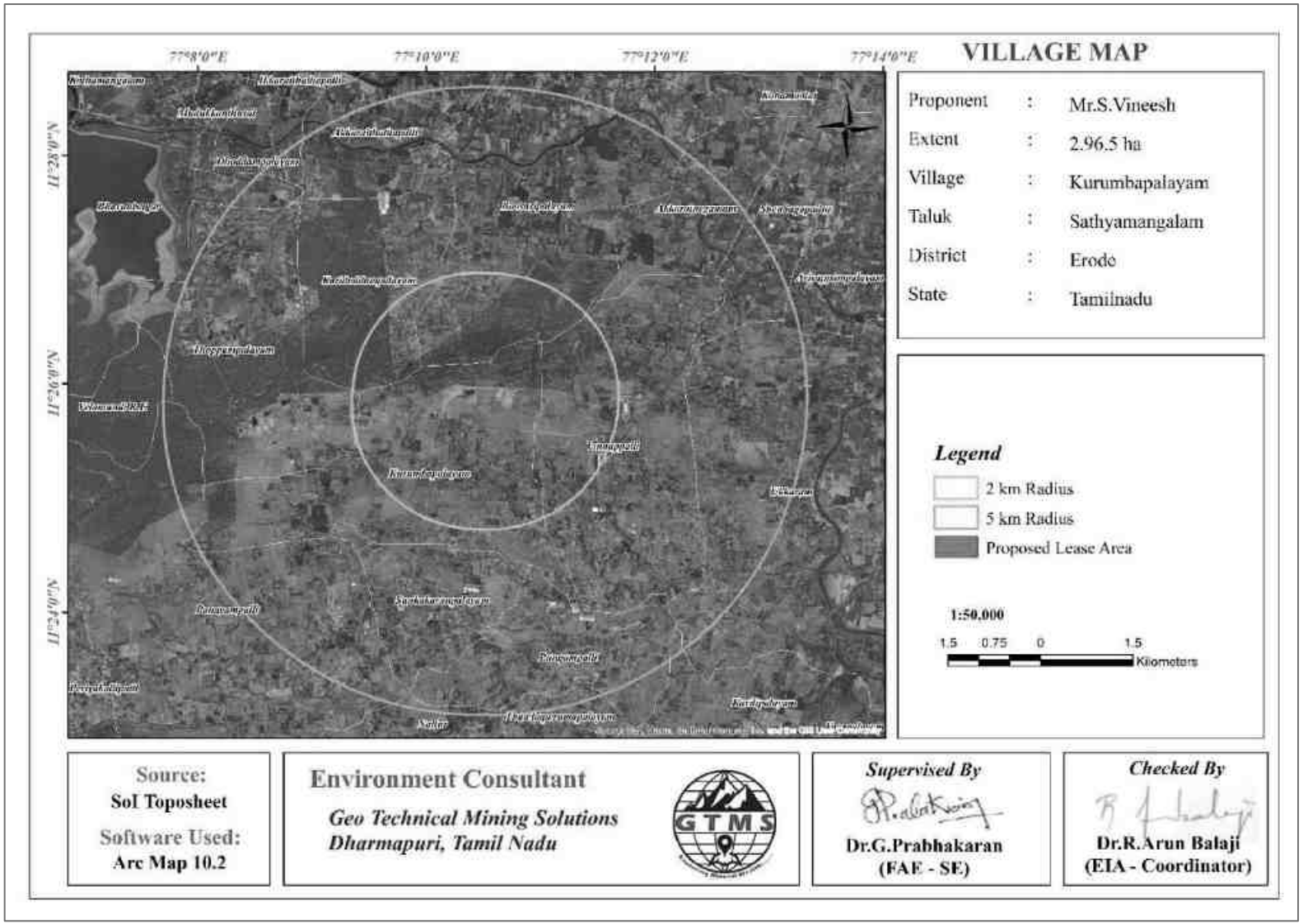


Figure 3.27 Socio Economic Village Boundary Map

Baseline Information:

The baseline information is collected in order to define the socio-economic profile of the study area. The process related database thus generated includes:

- Demographic structure
- Infrastructure base in the area
- Economic structure
- Health status
- Cultural attributes
- Public awareness and their concern about the project

3.6.2 Scope of Work

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

3.6.3 Methodology

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

a) Data such as number of houses, population, literacy, employment opportunities etc. will be collected directly from local people and analysed.
b) The details of the activities and population structure have been obtained from Census 2011 and analysed.
c) Based on the above data, impacts due to plant operation on the community have been assessed and recommendations for further improvement have been made.

3.6.4 Sources of Information and Data Base

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

3.6.5 Primary Survey

The primary data collection includes the collection of data through a structured interview schedule by direct observation method. The questionnaire survey includes both open and closed methods. The sample size is limited respondents, who were selected on the basis of simple random sampling from Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu State, in the field survey has been divided into two major segments

namely Primary Zone (0 -2 km) and Secondary Zone (2 - 5 km). The questionnaires were designed to suit the subjects considering their rural background enabling to furnish correct information and data as par as possible. Data were collected at village level and household level by questionnaires and focused group discussions.

3.6.6 Collection of Data from Secondary Sources

Data from secondary sources were collected on following aspects:

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

Table 3.32 Type of Information and Sources

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

3.6.7 Erode District

Erode district predominantly agrarian in nature, is emerging gradually but steadily as an Industrially Promising District. Erode was previously a part of Coimbatore District and it has been bifurcated from Coimbatore District on 17th September 1979 as a new district. Erode is known for the biggest textile shandy for marketing the powerloom and handloom products. The district has 3 Revenue Divisions and 7 Taluks. It has 20 blocks, 5 Municipalities, 1 Township, 59 town Panchayats and 343 Village Panchayats. The district has got a population of 23.20 lakhs accounting for 4.2% of the States population as per 1991 census against the share of 6.3% of the geographical area of the state. The population projected for the year 2000 is 25.06 lakhs. rural population consists of 75.29% of the total population, as compared with state's average of 65.85%. The density of the population is 283 per sq.km as against the state's average of 429 per sq.km. SC population represents 17.16% of the total population and the ST population is found to be 0.42% of the district population as per 1991 census. The total workforce of the district is 12.14 lakhs (including marginal workers, of which, 11.52 lakhs are main workers) as against states level of 241.94 lakhs. It accounts for 52.30% of the total population of the district. Agriculture and allied activities constitute the major source of employment with 59.68% of the total workforce. Secondary sector provides employment for 3.87% and the tertiary sector provides employment for 31.41% of the total workforce. Source: https://erode.nic.in/about-district/

3.6.8 Study area- Kurumbapalayam Village, Sathyamangalam Taluk

Kurumbapalayam is a medium size village located in Sathyamangalam Taluka of Erode district, Tamil Nadu with total 441 families residing. The Kurumbapalayam village has

population of 1521 of which 777 are males while 744 are females as per Population Census 2011. In Kurumbapalayam village population of children with age 0-6 is 146 which makes up 9.60 % of total population of village. Average Sex Ratio of Kurumbapalayam village is 958 which is lower than Tamil Nadu state average of 996. Child Sex Ratio for the Kurumbapalayam as per census is 848, lower than Tamil Nadu average of 943.

Kurumbapalayam village has lower literacy rate compared to Tamil Nadu. In 2011, literacy rate of Kurumbapalayam village was 61.02 % compared to 80.09 % of Tamil Nadu. In Kurumbapalayam Male literacy stands at 69.91 % while female literacy rate was 51.85 %. As per constitution of India and Panchyati Raaj Act, Kurumbapalayam village is administrated by Sarpanch (Head of Village) who is elected representative of village. Our website, don't have information about schools and hospital in Kurumbapalayam village.

Table. 3.33 Kurumbapalayam Village Population Facts

Particulars	Total	Male	Female
Total No. of Houses	441	-	-
Population	1521	777	744
Child (0-6)	146	79	67
Schedule Caste	132	65	67
Schedule Tribe	0	0	0
Literacy	61.02	69.91%	51.85%
Total Workers	954	511	443
Main Worker	822	--	--
Marginal Worker	132	62	70

Source: https://www.census2011.co.in/data/village/634818-kurumbapalayam-tamil-nadu.html

3.6.9 Working Population- Kurumbapalayam Village, Sathyamangalam Taluk

In Kurumbapalayam village out of total population, 954 were engaged in work activities. 86.16 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 13.84 % were involved in Marginal activity providing livelihood for less than 6 months. Of 954 workers engaged in Main Work, 422 were cultivators (owner or co-owner) while 80 were Agricultural labourer.

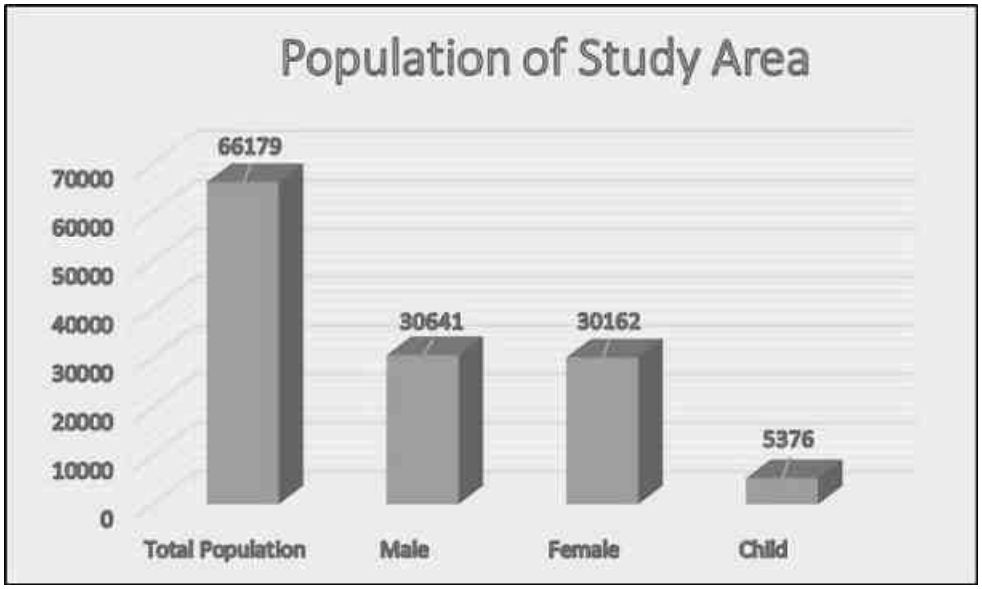
Benefits:

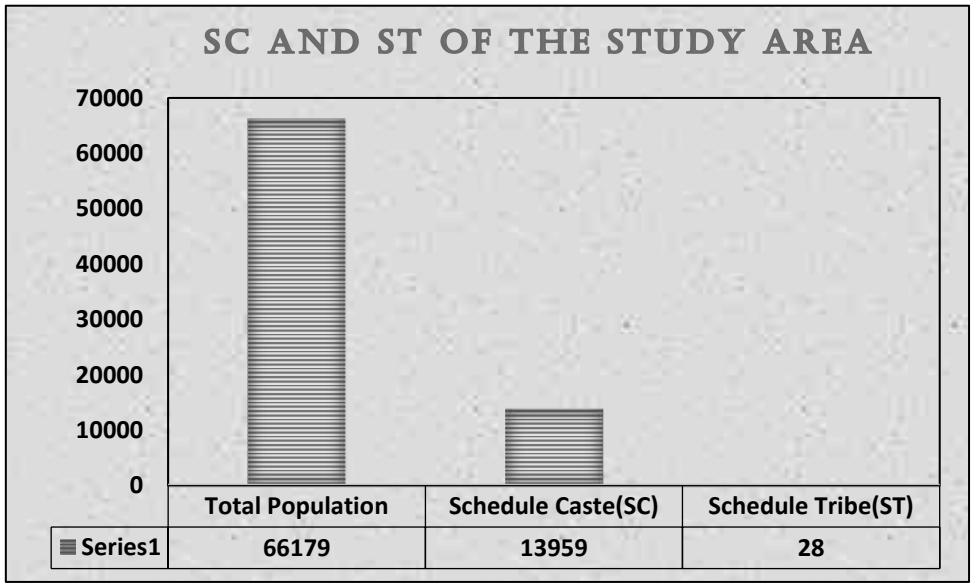
The local people have been provided with either direct employments or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities such as medical facilities, conveyance, free education, drinking water supply etc. The number of villages and settlements within a radius of 5 km from the project site along with population, their education level etc.. are given in the table 3.34.

Table 3.34 Population and Literacy Data of Study Area

Village Name	No. of Houses	Total Population		Child (0-6)		Schedule Caste		Schedule Tribe		Literacy %		Total Workers	
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Akkarainegamam	252	433	433	21	26	58	60	0	0	83.25	69.53	306	222
Akkaraithathapalli	807	1321	1298	121	88	334	316	0	0	74.83	59.34	935	815
Boosaripalayam	1,173	1,934	1,876	141	124	353	356	4	3	71.22	51.77	1464	1370
Dhoddampalayam	1,278	2086	2067	179	153	129	127	7	7	84.74	70.06	1443	1098
Karidoddampalayam	558	953	915	81	81	447	429	0	0	65.83	49.52	631	536
Kavilipalayam	1424	2303	2309	180	191	440	430	0	0	74.23	56.09	1600	1130
Kurumbapalayam	441	777	744	79	67	65	67	0	0	69.91	51.85	511	443
Nallur	2586	4393	4321	409	403	883	855	0	0	80.85	64.37	2784	1548
Panayampalli	1618	2642	2649	236	211	919	893	0	0	71.24	53.65	1762	1246
Pungampalli	678	1145	1106	109	101	343	354	0	0	70.46	52.74	714	436
Shenbagapudur	1398	2432	2369	243	237	449	469	2	1	69.67	52.35	1627	1108
Sunkakaranpalayam	533	919	859	114	94	319	300	0	0	67.83	46.93	617	416
Thatchaperumapalayam	349	603	572	47	43	94	92	0	0	65.11	41.78	438	385
Thoppampalayam	1275	2195	2156	222	207	568	549	1	2	68.12	53.26	1459	1195
Ukkaram	2781	4732	4711	422	392	1299	1330	0	0	67.12	49.59	3240	2438
Vinnappalli	1079	1773	1777	159	195	320	312	0	1	75.9	55.06	1245	1025
Total	**18230**	**30641**	**30162**	**2763**	**2613**	**7020**	**6939**	**14**	**14**	**72.5**	**54.8**	**20776**	**15411**

Source: *https://www.census2011.co.in/data/subdistrict/5749-sathyamangalam-erode-tamil-nadu.html*





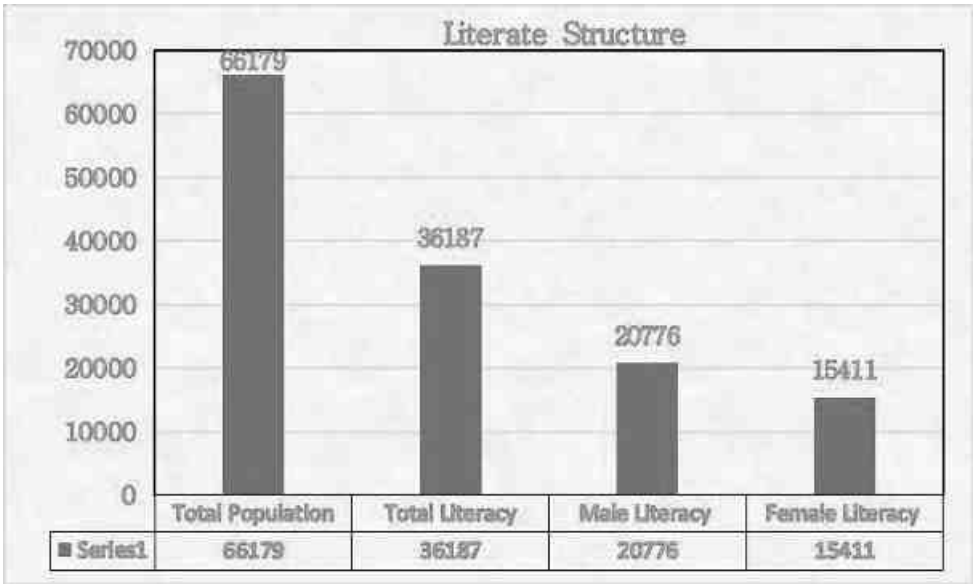


Figure 3.28 Chart Diagram about Population, SC, ST and Literacy in Surrounding Villages

Table 3.35 Workers Profile of Study Area

Village	Total Worker Population Person	Total Worker Population Male	Total Worker Population Female	Main Working Population Person	Main Cultivator Population Person	Main Agricultural Labourers Population Person	Main Other Workers Population Person	Non-Working Population Person
Akkarainegamam	528	306	222	520	258	125	8	291
Akkaraithathapalli	1750	935	815	1687	423	631	63	660
Boosaripalayam	2834	1464	1370	2451	784	994	383	711
Dhoddampalayam	2541	1443	1098	2527	136	80	14	1280
Karidoddampalayam	1167	631	536	1090	70	709	77	539
Kavilipalayam	2730	1600	1130	2412	764	467	318	1511
Kurumbapalayam	954	511	443	822	422	80	132	421
Nallur	4332	2784	1548	4007	385	833	325	3570
Panayampalli	3008	1762	1246	2761	873	905	247	1836
Pungampalli	1150	714	436	924	119	330	226	891
Shenbagapudur	2735	1627	1108	2216	550	1143	519	1586
Sunkakaranpalayam	1033	617	416	884	347	155	149	537
Thatchaperumapalayam	823	438	385	754	305	252	69	262
Thoppampalayam	2654	1459	1195	1911	462	792	743	1268
Ukkaram	5678	3240	24s38	4615	1190	2403	1063	2951
Vinnappalli	2270	1245	1025	906	195	169	1364	926

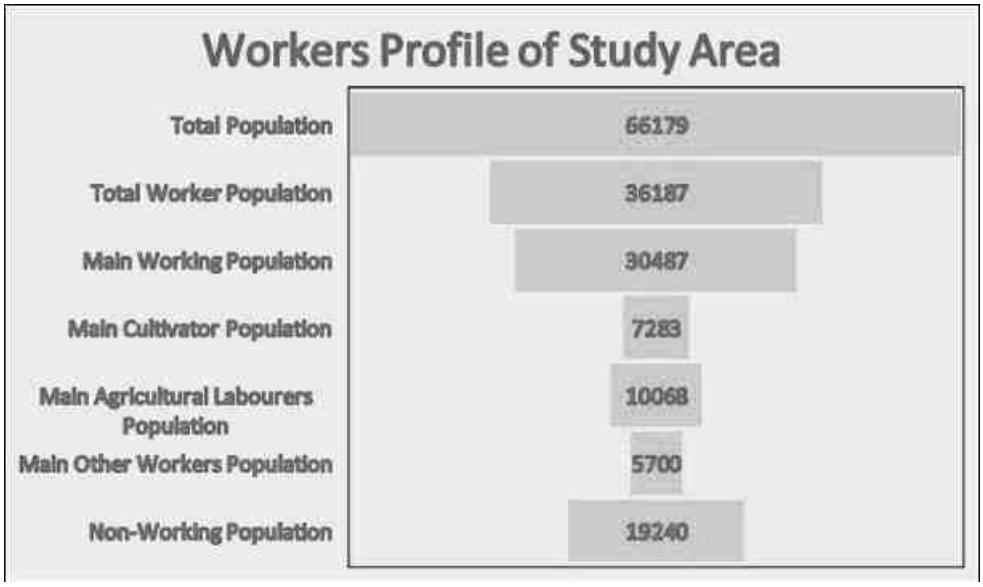


Figure 3.29 Chart Diagram about Workers Profile in Surrounding Villages

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

Awareness and opinion of the people about the project for the assessment of awareness about the project activities and opinion about it, following salient observations were recorded,

During survey it was observed that only nearby villagers are aware and other villagers are not aware about the proposed project.

People in the region expect job opportunities and improvement in educational, transportation and sanitation facility from project authority.

3.6.10 Recommendation and Suggestions

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

- Women empowerment– Home based income generation activities, vocational training programs and common education centre for increasing the literacy rate.
- Education – Free uniform, construction of common rooms and library, computer education and physical education, additional schools for girls, furniture and equipment in schools, up-gradation of existing school infrastructure.

- Agriculture/livestock – Infrastructure such as agricultural practices, electricity connections, assistance with buying improved tools and equipment, capacity building, supply and/or knowledge of better variety of seeds, pasture land development and trainings on animal husbandry& facility of veterinary doctor.
- Health – Improvements in sanitary conditions of villages, assistance with construction of latrines, improvement in drainage system, health camps and awareness campaigns for diseases like common cold, malaria, typhoid, tuberculosis, yellow fever and pneumonia. Repairing of PHCs and Anganwadi centers.
- People with disability – Establishment of center for special education, sensitization of the community towards disabled and awareness on Government schemes.
- While Developing an Action Plan, it is very important to identify the population who falls under the marginalized and vulnerable groups. So that special attention can be given to these groups with special provisions while making action plans.
- Connectivity –Transport connectivity to easiness accessibility to the region.

3.6.11 Conclusion

The socio-economic study of surveyed villages gives a clear picture of its population, average household size, literacy rate and sex ratio etc. It is also found that a part of population is suffering from lack of permanent job to run their day-to-day life. To evaluate the impacts of proposed quarry project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the locality of the site. Hence, it can be concluded that the present environment status of the study area will not be affected by the Kurumbapalayam rough stone and gravel cluster Quarries project. Hence, we adopt adequate control measures to protect the surrounding environment and will contribute in development of the study areas. The proposed project will provide preferential of employment to the local people there by the livelihood standards will be improved.

3.7 TRAFFIC DENSITY

The traffic survey conducted based on the transportation route of material, the Rough Stone and gravel is proposed to be transported mainly through NH-948 (Bengaluru – Coimbatore) and SH-15 (Mettupalayam – Sathyamangalam) as shown in Table 3.36- 3.39and in Figure 3.30. 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 3.36 Traffic Survey Locations

Station Code	Road Name	Distance and Direction
TS1	NH-948 (Bengaluru – Coimbatore)	2.15km - East
TS2	SH-15 (Mettupalayam – Sathyamangalam)	3.18km - West

Source: On-site monitoring by GTMS FAE & TM

Table 3.37 Existing Traffic Volume

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	121	363	175	175	142	71	609
TS2	113	339	137	137	169	85	561

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 3.38 Rough Stone Transportation Requirement

Transportation of Rough Stone Per day		
Capacity of trucks	No. of Trips per day	Volume in PCU
15 tonnes	76	228

Source: Approved Mining Plan

Table 3.39 Summary of Traffic Volume

Route	Existing traffic volume in PCU	Incremental traffic due to the project	Total traffic volume	Hourly Capacity in PCU as per IRC – 1960guidelines
NH-948 (Bengaluru – Coimbatore)	609	228	837	1200
SH-15 (Mettupalayam – Sathyamangalam)	561	228	789	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

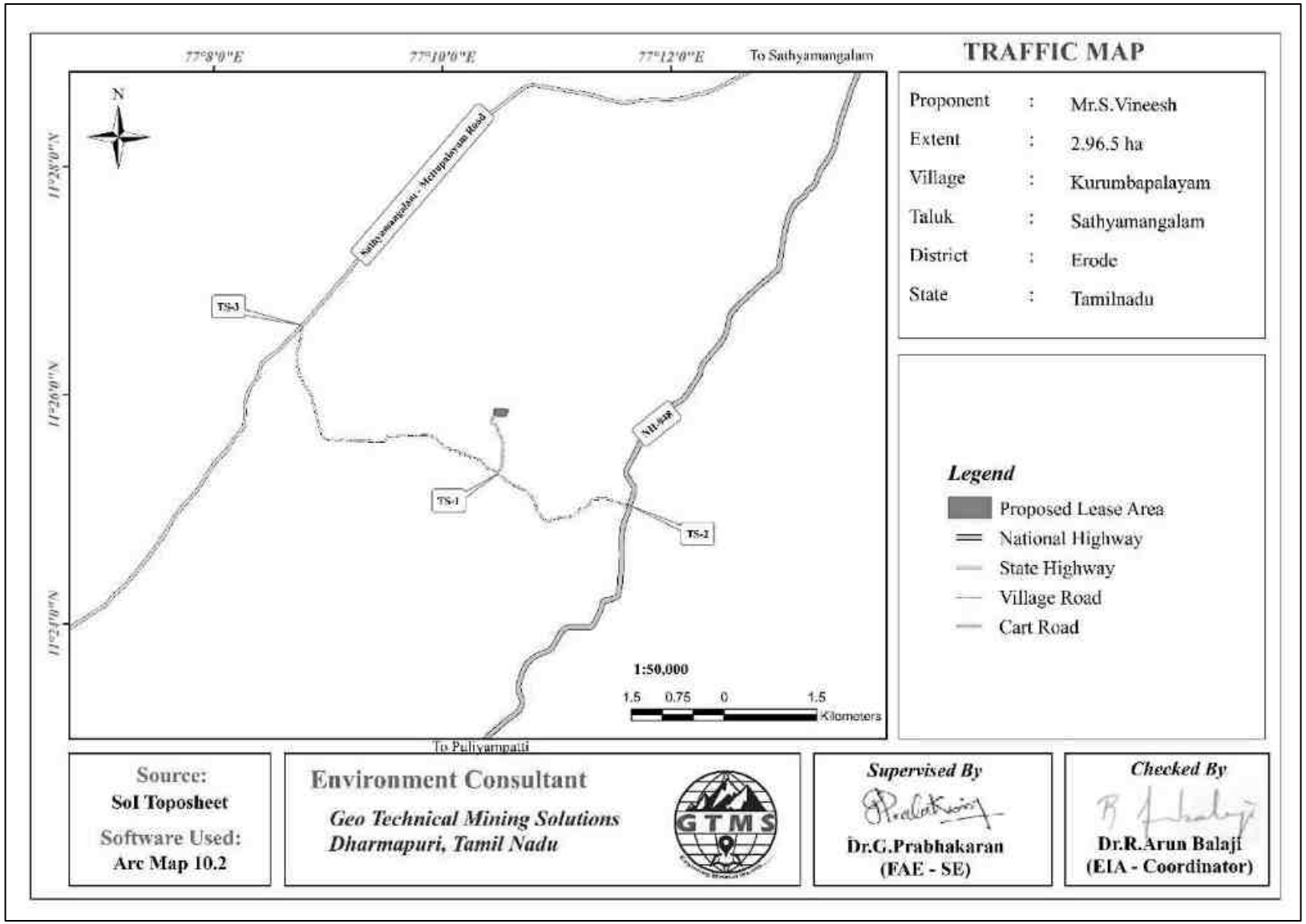


Figure 3.30 Traffic Density Map

3.8 SITE SPECIFIC FEATURES

There are no Wildlife Sanctuaries and National Park within 10 km radius. Therefore, there will be no need of acquisition/diversion of forest land. The details related to the environmentally sensitive areas around the proposed mine lease area i.e., 10 km radius and the nearby water bodies are given in the Table 3.40.

Table 3.40 Details of Environmentally Sensitive Ecological Features in the Study Area

S. No.	Sensitive Ecological Features	Name	Areal Distance in km
1	National Park / Wild life Sanctuaries	None	Nil within 10 km radius
		Sathiyamangalam WLS	7.79km-NW
2	Reserve Forest	Velamundi R.F	172m- N
		Talamalai Extn R.F	8.08km-NW
3	Lakes/ Reservoirs/ Dams/Streams/Rivers	Bhavani River	6.35km-N
		Bhavani Reservoir	5.76km-NW
		Sungai Lake	3.57km-S
		Parusapalayam Lake	5.46km-SW
		Nallur Lake	5.40km-S
4	Tiger Reserve/Elephant Reserve/ Biosphere Reserve	Sathiyamangalam Tiger Reserve	7.79km-NW
5	Densely Polluted Areas	None	Nil within 10 km radius
6	Mangroves	None	Nil within 10 km radius
7	Mountains/Hills	None	Nil within 10 km radius
8	Centrally Protected Archaeological Sites	None	Nil within 10 km radius
9	Industries/ Thermal Power Plants	None	Nil within 10 km radius
10	Defence Installation	None	Nil within 10 km radius

Source: Survey of India Toposheet





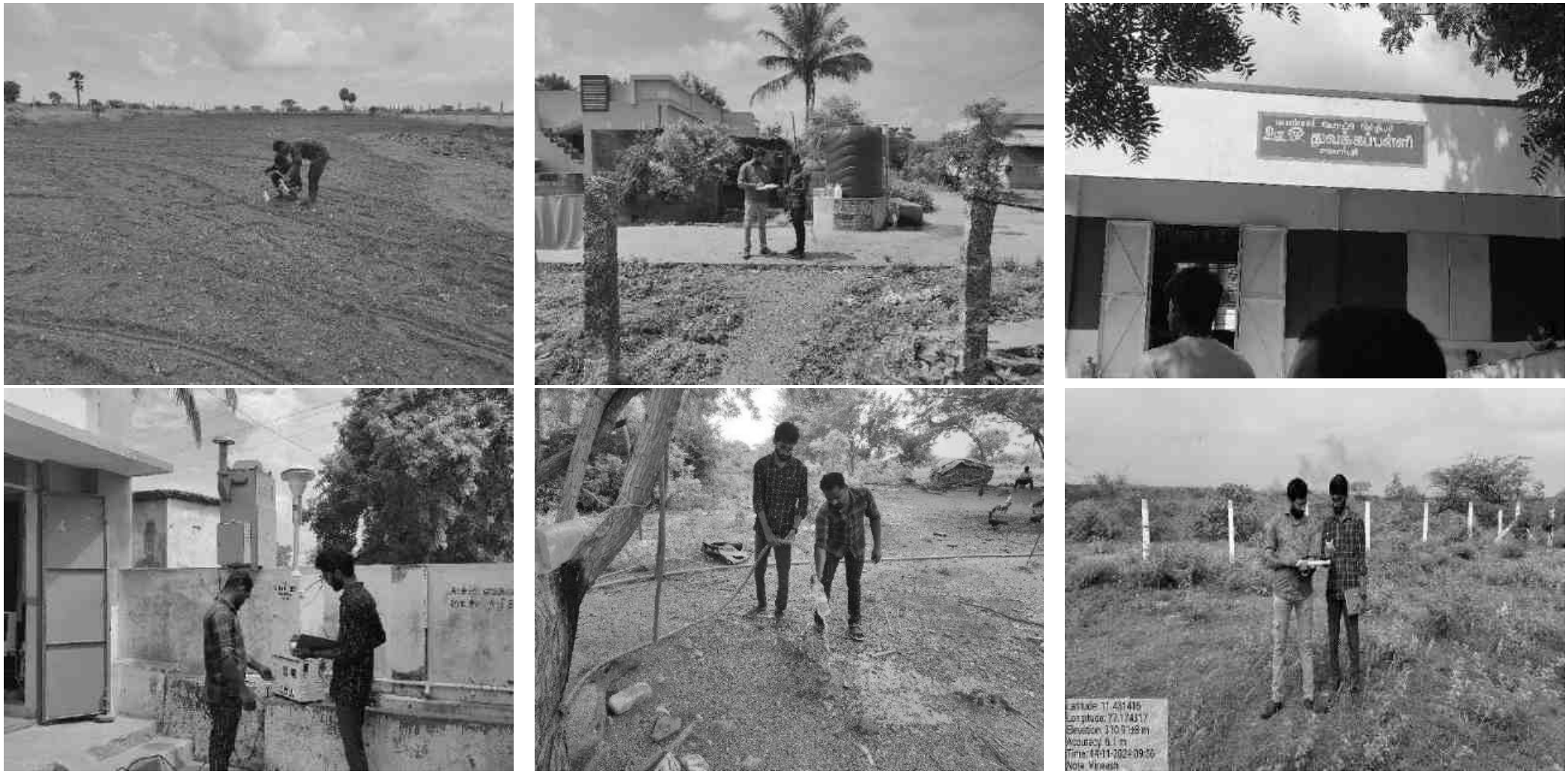



Figure 3.31 Field Study Photographs

CHAPTER IV

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

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. This chapter discusses the anticipated impacts on soil, land, water, air, noise, biological, and socioeconomic environments.

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 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,10m and 50m 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

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

4.3.1 Anticipated Impact

- Surface and ground water resources may be contaminated due to pit water discharge, domestic sewage, discharge of oil and grease bearing waste water from washing of vehicles and machineries, and washouts from surface exposure or working areas
- As the proposed project acquires 4.0KLD of water from water vendors, it will not extract water by developing abstraction structures in the lease area. Therefore, the project will not have impact on depletion of aquifer beneath the lease area.

4.3.2 Common Mitigation Measures for the Proposed Project

- Rain water from mine pit will be treated in settling tanks before being used for dust suppression and tree plantation purposes
- Domestic sewage from site office will be discharged in septic tank and then directed to soak pits
- Water from the tipper wash-down facility and machinery maintenance yard will be passed through interceptor traps/oil separators prior to its reuse

- 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
- Periodic (every 6 month once) analysis of ground water quality of quarry pit water and ground water of nearby villages will be conducted
- Artificial recharge structures will be established in suitable locations as part of the rainwater harvesting management program.

4.4 AIR ENVIRONMENT

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_{10} and $PM_{2.5}$) are the main air pollutants.
- Emissions of noxious gases due to incomplete detonation of explosive may sometimes pollute the air.
- The fugitive dust released from the mining operations may cause effect on the mine workers who are directly exposed to the fugitive dust.
- Simultaneously, the air-borne dust may travel to longer distances and settle in the villages located near the mine lease area.

4.4.2 Emission Estimation

Emission resulting from different mining activities is estimated using relevant empirical formulae developed by Chaulya et al.,2001. The equations used for SPM 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).

The emission rate thus calculated using the empirical formula is used as one of the inputs in the AERMOD modelling. It is important to note that PM_{10} emission rate is derived from the SPM estimation in the background that PM_{10} constitutes 52% of SPM emission. The $PM_{2.5}$ and PM_{10} 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	$PM_{2.5}$	0.542431082	29650	1.82945E-05
Overall Mine	PM_{10}	1.084862164		3.65889E-05

4.4.2.1 Modelling of Incremental Concentration

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 4.3-4.4.

4.4.2.2 Model Results

The post project resultant concentrations of PM_{10} and $PM_{2.5}$ (GLC) is given in Tables 4.3-4.4.

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

Station ID	Distance to core area (km)	Direction	PM 2.5 concentrations(µg/m³)			Comparison against air quality standard (60 µg/m³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	0.06	E	15.8	3.12	18.9	Below standard	19.7	Not significant
AAQ2	0.79	S	15.6	1	16.6		6.4	
AAQ3	3.30	SE	22.7	0	22.7		0.0	
AAQ4	3.68	SW	14.7	0.5	15.2		3.4	
AAQ5	2.65	W	15.2	0.05	15.25		0.3	
AAQ6	1.64	NNW	15.3	0	15.3		0.0	

Table 4.4 Incremental & Resultant GLC of PM_{10}

Station ID	Distance to core area (km)	Direction	PM10 concentrations(µg/m³)			Comparison against air quality standard (100 µg/m³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	0.06	E	39.9	6.13	46.03	Below standard	15.4	Not significant
AAQ2	0.79	S	39.5	5	44.5		12.7	
AAQ3	3.30	SE	46.1	0	46.1		0.0	
AAQ4	3.68	SW	36.8	1	37.8		2.7	
AAQ5	2.65	W	38.0	0.1	38.1		0.3	
AAQ6	1.64	NNW	38.3	0	38.3		0.0	

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.

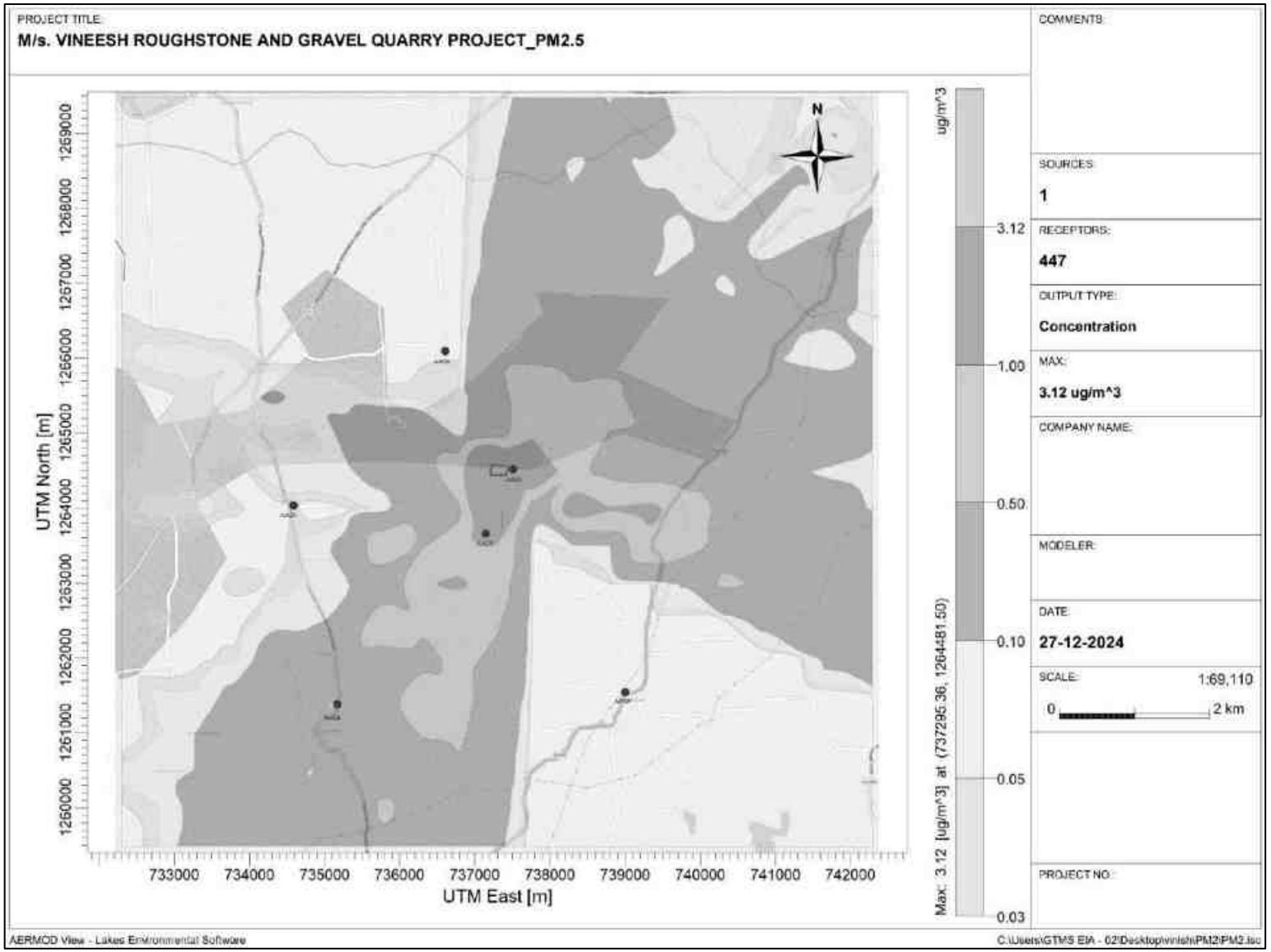


Figure 4.1 Predicted Incremental Concentration of $PM_{2.5}$

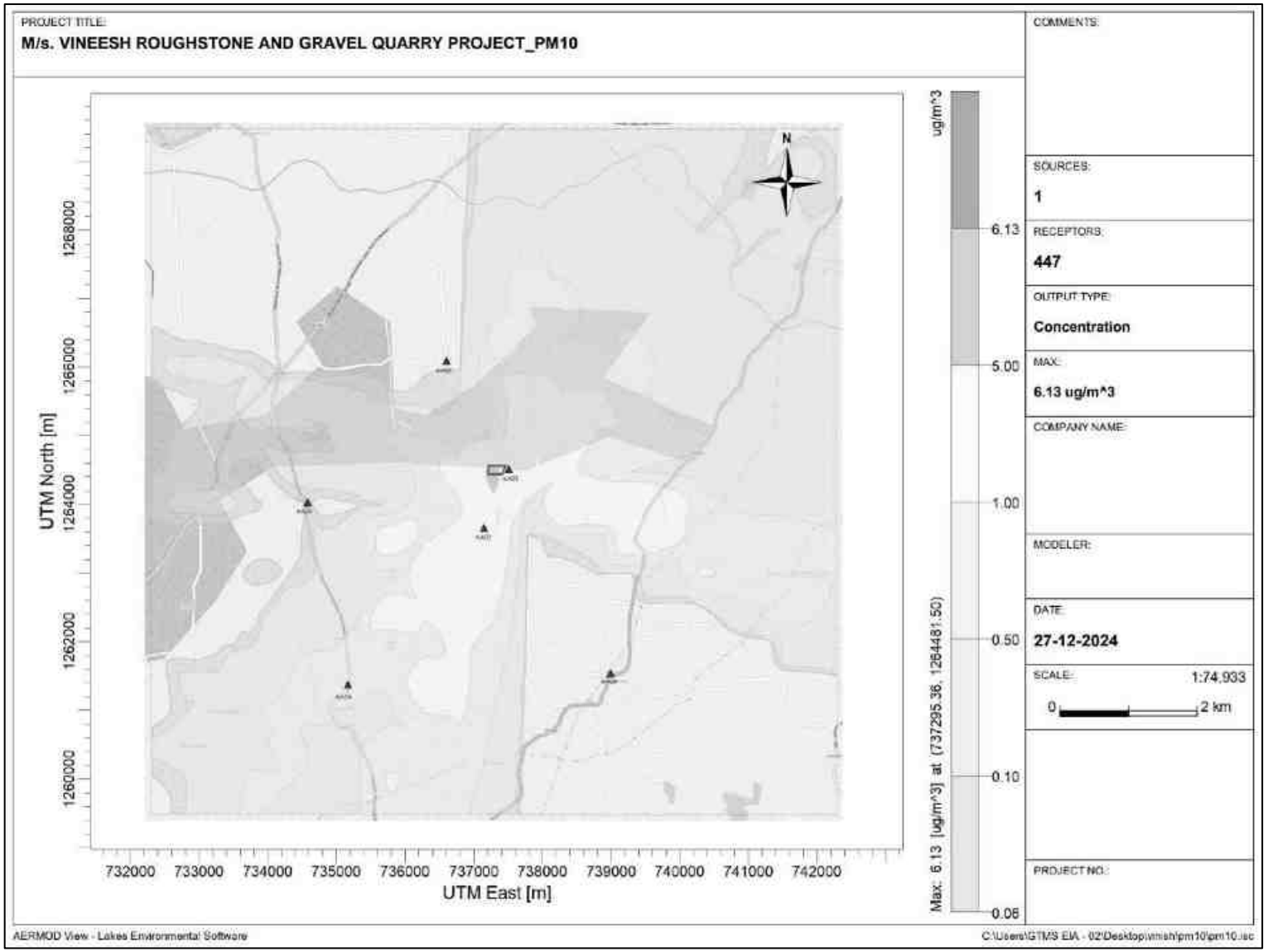


Figure 4.2 Predicted Incremental Concentration of PM_{10}

4.4.3 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.

Haul Road and Transportation

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

Green Belt

- Planting of trees all along mine haul roads outside the lease 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 modelling has been carried out to assess the impact on surrounding ambient noise levels. Basic phenomenon of the model is the geometric attenuation of sound. Noise at a point generates spherical waves which are propagated outwards from the source through the air at a speed

of 1, 100 ft/sec with the first wave making an ever-increasing sphere with time. As the wave spreads the intensity of noise diminishes as the fixed amount of energy is spread over an increasing surface area of the sphere. The assumption of the model is based on point source relationship i.e., for every doubling of the distance the noise levels are decreased by 6 dB (A).

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

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

Where,

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

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

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

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

4.5.1 Anticipated Impact

The attenuation due to several factors including ground reflection, atmosphere, wind speed, temperature, trees, and buildings as 35.5 dB (A), the barrier effect. 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, and 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 4.5.

Table 4.5 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**

The total noise to be produced by mining activity is calculated to be 95.8 dB (A). Generally, most mining operations produce noise between 95.8 dB (A).

Table 4.6 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	50.7	44.0	51.5
Kurumbapalayam	870	40.5	25.2	40.6
Pungampalli	3350	41.2	13.5	41.2
Panayampalli	3910	39.4	12.1	39.4
Anna Nagar	2680	40.1	15.4	40.1
Karuthottampalayam	1580	38.5	20.0	38.6
NAAQ Standards	Industrial Day Time - 75 dB (A) & Night Time- 70 dB (A) Residential Day Time -55 dB (A) & Night Time- 45 dB (A)			

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. Therefore, no impact is anticipated on the noise environment due to the project.

4.5.2 Common Mitigation Measures

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

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

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

4.5.3 Ground Vibrations

Ground vibrations due to the proposed mining activities are anticipated due to operation of mining machines like excavators, drilling and blasting, transportation vehicles, etc., however, the major source of ground vibration from the quarry is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kutcha 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 4.7 Predicted PPV Values due to Blasting

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s	Fly rock distance in m	Air Blast	
					Pressure (kPa)	Sound Level (dB)
P1	37.80	870	0.18	19	0.08	132

Table 4.8 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	37.80	100	5.7	19	1.03	154
		200	1.9		0.45	147
		300	1.0		0.27	143
		400	0.6		0.19	140
		500	0.4		0.15	137

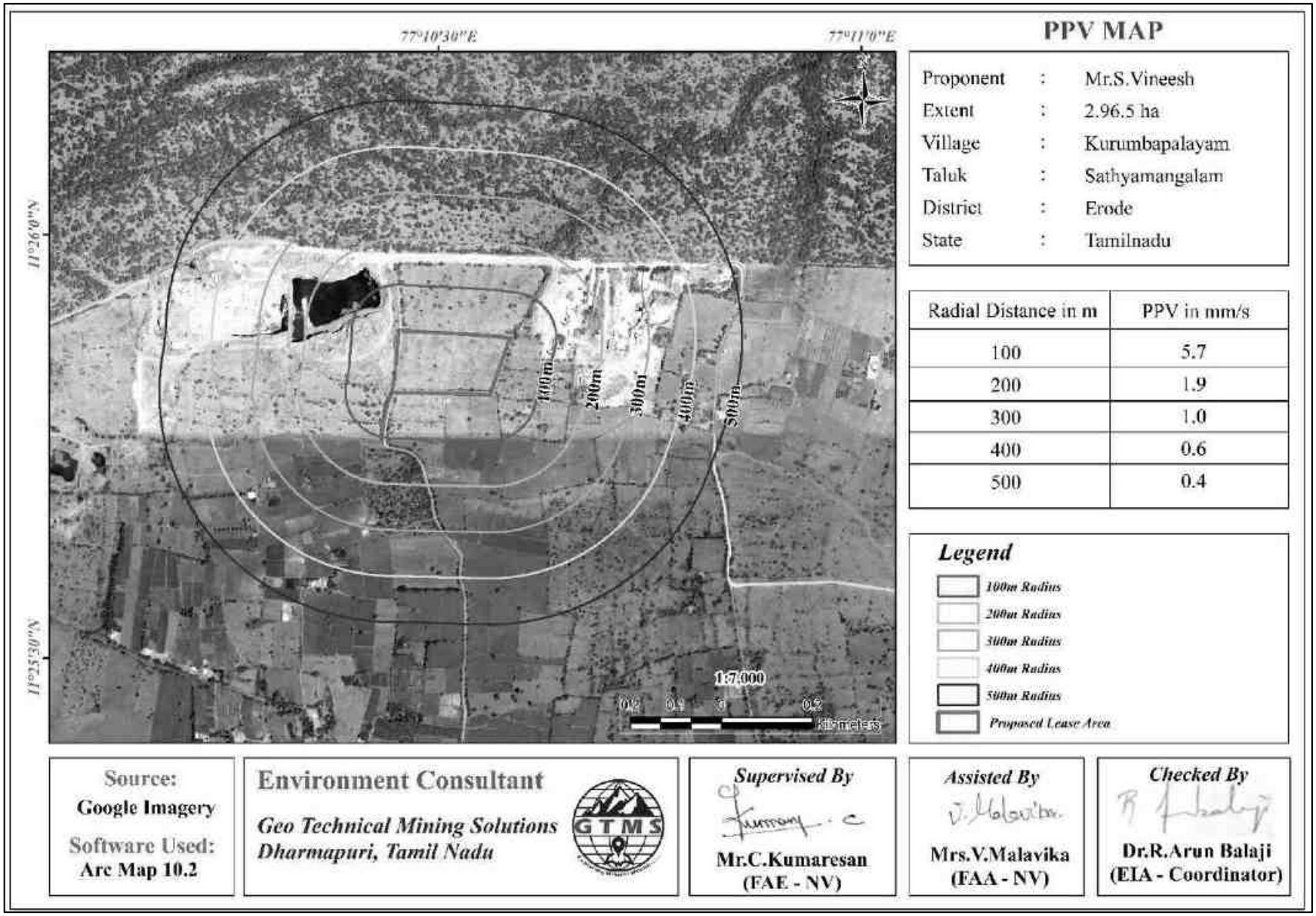


Figure 4.3: Predicted PPV Values due to Blasting at 100-500 m radius

4.5.3.1 Common Mitigation Measures

- The blasting operations in the cluster quarries are carried out without deep hole drilling and blasting using delay detonators which reduce the ground vibrations
- Proper quantity of explosives, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting
- Adequate safe distance from blasting will be maintained as per DGMS guidelines
- Blasting shelter will be provided as per DGMS guidelines
- Blasting operations will be carried out only during day time
- The charge per delay will be minimized and preferably a greater number of delays will be used per blasts
- During blasting, other activities in the immediate vicinity will be temporarily stopped
- Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast
- A fully trained explosives blast man (Mining Mate, Mines Foreman, 2nd Class Mines Manager/ 1st Class Mines Manager) will be appointed
- A set of shot firing rules will be drawn up and blasting shall commence outlining the detailed operating procedures that will be followed to ensure that shot firing operations on site take place without endangering the workforce or public
- Sufficient angular stemming material will be used to confine the explosive force and minimise environmental disturbance caused by venting / misfire
- The detonators will be connected in a predetermined sequence to ensure that only one charge is detonated at any one time and a NONEL or similar type initiation system will be used
- The detonation delay sequence shall be designed so as to ensure that firing of the holes is in the direction of free faces so as to minimise vibration effects.
- Appropriate blasting techniques shall be adopted in such a way that the predicted peak particle velocity shall not exceed 0.251mm/s.
- Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices.

4.6 ECOLOGY AND BIODIVERSITY

4.6.1 Impact on Ecology and Biodiversity

- There shall be negligible air emissions or effluents from the project site. During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly

- Most of the land in the buffer area is undulating terrain with crop lands, grass patches and small shrubs. Hence, there will be no effect on flora of the region. There are no trees in mine lease area.
- Carbon released from quarrying machineries and tippers during quarrying would be 4785kg per day, 1292065kg per year and 6460324kg over five years, as provided in Table 4.9.

Table 4.9 Carbon Released During Five Years of Rough Stone and Gravel Production

	Per day	Per year	Per five years
Fuel consumption of excavator	320	86442	432209
Fuel consumption of compressor	38	10152	50760
Fuel consumption of tipper	1428	385520	1927600
Total fuel consumption in liters	1786	482114	2410569
CO_2 emission in kg	4785	1292065	6460324

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.
- 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 35544kg 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 4.11), about 1393 trees will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 177722kg of the total carbon, as provided in Table 4.10.

Table 4.10 CO_2 Sequestration

CO_2 sequestration in kg	132	35544	177722
Remaining CO_2 not sequestered in kg	4654	1256520	6282602
Trees required for environmental compensation	52355		
Area required for environmental compensation in hectares	105		

Table 4.11 Recommended Species for Greenbelt Development Plan

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

Table 4.12 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		
	593	474	5337
	Number of plants outside the mine lease area		
	890	712	8006
Total	**1483**	**1186**	**13343**

Table 4.13 Budget for Greenbelt Development Plan

Activity	Plantation in the construction phase(3Months)	Cost	Capital Cost (Rs.)	Recuring Cost-per annum
Plantation inside the mine lease area (in safety margins)	593	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))"	118600	17790
Plantation outside the area	890	Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	266850	26685
Total			**385450**	**44475**

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

- ❖ Direct impact is anticipated on fauna of core zone
- ❖ Insignificant impact is anticipated on fauna in the buffer area due to air emissions, noise, vibration, transportation, waste water discharges, and changes in land use. There is no fauna in mine lease area.

4.6.4 Mitigation Measures on Fauna

- ❖ Fencing will be constructed around the proposed mine lease area to restrict the entry of stray animals
- ❖ The workers shall be trained not to harm any wildlife near the project site

4.6.5 Impact on agriculture and horticulture crops in 1km Radius

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

4.6.6 Mitigation Measures on agriculture and horticulture crops.

- ❖ The main objective of the green belt is to provide a barrier between the source of pollution and the surrounding areas. In order to compensate the loss of vegetation cover, it is suggested to carry out afforestation program mainly inside and outside of the lease area in different phases.
- ❖ It is a granite quarry, no explosives are used, there is no possibility of vibration and dust, thus there is no possibility of damage to the adjacent agricultural land.
- ❖ Quarry approach roads are sprayed with water 3 times a day to control dust. Thus, the damage to the nearby farmlands is controlled.

- ❖ A green belt will be created in 7.5 safety zone around the quarry to contain the dust from the quarry and prevent the dust from spreading to the adjacent agricultural land.
- ❖ Transportation of material will be carried out during day time and material will be covered with tarpaulin
- ❖ The speed of tippers plying on the haul road will be limited to < 20 km/hr to avoid generation of dust.

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.

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.

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.
- ❖ Increase in Employment opportunities both direct and indirect thereby increasing economic status of people of the region

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 discharges likely to cause adverse impacts is predicted in advance, appropriate mitigation measures like settling of suspended solids or passive treatment to improve water quality as well as quantity, etc., could be planned. Monitoring should demonstrate that there is no adverse effect of pollutant concentrations exceeding the statutory limits for the water, soil and air qualities in the area around the closed mine.

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

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

5.4 ANALYSIS OF ALTERNATIVE TECHNOLOGY

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

CHAPTER VI
ENVIRONMENTAL MONITORING PROGRAMME

6.0 GENERAL

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

6.1 METHODOLOGY OF MONITORING MECHANISM

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

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

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

❖ Seeking expert's advice when needed.

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

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

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

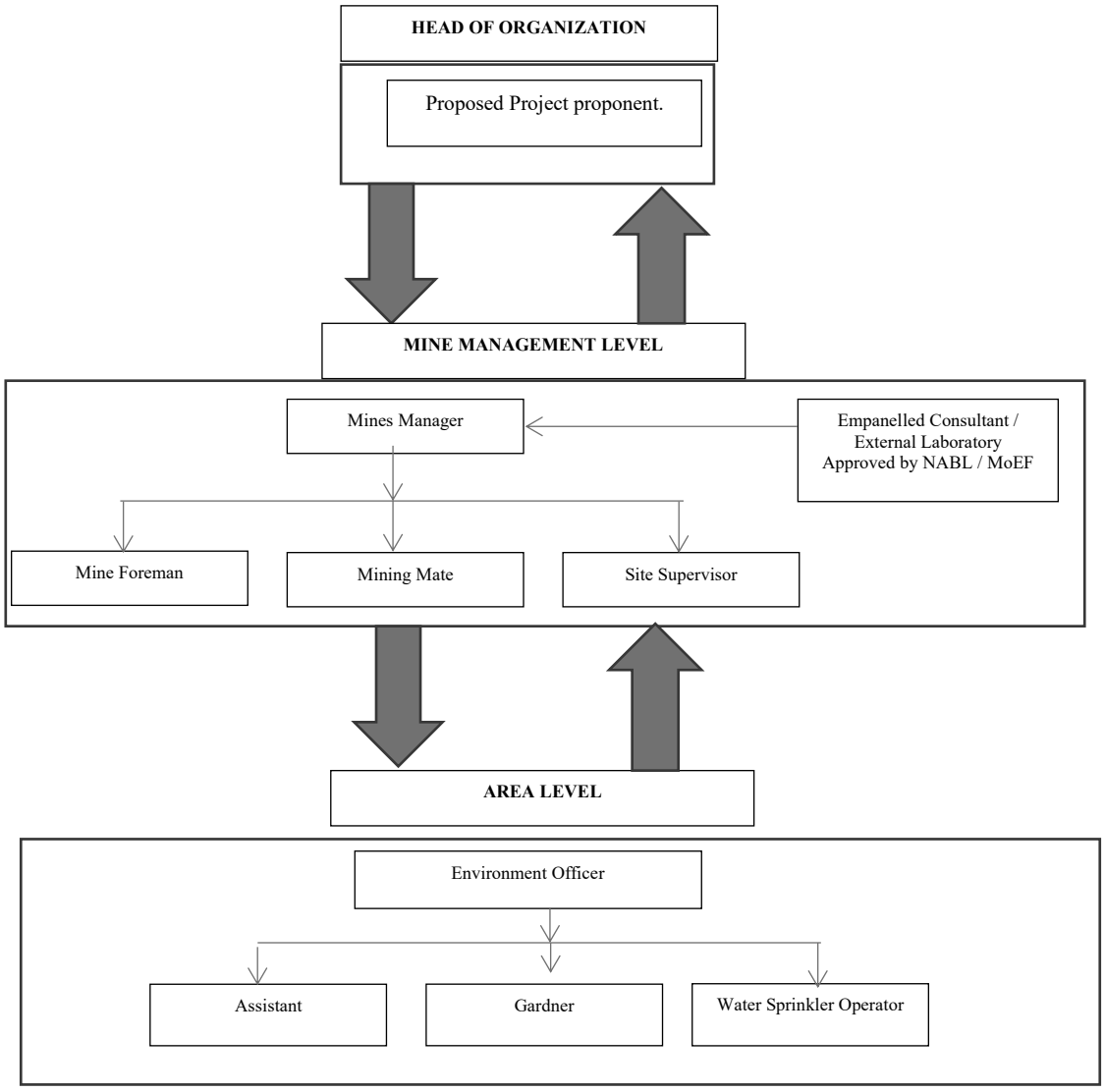


Figure 6.1 Proposed environmental monitoring chart

6.2 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

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

Table 6.1 Implementation Schedule for Proposed Project

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

6.3 MONITORING SCHEDULE AND FREQUENCY

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

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

- ❖ Air quality
- ❖ Water and wastewater quality
- ❖ Noise levels
- ❖ Soil quality and

❖ Greenbelt development

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

Table 6.2 Proposed Monitoring Schedule Post EC for the Proposed Quarry

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

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

6.4 BUDGETARY PROVISION FOR ENVIRONMENT MONITORING PROGRAM

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

Table 6.3 Environment Monitoring Budget

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

Source: Field Data

6.5 REPORTING SCHEDULES OF MONITORED DATA

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

Periodical reports to be submitted to:

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

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

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

CHAPTER VII
ADDITIONAL STUDIES

7.0 GENERAL

Additional studies deal with:

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

7.1 PUBLIC CONSULTATION FOR PROPOSED PROJECT

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

7.2 RISK ASSESSMENT FOR PROPOSED PROJECT

Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening. The methodology for the risk assessment is based on the specific risk assessment guidance issued by the Directorate General of Mine Safety (DGMS), Dhanbad, vide circular No.13 of 2002, dated 31st December, 2002. The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards in order to prioritize those that need immediate attention. Further, mechanisms responsible for these hazards are identified and their control measures, set to timetable are recorded along with pinpointed responsibilities. The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad for proposed project. Factors of risks involved due to human induced activities in connection with these proposed mining & allied activities with detailed analysis of causes and control measures for the mine is given in Table 7.1.

Table 7.1 Risk Assessment & Control Measures for Proposed Project

S. No.	Risk factors	Causes of risk	Control measures
1	Accidents due to explosives and heavy	Improper handling and unsafe working practice	✓ All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation,

	mining machineries.		1961 and Mines Rules, 1955 will be strictly followed during all mining operations. ✓ Workers will be sent to the Training in the nearby Group Vocational Training Centre Entry of unauthorized persons will be prohibited. ✓ Fire-fighting and first-aid provisions in the mine office complex and mining area. ✓ Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use. ✓ Working of quarry, as per approved plans and regularly updating the mine plans. ✓ Cleaning of mine faces on daily basis shall be daily done in order to avoid any overhang or undercut. ✓ Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of a Mine Manager. ✓ Maintenance and testing of all mining equipment as per manufacturer's guidelines.
2	Drilling	Improper and unsafe practices; Due to high pressure of compressed air, hoses may burst; Drill Rod may break;	✓ Safe operating procedure established for drilling (SOP) will be strictly followed. ✓ Only trained operators will be deployed. ✓ No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places, ✓ Drilling shall not be carried on simultaneously on the benches at places directly one above the other. ✓ Periodical preventive maintenance and replacement of worn-out accessories in the

			compressor and drill equipment as per operator manual. ✓ All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition. ✓ Operator shall regularly use all the personal protective equipment.
	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/ fining of blast holes Vibration due to movement of vehicles	✓ The maximum charge per delay and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blast can be conducted safely. ✓ SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation ✓ Shots are fired during daytime only. ✓ All holes charged on any one day shall be fired on the same day. ✓ The danger zone is and will be distinctly demarcated (by means of red flags)
3	Transportation	Potential hazards and unsafe workings contributing to accident and injuries Overloading of material While reversal & overtaking of vehicle	✓ Before commencing work, drivers personally check the truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio-visual reversing alarm, rear view mirrors, side indicator lights etc., are in good condition. ✓ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. ✓ Concave mirrors should be kept at all corners

		Operator of truck leaving his cabin when it is loaded.	✓ 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
4	Natural calamities	Unexpected happenings	✓ Escape Routes will be provided to prevent inundation of storm water ✓ Fire Extinguishers & Sand buckets
5	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	✓ Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m.

Source: Analysed and proposed by FAE & EC

7.3 DISASTER MANAGEMENT PLAN FOR PROPOSED PROJECT

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

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

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

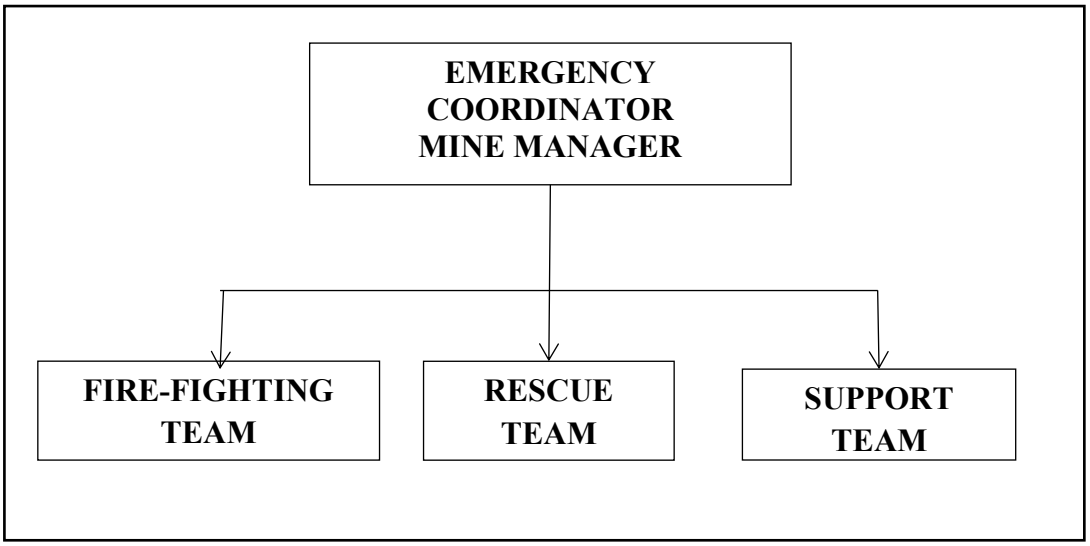


Figure 7.1 Disaster management team layout for proposed project

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.

7.3.1 Emergency Control Procedure

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

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

- ❖ Mine control rooms
- ❖ Emergency security controller

7.4 CUMULATIVE IMPACT STUDY

The Cumulative Impact is mainly anticipated due to drilling & blasting and excavation and transportation activities in all the projects within the cluster and major impact anticipated is on Air & Noise Environment and Ground Vibrations due to blasting. For this cumulative study, three proposed projects, known as P1, P2 and P3 are taken into consideration. The details of P1 have been given in Table 1.3 and the details of P2, P3 are given in the Table 7.2 and 7.3.

Table 7.2 Salient Features of the Proposed Project 'P2'

Name of the Quarry	Mr. P.R. Thirunavukarasu Rough Stone and Gravel Quarry	
Type of Land	Patta Land	
Extent	1.24.5 Ha	
S.F. No	148/1, 148/11, 148/12 and 148/13	
Toposheet No	58 E/03	
Location of Project Site	11°25'48.09"N to 11°25'51.82"N 77°10'13.72"E to 77°10'20.18"E	
Highest Elevation	328 m AMSL	
Ultimate depth of Mining	40m BGL	
Geological Resources	Rough Stone in m^3	Gravel in m^3
	332627	24862
Mineable Reserves	Rough Stone in m^3	Gravel in m^3
	104914	18448
Proposed reserves for five years	Rough Stone in m^3	Gravel in m^3
	87024	18448
Method of Mining	Open-Cast Mechanized mining	
Topography	Flat Topography	
Machinery proposed	Jack Hammer	3
	Compressor	1
	Tipper	9
	Excavator	1
Blasting Method	The quarrying operation is proposed to carried out by open cast, using jack hammer drilling followed by manual breaking	

	will be adopted to release the rough stone and nonel blasting is proposed in this lease area.
Proposed Manpower Deployment	18 Nos
Project Cost	Rs.74,85,000/-
CER Cost	Rs. 5,00,000/-
Proposed Water Requirement	3.0 KLD

Table 7.3 Salient Features of the Proposed Project 'P3'

Name of the Quarry	Mr. N.T.Saisada Rough Stone and Gravel Quarry	
Type of Land	Patta Land	
Extent	2.28.40Ha	
S.F. No	251(Part) and 152/4	
Toposheet No	58 E/03	
Location of Project Site	11° 25'51.36"N to 11° 25'55.19"N 77°10'07.83"E to 77°10'18.95"E	
Highest Elevation	330 m AMSL	
Ultimate depth of Mining	41m BGL	
Geological Resources	Rough Stone in m^3	Gravel in m^3
	685200	22840
Mineable Reserves	Rough Stone in m^3	Gravel in m^3
	145660	15582
Proposed reserves for five years	Rough Stone in m^3	Gravel in m^3
	80530	15582
Method of Mining	Open-Cast Mechanized mining	
Topography	Flat Topography	
Machinery proposed	Jack Hammer	4
	Compressor	1
	Tipper	3
	Excavator	1
Blasting Method	The quarrying operation is proposed to carried out by open cast, using jack hammer drilling followed by manual breaking will be adopted to release the rough stone and nonel blasting is proposed in this lease area.	

Proposed Manpower Deployment	27 Nos
Project Cost	Rs.93,64,000/-
CER Cost	Rs. 5,00,000/-
Proposed Water Requirement	4.0 KLD

7.4.1 Air Environment

As the production of rough stone and gravel plays a vital role in affecting the air environment. The data on the cumulative production resulting from three proposed project have been given in Tables 7.4 and 7.5.

Table 7.4 Cumulative Production Load of Rough Stone

Quarry	5 Years in m^3	Per Year in m^3	Per Day in m^3	Number of Lorry Load Per Day
P1	530256	106051	393	66
P2	104914	20983	78	13
P3	80530	16106	60	10
Grand Total	**715700**	**143140**	**531**	**89**

Table 7.5 Cumulative Production Load of Gravel

Quarry	Production for 3 Years (m^3)	Yearly Production (m^3)	Daily Production (m^3)	Number of Lorry Loads Per Day
P1	48024	16008	59	10
P2	18448	6149	23	4
P3	15582	5194	19	3
Grand Total	82054	27351	101	17

The cumulative study shows that the overall production of rough stone from three quarry is 531 m^3 per day with a capacity of 89trips of rough stone per day and that production of gravel from three proposed quarry is 101m^3 per day accounting for 17trips/day.

7.4.1.1 Cumulative Impact of Air Pollutants

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

Table 7.6 Cumulative impact results from the three proposed projects

Pollutants	Baseline Data (µg/m^3)	Incremental Values (µg/m^3)			Cumulative Value (µg/m^3)
		P1	P2	P3	
$PM_{2.5}$	15.8	3.12	2.54	1.49	**22.95**
PM_{10}	39.9	6.13	5.25	2.92	**54.20**

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 projects within the 500m radius.

Table.7.7 Cumulative impact of noise from three proposed projects

Location ID	Distance (m)	Direction	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	870	SE	40.5	25.2	40.6	**55**
Habitation Near P2	920	SE		24.7	40.6	
Habitation Near P3	1000	SE		24.0	40.6	
Cumulative Noise (dB (A))					45.4	

Source: Lab Monitoring Data

The cumulative analysis of noise due to three proposed projects shows that habitation will receive about 49.1dB (A) respectively. The cumulative results for all the villages in consideration do not exceed the limit set by CPCB for residential areas for day time.

Ground Vibrations

Cumulative results of ground vibrations due to mining activities in the all the three projects have been shown in Table 7.8.

Table 7.8 Cumulative effect of ground vibrations resulting from three projects

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	37.80	870	0.18
P2	7.48	920	0.04
P3	5.74	1000	0.03
Total			**0.25**

Results from the above tables 7.8 indicate that the cumulative PPV value of each habitation is well below the peak particle velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997.

7.4.3 Socio Economic Environment

Socio Economic benefits of the three proposed project were calculated and the results have been shown in Table 7.9 the three projects together will contribute Rs. 15,00,000/-towards CER fund.

Table 7.9 Socio Economic benefits from three proposed projects

Location ID	Project Cost	CER Cost
P1	Rs.76,45,000	Rs. 500000
P2	Rs.74,85,000/-	Rs. 500000
P3	Rs.93,64,000/-	Rs. 500000
Grand Total	**Rs. 2,44,94,000**	**Rs. 15,00,000**

Table 7.10 Employment benefits from three proposed projects

Location ID	Employment
P1	23
P2	18
P3	27
Grand Total	**68**

A total of 68 people will get employment due to three proposed Projects in cluster

7.4.4 Ecological Environment

Tabl e 7.11 Greenbelt Development Benefits from three Projects

Code	Number of Trees proposed	Area to be covered (m^2)	No. of Trees expected to be grown @ 80% survival rate	Species recommended
P1	1483	1186	13343	*Azadirachta indica, Albizia lebbeck, Delonix regia, Techtona grandis,* etc.,
P2	1090	9810	872	
P3	1142	10278	914	
Total	**3715**	**21274**	**15129**	

Cumulative studies show that the three proposed Projects will plant about 6888 native tree species like *Azadirachta indica*, *Albizia lebbeck*, *Delonix regia*, *Techtona grandis,* etc inside and outside the lease area. It is expected that 80 % of trees, i.e., 2509 trees will survive in this green belt development program.

7.5 PLASTIC WASTE MANAGEMENT PLAN FOR PROPOSED PROJECT

All the Project Proponent shall comply with Tamil Nadu Government Order (Ms) No. 84 Environment and Forest (EC.2) Department Dated: 25.06.2018 regarding ban on one time use and

throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986.

7.5.1 Objective

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

A detailed action plan to manage plastic waste has been provided in Table 7.12.

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

CHAPTER VIII
PROJECT BENEFITS

8.0 GENERAL

The proposed project at Kurumbapalayam Village aims to produce **530256m^3** of rough stone and **48024m^3 of gravel** over a period of 5 years. This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits:

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

8.1 EMPLOYMENT POTENTIAL

It is proposed to provide employment to about 23 persons for carrying out mining operations and give preference to the local people in providing employment in this cluster. In addition, there will be an opportunity for indirect employment to the form of contractual jobs, business opportunities, and service facilities etc. Because of this, the economic status of the local people will improve.

8.2 SOCIO-ECONOMIC WELFARE MEASURES PROPOSED

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

8.3 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE

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

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

8.4 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

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

8.5 OTHER TANGIBLE BENEFITS

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

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

8.6 CORPORATE SOCIAL RESPONSIBILITY

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

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

- Health Services
- Social Development
- Infrastructure Development
- Education & Sports
- Self-Employment
- CSR Cost Estimation

- ❖ CSR activities mainly contributing to education, health, training of women self-help groups and infrastructure etc., will be taken up in the Kurumbapalayam Village. CSR budget is allocated.

8.7 CORPORATE ENVIRONMENT RESPONSIBILITY

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

Table 8.1 CER Action Plan

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

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

8.8 SUMMARY OF PROJECT BENEFITS

The project would pay about **Rs.6,09,94,860** to the state government through various ways, as provided in Table 8.2.

Table 8.2 Project Benefits to the State Government

Particulars	Budget for Rough Stone (Rs.)	Budget for Gravel (Rs.)
CER	5,00,000	
Seigniorage @ Rs.90/m^3 of rough stone Rs.56/m^3 of gravel	47723040	2689344
District Mineral Foundation Tax @ 10% of Seigniorage	4772304	268934
Green Tax @ 10% of Seigniorage	4772304	268934
Total	**57767648**	**3227212**

CHAPTER IX

ENVIRONMENTAL COST BENEFIT ANALYSIS

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

CHAPTER X

ENVIRONMENTAL MANAGEMENT PLAN

10.0 GENERAL

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

10.1 ENVIRONMENTAL POLICY

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

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

10.1.1 Description of the Administration and Technical Setup

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

- Monitoring of the water/ waste water quality, air quality and solid waste generated.

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

10.2 Budgetary Provision for Environmental Management

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

Table 10.1 EMP Budget for Proposed Project

Attribute	Mitigation measures	Provision for Implementation	Capital Cost	Recurring Cost/annum
			(Rs.)	(Rs.)
Air Environment	Compaction, gradation and drainage on both sides	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare and yearly maintenance @ Rs. 10,000/- per hectare	29650	29650
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed sprinkler installation and new water tanker cost for capital; and water sprinkling (thrice a day) cost for recurring	800000	50000
	Air quality will be regularly monitored as per norms within ML area & ambient area	Yearly compliance as per CPCB norms	0	50000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000

	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance	75000	7500
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin to avoid escape of fines to the atmosphere	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governors @ Rs. 5000/- per tipper/dumper deployed	45000	0
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes	0	11250
	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	59300
	Installing wheel wash system near exit gate of quarry	Installation + Maintenance + Supervision	50000	20000
Total Air Environment			**999650**	**247700**
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	Provision made in OHS part	0	0

	blasting site at the time of charging.			
	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	1484717
Total Noise Environment			**50000**	**1486717**
Water Environment	Water Management	Provision for garland drain @ Rs. 10,000/- per hectare with maintenance of Rs. 5,000/- per annum (2.96.5 X 10000)	29650	14825
Total Water Environment			**29650**	**14825**
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
Total Waste Management			**30000**	**22000**
Implementation of EC, Mining Plan & DGMS Condition	Size 6’ X 5’ with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed display board at the quarry entrance as permanent structure	10000	1000
Total Implementation of EC, Mining Plan			**10000**	**1000**

Occupational Health and Safety	Workers will be provided with Personal Protective Equipment	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee)	92000	23000
	Health checkup for workers will be provisioned	IME & PME Health checkup @ Rs. 1000/- per employee	0	23000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	11860
	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 (4.82.7 hectare)	593000	29650
	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	148250	29650
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
Total Occupational Health and Safety			**873250**	**904160**
Development of Green Belt	Green belt development - 500 trees per hectare (200 Inside Lease Area & 3 00 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	118600	17790

		plant maintenance (recurring))"		
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	266850	26685
Total Development of Green Belt			**385450**	**44475**
Mine Closure	Closure includes 10% of the amount allotted for Greenbelt development, wire fencing, and garland drainage (Rule 27 in MCDR 2017 for Cat B mines will pay 2 lakhs per hectare or minimum amount of financial assurance of 5 lakhs)		100810	0
	G.O.(Ms)No.23, Dated: 28.09.2021	Section IVA of TNMMCR 1959 (@10% of Seigniorage Fee) (Seigniorage Fee for rough stone = Rs.90)	5041238	0
TOTAL			**7520048**	**2720877**

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

Ist Year	**IInd Year**	**IIIrd Year**	**IVth Year**	**Vth Year**	**Total Recurring Cost**	**Total EMP Cost**
2720877	2856921	2999767	3149755	3307243	**15034562**	**22554610**

In order to implement the environmental protection measures, an amount of **Rs. 7520048** as capital cost and recurring cost as **Rs. 2720877**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. 22554610** as shown in Table 10.2.

10.3 CONCLUSION

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

CHAPTER XI
SUMMARY AND CONCLUSION

11.1 INTRODUCTION

As the proposed rough stone and gravel mining project (B1) falls within the quarry cluster of 500 m radius with the total extent of 9.07.40ha, it requires submission of EIA report for grant of Environmental Clearance (EC) after conducting public hearing. The proposed project falling in S.F.No. S.F.No.178 over the extent of 2.96.5ha is situated in the cluster falling in Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu. The projects involved in the calculation of cluster extent are of three proposed quarries and one existing quarry.

11.2 PROJECT DESCRIPTION

The proposed project area is located between Latitudes 11°25'48.65745"N to 11°25'53.20359"N Longitudes from 77°10'26.66416"E to 77°10'35.04812"E in Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu. According to the approved mining plan, about 530256m^3 of rough stone and 48024m^3 of gravel will be mined up to the depth of 40 m BGL in the five years. The quarrying operation is proposed to be carried out by open cast semi-mechanized mining method involving drilling and formation of benches of the prescribed dimensions.

11.3 DESCRIPTION OF THE ENVIRONMENT

Baseline data were collected to evaluate the existing environmental condition in the core and buffer areas during **October through December 2024** as per CPCB guidelines. The data were collected by both the FAEs and NABL accredited and MoEF notified **Greenlink Analytical and Research Laboratory (India) Private Ltd** for the environmental attributes including soil, water, noise, air and by FAEs for ecology and biodiversity, traffic, and socio-economy.

11.3.1 Land Environment

Land use pattern of the area of 5 km radius was studied using Sentinel II imagery. LULC types and their extent are given in Table 11.1.

Table.11.1 LULC Statistics of the Study Area

S. No.	Classification	Area (ha)	Area (%)
1	Crop lands	5850.58	66.70
2	Built area	955.7	11.07
3	Water bodies	70.2	0.81
4	Mining Industrial area	91.14	1.06

5	Plantation	103.11	1.19
6	Bare ground	36.2	0.42
7	Rangeland	1619.5	18.75
Total		**8726.43**	**100.0**

11.3.2 Soil Environment

The soil samples in the study area show loamy textures varying between Silt Loam and sandy loam. pH of the soil varies from 6.85 to 7.01 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 188 to 264µS/cm

11.3.3 Water Environment

Surface and Ground Water Quality Resources and Result

Alampalayam lake and Sungai lake are two prominent surface water resources present in the study area. This lake was ephemeral in nature, which convey water only after rainfall events. Two surface water sample, known as SW1 were collected from the Alampalayam lake (3.35 km N) and SW2 were collected from the Sungai lake (3.83 km S) to assess the baseline water 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. Three groundwater samples, known as BW1, BW2 and OW1 were collected from bore wells and open well were analysed for physico-chemical conditions and bacteriological contents in order to assess baseline quality of ground water. The physical, chemical and biological parameters are within permissible limits except BW2 the total Hardness was slightly increased in compared with standards of IS10500:2012.

11.3.4 Air Environment

As per the monitoring data, $PM_{2.5}$ ranges from 15.4µg/m^3 to 17.5µg/m^3; PM_{10} from 37.0µg/m^3 to 41.9µg/m^3; SO_2 from 3.0µg/m^3 to 4.7µg/m^3; NO_x from 10.0µg/m^3 to 16.1g/m^3. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

Air quality Index

The AQI shows that the air quality of the study area falls within good category 40 causing minimal impact to human health.

11.3.5 Noise Environment

Noise level in core zone was 50.7 dB (A) Leq during day time and 46.3dB(A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 38.5 to 41.2dB (A) Leq and during night time from 37.0 to 40.9dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

11.3.6 Biological Environment

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.

Flora in core zone

There are no trees in the quarry lease area, only shrubs, herbs and grasses. Taxonomically total of 28 species belonging to 16 families were recorded. Amongthem are herbs (23) and shrubs (5). Majority of the species belongs to the family of Fabaceae and Poaceae.

Flora in 300 m radius zone

The vegetation habit analysis indicates that the flora of the 300m radius of the study area consists of 60 species belonging to 31 families. Among the 60 species, 22 herbs, 24 shrubs and 14 trees. the highest number of species were from the Poaceae family (7), followed by Fabaceae (6), Malvaceae (4), and Mimosaceae (4). Three species were recorded from the Amaranthaceae, Apocynaceae, and Asteraceae families, while two species each were recorded from the Arecaceae, Boraginaceae, Convolvulaceae, Cucurbitaceae, Euphorbiaceae, and Lamiaceae families. The endangered or threatened and Species Richness (margalef Index) in the study area it mentioned in Table 3.22-3.24. The Velamundi Reserve Forest is located 170 meters north of the quarry lease area. The reserve forest is predominantly populated with *Albizia amara, Vachellia leucophloea, Vachellia karroo, Chloroxylon swietenia*, and *Ziziphus mauritiana*.

Flora in 10 km radius buffer zone

The 10km radius A total of 107 species of invasive alien species belonging to 82 genera and 39 families were recorded in 10km radius (Table 3.25). Herbs (73.83%) formed the predominant life form followed by shrubs (10.28%), climbers (8.41%), trees (4.67%) and grasses (2.80%).

Fauna in Core Zone

The faunal species observed in the study area are listed in Table 3.27. A total of 39 species were recorded in core zone of the project area. The core zone exhibited fewer species, with only a small number of insects, mammals, and reptiles, whereas the buffer zone showed greater

species diversity. Among the 39 species recorded, the distribution was as follows: (13) 33% birds, (15) 39% insects, (04)10% reptiles, and (07)18% mammals. These species were cross-checked against the IUCN Red List Database version 3.1 to identify any threatened species. Data analysis revealed that 21 species are categorized as Least Concern on the Red List, while 18 species were not listed. The analysis indicates that there are no REET species in the core zone of the proposed quarry site.

Fauna in Buffer Zone

The faunal species observed in the study area are listed in Table 3.28. Taxonomically a total of 48 species belonging to 34 families have been recorded from the buffer zone area. Based on habitat classification the majority of species were Birds 19 (40%), followed by Insects 15 (31%), Reptiles 7 (15%), Mammals 4 (8%) and amphibians 3 (6%). There are 4 schedule II species and 24 schedule IV species according to Indian wild life Act 1972. Totally, 19 species of bird were sighted in the study area.

11.3.7 Socio Economic Environment

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

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

11.4.1 Land Environment

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

Mitigation Measures

- 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,10m 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.

11.4.2 Soil Environment

Anticipated Impact

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

Mitigation Measures

- 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.

11.4.3 Water Environment

Anticipated Impact

- Surface and ground water resources may be contaminated due to pit water discharge, domestic sewage, discharge of oil and grease bearing waste water from washing of vehicles and machineries, and washouts from surface exposure or working areas
- As the proposed project acquires 4.0 KLD of water from water vendors, it will not extract water by developing abstraction structures in the lease area. Therefore, the project will not have impact on depletion of aquifer beneath the lease area.

Mitigation Measures

- Rain water from mine pit will be treated in settling tanks before being used for dust suppression and tree plantation purposes
- Domestic sewage from site office will be discharged in septic tank and then directed to soak pits
- Water from the tipper wash-down facility and machinery maintenance yard will be passed through interceptor traps/oil separators prior to its reuse
- 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
- Periodic (every 6 month once) analysis of ground water quality of quarry pit water and ground water of nearby villages will be conducted
- Artificial recharge structures will be established in suitable locations as part of the rainwater harvesting management program.

11.4.4 AIR ENVIRONMENT

Anticipated Impact

Anticipated increase of the air pollutants due to quarrying activities have been predicted using AERMOD software. 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

Mitigation Measures

- 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
- 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
- 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
- The un-metaled haul roads will be compacted weekly before being put into use
- 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
- Planting of trees all along main mine haul roads and around the project site will be practiced to prevent the generation of dust
- Dust mask will be provided to the workers and their use will be strictly monitored

11.4.5 Noise Environment

Anticipated Impact

Total noise level in all the sampling areas is well below the CPCB standards for industrial and residential areas. The peak particle velocity produced by the charge of 37.80kg is well below that of 0.3 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997.

Mitigation Measures

- The blasting operations in the cluster quarries will use shallow holes and delay detonators to reduce the ground vibrations
- Proper quantity of explosives, suitable stemming materials and appropriate delay system will be used during 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
- 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
- Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices.

11.4.6 Biological Environment

Anticipated Impact

- During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly
- The Number of plants in the mining lease area is given in Chapter 3 which vegetation in the lease area may be removed during mining.
- Carbon released from quarrying machineries and tippers during quarrying would be 4785kg per day, 1292065kg per year and 6460324kg over five years

Mitigation Measures

- 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.
- Existing roads will be used; new roads will not be constructed to reduce impact on flora.
- 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 35544kg 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 4.11), about 1393 trees will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 177722kg of the total carbon.

11.4.7 Socio Economic Environment

Anticipated Impact

- 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

Mitigation Measures

- 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

11.4.8 Occupational Health

- All the persons will undergo pre-employment and periodic medical examination
- Employees will be monitored for occupational diseases by conducting medical tests: General physical tests, Audiometric tests, Full chest, X-ray, Lung function tests, Spiro metric tests, Periodic medical examination – yearly, Lung function test – yearly, those who are exposed to dust and Eye test
- Essential medicines will be provided at the site. The medicines and other test facilities will be provided at free of cost.
- The first aid box will be made available at the mine for immediate treatment. First aid training will be imparted to the selected employees regularly. The lists of first aid trained members shall be displayed at strategic places.

11.5 Environment Monitoring Program

Table 11.2 Environment Monitoring Program

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

11.6 ADDITIONAL STUDIES

11.6.1 Risk Assessment

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. 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.

11.6.2 Disaster Management Plan

The objective of the disaster management plan is to make use of the combined resources of the mine and the outside services to:

- Rescue and treat 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.

11.6.3 Cumulative Impact Study

- The results on the cumulative impact of the two proposed projects on air environment of the cluster do not exceed the permissible limits set by CPCB for air pollutants.
- The cumulative results of noise for the habitation in consideration do not exceed the limit set by CPCB for residential areas for day time
- PPV resulting from three proposed project is well below the permissible limit of Peak Particle Velocity of 5 mm/s
- The proposed three projects will allocate Rs. 15,00,000/- towards CER as recommended by SEAC
- The proposed three projects will directly provide jobs to 68 local people, in addition to indirect jobs
- The proposed three projects will plant 3715about trees in and around the lease area.
- The proposed three projects will add 318 PCU per day to the nearby roads.

11.7 Project Benefits

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

- Direct employment to 23 local people
- 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 Program
- Skill development & capacity building like vocational training.
- Rs. 5,00,000 will be allocated for CER

11.8 ENVIRONMENT MANAGEMENT PLAN

In order to implement the environmental protection measures, an amount of **Rs. 7520048** as capital cost and recurring cost as **Rs. 2720877**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. 22554610.**

CHAPTER XII

DISCLOSURES OF CONSULTANT

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

Address of the consultancy:

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

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

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

16	K.Ravichandiran	FAA	1(a)(i)	GEO	B
17	K.Prithivi	FAA	1(a)(i)	HG	**B**
18	G.Kavitha	FAA	1(a)(i)	EB,SC	**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.R. Arun Balaji**

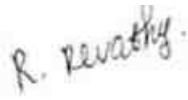
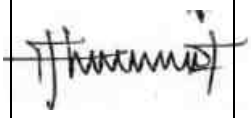
Designation : EIA Coordinator

Name of the EIA Consultant Organization : Geo Technical Mining Solutions

Period of Involvement : Till date

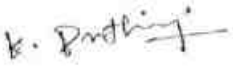
We, the FAEs and FAAs hereby declare that information furnished in this EIA/EMP report for **Thiru. S. Vineesh** rough stone and gravel quarry project with the extent of 2.96.50 ha situated in the cluster with the extent of 9.07.40ha in Kurumbapalayam Village, Sathyamangalam Taluk, Erode District of 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	○ 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	○ Suggesting water treatment systems, drainage facilities ○ Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	R.Revathy	
3	HG	○ Interpretation of ground water table and predict impact and propose mitigation measures. ○ Analysis and description of aquifer Characteristics	G.Umamaheshwaran	
4	GEO	○ Field Survey for assessing the regional and local geology of the area. ○ Preparation of mineral and geological maps. ○ Geology and Geo morphological analysis/description and Stratigraphy/Lithology.	P. Vellaiyan	
5	SE	○ Revision in secondary data as per Census of India, 2011. ○ Impact Assessment & Preventive Management Plan ○ Corporate Environment Responsibility.	Dr. G. Prabhakaran	
6	EB	○ Collection of Baseline data of Flora and Fauna. ○ Identification of species labelled as Rare, Endangered and threatened as	R.Elavarasan	

		per IUCN list. o Impact of the project on flora and fauna. o Suggesting species for greenbelt development.		
7	RH	o Identification of hazards and hazardous substances o Risks and consequences analysis o Vulnerability assessment o Preparation of Emergency Preparedness Plan o Management plan for safety.	J.N. Manikandan	
8	LU	o Construction of Land use Map o Impact of project on surrounding land use o Suggesting post closure sustainable land use and mitigative measures.	G. Prithiviraj	
9	NV	o Identify impacts due to noise and vibrations o Suggesting appropriate mitigation measures for EMP.	C. Kumaresan	
10	AQ	o Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. o Recommending mitigations measures for EMP	Dr.R. Arun Balaji	
11	SC	o Assessing the impact on soil environment and proposed mitigation measures for soil conservation	Dr. D.Kalaimurugan	
12	SHW	o Identify source of generation of non-hazardous solid waste and hazardous waste. o 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	V. Malavika	NV, SHW	○ Site visit along with FAE Assistance in report preparation. ○ Assistance to FAE in both primary and secondary data collection ○ Assistance in noise prediction modelling	
2	P. Dhatchayini	AQ	○ Site visit with FAE ○ Assistance to FAE in collection of both primary and secondary data	
3	K.Prithivi	HG	○ Site visit with FAE ○ Provide inputs & Assisting FAE for HG	
4	K.Ravichandiran	GEO	○ Field visits along with FAE ○ Assistance to FAE in both primary and secondary data collection	
5	C.Ragul	LU & LC	○ Field visits along with FAE Assistance to FAE in both primary and secondary data collection	
6	G.Kavitha	EB, SC	○ Site visit with FAE ○ Collection of Baseline data of Flora and Fauna. ○ Impact of the project on flora and fauna.	
7	M.Arunkumar	WP	○ Field visits along with FAE ○ Assistance to FAE in both primary and secondary data collection	

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 **Thiru. S. Veenish** rough stone and gravel quarry project with the extent of 2.96.50ha situated in the cluster with the extent of 9.07.40ha in Kurumbapalayam Village, Sathyamangalam Taluk, Erode 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/23-26/RA 0319
Validity	:	Till 31.12.2026

TERMS OF REFERENCE (ToR) COMPLIANCE

ToR File No.11022

TOR Identification No. TO24B0108TN5662384N, dated.20/08/2024

S. Vineesh, Rough Stone and Gravel Quarry

Specific Terms of Reference for (Mining of Minerals)

1.SEIAA Specific Conditions:

S.No	Terms of Reference	Remarks
1.1	The authority noted that this proposal was placed for appraisal in 487th meeting of SEAC held on 01.08.2024. SEAC has furnished its recommendations for granting Terms of Reference subject to the conditions stated therein. After detailed discussions, the Authority accepted the recommendation of SEAC and decided to grant of Terms of Reference (ToR) along with Public Hearing for the quantity of 5,30,256 m^3 of Rough Stone & 48,024m^3 of Gravel with an ultimate depth of mining is 40 m BGL. The annual peak production is 1,21,236m^3 of rough stone & 17,168m^3 of Gravel. As per the approved mining plan, under cluster of undertaking the combined Environmental Impact Assessment Study and Preparation of separate Environment Management Plan subject to the conditions as recommended by SEAC & normal conditions & the conditions mentioned in 'Annexure B' of this minute.	The details are discussed in the EIA report under Chapter II.

2. SEAC Conditions - Site Specific:

S.No	Terms of Reference	Remarks
2.1	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for	The details regarding the Cluster Management Committee (CMC) will be submitted in the final EIA report.

	the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: (i) Copy of the agreement forming CMC. (ii) The Organisation chart of the Committee with defining the role of the members (iii) The 'Standard Operating Procedures' (SoP) executing the planned activities.	

3. SEAC Standard Conditions:

<table>
<tr><th>S.No</th><th colspan="3">Terms of Reference</th><th>Remarks</th></tr>
<tr><td>3.1</td><td>1</td><td colspan="2">In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following:</td><td></td></tr>
<tr><td rowspan="6"></td><td rowspan="6"></td><td>(i)</td><td>Original pit dimension</td><td rowspan="6">As it is a fresh quarry, the conditions are not applicable.</td></tr>
<tr><td>(ii)</td><td>Quantity achieved Vs EC Approved Quantity</td></tr>
<tr><td>(iii)</td><td>Balance Quantity as per Mineable Reserve calculated.</td></tr>
<tr><td>(iv)</td><td>Mined out Depth as on date Vs EC Permitted depth</td></tr>
<tr><td>(v)</td><td>Details of illegal/illicit mining</td></tr>
<tr><td>(vi)</td><td>Violation in the quarry during the past working.</td></tr>
</table>

		(vii)	Quantity of material mined out outside the mine lease area	
		(viii)	Condition of Safety zone/benches	
		(ix)	Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.	
	2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.		The VAO certificate is attached in **Annexure IV.**
	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		The details of structures such as dwelling houses, places of worship, industries, factories, sheds, etc. within the radius of 500m from the proposed project area will be given in the final EIA report.
	4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water		Detailed hydrological study will be submitted in the **Annexure VII**.

		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.	The details of Bio diversity from the reputed institution will be submitted in the final EIA report.
	6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc, up to a radius of 25 km from the proposed site.	The DFO letter is attached in the **Annexure V.**
	7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	As it is a fresh lease area, the Slope Stability report is not required.

	8	However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level.	As it is a fresh lease area, the Slope Stability report is not required.
	9	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.	The affidavit for blasting will be enclosed in the final EIA report.
	10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	A conceptual design of blasting has been given in Section 2.6 under Chapter II in the EIA report page 13-20.
	11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.	The details and the photographic evidence showing the project proponents of past mining activities will be submitted in the EIA report.
	12	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,	

	13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	
	14	Quantity of minerals mined out.	
		• Highest production achieved in any one year.	
		• Detail of approved depth of mining.	
		• Actual depth of the mining achieved earlier.	As it is a new quarry, the conditions are not applicable.
		• Name of the person already mined in that leases area. If EC and CTO already obtained, the copy of the same shall be submitted.	
		• Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	
	15	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Toposheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All corner coordinates of the mine lease area have been superimposed on a high-resolution Google Earth Image, as shown in Figure 2.3 under Chapter II in the EIA report page 12.
	16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.	The drone video will be submitted during final EIA presentation.

	17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Photographs of adequate fencing, green belt along the periphery of the project area and the photographs showing nearby water bodies will be included in final EIA report.
	18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	The Resources and Reserves of Rough Stone were calculated based on cross-section method by plotting sections to cover the maximum lease area for the proposed project. The details reserve estimation has been shown in Table 2.3 under Chapter II in the EIA report page 13.
	19	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Details of manpower required for this project have been given in Table 2.14 under Chapter II in the EIA report page 21.
	20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both	The hydrogeological study is discussed in the Section 3.2.2 under Chapter III in the EIA report page 35-43.

		monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.	
	21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study.	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 in the EIA report page 22-88.
	22	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	Results of cumulative impact study due to mining operations are given in Section 7.4 under Chapter VII in the EIA report page 119-123.
	23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	As part of rainwater harvesting measures, the rain water from garland drainage system will be diverted to nearby check dams after treating the water in settling tanks. The detailed rain water harvesting

			report will be submitted in the final EIA report.
	24	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features has been discussed in Section 3.1 in the EIA report page 23-29 under Chapter III. The details of surrounding sensitive ecological features have been provided in Table 3.40 under Chapter III in the EIA report page 86. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Table 2.8 under Chapter II in the EIA report page 17.
	25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	This condition is not applicable to this project because no dumps have been proposed outside the lease area.
	26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.

		TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	
	27	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	As part of rainwater harvesting measures, the rain water from garland drainage system will be diverted to nearby check dams after treating the water in settling tanks. The detailed rain water harvesting report will be submitted in the final EIA report.
	28	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 in the EIA report page 83-85.
	29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	A detailed tree survey was caried out within 300 m radius and the results have been discussed in Section 3.5 under Chapter III in the EIA report page 57-74.
	30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	A progressive mine closure plan has been attached with the approved mining plan report in Annexure III. The budget details for the progressive mine closure plan are shown in Table 2.9 under Chapter II in the EIA report page 18.
	31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and	The EIA coordinator and the FAE for ecology and biodiversity visited the study area and educated the local students about the importance of

		fauna by involving them in the study, wherever possible.	protecting the biological environment.
	32	The purpose of green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	A detailed greenbelt development plan has been provided in Section 4.6 under Chapter IV in the EIA report page 100-104.
	33	Taller/one year old Saplings raised in appropriate size of bags; preferably ecofriendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner	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.
	34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	A disaster management plan for the project has been provided in Section 7.3 under Chapter VII in the EIA report page 117-118.

	35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	A risk assessment plan for the project has been provided in Section 7.2 under Chapter VII in the EIA report page 114-117.
	36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health impacts of the project and preventive measures have been discussed in detail in Section 4.8 under Chapter IV in the EIA report 104-106.
	37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No public health implications are anticipated due to this project. Details of CSR and CER activities have been discussed in Sections 8.6 and 8.7 under Chapter VIII in the EIA report page 126-127.
	38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	No negative impact on socio-economic environment of the study area is anticipated and this project shall benefit the socio-economic environment by offering employment for 23 people directly as discussed in Section 8.1 under Chapter VIII in the EIA report page 125.

	39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
	40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	The benefits of the project are discussed in the Chapter VIII in the EIA report page 125-127.
	41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	It is fresh lease area and the condition is not applicable.
	42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	A detailed environment management plan has been prepared following the suggestion made by SEAC, as shown in Chapter X in the EIA report page 129-134. The sworn affidavit stating to abide the EMP for the entire life of mine will be submitted during final EIA report.
	43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal	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

		provisions in the Environment (Protection) Act, 1986.	lead to withdrawal of this terms of reference besides attracting penal provisions in the Environment (Protection) Act, 1986.

4. SEIAA Standard Conditions:

S.No	Terms of Reference		Remarks
	Cluster Management Committee		
4.1	1	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	A cluster management committee including all 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	All the information has been discussed in Section 2.6 under Chapter II in the EIA report page 13-20.

		individual quarry in the form of route map and network.	
	5	The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.	It will be informed to the committee.
	6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	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 deliberate on the health of the workers/staff involved in the mining as well as the health of the public in the vicinity.	The information on the health of the workers and the local people will be updated periodically.
	Agriculture & Agro-Biodiversity		
	9	Impact on surrounding agricultural fields around the proposed mining Area.	There shall be negligible air emissions or effluents from the project site. During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation

			significantly, as shown in Section 4.6 under Chapter IV in the EIA report page 100-104.
	10	Impact on soil flora & vegetation around the project site.	The details on flora have been provided in Section 3.5 under Chapter III in the EIA report page 57-68. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
	11	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	Details of vegetation in the lease area have been provided in Section 3.5 under Chapter III in the EIA report page 57-68. Details about transplantation of plants have been provided in Section 4.6 under Chapter IV in the EIA report page 100-104.
	12	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 in the EIA report page 57-74 and measures have been provided in Section 4.6 under Chapter IV in the EIA report page 100-104.
	13	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	All the essential environmental protective measures will be followed by the proponent to manage the surrounding environment and restore the ecosystem, as discussed in Chapter IV in the EIA report page 89-107.

	14	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.	The impact of project on the land environment has been discussed in Section 4.1 under Chapter IV in the EIA report page 89-90.
		Forests	
	15	The project proponent shall detail 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.
	16	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	The impacts of the project on ecology and biodiversity have been discussed in Section 4.6 under Chapter IV in the EIA report page 100-104.
	17	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	The impacts of the project on standing trees and the existing trees have been discussed in Section 4.6 under Chapter IV in the EIA report page 100-104.
	18	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	The protected areas, National Parks, Corridors and Wildlife pathways near project site within 10 km radius has been provided in Table 3.40 under Chapter III in the EIA report page 86.
	19	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining	The detailed hydrology report is attached in the **Annexure VII.**

		activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	
	20	Erosion Control measures.	Garland drainage structures will be constructed around the lease area to control the erosion, as discussed in Section 4.3 under Chapter IV in the EIA report page 90-91.
	21	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	The matter has been discussed under Chapter IV in the EIA report page 89-107.
	22	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reserviour.	An analysis for food chain in aquatic ecosystem has been discussed in Section 3.5 under Chapter 3 in the EIA report page 57-74.
	23	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	The impacts of the proposed project on the surrounding environment have discussed in Chapter IV in the EIA report page 89-107.
	24	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	The impact of the proposed project on aquatic plants and animals in water bodies has been discussed in Section 4.6 under Chapter IV in the EIA report page 100-104.

	25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The impact of mining on soil environment has been discussed in Section 4.2 under Chapter IV in the EIA report page 90.
	26	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	The impacts on water bodies, streams, lakes have been discussed in Section 4.3 under Chapter IV in the EIA report page 90-91.
	27	The EIA shall include the impact of mining activity on the following:	
		a. Hydrothermal / Geothermal effect due to destruction in the Environment	a. The average geothermal gradient of earth is 25^0C/km. As the proposed depth of mining is 40m below the local ground level, the temperature will increase by 1^0C at the depth of mining.
		b. Bio-geochemical processes and its foot prints including environmental stress.	b. No, Bio-geochemical processes and its foot prints including environmental stress are anticipated and at the end of life of mine the proposed quarry shall be left as an artificial reservoir structure and allowed to collect rain water and shall enrich the ecosystem.
		c. Sediment geochemistry in the surface streams	c. The details of sediment geochemistry are discussed in the Table 3.4 under Chapter III in the EIA report page 35.
	Energy		
	28	The measures taken to control Noise, Air, Water, Dust Control and steps	The measures taken to control noise, air, water, and dust have been given

		adopted to efficiently utilise the Energy shall be furnished.	under Chapter IV in the EIA report page 89-107.
	29	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	The carbon emission and the measures to mitigate carbon emission have been discussed in Section 4.6 under Chapter IV in the EIA report page 100-104.
	30	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features.	The matter has been discussed in Chapter IV in the EIA report page 89-107.
	31	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	There is no emission impact to local livelihood from this quarry project. All the vehicles used for transportation of the quarry materials will be maintained regularly to keep the GHGs emissions with in statuary limits.
	32	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	A progressive mine closure plan has been attached with the approved mining plan report in Annexure III. The budget details for the progressive mine closure plan are shown in Table 2.9 under Chapter II in the EIA report page 18.
	EMP		

	33	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	A detailed Environment Management plan has been given under Chapter X in the EIA report page 129-134.
	34	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	A detailed Environment Management plan has been given in Tables 10.1 & 10.2 under Chapter X in the EIA report page 130-134.
	Risk Assessment		
	35	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	The risk assessment and management plan for this project has been provided in Section 7.2 under Chapter VII in the EIA report page 114-117.
	Disaster Management Plan		
	36	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	The disaster management plan for this project has been provided in Section 7.3 under Chapter VII in the EIA report page 117-119.
	Others		

	37	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	The VAO certificate of 300 m radius have been attached in the attached in the Annexure IV.
	38	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	The concerns raised during the public consultation will be submitted in the final EIA report.
	39	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	The plastic waste management has been given in Section 7.5 under Chapter VII in the EIA report page 123-124.

Standard Terms of Reference for (Mining of minerals)

1.

1.1	An EIA-EMP Report shall be prepared for peak capacity (…. MTPA) operation in an ML/project area of .... ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.	Yes, it is based on the generic structure specified in Appendix III of the EIA Notification, 2006. i.e., the peak capacity of the proposed quarry is 1484717 MTPA and operation in an ML/project area of 2.96.5ha.

1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modelling for..... MTPA of mineral production based on approved project/Mining Plan for.....MTPA. Baseline data collection can be for any season (three months) except monsoon.	The baseline environment quality represents the background environmental scenario of various environmental components such as land, water, air, noise, biological and socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering October - December 2024 with CPCB guidelines. The detailed baseline environmental monitoring studies were carried out and the results are discussed in the Chapter III and the approved mining plan is attached in the Annexure III.
1.3	Proper KML file with pin drop and coordinate of mine at 500-1000 m interval be provided	The KML file with proper pin drop and coordinate of the mine will be uploaded during the online submission.
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal	The details of environmentally sensitive ecological features in the study area are given in the Table 3.40 under Chapter III in the EIA report page 86.

	and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also	
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.	The map showing the lease area with cluster details is shown in the Figure 1.1, Chapter I in the EIA report page 4. The agriculture and water bodies details are given in the Table 3.40 under Chapter III in the EIA report page 86.
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.	The contour map will be submitted in the final EIA report.
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ river let system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need elaboration in form of length, quantity and quality of water to be diverted.	The catchment area map will be submitted in the final EIA report.
1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be	The reserve details are discussed in the Section 2.5 under Chapter II in the EIA report page 13.

	provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.	
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.	The details of mining method, technology, equipment, etc is discussed in the Section 2.6 under Chapter II in the EIA report page 13-20.
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channelling of the existing rivers/water courses flowing though the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.	There is no any drainage within or around the lease area. The drainage map is shown in Figure 3.4 under Chapter III, in the EIA report page 28.
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left	Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Table 2.8 under Chapter II in the EIA report 17. There is no any drainage within or around the lease area. The drainage map is shown in Figure 3.4 under Chapter III in the EIA report 28.

<table>
<tr><td></td><td>undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channelling of the water courses, etc., approach roads, major haul roads, etc should be indicated.</td><td>The traffic survey conducted based on the transportation route of material, the Rough Stone is proposed to be transported mainly through NH-948 (Bengaluru – Coimbatore) and SH-15 (Mettupalayam – Sathyamangalam) as shown in Table 3.36 and in Figure 3.27 under Chapter III in the EIA report page 84-85.</td></tr>
<tr><td>1.12</td><td colspan="2">Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights.
<table>
<tr><th>S. No</th><th>ML/Project Land use</th><th>Area under Surface Area Rights (ha)</th><th>Area Under Mining Rights (ha)</th><th>Area under Both (ha)</th><th></th></tr>
<tr><td>1</td><td>Agricultural land</td><td>---</td><td>---</td><td>---</td><td></td></tr>
<tr><td>2</td><td>Forest Land</td><td>---</td><td>---</td><td>---</td><td></td></tr>
<tr><td>3</td><td>Grazing Land</td><td>---</td><td>---</td><td>---</td><td></td></tr>
<tr><td>4</td><td>Settlements</td><td>---</td><td>---</td><td>---</td><td></td></tr>
<tr><td>5</td><td>Others (specify)</td><td>2.96.5</td><td>2.96.5</td><td>2.96.5</td><td></td></tr>
<tr><td>S. N.</td><td>Details</td><td>Area (ha)</td><td colspan="3" rowspan="3"></td></tr>
<tr><td>1</td><td>Buildings</td><td>---</td></tr>
<tr><td>2</td><td>Infrastructure</td><td>---</td></tr>
</table></td></tr>
</table>

	3	Roads	---	
	4	Others (specify)	2.96.5	
	Total	2.96.5		
1.13	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate budgetary provision should be prepared and submitted with EIA-EMP Report; and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.		The details on flora and fauna have been provided in Section 3.5 under Chapter III in the EIA report page 57-74.
1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM_{10}, $PM_{2.5}$, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/			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

	MoEF&CC certification of the respective laboratory and NABET accreditation of the consultant to be provided.	project site were carried out covering October - December 2024 with CPCB guidelines. Environmental baseline data were collected by an NABL accredited and MoEF notified Greenlink Analytical and Research Laboratory (India) Private Ltd for the environmental attributes including soil, water, air, and noise and by FAEs for ecology and biodiversity, traffic, and socio-economy.
1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air)/downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.	The detailed study is discussed in the Chapter III in the EIA report page 22-88.

1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10 km buffer zone i.e. dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison with the monitoring data to be provided	10km baseline study can be conducted only when total cluster area extent of the projects is above 25ha. Here, the proposed cluster area of the projects is less than 25ha, (i.e.9.07.40ha) and so baseline monitoring study is done for 5 km only. The baseline study of the air quality is discussed in the Section 3.3 under the Chapter III in the EIA report page 43-53.
1.17	A detailed traffic study along with presence of habitation in 100m distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.	There is no need of road widening, the details of traffic study are discussed in the Section 3.7 under Chapter III in the EIA report page 83-85. Carbon released from quarrying machineries and tippers during quarrying would be 4785kg per day, 1292065kg per year and 6460324kg over five years.
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study also includes the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided	The socio-economic study is discussed in the Section 3.6 under Chapter III in the EIA report page 74-83.

	and to link it with the initialization and quantification of need based survey for CSR activities to be followed.	
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.	There is no forest within 10km. The Ecology and biodiversity study is discussed in the Section 3.5 under Chapter III in the EIA report page 57-74. 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 177722kg of carbon per year. Therefore, we recommend planting large number of trees around the quarry and near school campuses, government wasteland, roadsides etc.
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.	The occupational health and safety of the personnel and manpower for the mine is submitted in the Section 4.8 under Chapter IV in the EIA report page 104-106.
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted.	The hydrological studies as per GEC 2015 guidelines will be prepared and submitted in the final EIA report.
1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater	Artificial recharge structures will be established in suitable locations as part of the rainwater harvesting management program. The detailed rain water harvesting will be submitted in the final EIA report.

<table>
<tr><td></td><td>should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.</td><td colspan="3"></td></tr>
<tr><td>1.23</td><td>Study on land subsidence including modelling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.</td><td colspan="3">It is fresh lease area and the condition is not applicable.</td></tr>
<tr><td rowspan="5">1.24</td><td rowspan="5">Detailed water balance should be provided. The breakup of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.</td><td>Purpose</td><td>Quantity</td><td>Source</td></tr>
<tr><td>Dust Suppression</td><td>1.5 KLD</td><td rowspan="4">The water requirement is purchased from the authorized water vendor.</td></tr>
<tr><td>Green Belt development</td><td>1.5 KLD</td></tr>
<tr><td>Drinking & Domestic</td><td>1.0 KLD</td></tr>
<tr><td>Total</td><td>4.0 KLD</td></tr>
<tr><td>1.25</td><td>PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs</td><td colspan="3">Quarry project proponent controls air pollution by water sprinkling method on roads and quarry sites and green belt development method is adopted.</td></tr>
<tr><td>1.26</td><td>PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of mineral. The measures adopted to conserve energy or use of renewable sources shall be explored</td><td colspan="3">The PP is advised to use LNG/CNG trucks in mining operation because these trucks can control air pollution and noise pollution.</td></tr>
<tr><td>1.27</td><td>PP to evaluate the greenhouse emission gases from the mine operation/ washery plant and corresponding carbon absorption plan.</td><td colspan="3">There is no greenhouse emission in the project lease area.</td></tr>
</table>

1.28	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.	The details are discussed in the Section 7.2 & 7.3 under Chapter VII in the EIA report page 114-118.
1.29	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation, handling & storage/stockyard, etc, Impact of blasting, noise and vibrations should be provided.	The proposed mine lease area is open cast semi mechanized mining operation. The impact and its mitigation measures are discussed under the Chapter IV in the EIA report page 89-107.
1.30	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.	The details regarding are discussed in the Section 4.4.2 under Chapter IV in the EIA report page 91-94.
1.31	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.	The details are given in the Section 2.6 under Chapter II in the EIA report page 13-20.
1.32	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the	Quarry project proponent controls air pollution by water sprinkling method on roads and quarry sites and green belt development method is adopted

	mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.	
1.33	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre- mining status should be provided. A Plan for the ecological restoration of the mined-out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.	The present mining is proposed to an average depth of 40m BGL has been envisaged as workable depth for safe & economic mining during the lease period. The mined-out area with fenced on top of open cast working with SI fencing. No immediate proposals for closure of pit as the rough stone persist still at deeper level. The details of mine closure budget are discussed in the Section 2.6.4 under Chapter II in the EIA report page 17-18.
1.34	Adequate greenbelt nearby areas, mineral stock yard and transportation area of mineral shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route.	The details are given in the Section 4.6 under Chapter IV in the EIA report page 100-104.
1.35	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.	The detailed EMP is given in the Chapter X in the EIA report page 129-134.
1.36	Details of R&R. Detailed project specific R&R Plan with data on the existing socio-economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the	Not Applicable. The proposed lease area belongs to the lessee and there is no any habitation in the lease area.

	displaced people, civic and housing amenities being offered, etc and costs along with the schedule of the implementation of the R&R Plan should be given.		
1.37	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.		The CSR plan is discussed in the Section 8.6 in Chapter VIII in the EIA report page 126-127.
1.38	Corporate Environment Responsibility:		
1.39	a)	The Company must have a well laid down Environment Policy approved by the Board of Directors.	The CER plan is discussed in the Section 8.7 in Chapter VIII in the EIA report page 127.
1.40	b)	The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.	
1.41	c)	The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.	
1.42	d)	To have proper checks and balances, the company should have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large.	

1.43	e)	Environment Management Cell and its responsibilities to be clearly spleel out in EIA/ EMP report	
1.44	f)	In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	
1.45	Status of any litigations/ court cases filed/pending on the project should be provided.		No litigation is pending in any court against this project.
1.46	PP shall submit clarification from DFO that mine does not fall under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.		The DFO letter is attached in the **Annexure V.**
1.47	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable.		The clearance copy of approved mining plan letter is attached in the Annexure III.

1.48	Details on the Forest Clearance should be given as per the format given:					
	Total ML Project Area	Total Forest land (ha) If more than one provides details of each FC	Date of FC	Extent of Forest Land	Balance area for which FC is yet to be obtained	Status of apply for diversion of forest land
	NA	NA	NA	NA	NA	NA

1.49	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure	Approved Mining plan of the expansion proposal is attached in the Annexure III and the mine closure plan is discussed in the

	plan shall be detailed in EIA/ EMP report	Section 2.6.4 in Chapter II in the EIA report page 18.
1.50	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.	The public hearing comments will be submitted during final EIA report.
1.51	PP shall carry out survey through drone highlighting the ground reality for at least 10 minutes	The drone video survey will be submitted in the final EIA report.
1.52	Detailed Chronology of the project starting from the first lease deed allotted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular form.	The required documents for the proposed quarry are provided in the chronology order in Annexure III.

1.53	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification)	The first page of the EIA report mentions the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification).
1.54	The compliances of ToR must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapter's section.	The provisions of ToR are shown in tabular form with respective chapter section and page no. Also, the sequence of respective ToR within the EIA-EMP report is mentioned in all chapter section.

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.	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.
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management,	All the documents are in the name of the lessee.

	mining technology etc. and should be in the name of the lessee.	
4.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All corner coordinates of the mine lease area have been superimposed on a high-resolution Google Earth Image, as shown in Figure 2.3 under Chapter II in the EIA report page 11.
5.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Toposheets of Survey of India have been used for showing sampling locations of air, soil, water, and noise, as shown in Chapter III in the EIA report page 22-88.
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	The Environmental Policy is discussed in the Section 10.1 under Chapter X in the EIA report page 129-130.

	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	It is an opencast quarrying operation proposed to operate in Manual method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 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.
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.,	The study area considered for this study is of 5 km radius for air, soil, water, and noise level sample collections, while the study

	should be for the life of the mine / lease period.	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.
10.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use 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 in the EIA report page 23-29. The details of surrounding sensitive ecological features have been provided in Table 3.40 under Chapter III in the EIA report page 86. Land use plan of the project area showing pre- operational, operational and post- operational phases are discussed in Table 2.8 under Chapter II in the EIA report page 17.
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	It is not applicable as there is no forest land involved within the proposed project area. The details have been discussed in Table 3.40 under Chapter III in the EIA report page 86.

	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.	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 in the EIA report page 59-68.
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	There is no any wildlife/protected area within 10 km radius from the periphery of the project area. Information regarding the

	the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	same has been given in Table 3.40 under Chapter III in the EIA report page 86.
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 3.40 under Chapter III in the EIA report page 86.
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	A detailed biological study was carried out in both core and buffer zones and the results have been discussed in Section 3.5 under Chapter III in the EIA report page 57-74.

	should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	
19.	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared. in 'Critically Polluted' Area and does not come under 'Aravalli Range.
20.	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable The project doesn't attract the C.R.Z. Notification, 2018.

21.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspect should be discussed in the Report	Not Applicable. There are no approved habitations of SCs/STs and other weaker sections in the lease area. Therefore, R&R Plan / Compensation Plan 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	Baseline data were collected for the period of October - December 2024 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 in the EIA report page 23-86.

	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 modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map	Air quality modelling for prediction of incremental GLCs of pollutants was carried out using AERMOD view 11.2.0. The model results have been given in Section 4.4 under the Chapter IV in the EIA report page 91-95.
24.	The water requirement for the project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the project should be indicated.	The water requirement for the project, its availability and source have been provided in Table 2.11 under Chapter II in the EIA report page 18.

25.	Necessary clearance from the competent Authority for drawl of requisite quantity of water for the project should be provided.	Not Applicable. Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved water vendors.
26.	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Part of the working pit will be allowed to collect rain water during the spell of rain. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan 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 in the EIA report page 90-91.
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	The ground water table is found at the depth of 55-60m below ground level. The ultimate depth of quarry is 50m 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 in the EIA report page 29-43.

	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	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 321m AMSL. Ultimate depth of the mine is 50m BGL. Depth to the water level in the area is 55-60m 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	Greenbelt development plan has been given in Section 4.6 under Chapter IV in the EIA report page 100-104.

	population with emphasis on local and native species and the species which are tolerant to pollution	
32.	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Traffic density survey was carried out to analyses the impact of transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details have been provided in Section 3.7 under Chapter III in the EIA report page 83-85.
33.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities will be provided to the mine workers after the grant of quarry lease and the same has been discussed in Section 2.6.6 under Chapter II in the EIA report page 18.
34.	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Progressive mine closure plan has been prepared for this project and is given in Section 2.6.4 under Chapter II in the EIA report page 18.
35.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out	Occupational health impacts of the project and preventive measures have been

	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.	explained in detail in Section 4.8 under Chapter IV in the EIA report page 104-105.
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 in the EIA report page 126-127.
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 23 people directly as discussed in Section 8.1 under Chapter VIII 125.
38.	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	A detailed Environment Management Plan has been prepared and provided in Tables 10.1 & 10.2 under Chapter X in the EIA report page 130-134.
39.	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action	The outcome of public hearing will be submitted during the final EIA report.

	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	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.76,45,000/- CER Cost is Rs.5,00,000/- In order to implement the environmental protection measures, an amount of Rs.7520048 as capital cost and recurring cost as Rs.2720877 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 22554610, as shown in Tables 10.1 & 10.2 under Chapter X in the EIA report page 130-134.
42.	A disaster management plan shall be prepared and included in the EIA/EMP Report.	The disaster management plan for this project has been provided in Section 7.3 under Chapter VII in the EIA report page 117-118.
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 in the EIA report page 125-127.
44	Besides the above, the below mentioned general points are also to be followed:	

a)	Executive Summary of the EIA/EMP Report.	Executive summary has been enclosed as a separate booklet.
b)	All documents to be properly referenced with index and continuous page numbering.	All the documents have been properly referenced with index and continuous page numbering.
c)	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of tables and source of the data collected have been mentioned.
d)	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	Original Baseline monitoring reports will be submitted in the final EIA report.
e)	Where the documents provided are in a language other than English, an English translation should be provided.	All the documents provided here are in English language.
f)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	The questionnaire will be submitted in the final EIA report.
g)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF & CC vide O.M. No. J-11013/41/2006-IA. II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) dated 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-Iand the PFR for securing the TOR) should be brought to the attention of MoEF & CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	No changes are made in the basic scope and the project parameters.
i)	As per the circular no. J-11011/618/2010- IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	As it is a new lease area, the condition is not applicable.
j)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	All the plans including surface & geological plans, and progressive closure plan have been included in Annexure III.

सत्यमेव जयते

File No: 11022
Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Environment Impact Assessment Authority(SEIAA), TAMIL NADU)
***

Dated **20/08/2024**

To,

VINEESH
S/O. SUNDARARAJ,115A, SOMAIYANUR,CHINNATADAGAM,COIMBATORE-641108.,
COIMBATORE, COIMBATORE, TAMIL NADU, 641108
vineeshs273@gmail.com

Subject: Grant of Terms of Reference with Public hearing under the provision of the EIA Notification 2006 as amended-regarding.

Sir/Madam,

This is in reference to your application for Grant of Terms of Reference with public Hearing under the provision of the EIA Notification 2006-regarding in respect of project for the Proposed Rough stone & Gravel Quarry lease over an extent of 2.96.5Ha at SF.No. 178 of Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu by Thiru.S.Vineesh submitted to Ministry vide proposal number SIA/TN/MIN/481390/2024 dated 18/06/2024.

Ref:

1. Online Proposal No: SIA/TN/MIN/481390/2024, Dated:18.06.2024.
2. Your application submitted for Terms of Reference dated:25.06.2024.
3. Minutes of the 487th SEAC meeting held on 01.08.2024.
4. Minutes of the 748th SEIAA meeting held on 13.08.2024

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO24B0108TN5662384N
(ii) File No.	11022
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals,1(a) Mining of minerals
(vii) Name of Project	Kurumbapalayam Village Rough Stone and Gravel Mining Lease
(viii) Name of Company/Organization	VINEESH
(ix) Location of Project (District, State)	ERODE, TAMIL NADU
(x) Issuing Authority	SEIAA
(xii) Applicability of General Conditions	yes

(xiii) Applicability of Specific Conditions yes

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

4. The above-mentioned proposal has been considered by SEIAA in the meeting held on 13/08/2024. The minutes of the meeting and all the Application and documents submitted [(viz. Form-1 Part A, Part B, EIA, EMP)] are available on PARIVESH portal which can be accessed by scanning the QR Code above.

5. The SEAC has based on information & clarifications provided by the project proponent and after detailed deliberations recommended the proposal for grant of Terms of Reference with Public Hearing under the provision of EIA Notification, 2006 and as amended thereof subject to stipulation of specific and general conditions as detailed in Annexure (2).

6. The SEIAA has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the SEAC hereby decided to grant Terms of Reference with Public Hearing for instant proposal of M/s. VINEESH under the provisions of EIA Notification, 2006 and as amended thereof.

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

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

9. 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.

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

Copy To

1. The Principal Secretary to Government, Environment, Climate Change and 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 - 110 032.
3. The Chairperson, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai - 600 032.
4. The APCCF (C), Regional Office, MoEF & CC (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungambakkam, Chennai - 34.
5. Monitoring Cell, IA Division, Ministry of Environment, Forests & CC, Paryavaran Bhavan, CGO Complex, New Delhi - 110 003.
6. The District Collector, Erode District.
7. Stock File

Annexure 1

Specific Terms of Reference for (Mining Of Minerals)

1. Seiaa Specific Conditions:

S. No	Terms of Reference
1.1	The authority noted that this proposal was placed for appraisal in 487th meeting of SEAC held on 01.08.2024. SEAC has furnished its recommendations for granting Terms of Reference subject to the conditions stated therein. After detailed discussions, the Authority accepted the recommendation of SEAC and decided to **grant of Terms of Reference (ToR) along with with Public Hearing for the quantity of 5,30,256 m^3 of Rough Stone & 48,024 m^3 of Gravel with an ultimate depth of mining is 40 m BGL .The annual peak production is 1,21,236m^3 of rough stone & 17,168m^3 of Gravel.** As per the approved mining plan, under cluster of undertaking the combined Environmental Impact Assessment Study and Preparation of separate Environment Management Plan subject to the conditions as recommended by SEAC & normal conditions & the conditions mentioned in 'Annexure B' of this minutes

2. Seac Conditions - Site Specific

S. No	Terms of Reference
2.1	1. A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: **(i)** Copy of the agreement forming CMC. **(ii)** The Organisation chart of the Committee with defining the role of the members **(iii)** The 'Standard Operating Procedures' (SoP) executing the planned activities.

3. Seac Standard Conditions

S. No	Terms of Reference
3.1	1. In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone/benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m. 2. Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site. 3. The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc. 4. The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed

S. No	Terms of Reference
	quarry. 5. The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report. 6. The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site. 7. In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC. 8. However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level. 9. The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent. 10. The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site. 11. The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences. 12. If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines, 13. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? 14. Quantity of minerals mined out. Highest production achieved in any one year Detail of approved depth of mining. Actual depth of the mining achieved earlier. Name of the person already mined in that leases area. If EC and CTO already obtained, the copy of the same shall be submitted. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches. 15. All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone). 16. The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc., 17. The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan. 18. The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same. 19. The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the

S. No	Terms of Reference
	Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment. 20. The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. 21. The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study. 22. The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind. 23. Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted. 24. Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given. 25. Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided. 26. Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered. 27. Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided. 28. Impact on local transport infrastructure due to the Project should be indicated. 29. A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity. 30. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific. 31. As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible. 32. The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner. 33. Taller/one year old Saplings raised in appropriate size of bags, preferably ecofriendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along

S. No	Terms of Reference
	the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner 34. A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period. 35. A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period. 36. Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed. 37. Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations. 38. The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation. 39. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given. 40. Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc. 41. If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB. 42. The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine. 43. Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.

4. Seiaa Standard Conditions:

S. No	Terms of Reference
4.1	Cluster Management Committee 1. Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry. 2. The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc., 3. The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines. 4. Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network. 5. The committee shall deliberate on risk & emergency management plan, fire safety & evacuation plan and sustainable development goals pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan. 6. The Cluster Management Committee shall form Environmental Policy to practice sustainable

S. No	Terms of Reference
	mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail in the EIA Report. 7. The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner. 8. The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public in the vicinity. Agriculture & Agro-Biodiversity 9. Impact on surrounding agricultural fields around the proposed mining Area. 10. Impact on soil flora & vegetation around the project site. 11. Details of type of vegetation including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetation all along the boundary of the proposed mining area shall committed mentioned in EMP. 12. The Environmental Impact Assessment should study the agro-biodiversity, agro-forestry, horti-cultural plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem. 13. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services. 14. The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock. Forests 15. The project proponent shall detailed study on impact of mining on Reserve forests and free ranging wildlife. 16. The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna. 17. The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection. 18. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site. Water Environment 19. Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period. 20. Erosion Control measures. 21. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas. 22. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. 23. The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities. 24. The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts. 25. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components. 26. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites. 27. The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment.

S. No	Terms of Reference
	b) Bio-geochemical processes and its foot prints including environmental stress. c) Sediment geochemistry in the surface streams. Energy 28. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished. Climate Change 29. The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities. 30. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features. 31. Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood. Mine Closure Plan 32. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued. EMP 33. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs. 34. The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan. Risk Assessment 35. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining. Disaster Management Plan 36. To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued. Others 37. The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc. 38. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan. 39. The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.

Standard Terms of Reference for (Mining of minerals)

1.

S. No	Terms of Reference
1.1	An EIA-EMP Report shall be prepared for peak capacity (…..MTPA)operation in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.

S. No	Terms of Reference
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modeling for..... MTPA of mineral production based on approved project/Mining Plan for.....MTPA. Baseline data collection can be for any season (three months) except monsoon.
1.3	Propoer KML file with pin drop and coordinate of mine at 500-1000 m interval be provided
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ riverlet system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need eloboration in form of lengthe, quantity and quality of water to be diverted
1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing though the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features

S. No	Terms of Reference
	such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channelling of the water courses, etc., approach roads, major haul roads, etc should be indicated.
1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights S.N ML/Project Land use Area under Surface Rights(ha) Area Under Mining Rights(ha) (ha) Area under Both (ha) 1 Agricultural land 2 Forest Land 3 Grazing Land 4 Settlements 5 Others (specify) S.N. Details Area (ha) 1 Buildings 2 Infrastructure 3 Roads 4 Others (specify) Total
1.13	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate budgetary provision should be prepared and submitted with EIA-EMP Report; and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.
1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/ MoEF&CC certification of the respective laborartory and NABET accreditation of the consultant to be provided.
1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air)/downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as

S. No	Terms of Reference
	per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10 km buffer zone i.e. dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison with the monitoring data to be provided
1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need based survey for CSR activities to be followed.
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted
1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.
1.23	Study on land subsidence including modeling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.
1.24	Detailed water balance should be provided. The break up of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each

S. No	Terms of Reference
	APCEs
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of mineral. The measures adopted to conserve energy or use of renewable sources shall be explored
1.27	PP to evaluate the green house emission gases from the mine operation/ and corresponding carbon absorption plan.
1.28	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.
1.29	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation, handling & storage/stockyard, etc, Impact of blasting, noise and vibrations should be provided.
1.30	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.
1.31	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.
1.32	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.
1.33	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre- mining status should be provided. A Plan for the ecological restoration of the mined out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.
1.34	Adequate greenbelt nearby areas, mineral stock yard and transportation area of mineral shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route.
1.35	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.
1.36	Details of R&R. Detailed project specific R&R Plan with data on the existing socio- economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc and costs along with the schedule of the implementation of the R&R Plan should be given.

S. No	Terms of Reference
1.37	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.
1.38	Corporate Environment Responsibility:
1.39	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.
1.40	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.
1.41	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.
1.42	d) To have proper checks and balances, the company should have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large.
1.43	e) Environment Managament Cell and its responsibilities to be clearly spleel out in EIA/ EMP report
1.44	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.
1.45	Status of any litigations/ court cases filed/pending on the project should be provided.
1.46	PP shall submit clarification from DFO that mine does not falls under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.
1.47	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable.
1.48	Details on the Forest Clearance should be given as per the format given: Total ML Area (ha) / Total Forest land (ha) If more than one provide details of each FC / Date of FC / Extent of Forest Land / Balance area for which FC is yet to be obtained / Status of appl For diversion of forest land
1.49	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report
1.50	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.

S. No	Terms of Reference
1.51	PP shall carry out survey through drone highlighting the ground reality for atleast 10 minutes
1.52	Detailed Chronology of the project starting from the first lease deed alloted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular form.
1.53	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET acrreditation) and Laboratory (NABL / MoEF & CC certification)
1.54	The compliances of ToR must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapter,s section.

A. STANDARD TERMS OF REFERENCE

1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.
4) All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
5) Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.
7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.
8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.

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

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

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

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

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

14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.

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

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

17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects

due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.

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

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

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

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

22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented

date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.

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

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

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

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

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

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

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

30) Information on site elevation, working depth, groundwater table etc. Should be provided

both in AMSL and bgl. A schematic diagram may also be provided for the same.

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

32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.

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

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

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

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

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

38) Detailed Environmental Management Plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural

and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.

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

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

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

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

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

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

a) Executive Summary of the EIA/EMP Report

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

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

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

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

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

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

h) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have to be altered. Post Public Hearing changes in structure and

content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.

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

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

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

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

1. Project name and location (Village, District, State, Industrial Estate (if applicable).
2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
3. Measures for mitigating the impact on the environment and mode of discharge or disposal.
4. Capital cost of the project, estimated time of completion.
5. The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.
6. A detailed study of the lithology of the mining lease area shall be furnished.
7. Details of village map, “A” register and FMB sketch shall be furnished.
8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be shall be submitted along with EIA report.
9. Obtain a letter /certificate from the Assistant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report.
10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010.
11. Detail plan on rehabilitation and reclamation carried out for the stabilization and

restoration of the mined areas.

12. The EIA study report shall include the surrounding mining activity, if any.
13. Modeling study for Air, Water and noise shall be carried out in this field and incremental increase in the above study shall be substantiated with mitigation measures.
14. A study on the geological resources available shall be carried out and reported.
15. A specific study on agriculture & livelihood shall be carried out and reported.
16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.
17. Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
18. Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
19. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
20. Likely impact of the project on air, water, land, flora-fauna and nearby population
21. Emergency preparedness plan in case of natural or in plant emergencies
22. Issues raised during public hearing (if applicable) and response given
23. CER plan with proposed expenditure.
24. Occupational Health Measures
25. Post project monitoring plan
26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited agencies.
27. A detailed report on the green belt development already undertaken is to be furnished and also submit the proposal for green belt activities.
28. The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines.
29. A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals.
30. Reserve funds should be earmarked for proper closure plan.
31. A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and forests (EC.2) Department dated 25.06.2018 regarding ban on one time use and throw

away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.

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

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

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

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

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

e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -l1013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website http://www.moef.nic.in/ may be referred.

- After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
- The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
- The TORs with public hearing prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.

From

Thiru. V. Sasikumar, M.Sc.,
Assistant Director,
Geology and Mining,
Erode

To

Thiru. S. Vineesh,
S/o. Sundararaj,
115A, Somaiyanur,
Chinnatadagam,
Coimbatore - 641 108.

R.c. No. 717/ Mines / 2023 dated: 11.06.2024.

Sub: Mines and Minerals – Minor Mineral – Rough Stone and Gravel- Erode District - Sathyamangalam Taluk - Kurumbapalayam Village- S.F.No. 178 - Over an Extent of 2.96.50 Hectares of patta land- Quarry lease for Rough Stone and Gravel - Application preferred by Thiru. S. Vineesh - Precise area communicated for the proposed grant of quarry lease - Mining Plan Submitted for approval - approved - further details requested - furnished regarding.

Ref:
1. Application for Rough Stone and Gravel quarry permission preferred by S. Vineesh dated: 27.12.2023.
2. G.O. Ms. No. 79 / Industries (MMC 1) Department dated 06.04.2015.
3. The Assistant Director, Geology and Mining, Erode letter R.C. No. 717/Mines/2023 dated 06.06.2024.
4. Mining Plan submitted by Thiru. S. Vineesh letter dated: Nil (Received on 10.06.2024).
5. This office letter even no. dated. 11.06.2024 (Mining Plan approved).

****

In the reference 3rd cited, precise area was communicated to the applicant Thiru. S. Vineesh for submission of mining plan, for grant of Rough Stone quarry lease, over an extent of 2.96.5 hectares, comprising in S.F.No. 178 of Kurumbapalayam Village of Sathyamangalam Taluk, Erode District. As directed the applicant submitted the mining plan and same was approved vide reference 5th cited.

As requested by the applicant, the details of existing, proposed and expired quarries situated within the radius of 500 meters from the subject area are furnished as follows:-

1. Existing quarries:

SNo	Name of the Applicant	S.F.Nos	Extent (Hect)	Lease Details
1.	N.T. Saisada	152/2 and 152/3	1.64.5 Hect	R.C. No. 22023/2017/X-1 dated 23.12.2021. (23.12.2021 to 22.12.2026)

2. Proposed quarries :

Sl.No	Name of the Applicant	S.F.Nos	Extent (Hect)	Date of application
1.	Thirunavukarasu	148/1, 148/11, 148/12, 148/13 and 157/1	2.18.0 Hect	02.05.2022
2.	N.T. Saisada	151 (part) and 152/4	2.28.40 Hect	16.03.2023
3.	S. Veenish	178	2.96.50 Hect	27.12.2023

3. Lease expired and abandoned quarries:

SNo	Name of the Applicant	S.F.Nos	Extent(Hect)	Lease Period
1.	------- NIL - ------			

Assistant Director,
Geology and Mining,
Erode

From

Thiru. V. Sasikumar, M.Sc.,
Assistant Director,
Geology and Mining,
Erode

To

Thiru. S. Vineesh,
S/o. Sundararaj,
115A, Somaiyanur,
Chinnatadagam,
Coimbatore - 641 108.

R.c. No. 717/ Mines / 2023 dated: 11.06.2024.

Sub: Mines and Minerals – Minor Mineral – Rough Stone and Gravel- Erode District - Sathyamangalam Taluk - Kurumbapalayam Village- S.F.No. 178 - Over an Extent of 2.96.50 Hectares of patta land- Quarry lease for Rough Stone and Gravel - Application preferred by Thiru. S. Vineesh - Precise area communicated for the proposed grant of quarry lease - Mining Plan Submitted for approval - Approved - regarding.

Ref:
1. Application for Rough Stone and Gravel quarry permission preferred by S. Vineesh dated: 27.12.2023.
2. G.O. Ms. No. 79 / Industries (MMC 1) Department dated 06.04.2015.
3. The Assistant Director, Geology and Mining, Erode letter R.C. No. 717/Mines/2023 dated 06.06.2024.
4. Mining Plan submitted by Thiru. S. Vineesh letter dated: Nil (Received on 10.06.2024).

****

Thiru. S. Vineesh preferred an application for the grant of Rough Stone and Gravel quarry lease over an extent of 2.96.50 Hectare of Patta land in S.F.No. 178 of Kurumbapalayam Village of Sathyamangalam Taluk, Erode District vide the reference 1st cited and the precise area was communicated to the applicant vide the reference 3rd cited with a direction to submit the approved mining plan and Environmental Clearance.

As directed, the applicant submitted three copies of mining plan for approval vide the reference 4th cited. The Mining Plan has been verified in detail and found that it was prepared in accordance with the guidelines / instructions issued by the Commissioner of Geology and Mining in letter RC. No. 3868 / LC / 2012 dated 19.11.2012.

Therefore in exercise of the powers conferred under Rule 41(2) of Tamil Nadu Minor Mineral Concession Rules, 1959, read with G.O. (Ms). No.79 / Industries (MMC 1) Department dated 06.04.2015, the mining plan is hereby approved, subject to the following conditions:

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

(ii) This approval of the mining plan does not in any way convey the approval of the Government in terms or any other provisions of the Mines and Minerals (Development and Regulation) Act, 1957, or any other connected laws including Forest (Conservation) Act, 1980, Forest Conservation Rules, 1981, Environment Protection Act, 1980, Explosives Act, 1884 (Central Act IV of 1884) Minor Mineral Concession and Development Rules, 2010 and the Rules made there under and the Tamil Nadu Minor Mineral Concession Rules, 1959.

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

(iv) The validity of the mining plan is co-terminus with the lease period.

(v) Quarrying shall be done in accordance with the approved Mining Plan and that the mining plan is approved without prejudice to any other law applicable to the quarry lease from time to time whether such laws are made by the Central Government, State Government or any other authority.

(vi) If anything is found to be concealed as required by the Mines Act in the contents of the Mining Plan and the proposal for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

(vii) A safety distance of 7.5 meters shall be provided for the patta lands situated adjacent to the applied area.

(viii) A safety distance of 10 meters shall be provided for the panchayat road situated on the western side of the applied area.

Encl.: Approved Mining Plan.

Assistant Director,
Geology and Mining,
Erode

Assistant Director
Erode
Geology and Mining

MINING PLAN

FOR KURUMBAPALAYAM VILLAGE ROUGH STONE AND GRAVEL MINING LEASE

WITH PROGRESSIVE QUARRY CLOSURE PLAN

Patta- Ryotwari land/Open cast-Semi Mechanized mining/ Non- Forest/Non - Captive Use – "B' Category

Lease period 10 Years from the date of lease execution

(Mine plan prepared for first five years)

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

LOCATION OF THE LEASE AREA

STATE	:	**TAMILNADU**
DISTRICT	:	**ERODE**
TALUK	:	**SATHYAMANGALAM**
VILLAGE	:	**KURUMBAPALAYAM**
S.F. NO'S	:	**178**
EXTENT	:	**2.96.5 HECTARES**

ADDRESS OF THE APPLICANT

Mr.S.Vineesh,

S/o. Sundararaj,

115A, Somaiyanur

Chinnatadagam,

Coimbatore – 641108.

PREPARED BY

G.UMAMAHESWARAN, M.Sc.,

Qualified person

GEO TECHNICAL MINING SOLUTIONS

(A NABET Accredited & ISO Certified Company)

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

Oddapatti, Collectorate Post office,

Dharmapuri-636705. Tamil Nadu.

Mob. : +91 9790462882.

E-mail: info.gtmsdpi@gmail.com ,

Website: www.gtmsind.com

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ANNEXURES

Sl. No.	Description	Annexure No.
1.	Copy of precise area communication letter	I
2.	Copy of **FMB** (Field Measurement book)	II
3.	Copy of Village Map	III
4.	Copy of "A" registered	IV
5.	Copy of patta	V
6.	Photocopy of the proposed lease area	VI
7.	Copy of explosive willing letter, agreement from explosive license holder & explosive license	VII
8.	Copy of ID Proof of the authorized signature	VIII
9.	Copy of Qualified Person Certificate	IX

LIST OF PLATES

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

Assistant Director
Erode
Geology and Mining

Mr.S.Vineesh,
S/o. Sundararaj,
115A, Somaiyanur
Chinnatadagam,
Coimbatore – 641108.

CONSENT LETTER FROM THE APPLICANT

The Mining Plan for rough stone and gravel quarry lease in S.F.No: 178, over an extent of 2.96.5 hectares, Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu State has been prepared by

G.UMAMAHESWARAN, M.Sc., Qualified person

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

G.UMAMAHESWARAN, M.Sc.,
Qualified person
GEO TECHNICAL MINING SOLUTIONS
(A NABET accredited & ISO certified Company)
No: 1/213-B, Ground Floor, Natesan Complex,
Oddapatti, Collectorate Post office, Dharmapuri-636705
Ph: +91 9790462882
E-mail: info.gtmsdpi@gmail.com,
Website: www.gtmsind.com

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

Place: Coimbatore, TN

Date: 09.06.2024

Signature of the applicant
(S.Vineesh)

Assistant Director * Erode * Geology and Mining

Mr.S.Vineesh,
S/o. Sundararaj,
115A, Somaiyanur
Chinnatadagam,
Coimbatore – 641108.

DECLARATION

The Mining Plan of rough stone and gravel quarry lease in S.F.No: 178, over an extent of 2.96.5 hectares, Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu State have been prepared with my consultation and I have understood the contents and agree to implement the same in accordance with the Mining Laws.

Place: Erode, TN

Date: 09.06.2024

Signature of the applicant
(S.Vineesh)

Assistant Director
Erode
Geology and Mining

CERTIFICATE

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

I, G.Umamaheswaran prepared this Mining plan in respect of rough stone and gravel quarry lease in S.F.No: 178, over an extent of 2.96.5 Hect, Patta land of Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu State. The mining plan prepare under rule 41 of Tamil Nadu Minor Mineral Concession Rules, 1959 Amendments, 2019.

Place: Dharmapuri, TN

Date:

G.Umamaheswaran, M.Sc.,

Qualified Person
GEO TECHNICAL MINING SOLUTIONS
(ISO 9001: 20[illegible] Certified Company
1/213-B, Ground [illegible] Natesan Complex,
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G.UMAMAHESWARAN, M.Sc.,
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Ph: +91 9790462882,
E-mail: info.gtmsdpi@gmail.com,
Website: www.gtmsind.com

Assistant Director * Erode * Geology and Mining

CERTIFICATE

This is to certify that the provisions of 19(1), 20 and 22 of Tamil Nadu Minor Minerals Concession Rules, 1959 have been observed in the mining plan for the grant of rough stone and gravel quarry lease in S.F.No: 178, over an extent of 2.96.5 hectares, Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu State applied to **Mr.S.Vineesh**, Erode District, Tamil Nadu.

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:

G.Umamaheswaran, M.Sc.,
Qualified Person
GEO TECHNICAL MINING SOLUTIONS
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Ph: +91 9790462882,
E-mail: info.gtmsdpi@gmail.com,
Website: www.gtmsind.com

Assistant Director Erode Geology and Mining

CERTIFICATE

I certify that the preparation of Mining Plan for rough stone and gravel quarry lease in S.F.No: 178 over an extent of 2.96.5hectares, Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu prepared to **Mr.S.Vineesh**, Coimbatore District, Tamil Nadu, covers all the provisions of Mines Act, Rules and Regulations etc. made there in and if any specific permission is required the applicant will approach **"The Director General of Mines Safety"**, Chennai. The standards prescribed by DGMS regarding Mines Health will be strictly implemented.

Place: Dharmapuri, TN
Date:

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

MINING PLAN

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

Patta- Ryotwari land/Open Cast-Semi Mechanized mining/ Non- Forest/Non - Captive Use – "B' Category

Lease period 10 Years from the date of lease execution

(Mine plan prepared for first five years)

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

INTRODUCTORY NOTES:

a) **Introduction:** The applicant Mr.S.Vineesh, S/o. Sundararaj, 115A, Somaiyanur, Chinnatadagam, Coimbatore District, Tamil Nadu State – 641108 and filed with application for new proposal has requested to grant the quarrying lease for rough stone and gravel in S.F.No. 178 over an extent of 2.96.5 hectare of Kurumbapalayam Village, Sathyamangalam Taluk, Erode District, Tamil Nadu State for a period of 10 years.

b) **Precise area communication letter particulars:** The Assistant Director, Department of Geology and Mining, Erode has directed to the applicant Mr.S.Vineesh through his precise area communication letter **Rc.No.717/Mines/2023 Dated: 06.06.2024,** has recommended quarrying lease for rough stone and gravel quarry lease at Tamil Nadu State, Erode District, Sathyamangalam Taluk, Kurumbapalayam Village in S.F.No: 178, over an area of 2.96.5 hectares and should be submitted draft mining plan for approval for the period of 90 days the following conditions for a period of ten (10) years under Rule 19 (1), 20 & 22 of Tamil Nadu Minor Mineral Concession Rules, 1959.

1. Quarrying should be done leaving a 10 meter safety distance for Panchayat road on the western side of the applied lease area.
2. A safety distance 7.5meters should be left out nearby the patta land from the applied lease area and while quarrying operation.

c) **Preparation and Submission of Mining Plan:** The Mining Plan with progressive quarry closure plan has been prepared under rule 41 and submission of under rule 42 of Tamil Nadu Minor Mineral Concession Rules, 1959, for mining lease as per

conditions mentioned in the precise area communication letter **Rc.No.717/Mines/2023 Dated: 06.06.2024.**

d) **Geological resources and Mineable reserves:** Geological resource of estimated as **1473750m³** including the resources of safety zone, and gravel. Of which, rough stone resources of about **1414800m³** and gravel is about **58950m³**. The total mineable reserve is estimated to be **616350m³** by deducting the reserve safety zone, block in benches from the total Geological resources. Of which, rough stone is about **568326m³** and gravel is about **48024m³** up to a depth of 50m below the ground level (R.L.321m-271m) (Refer Plate No. IIIA & VIIA).

e) **Proposed production schedule:** Total proposed production of **578280m³**. Of which, rough stone is **530256m³** and gravel is **48024m³** up to a depth of 40m below the ground level (R.L.321m-281m) for first five years plan period. Average production is **106051m³** of rough stone and gravel is **16008m³** per year (Refer Plate No. IVA).

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

i. **Interstate boundary:** There is no interstate boundary around 10Km radius periphery of proposed lease area.
ii. **Wildlife Sanctuaries any:** There are Sathiyamangalam wildlife sanctuaries situated about 8.2Km away on northwest side from the project.
iii. **Forest (conservation) Act, 1980:** No forest land granted for quarrying and within 60m radius there is no reserve forest.
iv. **CRZ Notification, 2019:** There is no Sea coastal zone found within radius of 10km and this project site doesn't attract CRZ Notification, 2019.

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

a) Usage of sharp drill bits while drilling which will help in reducing noise.
b) Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders.
c) Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained.
d) Green Belt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise.

e) Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation.

f) Transportation of material will be carried out during day time and material will be covered with tarpaulin.

g) The speed of tippers plying on the haul road will be limited below 20 km/hr to avoid generation of dust.

h) And any other conditions as stipulated by the concerned authorities should be followed to protect the environment.

1.0 GENERAL:

a.	Name of the Applicant	:	**Mr.S.Vineesh**
	Applicant address	:	S/o. Sundararaj, 115A, Somaiyanur, Chinnatadagam,
	District	:	Coimbatore
	State	:	TamilNadu
	Pin code	:	641108
	Phone	:	--
	Fax	:	Nil
	Gram	:	Nil
	Telex	:	Nil
	E-mail	:	.....
b.	Status of the Applicant		
	Private individual	:	Private individual
	Cooperative Association	:	---
	Private company	:	---
	Public Company	:	---
	Public Sector Undertaking	:	---
	Joint Sector Undertaking	:	---
	Other (pl. specify)	:	---
c.	Mineral(s) Which are occurring in the area and which the applicant intends to mine	:	Rough stone and gravel quarry lease
d.	Period for which the mining lease granted /renewed/ proposed to be applied	:	The precise area has been communicated to the applicant for quarrying period of Ten (10) years.
e.	Name of the QP preparing the Mining Plan	:	G. Umamaheswarn, M.Sc.,
	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 9790462882
	Fax	:	Nil
	e-mail	:	maheswaran.gk@gmail.com
	Telex	:	Nil
	Registration Number	:	Nil
	Date of grant/renewal	:	Nil
	Valid upto	:	Nil
f.	Name of the prospecting agency	:	Geo Technical Mining Solutions
	Address	:	No: 1/213-B, Ground Floor, Natesan Complex, Oddapatti, Collectorate Post office, Dharmapuri-636705 Web site: www.gtmsind.com
	Phone	:	----
g.	Reference No. and date of consent letter from the state government	:	The precise area communication letter was received from the Assistant Director, Department of Geology and Mining, District Collectorate, Erode Vide **Rc.No.717/Mines/2023 Dated: 06.06.2024**

2.0 LOCATION AND ACCESSIBILITY:

a.	Details of the Area:	:	Refer plate no: IA & IB
	District & State	:	Erode, Tamil Nadu
	Taluk	:	Sathyamangalam
	Village	:	Kurumbapalayam
	Khasra No./ Plot No./ Block Range/ Felling Series etc.		

Survey No.	Sub division	Total Extent in Hect	Patta No.	Name of the Land Owner	Mine lease Applied S.F. No.	Mine lease Applied Area out of total area in hect.
178	-	2.96.5	1539	Mr.S.Vineesh S/o. Sundararaj	178	2.96.5
Total Extent		**2.96.5**			**Applied lease area extent**	**2.96.5**

Lease area (hectares)	:	2.96.5 hectare
Whether the area is recorded to be in forest (please specify whether protected, reserved, etc)	:	No, forest is involved. This is recorded patta Land.
Ownership / Occupancy	:	This is a patta land S.F.No. 178 is registered

			in the name of Mr.S.Vineesh vides Patta No.1539. (Ref. Annex. No:V).
	Existence of Public Road / Railway line if any nearby and approximate distance	:	✓ Excavated materials will be transported through the approach road on the northwest side of the lease applied area. ✓ The NH-948 road is situated about 2.16km away on the eastern side of the applied lease area. ✓ The SH-15 road is situated about 3.18km away on the western side of the applied lease area. ✓ There is no railway line is situated within radius of 5.0km periphery of the proposed lease area
	Toposheet No. with latitude and longitude	:	Toposheet No. **58 E/03** Latitude : From 11°25'48.65745"N to 11°25'53.20359"N Longitude: From 77°10'26.66416"E to 77°10'35.04812"E
	Geo-Coordinates of the lease boundary:		

PILLAR No	LATITUDE	LONGITUDE
1	11°25'52.66538"N	77°10'35.04812"E
2	11°25'48.65745"N	77°10'33.61684"E
3	11°25'48.83956"N	77°10'26.66416"E
4	11°25'50.34902"N	77°10'26.93753"E
5	11°25'53.20359"N	77°10'27.08801"E
6	11°25'52.86053"N	77°10'33.57957"E

	Land use pattern (Forest, Agricultural, Grazing, Barren etc.)	:	It is an barren and virgin ground
b)	***Attach a general location and vicinity map showing area boundaries and existing and proposed access routs. It is preferred that the area to be***	:	Refer plate no-IA & IB

	marked on a survey of India topographical map or a cadastral map or forest map as the case may be. However if none of these are available, the area should be shown on an accurate sketch map on scale of 1 : 5000.		

i) INFRASTRUCTURE AND COMMUNICATION:

S.No	Description	Place	Distance	Direction
a.	Nearest post office	Valipalayam	2.3Km	Southeast
b.	Nearest police station	Punjai Puliampatti	8.5km	South
c.	Nearest fire station	Sathyamangalam	10.6km	Northeast
d.	Nearest medical facility	Vinnappalli	2.7Km	Southeast
e.	Nearest school	Vinnappalli	2.4Km	Southeast
f.	Nearest railway station	Mettupalayam	29.2km	Southwest
g.	Nearest port facility	Cochin	191km	Southwest
h.	Nearest airport	Coimbatore	50.0km	Southwest
i.	Nearest DSP office	Sathyamangalam	10.9km	Northeast
j.	Nearest villages	Karidoddampalayam	1.6km	Northwest
		Puduroad	3.1km	East
		Vinnappalli	2.3km	Southeast
		Kurumbapalaiyam	0.9km	South

PART – A

3.0 GEOLOGY AND MINERAL RESERVES:

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

(i)	Topography	:	The proposed lease area exhibits flat topography. The proposed site shows the maximum elevation (321m) was observed in N-S side of the site. The slope is towards South side and falls in Toposheet no. 58- E/03.

(ii) **a) Geology of the District**:

The Erode district forms part of the Archean complex of peninsular gneiss. Generally the entire area of the district is traversed by metamorphosed Gneissic rocks of Arechaean age. The northern parts of the district i.e. Thalamalai Reserved Forest and Bargur Reserved forest of the district are occupied by Charnockite. Similarly in the southern part of the district, the Charnockite is noticed in Dharapuram and Vellakoil areas.

In the central part, the country rock is intruded by intrusive rock like dolerite. The pegmatite intrusions are also observed here and there in the northern part of the district. The important rock types encountered in this area are Granitic gneiss, mica gneiss, hornblende gneiss, charnockite and pink granite.

Order of superposition of the proposed lease area,

Age	Group	Rock Formation
Recent to Sub recent	----	Topsoil (1-2m thick),
Proterozoic	Acid intrusive	Pink medium grained granite/ Granite gneiss
Archaean	Charnockite Group	Pyroxene Granulite, Charnockite (acid to intermediate) / Crystalline limestone / Quartzite

(iii) Local / Mine Geology of the mineral deposit area:

a) Topography of the proposed lease area:

The proposed lease area exhibits flat topography. The proposed site shows the maximum elevation (321m) was observed in N-S side of the site. The slope is towards Southern side. The applied lease area covered with lateritic (gravel) soil and beneath the charnockite rocks found based on existing pit nearby the lease area. Surface plan preparing for contour lines, surface features and Geological mapped the applied lease area.

b) Mode of origin:

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

c) 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.

d) Chemical composition of rocks:

The compositional characteristics of coexisting orthopyroxene, garnet and biotite have established several petrographic varieties within the Charnockites–Enderbites such as the granulite's and gneisses. Plagioclase feldspars, alkali feldspars and quartz are the salic minerals present in this series of rocks.

Order of superposition of rocks in the proposed site:

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

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

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

(d) ***Broadly indicate the Year wise 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 programmed proposed in this area. Its massive homogeneous parent rock. Hence exploration proposal is not required to this mining project.

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

The geological resources were computed by cross section method with respect to the boundaries of the lease area. In this method, the lease area was one sections (longitudinal and transverse) to calculate the volume of material up to the depth of 50m below ground level. The longitudinal and transverse cross sections were assigned XY-AB. Using the cross-sectional method, total reserve is estimated to be **1473750m^3** including the resources of safety zone, and gravel. Of which, rough stone is about **1414800m^3** and gravel resource of about **58950m^3**.

The gravel is obtained about 2m (R.L.321-319m) from below the surface and a rough stone starts from 3 to 50m (R.L.319-271m) below ground level. (Refer plate no.IIIA).

GEOLOGICAL RESOURCES							
Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m^3	Rough Stone in m^3	Gravel in m^3
XY-AB	I	225	131	2	58950	.....	58950
	I	225	131	3	88425	88425	.....
	II	225	131	5	147375	147375	.....
	III	225	131	5	147375	147375	.....
	IV	225	131	5	147375	147375	.....
	V	225	131	5	147375	147375	.....
	VI	225	131	5	147375	147375	.....
	VII	225	131	5	147375	147375	.....
	VIII	225	131	5	147375	147375	.....

IX	225	131	5	147375	147375	.....
X	225	131	5	147375	147375	.....
TOTAL			**50**	**1473750**	**1414800**	**58950**

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

The total mineable reserve is estimated to be **616350m³** by deducting the reserve safety zone, block in benches from the total Geological resources up to a depth of 50m (R.L.321-271m) below ground level. Of which, rough stone is about **568326m³** and gravel is about **48024m³**. The commercially viable rough stone has been prepared on 1: 1000 scale and sections are prepared in a scale of 1:1000 in horizontal axis and 1:500 as vertical axis (Refer plate no. VIIA).

MINEABLE RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m³	Rough Stone in m³	Gravel in m³
XY-AB	I	207	116	2	48024	.....	48024
	I	207	116	3	72036	72036	.....
	II	197	106	5	104410	104410	.....
	III	187	96	5	89760	89760	.....
	IV	177	86	5	76110	76110	.....
	V	167	76	5	63460	63460	.....
	VI	157	66	5	51810	51810	.....
	VII	147	56	5	41160	41160	.....
	VIII	137	46	5	31510	31510	.....
	IX	127	36	5	22860	22860	.....
	X	117	26	5	15210	15210	.....
TOTAL					**616350**	**568326**	**48024**

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)	:	It is a fresh grant lease. The mining operation is opencast, semi-mechanized method are adopted and on single shift basis only. Under the regulation 106 of the Metalliferous Mines Regulations, 1961 in all open cast workings in hard rock, the benches and sides should be properly benched and sloped. The bench height should not exceed 5m and the bench width

			should not less than the bench height. The slope of the benches should not exceed 45° from horizontal

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

Total proposed production **578280m³**. Of which, rough stone is **530256m³** and gravel is **48024m³** up to a depth of 40m below the ground level (R.L.321m-281m) for five years plan period. Average production is **106051m³** of rough stone and **16008m³** of gravel per year (Refer Plate No. IVA).

Year	Pit No.(s)	Topsoil/Over burden (m³)	ROM (m³)	Saleable rough stone (m³) @ 100%	Rough stone rejects(m³)	Sub grade/ Weathered rock in (m³)	Saleable Gravel (m³)	Rough stone to topsoil ratio
First	I	---	121680	104512	...	....	17168	....
Second	I	---	136780	121236	...	....	15544	....
Third	I	---	131880	116568	...	....	15312	....
Fourth	I	---	115270	115270	...	....	....	....
Fifth	I	---	72670	72670	...	....	....	....
Total	**---**	**---**	**578280**	**530256**	**...**	....	**48024**	**....**

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

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

YEARWISE PRODUCTIONS								
Year	Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m³	Rough Stone in m³	Gravel in m³
I-YEAR	XY-AB	I	74	116	2	17168	.....	17168
		I	74	116	3	25752	25752	.....
		II	64	106	5	33920	33920	.....
		III	54	96	5	25920	25920	.....
		IV	44	86	5	18920	18920	.....
TOTAL						**121680**	**104512**	**17168**
II-YEAR	XY-AB	I	67	116	2	15544	.....	15544
		I	67	116	3	23316	23316	.....
		II	68	106	5	36040	36040	.....

250

		III	68	96	5	32640	32640	.....
		IV	68	86	5	29240	29240	.....
TOTAL						**136780**	**121236**	**15544**
III-YEAR	XY-AB	I	66	116	2	15312	.....	15312
		I	66	116	3	22968	22968	.....
		II	65	106	5	34450	34450	.....
		III	65	96	5	31200	31200	.....
		IV	65	86	5	27950	27950	.....
TOTAL						**131880**	**116568**	**15312**
IV-YEAR	XY-AB	V	167	76	5	63460	63460	.....
		VI	157	66	5	51810	51810	.....
TOTAL						**115270**	**115270**	**0**
V-YEAR	XY-AB	VII	147	56	5	41160	41160	.....
		VIII	137	46	5	31510	31510	.....
TOTAL						**72670**	**72670**	**0**
GRAND TOTAL						**578280**	**530256**	**48024**

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

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

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

Rough stone:

Mineable reserves of rough stone = **568326m³**

Five years production of rough stone = **530256m³**

Monthly production of rough stone = **8837m³**

Remaining mineable Reserves = **38070m³**

Gravel:

Mineable reserves of gravel = **48024m³**

Year wise production of gravel = **16008m³**

Monthly production of gravel = **1334m³**

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

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

i)	Time frame of completion of mineral exploration program in leasehold area: Give broad description identified potential areas to be covered in the given time frame:	:	Considering the indefinite depth persistence of the rough stone deposit is proved beyond the workable limits about up to a depth of 50m below ground level (R.L.321m-271m) from the petrogenetic character of the rock as well as from the actual mining practice in the area and with the current trend of rough stone production the quarry may sustain for 10 years.

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

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

ULTIMATE PIT LIMIT-(XY-AB)

Bench	Bench R.L	Period	Overburden/ Mineral	L (m)	W (m)	D (m)
I	R.L.321-319m	First 5 years	Gravel	207	116	2
I	R.L.319-316m		Rough stone	207	116	3
II	R.L.316-311m		Rough stone	197	106	5
III	R.L.311-306m		Rough stone	187	96	5
IV	R.L.306-301m		Rough stone	177	86	5
V	R.L.301-296m		Rough stone	167	76	5
VI	R.L.296-291m		Rough stone	157	66	5
VII	R.L.291-286m		Rough stone	147	56	5
VIII	R.L.286-281m		Rough stone	137	46	5
IX	R.L.281-276m	Remaining five years	Rough stone	127	36	5
X	R.L.276-271m		Rough stone	117	26	5
					Total	**50m**

iii)	Whether the site for disposal of waste rock or an un-saleable material have/ has been examined for adequacy of land and suitability of long-term use in the event of continuation of mining activity: -	:	The recovery of rough stone and gravel in this quarry is 100%. There is no waste rock will be proposed in this lease area.

iv)	Whether back filling of pits after recovery of mineral up to techno-economically feasible depth envisaged. If so, describe the broad features of the proposal: -	:	As the depth of persistence of the deposit may likely to continue for further depth, it is proposed not to backfilled the quarry pit.
v)	Whether post mining land use envisaged: -	:	At the end of mining activities over the quarry pit may be utilized fish culture or storage of rain water reservoir used for irrigation purposes.
g.	***Open cast Mines:***		
	i). Describe briefly giving salient features of the mode of working (Mechanized, Semi-mechanized, manual)	:	It is a fresh quarry lease. The mining operation is open-cast, semi-mechanized methods are adopted and on single shift basis only. Under the regulation 106 of the Metalliferous Mines Regulations, 1961 in all open cast workings in hard rock, the benches and sides should be properly benched and sloped. The bench height should not exceed 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. Excavators and tipper combination are adapted.
	ii) Describe briefly the layout of mine workings, the layout of faces and sites for disposal of overburden /waste. A reference to the plans enclosed under 4(b) and 4(d) will suffice	:	The rough stone is proposed to quarry at 5m bench height & width conventional opencast semi mechanized quarrying operation using drilling with the help of tractor mounted compressor attached with jack hammers, nonel blasting and waste and are removal using Hydraulic excavator and loaded directly to the tippers.

			Bench height = 5mts. Bench width = 5mts.
	a. Details of topsoil/ overburden	:	No separate of topsoil will be removed.
	b. Rough stone waste and side burden waste:-	:	The recovery of rough stone in this quarry is 100%. Any other waste or side burden dumps are doesn't proposed.
h.	***Underground Mines:***	:	Not applicable

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

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

(1) Drilling Machines:

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

Details of drilling equipment's are given below.

Type	Nos	Dia of hole (mm)	Size / Capacity	Make	Motive power	H.P
Jack Hammer	3	32 mm	Hand held	---	Diesel	--
Compressor	1	---	Air	--	Diesel	--

(2) Loading Equipment:

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

(3) Haulage and Transport Equipment

(a) Haulage within the mining leasehold:

Type	Nos	Size / Capacity	Make	Motive power	H.P.
Tipper	9	--	--	Diesel	--

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

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

a) Transport from mine head to the destination	:	Tipper will be used for transport rough stone and gravel from the mine head to needy customer.
c. Describe briefly the transport system (please specify)	:	Hydraulic excavator and tippers utilized for internal transport sizeable rough stone lumps and deliver to the

			customer's area.
	d. Ore transported by : own trucks / hired trucks	:	Hired trucks for initially production purposes.
	e. Main destination to which ore is transported (giving to and from distance)	:	Excavated rough stone minerals directly will 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 and gravel in this quarry is 100%.

f. Details of hauling / transport equipment:

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

(4). Miscellaneous:

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

(A) Operations	:	The mining operation is open-cast, semi-mechanized methods are adopted and on single shift basis only.
(B) Machineries deployed	:	Machineries like Tractor mounted compressor attached with Jack hammers is proposed to drilling and blasting. Hydraulic Excavators and tipper combination are adapted. (refer Part-A-4 (i))

5. BLASTING:

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

Blasting pattern:

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

Rough stone Production for 5 Years = 530256m^3

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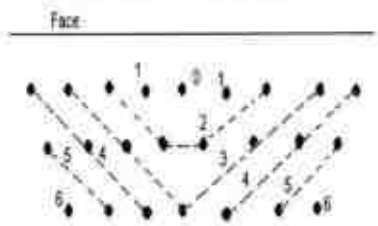
BLAST DESIGN	
Blasthole Diameter (D) in mm	32
Burden (B) in m	1.2
Spacing (S) in m	1.38
Subdrill in m	0.5
Charge length (C) in m	0.70
Stemming	0.5
Hole Length (L) in m	1.2
Bench Height (BH) in m	2.5
Mass of explosive/hole in g	437.5
Stemming material size in mm	3.2
Burden stiffness ratio	2.08
Blast volume/hole in m^3	4.14
Production of rough stone/day in m^3	379
Number of blast holes/day	60
Number of blast round/day	2
Blasthole pattern	Staggered
Mass of explosive /day in kg	**26.25**
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
Note: If >2kg of explosives per day use for blasting if proponent get the permission from the **DGMS**	



Stagged method of mining

b) Type of explosives used / to be used:

Following explosives are recommended for efficient blasting with safe practice.

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

c) Measures proposed to minimize ground vibration due to blasting:

The control blasting measures is being adopted for minimizing ground vibration and fly rock. Shallow depths jackhammer drilling and blasting is proposed to be carried out with minimum use of explosive mainly to give hearing effect in rough stone for easy excavation and to control fly rock.

Delay detonators:

Delay blasting permits to divide the shot to smaller charges, which are detonated in a predetermined millisecond sequence at specific time intervals.

The major advantages of delay blasting are:

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

Blasting program for the production per day

No of holes	:	60holes
Yield	:	379m^3
Total explosive required	:	26.25kg-Slurry explosives
Charge per hole	:	0.5kg
Blasting at day time only	:	12.0p.m-1.0p.m

	d) Powder factor in ore and overburden / waste / development heading / stope	:	Powder factor is proposed as 0.10 kg per holes of explosives
	e) Whether secondary blasting is needed, if so describe it briefly	:	There is no secondary blasting will be involved in this area.
	f) Storage of explosives (like capacity and type of explosive magazine)	:	1. The applicant is advised to engage an authorized explosive agency to carry out blasting. 2. First Aid Box will be keeping ready at all the time.
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 60m in rainy season and 65m in summer from the below ground level in the

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			adjacent bore wells of the area.
	b) Workings expected to be _____ m. above / reach below water table by the year _____.	:	Proposed ultimate depth of mining is 50m bgl. Now, the present Mining lease will be proposed above the water table and hence, quarrying may not affect the ground water.
	c) Quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged	:	The ground water may not rise immediately in this type of mining. However, the rain water percolation and collection of water from the seepage will be less than 300 Lpm and it will 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 doesn't contaminate with any hazardous things.
7. (a)	***STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE:*** Indicate briefly the nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the next five years: No separate of topsoil will be removed and any other waste or side burden dumps are doesn't proposed.		
(b)	Land chosen for disposal of waste with proposed justification	:	There is no waste are proposed.
(c)	Attach a note indicating the manner of disposal and configuration, sequence of buildup of dumps along with the proposals for the stacking of sub-grade ore, to be indicated year wise.	:	There is no waste or any other mineral dumps are proposed. If rough stone may be unsold will be keep within the lease boundary.
8.	***USE OF MINERAL:***		
(a)	Describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)	:	The excavated stone materials will be supplied to the consumers like stone pillar, sized stone, etc. For instance, aggregates are mostly used for building,

			roads and footpaths., etc
(b)	Indicate physical and chemical specifications stipulated by buyers	:	Basically, the materials produced at this quarry are rough stone and the same are used for building stone, sized stone materials only, so there are no chemical specifications are specified. Only physical specifications are involved.
(c)	Give details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers.	:	Not blending process is involved, after blasting the rough stone will be directly loaded to the needy customer.
9.	***OTHERS***		
(a)	**Describe briefly the following** Site services	:	Infrastructure required for such mines like office, stores, canteen, first aid station, shelter latrine and bath rooms have been provided as per the Metalliferous Mines Regulations, 1961 as a welfare amenity for our quarry laborers.

(b) Employment potential :

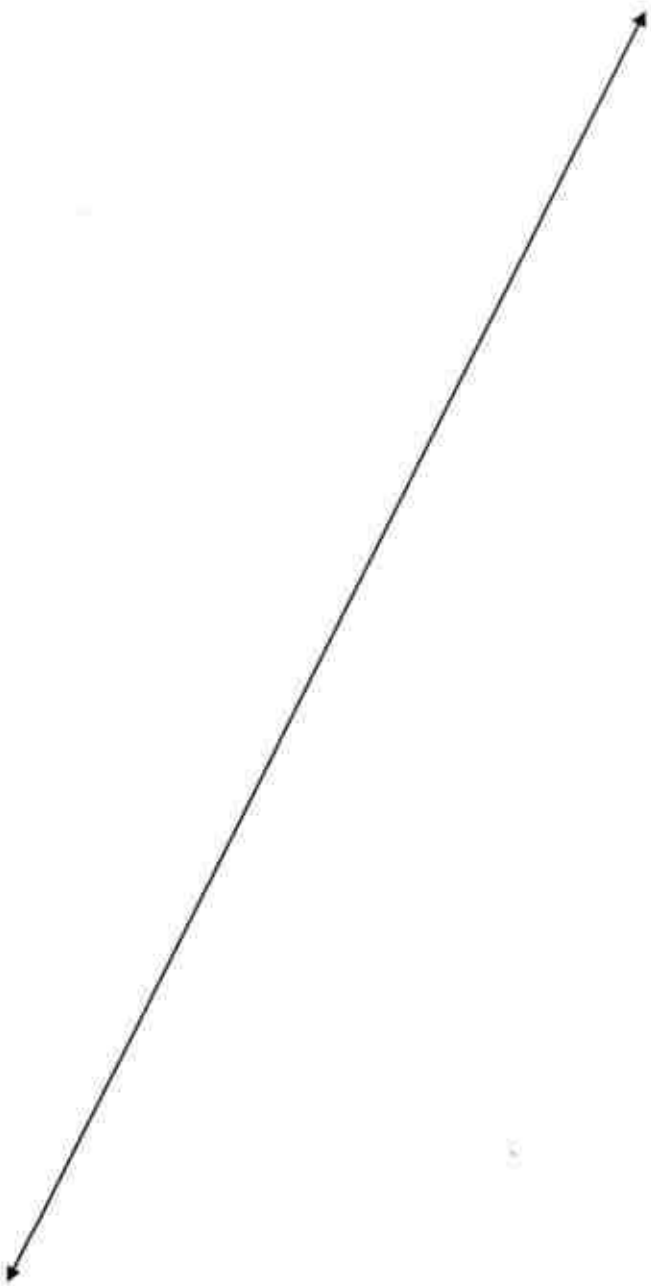
As per Mines safety under the provisions of Metalliferous Mines Regulations, 1961 and under the Mines Act, 1952, whenever the workers are employed more than 10, it is preferred to have a qualified mining mate to keep all the production workers directly under his control and supervision.

The following man power is proposed for quarrying stone material during the five years period the same manpower will be utilize for this mining plan period to achieve the proposed production and to comply the provisions of as per the MMR, 1961 norms.

1.	Highly Skilled	IInd class Mines Manager	1No.
		Mine Geologist	1No.
		Blaster	1No.
2.	Semi-skilled	Driver	9 No's
		Hitachi Operator	1No.
3.	Unskilled	Musdoor / Labours	10 No's
		Total =	**23 No's**

10	MINERAL PROCESSING/BENEFICIATIONS:		
(a)	If processing / beneficiations of the ore or minerals mined is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the processing /beneficiation. This should indicate size and grade of feed material and concentrate (finished marketable product), recovery rate.	:	Excavated rough stone minerals directly will be used by the applicant in his own crusher for required size ½, ¾ and 1½ inches Jelly which are mainly used in road and building construction purpose. The recovery of rough stone and gravel 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 will 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 will 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 0.3KLD, utilized water is 0.7KLD, Dust suppression is 1.5KLD and Green Belt is 1.5KLD. Minimum quantity of water 4.0KLD per day has to be maintained as per the Mines Rules,

			1952. It is proposed to make an authorized water vendors for drinking water, dust suppression. The workers utilized water will be used for green belt development. The sewage water to a tune of 0.7KLD generated from the mine office toilet and mine labour toilet will be diverted to the septic tank followed by soak pit.



PART – B

11.0 ENVIRONMENTAL MANAGEMENT PLAN :

a) **Attach a note on the statuts of Baseline information with regard to the Following :**

11.1 Existing land use pattern indicating the area already degraded due to quarrying /pitting, dumping, roads, processing plant, workshop, township etc in a tabular form. The present land use pattern is given as below.

Sl. No.	Land Use	Present area (Hect.)
1.	Area under mining	Nil
2	Infrastructure	Nil
3	Road	Nil
4	Green belt & Dump	Nil
5	Drainage & Settling Tank	Nil
6	Un-utilized area	2.96.5
	Grand total	**2.96.5**

11.2	Water Regime	:	Water table in this area is noticed at a depth of 65m in summer and 60m in rainy season from the general ground level and presently the quarrying of rough stone and gravel is proposed up to a depth of 50m bgl. Hence, it will not affect the ground water depletion of this area. Drinking water will be bought to authorized vendor of the nearby the village. The dust suppression and green belt development will be bought to water tanker.
11.3	Flora and Fauna	:	There is no major flora observed in this area and no other valuable trees are noticed in the lease area. Further, neither flora of botanical interest nor fauna of zoological interest is noticed in this area.
11.4	Quality of air, ambient noise level and water	:	Air or dust expected to be generated from drilling process, hauling roads, places of excavation etc.., will be suppressed by periodical wetting of land by water spraying. Quarrying of rough stone will be carried out by drilling and blasting by using low power explosives, and hence,

			noise will be very minimum. However, periodical noise level monitoring will be carried out every six months around the quarry site.

11.5 Climatic conditions:

Climate:

In Erode, the wet season is oppressive and overcast, the dry season is humid and partly cloudy, and it is hot year-round. Over the course of the year, the temperature typically varies from 69°F to 100°F and is rarely below 65°F or above 105°F.

Based on the beach/pool score, the best time of year to visit Erode for hot-weather activities is from mid December to mid March.

Rainfall:

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Erode experiences extreme seasonal variation in monthly rainfall.

The rainy period of the year lasts for 9.6 months, from March 18 to January 6, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Erode is October, with an average rainfall of 4.3 inches.

The rainless period of the year lasts for 2.4 months, from January 6 to March 18. The month with the least rain in Erode is February, with an average rainfall of 0.3 inches.

11.6 Human Settlement:

The nearest villages are found in the buffer zone with population as per 2011 census.

S.No	Village	Direction	Distance in Kms	Population
1	Karidoddampalayam	Northwest	1.6km	1868
2	Puduroad	East	3.1km	778
3	Vinnappalli	Southeast	2.3km	3550
4	Kurumbapalaiyam	South	0.9km	1521

11.7	Public buildings, places of worship and monuments	:	No infrastructure like residential building, places of special interest like archeological monuments, sanctuaries etc., are found

			around 10km radius.
11.8	Attach plans showing the locations of sampling stations	:	The proposed ambient air quality, water quality ambient noise level and vibration are periodically tested for every season (6 months once) around 5km radius as per the guidance of MoEF and EIA notification 2006 and also covering DGMS norms.
11.9	Does area (partly or fully) fall under notified area under Water (Prevention & Control of Pollution), Act, 1974	:	The proposed area not fall under notified area under water (Prevention & Control of Pollution), Act, 1974

b) Attach an Environmental Impact Assessment Statement describing the impact of mining and beneficiation on environment on the following over the next five years (and upto conceptual plan period for 'A' category mines)

i) ***Land area indicating the area likely to be degraded due to quarrying / pitting, dumping, roads, workshop, processing plant, township etc:***

Due to quarrying and exploitation of the rough stone and gravel, there will impact in the form i.e. change in the ground profile, pits, and dumps. The details of the land use pattern, during the ensuing plan period and till lease period is shown in the tabular form:

Sl. No.	Land Use	Area in use during the quarrying period (Hect)
1.	Area under mining	2.41.96
2	Infrastructure	0.03.0
3	Road	0.05.0
4	Green belt & Dump	0.39.64
5	Drainage & Settling Tank	0.06.9
6	Un-utilized area	Nil
	Grand total	**2.96.50**

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

			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 will be recoded using mini seismograph devises as per the guidance of MoEF and EIA Notification 2006 and also covering DGMS norms.
vi).	Water regime		No major water bodies like rivers, pond, lake etc., located within a radius of 50m.
vii).	Socio-economics		1. To provide Employment opportunities of the nearby villagers. 2. For the cultural development of the nearby villagers.
viii).	Historical monuments etc.		There are no historical monuments, etc found around 10km radius.

c) Attach an Environmental Management Plan (supported by appropriate plans and sections) defining the time bound action proposed to be taken with sequence & timing in the following areas (or diagrams should be used):

i).	Temporary storage and utilization of topsoil	:	No separate of topsoil will be removed.
ii).	Year wise proposal for reclamation of land affected by abandoned quarries and other mining activities during first five years (and upto conceptual plan period for 'A' category mines) clarifying the extent of back filling and re-contouring and / or alternative use of unfilled /	:	The present mining is proposed to an average depth of 40m bgl has been envisaged as workable depth for safe & economic mining during the lease period. The mined-out area will be fenced on top of working bench with S1 fencing. No immediate proposals for closure of pit as the rough stone persist still at deeper

	partially filled excavations / road sides / slopes and mine. In case abandoned quarries/ pits are proposed to be used as reservoir, their size, water holding capacity and proposal for utilization of such water be given.		level.

iii) ***Programme of afforestation, Yearwise for the initial five years (and upto conceptual plan period for 'A' category mines) indicating the number of plants with name of species to be afforested under different areas in hectares.***

Green Belt Development:

Safety barrier, school and nearest panchayat roads has been identified to be utilized for Greenbelt appropriate native species of Neem, Pungan and other regional trees will be planted in a phased manner as described below.

Year	Place	Area in Sq.m	No.of Plants	Rate of survival	Rate	Amount in Rs
First	Lease Boundary	3964	440	80%	@100 Rs Per sapling	44,000/-
Second	Approach road and Nearby Village Road	--	300	80%		30,000/-
Third	Schools	--	200	80%		20,000/-
					Total	**94,000/-**

iv).	Stabilization and vegetation of dumps along with waste dump management Year wise for the first five years (and up to conceptual plan period for 'A' category mines).	:	No waste or rejects removed in this lease area.
v).	Measures to control erosion / sedimentation of water courses.	:	Not applicable. There are no major dumps are stabilized in this quarry area.
vi).	Treatment and disposal of water from mine.	:	It will not be harmful and it does not require any treatment before discharging

			into the natural courses.
vii).	Measures for minimizing adverse effects on water regime.	:	There is no water to be pumped out will be very pure and portable and therefore, it will not affect any water regime surrounding the quarry. The worked-out pit will be protected with barbed wire and the mined-out pit will be used as storage rain water pit. The open pit will be used as rain water storage structure to augment groundwater levels which improve the mine environment.
viii).	Protective measures for ground vibrations / air blast caused by blasting,	:	It is a small "B" category opencast, semi mechanized method of mining is adopted and no heavy machinery will be used. The only smooth blasting is proposed, therefore no change for ground vibration or noise from the quarry.
ix).	Measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity.	:	No historical monuments and for rehabilitation of human settlements doesn't to be disturbed during mining activity.
x).	Socioeconomic benefits arising out of mining.	:	The nearest villages are will get employment benefits.

d). Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only)

Not applicable. It is "B" category quarry

12.0 PROGRESSIVE QUARRY CLOSURE PLAN:

12.1	Steps proposed for phased restoration, reclamation of already mined out area.	:	The Ultimate mining is proposed to an average depth of 50m bgl. The mined-out area will be fenced on top of working bench with S1 fencing to arrest the entry of cattle's and

			public in to the quarry site.
12.2	Measures to be under taken on mine closure as per Act & Rules	:	Measures will be taken as per the Acts and Rules. Green belt development at the rate of 440 trees will be proposed in the quarry lease area. No immediate proposals for closure of pit as the rough stone persist still at deeper level.
12.3	Mitigation measures to be undertaken for safety and restoration/ reclamation of the already mined out area	:	The quarry lease is a fresh mining lease. No mitigation measures adopted.
12.4	Mine closure activity	:	The present mining plan is proposed to depth of 40m bgl has been envisaged as workable depth for safe & economic mining during the lease period. The mined-out area will be fenced on top of open cast working with S1 fencing. No immediate proposals for closure of pit as the rough stone persist still at deeper level.
12.5	Safety and security	:	Safety measures implement to the prevent access to surface opening excavations will be taken as Metalliferous mine regulations, 1961, it is a small open cast mining method adopted. Safety provisions like helmet, goggles, safety shoes, Dust mask, Ear muffs etc have to be provided as per the circulars and amendments made for Mine labours under the guidance of DGMS being a mechanized operation.
12.6	Disaster management and Risk Assessment	:	Open cast semi mechanized method of mining is adopted in this quarry. If the benches are made with proposed height and with no risk will be there. Even then if any minor or major accident happens the quarry staffs having

			First aid facilities with first aid box with all necessary medicine and stretches etc., to give first aid treatment at the site and will arrange immediately the vehicle to reach nearest hospital, if any disaster happens the lessee is capable to meet such eventualities. At the time of any accident during mining activity, proposal of first aid facility at quarry and one vehicle always ready at quarry site.
12.7	Care and maintenance during temporary discontinuance	:	A board of discontinuance will be changed on the main entrance of the working place. One watch man will be kept on the quarry area for security purposes also look after the survival of the plants.
12.8	Economic repercussions of closure of quarry and man power entrenchments	:	During the five years mining period the employment potential will be generated, general financial status and socio-economic conditions of approx. 23 labors will be improved.

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

A	**Fixed Asset Cost:**		
	1. Land Cost	:	Rs. 10,00,000/-
	2. Labour Shed		Rs. 1,00,000/-
	3. Sanitary Facility	:	Rs. 1,00,000/-
	4. Fencing	:	Rs. 3,00,000/-
	5. Other expenses (Security guard, dust bin, etc)	:	Rs. 3,00,000/-
	Total	:	**Rs. 18,00,000/-**
B	**B. Machinery cost**	:	**Rs. 25,00,000/-** (Hire Basis)
C	**Total Expenditure of EMP cost** (for five years)		
	1. Drinking Water Facility	:	Rs. 1,00,000/-
	2. Sanitary facility & Maintenance	:	Rs. 1,00,000/-

	3. Permanent water sprinkler	:	Rs. 1,50,000/-
	4. Afforestation and its maintenance	:	Rs. 94,000/-
	5. Safety Kits	:	Rs. 75,000/-
	6. Provision of tyre washing facility	:	Rs. 50,000/-
	7. Surface runoff management structures like garland drain, settling pond & Bund (0.06.9 Hect or 690Sq.m X 400	:	Rs. 2,76,000/-
	8. Blasting materials with blast mat cost	:	Rs. 20,00,000/-
	9. Environment monitoring	:	Rs. 5,00,000/-
	Total	:	**Rs. 33,45,000/-**
D	**Total Project Cost (A+B+C)**	:	**Rs. 76,45,000/-**

13.0 FINANCIAL ASSURANCE:

Not applicable, it is a small "B" rough stone and gravel quarry.

14.0 CERTIFICATES:

All required certificates are enclosed.

15.0 PLAN AND SECTIONS, ETC:

Plan and Sections are submitted along with mining plan.

16.0 ANY OTHER DETAILS INTEND TO FURNISH BY THE APPLICANT:

(i) Care and precautionary measures will be taken for the safety of workers as per Rules and Acts.

(ii) The applicant will endeavor every attempt to quarry the rough stone and gravel economically without any wastage and to improve the environment and ecology.

(iii)The mining plan is prepared by incorporating the conditions stipulated in the precise area communication issued by the Assistant Director of Geology and Mining, Erode vide letter **Rc.No.717/Mines/2023 Dated: 06.06.2024.**

(iv)Total proposed production of **578280m^3**. Of which, rough stone is about **530256m^3** and gravel is about **48024m^3** up to a depth of 40m below the ground level (R.L.321m-281m) for first five years plan period. Average production is **106051m^3** of rough stone and **16008m^3** of gravel per year.

Assistant Director
Erode
Geology and Mining

17.0 CSR Expenditure:

CSR (Corporate Social responsibility) shall provide by the applicant @ 2.0% of average net profit of the company for the last three financial years to the nearby village on the Ministry has notified the amendments in section 135 of the Act as well in the CSR Rules on 22nd January 2021 as circular no. CSR-05/01/2021-CSR-MCA dated 25th August 2021.

Place: Dharmapuri, TN

Date:

G.Umamaheswaran, M.Sc.,

Qualified Person
GEO TECHNICAL MINING SOLUTIONS
(ISO 9001: 2015 Certified Company
1/213-B, Ground Floor, Natesan Complex,
Collectorate Post Office
Oddapatti, Dharmapuri-636705

This Mining Plan is approved subject to the conditions indicated in the Mining Plan approved letter in
R.C. No. 717/mines/2023
Dated: 11.06.2023.

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

Assistant Director,
Geology and Mining,
Erode.

11/6/23

ANNEXURE -1

உதவி இயக்குநர் அலுவலகம்,
புவியியல் மற்றும் சுரங்கத்துறை,
ஈரோடு

Assistant Director * Erode * Geology and Mines

ந.க. 717 /கனிமம்/2023

நாள்: 06.06.2024.

குறிப்பாணை

பொருள்: கனிமங்களும் குவாரிகளும் - ஈரோடு மாவட்டம் - சிறுகனிமம் - சாதாரணக்கற்கள் மற்றும் கிராவல் - சத்தியமங்கலம் வட்டம் - குரும்பபாளையம் கிராமம் - புல எண். 178-இல் 2.96.50 ஹெக்டர் பரப்பில் சாதாரணக்கற்கள் மற்றும் கிராவல் மண் வெட்டி எடுக்க குவாரி குத்தகை உரிமம் கோரி திரு. எஸ். வினீஸ், த/பெ. சுந்தரராஜ் என்பவர் விண்ணப்பம் அளித்தது - அங்கீகரிக்கப்பட்ட சுரங்கத்திட்டம் மற்றும் சுற்றுச் சூழல் ஒப்புதல் பெற்று அளிக்க கோருதல் - தொடர்பாக.

பார்வை:

1. திரு. எஸ். வினீஸ், த/பெ. சுந்தரராஜ் என்பவரின் மனு நாள் 27.12.2023.
2. சத்தியமங்கலம் வருவாய் வட்டாட்சியரின் அறிக்கை ந.க. 52/2024/அ3 நாள் 06.02.2024.
3. கோபிசெட்டிபாளையம் வருவாய் கோட்டாட்சியர் அவர்களின் அறிக்கை ந.க. 198/2024/ஆ3 நாள் 08.05.2024
4. வட்டார வளர்ச்சி அலுவலர் (கி.ஊ), பவானிசாகர் கடிதம் ந.க. எண் 1349/2024/ஆ1 நாள் 17.05.2024.
5. ஈரோடு புவியியல் மற்றும் சுரங்கத்துறை உதவி புவியியலாளர் மற்றும் தனி வருவாய் ஆய்வாளர் ஆகியோரின் தணிக்கை குறிப்பு நாள்: 10.05.2024.
6. மாவட்ட நகர் ஊரமைப்பு துணை இயக்குநர் (பொ), ஈரோடு கடிதம் ந.க. எண் 17/2024/ஈமா-3 நாள் 29.05.2024.
7. அரசு அணை எண் 169 தொழில் (எம்எம்சி1) துறை நாள் 04.08.2020.

ஈரோடு மாவட்டம், சத்தியமங்கலம் வட்டம், குரும்பபாளையம் கிராமம், புல எண். 178-இல் 2.96.50 ஹெக்டர் பரப்பில் சாதாரண கற்கள் மற்றும் கிராவல் மண் வெட்டியெடுக்க பத்து ஆண்டுகளுக்கு திரு. எஸ். வினீஸ், த/பெ. சுந்தரராஜ் என்பவர் விண்ணப்பித்ததன் பேரில் குவாரிக் குத்தகை உரிமம் வழங்குவது தொடர்பாக, சத்தியமங்கலம் வருவாய் வட்டாட்சியர், கோபிசெட்டிபாளையம் வருவாய் கோட்டாட்சியர், பவானிசாகர் வட்டார வளர்ச்சி அலுவலர் (கி.ஊ), புவியியல் மற்றும் சுரங்கத்துறை உதவி புவியியலாளர் (கனிமம்), தனி வருவாய் ஆய்வாளர் (கனிமம்) மற்றும் ஈரோடு நகர் ஊரமைப்பு துணை இயக்குநர் (பொ) ஆகியோர் மேற்காணும் விண்ணப்ப புல எண். 178-இல் 2.96.50 ஹெக்டர் பரப்பில் பத்து ஆண்டுகளுக்கு தமிழ்நாடு சிறுகனிம சலுகை விதிகள், 1959-ன் விதி எண். 19 (1), 20, 22 ஆகியவற்றின் கீழ் சாதாரண கற்கள் மற்றும் கிராவல் மண் வெட்டியெடுக்க குவாரி குத்தகை உரிம அனுமதி சில நிபந்தனைக்குட்பட்டு வழங்கலாம் என பரிந்துரை செய்துள்ளனர்.

எனவே, மேற்காணும் பரிந்துரைகளின் அடிப்படையில் ஈரோடு மாவட்டம், சத்தியமங்கலம் வட்டம், குரும்பபாளையம் கிராமம், புல எண். 178-இல் 2.96.50 ஹெக்டர் பட்டா நிலத்தில், திரு. எஸ். வினீஸ், த/பெ. சுந்தரராஜ் என்பவருக்கு குவாரி குத்தகை ஒப்பந்த ஆவணம் நிறைவேற்றப்பட்ட நாளிலிருந்து பத்து ஆண்டுகளுக்கு சாதாரணக்கற்கள் மற்றும் கிராவல் மண் வெட்டி எடுக்க குவாரி குத்தகை உரிமம் வழங்குவது தொடர்பாக கீழ்க்காணும் நிபந்தனைகளுக்கு உட்பட்டு ஈரோடு உதவி இயக்குநரால் ஏற்பளிக்கப்பட்ட சுரங்கத் திட்டம் மற்றும் மாநில சுற்றுச் சூழல் அமைப்பிடம் இருந்து பெறப்பட்ட சுற்றுச்சூழல் ஒப்புதல் ஆகியன உரிய காலத்திற்குள் விண்ணப்பதாரால் பெற்றளிக்கப்பட வேண்டும் என தெரிவிக்கப்படுகிறது.

1. புலத்தின் மேற்கு பகுதியில் உள்ள பஞ்சாயத்து ரோடுக்கு 10 மீட்டர் பாதுகாப்பு இடைவெளி விட்டு குவாரி பணிபுரிய வேண்டும்.
2. புலத்தை சுற்றி அமைந்துள்ள பட்டா நிலங்களுக்கு 7.5 மீட்டர் பாதுகாப்பு இடைவெளி விட்டு குவாரி பணிபுரிய வேண்டும்.

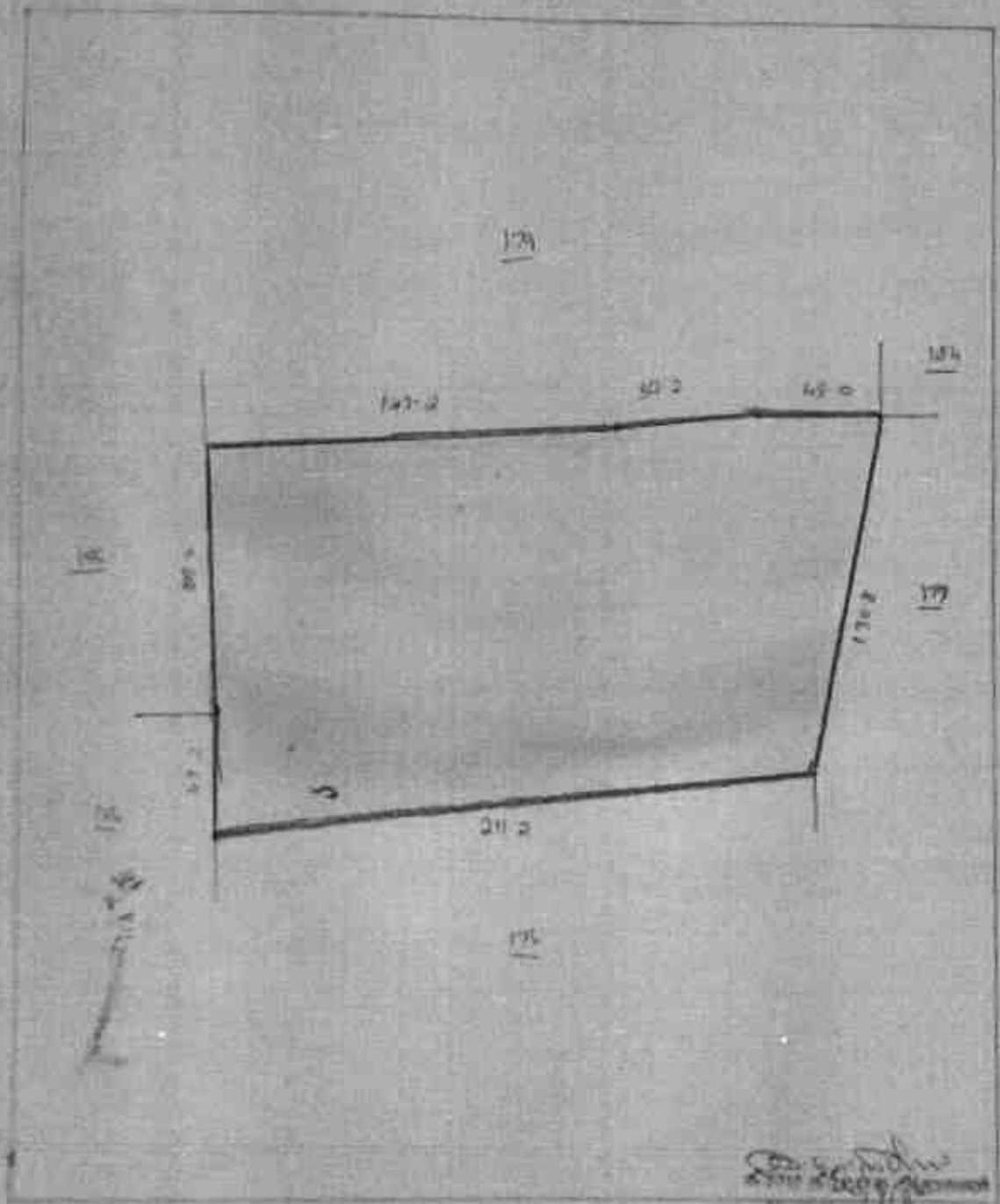
உதவி இயக்குநர்,
புவியியல் மற்றும் சுரங்கத்துறை,
ஈரோடு.

பெறுநர்

திரு. எஸ். வினீஸ்,
த/பெ. சுந்தரராஜ்,
சோமையனூர், சின்னதடாகம்,
கோயமுத்தூர் - 641108.

ANNEXURE -II

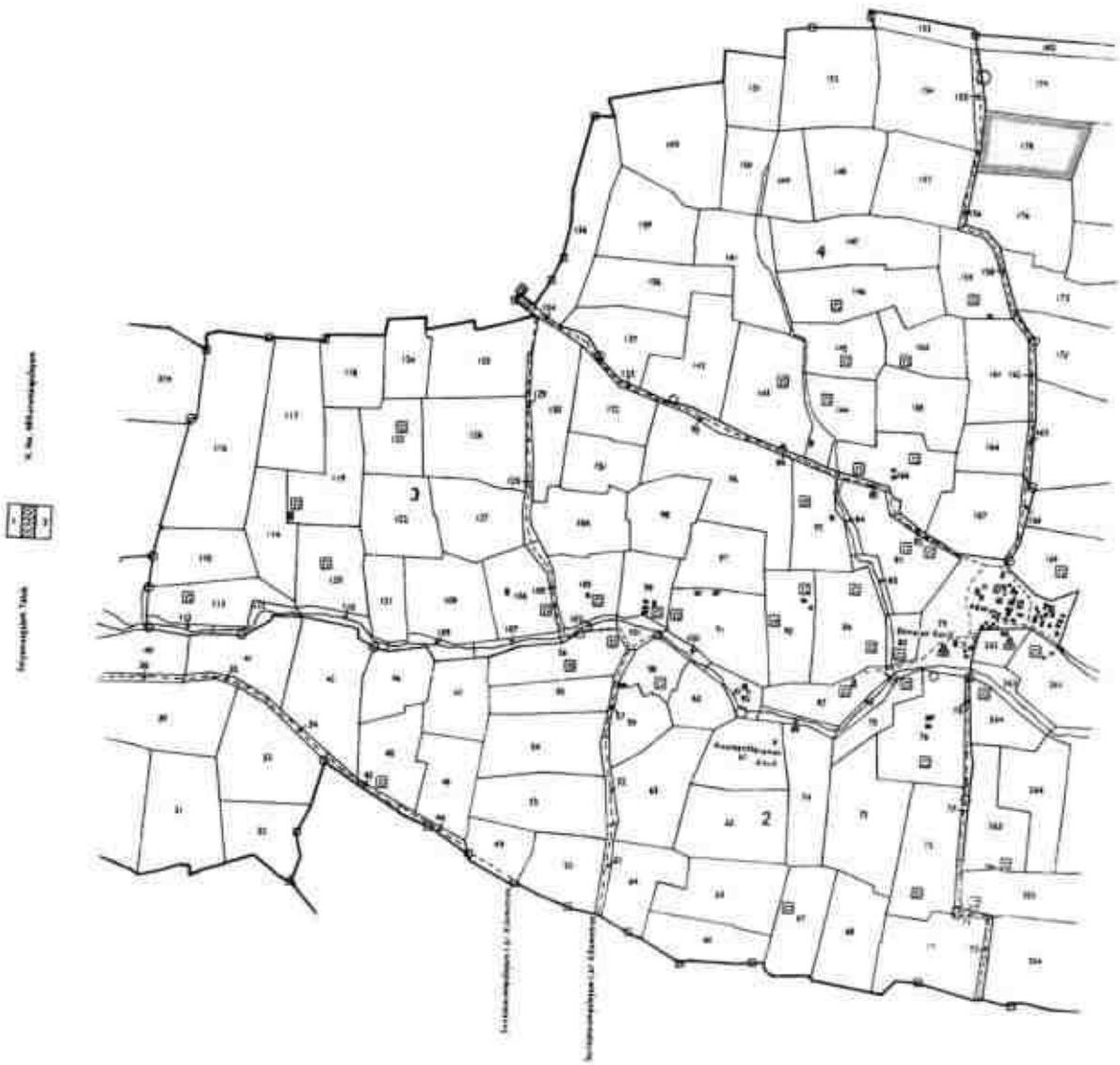
Assistant Director
Erode
Geology and Mining



LEASE APPLIED AREA

Assistant Director
Erode
Geology and Mining

RESERVED FOREST



No. 47
SUNKARARAMPALAYAM

LEASE APPLIED AREA

அ-பதிவேடு விவரங்கள் - ஊரகம்

Assistant Director * Erode * Geology and Mining

மாவட்டம் : ஈரோடு

வட்டம் : சத்தியமங்கலம்

கிராமம் : 048 குரும்பபாளையம்

1. புல எண்	**178**	9. மண் வயனமும் ரகமும்	**8 - 4**
2. உட்பிரிவு எண்	-	10. மண் தரம்	**6**
3. பழைய புல உட்பிரிவு எண்	**181**	11. தீர்வை (ரூ - ஹெ)	**1.38**
4. பகுதி	-	12. பரப்பு (ஹெக்டேர் - ஏர்)	**2 - 96.50**
5. அரசு / ரயத்துவாரி	**ரயத்துவாரி**	13. மொத்த தீர்வை (ரூ - பை)	**4.09**
6. நிலத்தின் வகை	**புஞ்சை**	14. பட்டா எண்	**1539**
7. பாசன ஆதாரம்	-	15. குறிப்பு	-
8. இரு போகமா	-	16. பெயர்	**1.வினீஷ்**

குறிப்பு:

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **https://eservices.tn.gov.in** என்ற இணைய தளத்தில் **10/32/048/178/-/110818** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.

ANNEXURE - V

- 231 -

Assistant Director Erode Geology and Mining

தமிழ்நாடு அரசு

வருவாய்த் துறை

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

மாவட்டம் : ஈரோடு வட்டம் : சத்தியமங்கலம்

வருவாய் கிராமம் : 048 குரும்பபாளையம் பட்டா எண் : 1539

உரிமையாளர்கள் பெயர்

1. சுந்தரராஜ் மகன் வினீஷ்

புல எண்	உட்பிரிவு	புன்செய்		நன்செய்		மற்றவை		குறிப்புரைகள்
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை	
		ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	
155	3	0 - 1.50	0.06	--	--	--	--	2023/0103/10/429504-- -------- 23-12-2023
156	3	0 - 1.00	0.06	--	--	--	--	2023/0103/10/429504-- --நிலவியல் வண்டிப்பாதை----- 23-12-2023
178	-	2 - 96.50	4.09	--	--	--	--	2023/0103/10/429504-- -------- 23-12-2023
		2 - 99.00	4.21					

குறிப்பு :

1. மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் **https://eservices.tn.gov.in** என்ற இணைய தளத்தில் **10/32/048/01539/110818** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.
2. இத் தகவல்கள் 20-05-2024 அன்று 04:53:15 PM நேரத்தில் அச்சடிக்கப்பட்டது.
3. கைப்பேசி கேமராவின்2D barcode படிப்பான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்

ANNEXURE - VI

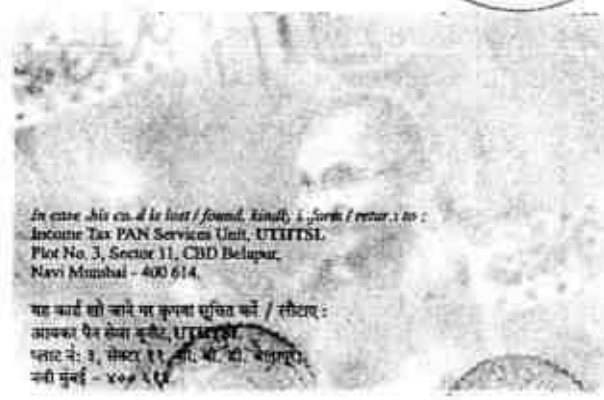
Assistant Director * Erode * Geology and Mining

PHOTOCOPY OF THE APPLIED LEASE AREA

Field photos in respect of rough stone and gravel quarry lease in S.F.No: 178 Patta land – over an extent of 2.96.5 hectares – Kurumbapalayam Village – Sathyamangalam Taluk – Erode District - Tamil Nadu State belongs to **Mr.S.Vineesh S/o Sundararaj.**

ANNEXURE - VIII

Assistant Director
Erode
Geology and Mining



Assistant Director * Geology and Mining * Erode

आधार

இந்திய அரசாங்கம்
Unique Identification Authority of India
Government of India

பதிவேட்டு எண்/ Enrolment No.: 2726/11105/85468

To
வினீஷ் சுந்தரராஜ்
Vineesh Sundararaj
S/O: Sundarraj
2/115 A
SOMAIYANUR
Nanjundapuram
Tadagam
Coimbatore Tamil Nadu - 641108
9790297979

Signature valid

உங்கள் ஆதார் எண் / Your Aadhaar No. :
7671 9398 1797
VID : 9172 6764 3429 2059
எனது ஆதார், எனது அடையாளம்

இந்திய அரசாங்கம்
Government of India
வினீஷ் சுந்தரராஜ்
Vineesh Sundararaj
பிறந்த நாள்/DOB: 01/10/1993
ஆண்/ MALE
7671 9398 1797
VID : 9172 6764 3429 2059
எனது ஆதார், எனது அடையாளம்

Government of India
AADHAAR

- அடையாளத்திற்கான சான்று, குடியுரிமைக்கு அல்ல.
- அடையாள சான்றை ஆன்லைன் ஆதார் சேவை மூலமாக பெறவும்.
- இது எலக்ட்ரானிக் செயல்முறை மூலம் தயாரிக்கப்பட்ட கடிதமாகும்.

INFORMATION

- Aadhaar is a proof of identity, not of citizenship.
- To establish identity, authenticate online.
- This is electronically generated letter.

- ஆதார் நாடு முழுவதிலும் செல்லுபடியாகும்.
- வருங்காலத்தில் அரசு மற்றும் அரசு சாரா சேவைகளை பயன்படுத்திக் கொள்ள ஆதார் உதவிகரமாக இருக்கும்.
- Aadhaar is valid throughout the country.
- Aadhaar will be helpful in availing Government and Non-Government services in future.

Unique Identification Authority of India

முகவரி:
S/O: சுந்தரராஜ், 2/115 ஏ, சோமையனூர், நஞ்சுண்டாபுரம், தொகுதி, கோயம்புத்தூர், தமிழ் நாடு - 641108

Address:
S/O: Sundarraj, 2/115 A, SOMAIYANUR, Nanjundapuram, Coimbatore, Tamil Nadu - 641108

7671 9398 1797
VID : 9172 6764 3429 2059

-239- ANNEXURE-IX

Reg. No. 07PGL23011
Col Code 106

No. 2KI 000143

பெரியார் பல்கலைக்கழகம்
Periyar University

Assistant Director
Erode
Geology and Mining

அறிவியல் புலம்
FACULTY OF SCIENCE

பெரியார் பல்கலைக்கழக ஆட்சிக்குழு **2009** ஆம் ஆண்டு **ஏப்ரல்** மாதம் நடந்த **பயன்பாட்டுப்புவியமைப்பியல்** தேர்வில் அரசு கலைக் கல்லூரி, சேலம் - 636 007 (தன்னாட்சி) பயின்ற **G உமாமகேஸ்வரன்** என்பவர் **தனிச்சிறப்புடன் முதல் வகுப்பில்** தேர்ச்சி பெற்றார் என்று தக்க தேர்வாளர்கள் சான்றளித்தபடி **அறிவியல் நிறைஞர்** என்னும் பட்டத்தை அவருக்குப் பல்கலைக்கழக இலச்சினையுடன் வழங்குகிறது.

The Syndicate of the **Periyar University** *hereby makes known that* **UMAMAHESWARAN G** *has been admitted to the* **DEGREE OF MASTER OF SCIENCE in APPLIED GEOLOGY** *he/she having been certified by duly appointed Examiners to be qualified to receive the same and was placed in the* **FIRST CLASS WITH DISTINCTION** *at the Examination held in* **APR-2009** *through* GOVERNMENT ARTS COLLEGE, SALEM - 636 007 (AUTONOMOUS).

Given under the seal of this university

நாள்
Dated 16-04-2010
சேலம் 636011, தமிழ்நாடு, இந்தியா.
Salem 636011, Tamil Nadu, India.

பதிவாளர்
Registrar

துணைவேந்தர்
Vice-Chancellor

IAC. No. 142 / TNGST. No. 27021 61
GST. No. 704529 / SLM / Dt. 7-4-99

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BALAJI MINES

Proprietor : E. SANTHARAMAN,
PURITY LIME STONE SUPPLIERS,
5/88, CHINNAGOLLAPATTI, KANNANKURICHI P. O.
SALEM-636 008. Tamil Nadu.

Assistant Director * Erode * Geology and Mining

Mines : Dever Malai Village, Kulithalai Tk., KARUR Dt. (Via) Karur to Palayam.

Date _____

EXPERIENCE CERTIFICATE

I E.SANTHARAMAN being the Managing Director of BALAJI MINES do hereby certify that Thiru. G.UMAMAHESWARAN, son of P.GOPAL (Whose signature is appended) worked as a Geologist in the above mine from 01.08.2011 to 31.10.2016. During his term of work aforesaid, he has obtained practical experience as detailed overleaf. The duties connected with his work have involved his continuous attendance at the mine, and have been efficiently performed by him.

I believe him to be of good character and a fit and proper person to be examined for Certificate of Competency.

E. Santharaman

(Signature with date and official Seal)

TIN No: 33852702141
CST No: 704529 / 7-4-99
BALAJI MINES
5/88, Chinnagollapatti,
Kannankurichi (P.O), SALEM-8.

G Umamahesh

(Signature of Candidate)

IAC. No. 142 / TNGST. No. 2702141
CST. No. 704529 / SLM / Dt. 7-4-98

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BALAJI MINES
Proprietor : E. SANTHARAMAN,
PURITY LIME STONE SUPPLIERS,
5/88, CHINNAGOLLAPATTI, KANNANKURICHI P
SALEM-636 008. Tamil Nadu.

Assistant Director * Erode * Geology and Mining

Mines : Devar Malai Village, Kulithalai Tk., KARUR Dt. (Via) Karur to Palayam.

Date

Particular of Practical experience	Place of experience	Period of Practical Experience		Total experience		
(a)	(b)	(c)		(e)		
		From	To	Year	Months	Days
Worked as Geologist and it Include Mine Workings, Exploration, Surveying, Drilling & Sampling Quality Control	Open cast Workings	01.08.2011	31.10.2016	05	02	30
Grand Total				05	02	30

AVERAGE MONTHLY OUTPUT (D) / AVERAGE DAILY EMPLOYMENT (e) DURING THE ABOVE PERIOD IS GIVEN BELOW:

In below ground working	In open – cast working	In all
NIL	30	30

E Santharaman

(Signature of Managing Director with date and official Seal)

TIN No: 33852702141
CST No: 704529/7-4-98
Name of the Mine: BALAJI MINES
BALAJI MINES
5/88, Chinnagollapatty,
Kannankurichi (P.O), SALEM-8

Gunanidhy

(Signature of Candidate)

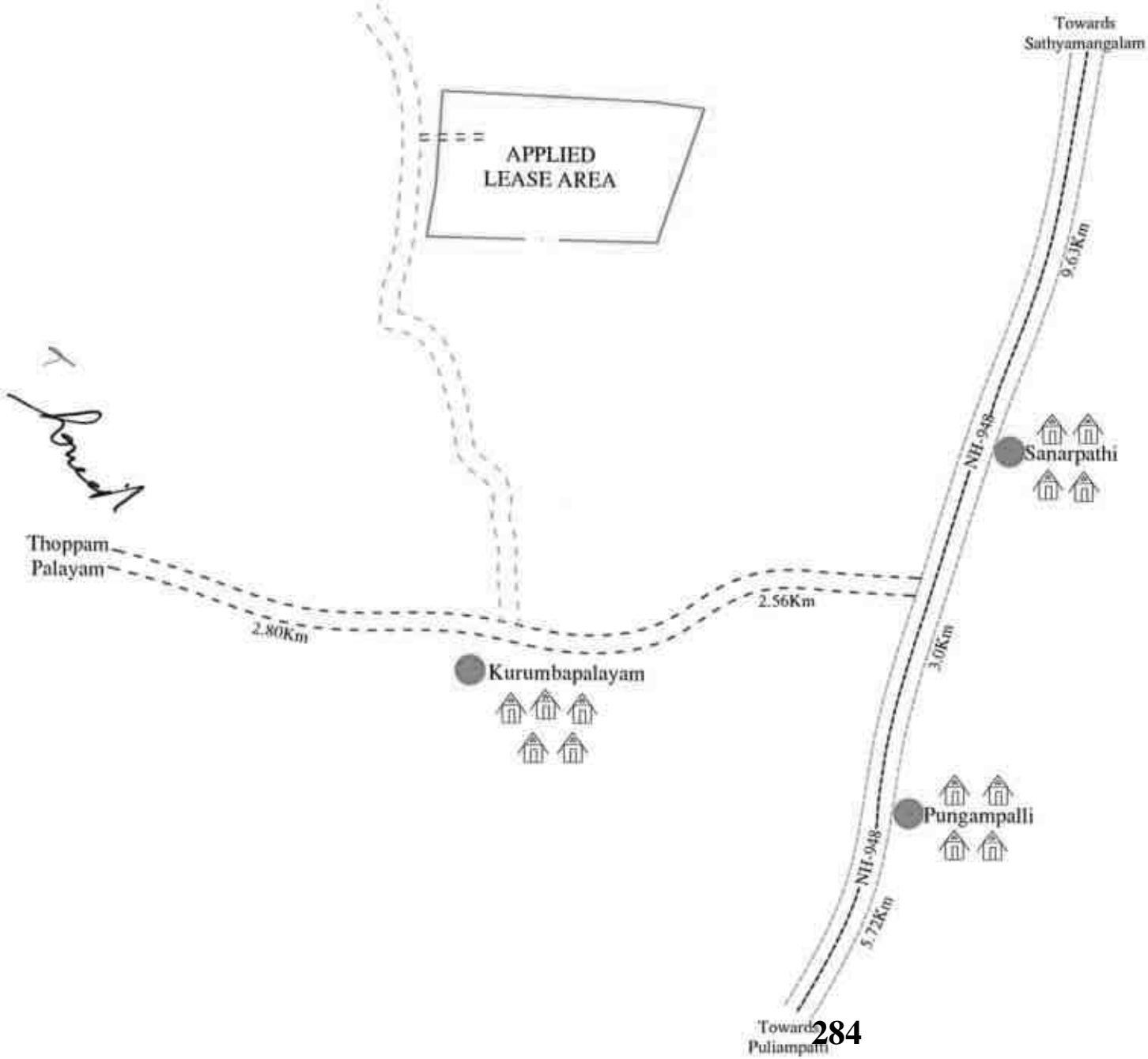


PLATE No-I

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR,
CHINNATADAGAM,
COIMBATORE - 641108.

Assistant Director * Geology and Mining * Erode

LEASE APPLIED AREA:

S.F.No	: 178
EXTENT	: 2.96.5Hect
VILLAGE	: KURUMBAPALAYAM
TALUK	: SATHYAMANGALAM
DISTRICT	: ERODE

INDEX

- MINE LEASE AREA
- APPROACH ROAD
- NH - 948 ROAD
- VILLAGE ROAD
- CART 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

G. UMAMAHESWARAN
QUALIFIED PERSON

-24 S-1

11°25'53.20359"N

77°10'26.66416"E

Assistant Director
Erode
Geology and Mining

N

Hogenakal Falls
Pennagaram
Mahadeswara Hills
Adiyamankottai
Stanley
CHAMRAJNAGAR
B.R Hills
Gundlupet
Mettur
Burgur
Talavadi
Bandipur
Omalur
Taramangalam
Bannari
Mudumalai
Satyamangalam
NILGIRIS
Doda Betta
Gopichettipalayam
Bhavani
Kaveri
Sankagiri
Bhavani Sagar
Kotagiri
Nambiyur
Coonoor
ERODE
Avalanche
Mettupalayam
Perundurai
Karamadai
Avanashi
ERODE
Chennimalai
Marudamalai
Nilambur
Tiruppur
COIMBATORE
Palladam
Kangayam
KARUR
Chettipalayam
Udiyur
Amaravathi
Malampuzha
COIMBATORE
Aravakkurichchi
Dharapuram
PALAKKAD
Pollachi

PLATE No-IA

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

MINE LEASE AREA:

TOPO SHEET NO : 58-E/03

LATITUDE : 11°25'48.65745"N to 11°25'53.20359"N

LONGITUDE : 77°10'26.66416"E to 77°10'35.04812"E

LOCATION PLAN
NOT TO SCALE

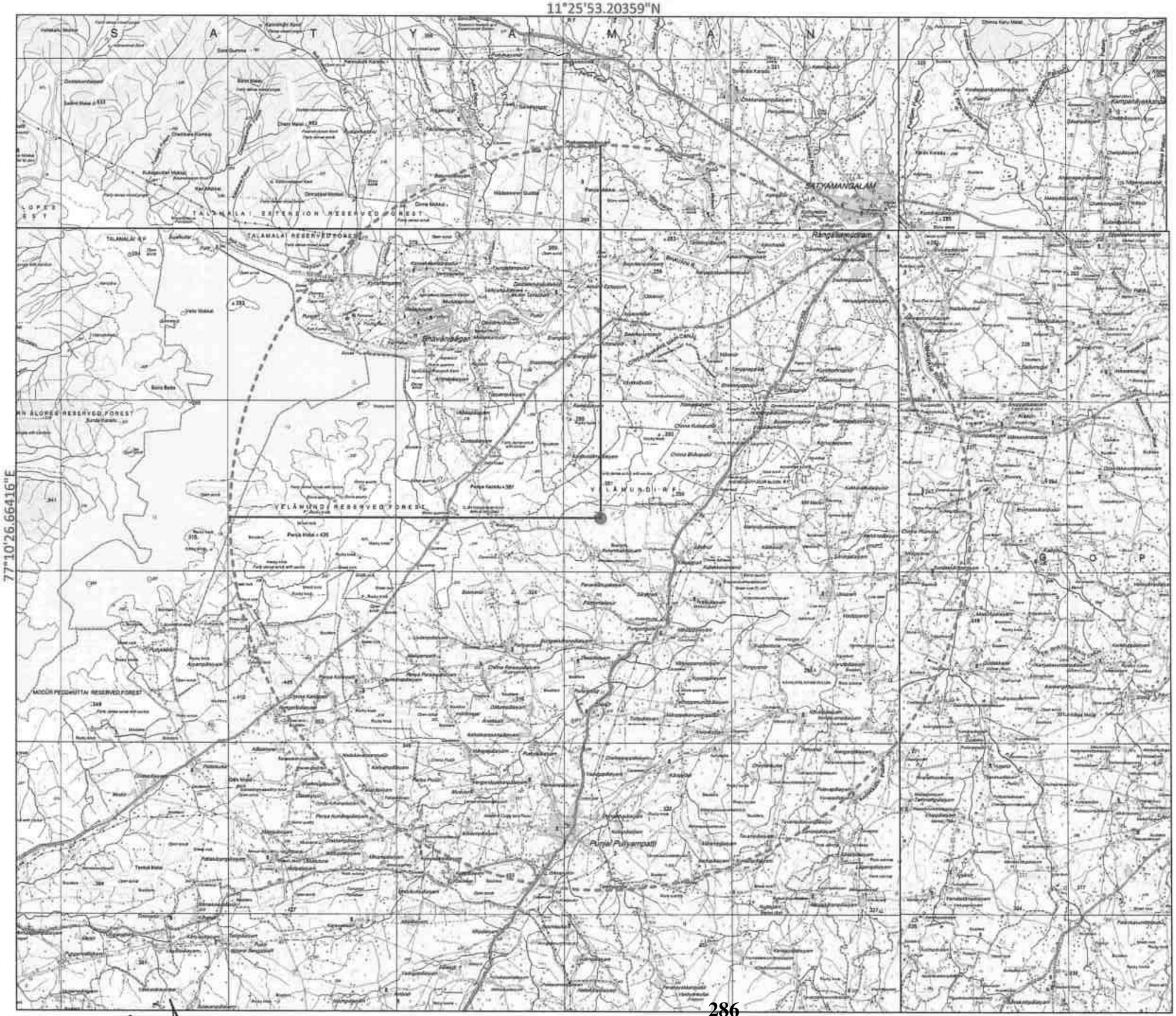
Prepared By:

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

G. UMAMAHESWARAN
QUALIFIED PERSON

11°25'53.20359"N

77°10'26.66416"E



N

Assistant Director
Erode
Geology and Mining

PLATE No-IB

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

TOPO SHEET NO : 58-E/03

LATITUDE : 11°25'48.65745"N to 11°25'53.20359"N

LONGITUDE : 77°10'26.66416"E to 77°10'35.04812"E

MINE LEASE AREA

10KM RADIUS

CONVENTIONAL SYMBOLS

TOPOSHEET MAP

SCALE– 1:1,00,000

Prepared By:

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

G. UMAMAHESWARAN
QUALIFIED PERSON

11°25'53.20359"N

77°10'26.66416"E

N

Assistant Director
Erode
Geology and Mining

PLATE No-IC

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:

S.F.No	: 178
EXTENT	: 2.96.5Hect
VILLAGE	: KURUMBAPALAYAM
TALUK	: SATHYAMANGALAM
DISTRICT	: ERODE

INDEX

MINE LEASE AREA	
APPROACH ROAD	
CART ROAD	
100m RADIUS	
200m RADIUS	
300m RADIUS	
400m RADIUS	
500m RADIUS	
VELAMUNDI R.F	

TOPO SHEET NO : 58-E/03

LATITUDE : 11°25'48.65745"N to 11°25'53.20359"N

LONGITUDE : 77°10'26.66416"E to 77°10'35.04812"E

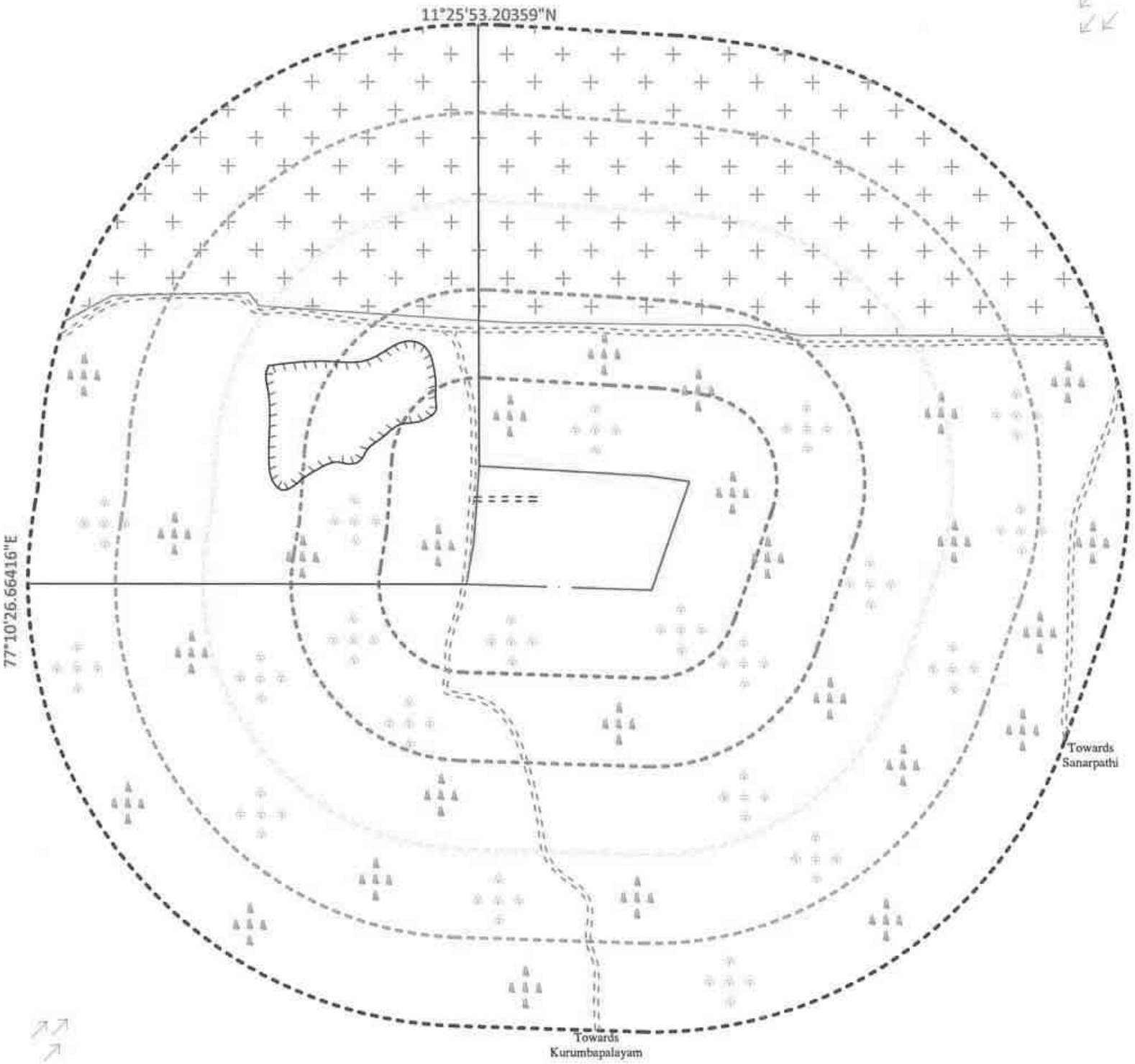
SATELLITE IMAGERY MAP

SCALE – 1:5000

Prepared By:

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

G. UMAMAHESWARAN
QUALIFIED PERSON



N

Assistant Director
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Geology and Mining

PLATE No-ID

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
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CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:

S.F.No	: 178
EXTENT	: 2.96.5Hect
VILLAGE	: KURUMBAPALAYAM
TALUK	: SATHYAMANGALAM
DISTRICT	: ERODE

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- MINE LEASE AREA
- APPROACH ROAD
- CART ROAD
- 100m RADIUS
- 200m RADIUS
- 300m RADIUS
- 400m RADIUS
- 500m RADIUS
- EXISTING QUARRY PIT
- VELAMUNDI R.F
- SHRUBS & TREES

TOPO SHEET NO : 58-E/03

LATITUDE : 11°25'48.65745"N to 11°25'53.20359"N

LONGITUDE : 77°10'26.66416"E to 77°10'35.04812"E

ENVIRONMENTAL PLAN

SCALE– 1:5000

Prepared By:

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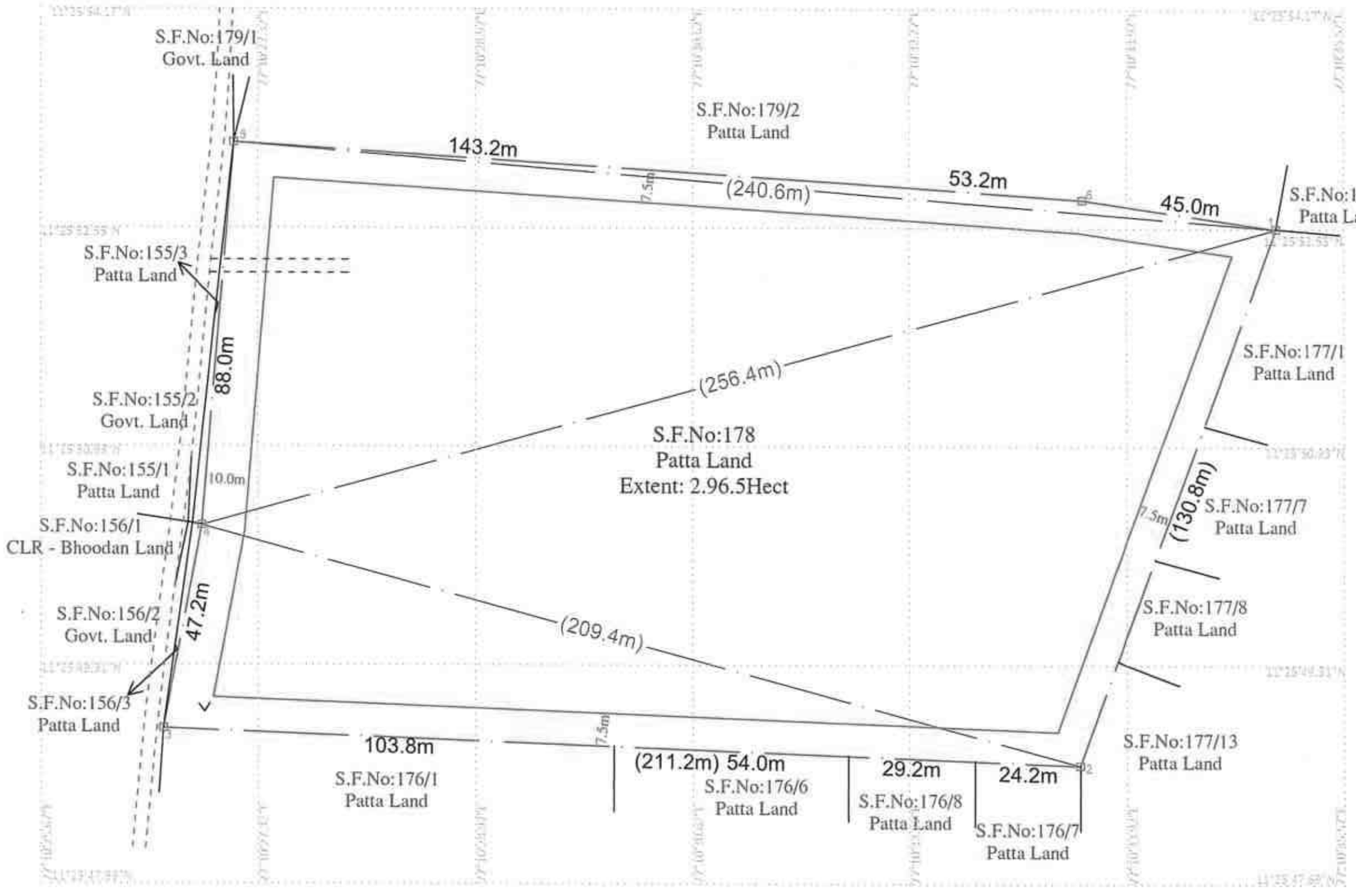
G. UMAMAHESWARAN
QUALIFIED PERSON



N

Assistant Director
Erode
Geology and Mining

PLATE No-II

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

QUARRY LEASE APPLIED AREA
SAFETY AREA
CART AND APPROACH ROAD
BOUNDARY PILLAR STONES

PILLAR No	LATITUDE	LONGITUDE
1	11°25'52.66538"N	77°10'35.04812"E
2	11°25'48.65745"N	77°10'33.61684"E
3	11°25'48.83956"N	77°10'26.66416"E
4	11°25'50.34902"N	77°10'26.93753"E
5	11°25'53.20359"N	77°10'27.08801"E
6	11°25'52.86053"N	77°10'33.57957"E

MINE LEASE PLAN
SCALE- 1:1000

Prepared By:
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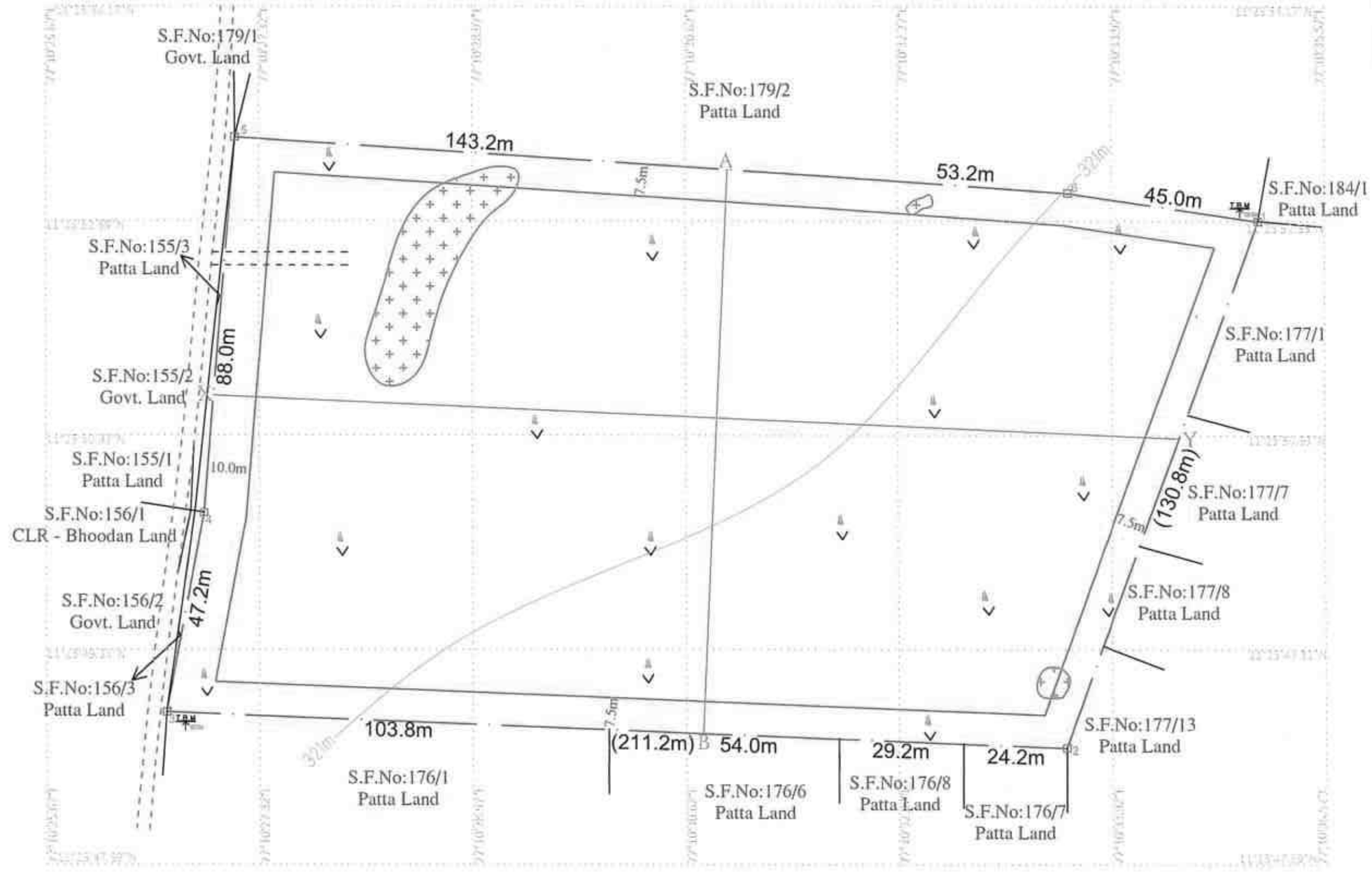
G. UMAMAHESWARAN,
QUALIFIED PERSON



Assistant Director
Erode
Geology and Mining

PLATE No-III

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

- QUARRY LEASE APPLIED AREA
- SAFETY AREA
- CART & APPROACH ROAD
- BOUNDARY PILLAR STONES
- OUT CROP
- GRAVEL & SHRUBS
- CONTOUR LINES
- TEMPORARY BENCH MARKS

SURFACE & GEOLOGICAL PLAN
SCALE- 1:1000

Prepared By:
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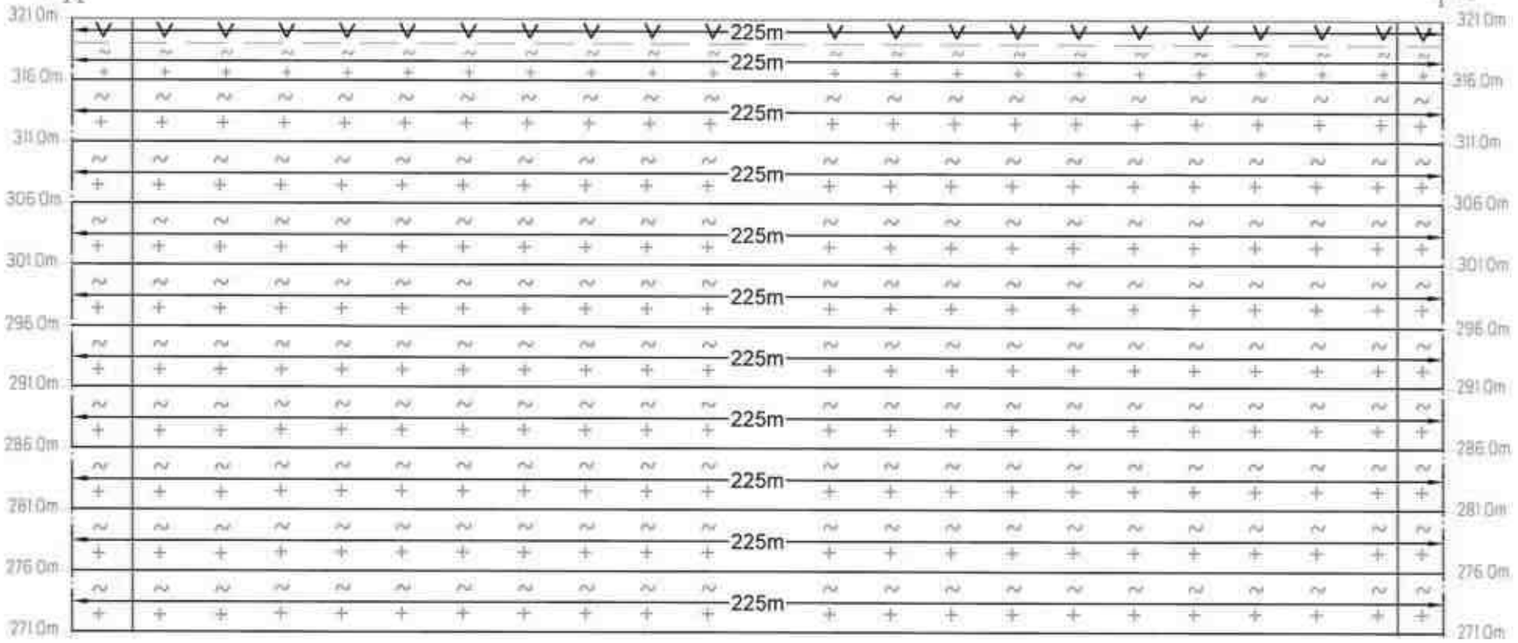
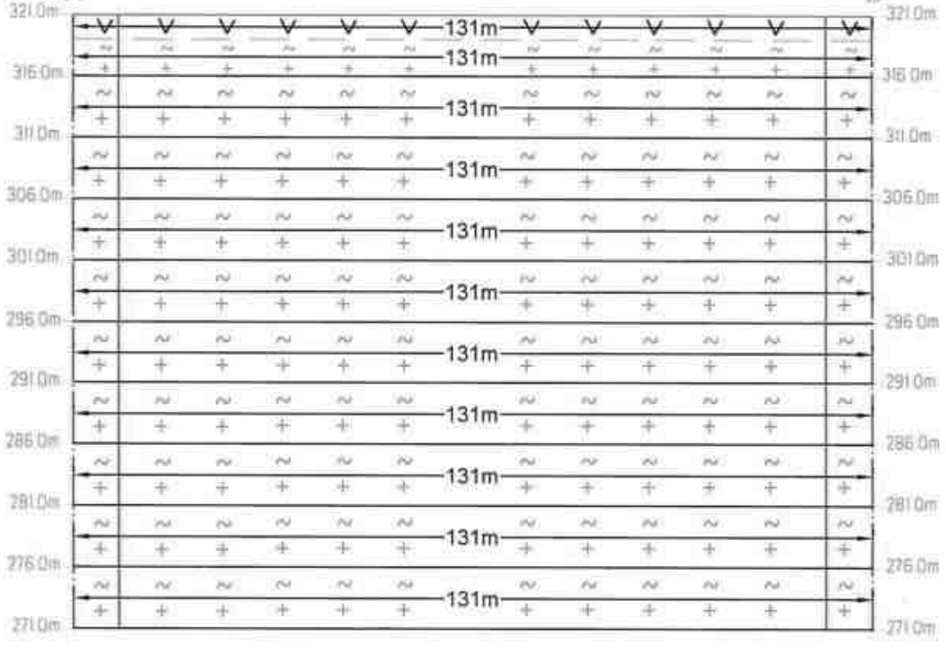
G. UMAMAHESWARAN,
QUALIFIED PERSON

SECTION ALONG X–Y



SECTION ALONG A–B



GEOLOGICAL RESOURCES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m^3	Rough Stone in m^3	Gravel in m^3
XY-AB	I	225	131	2	58950	.....	58950
	I	225	131	3	88425	88425	.....
	II	225	131	5	147375	147375	.....
	III	225	131	5	147375	147375	.....
	IV	225	131	5	147375	147375	.....
	V	225	131	5	147375	147375	.....
	VI	225	131	5	147375	147375	.....
	VII	225	131	5	147375	147375	.....
	VIII	225	131	5	147375	147375	.....
	IX	225	131	5	147375	147375	.....
	X	225	131	5	147375	147375	.....
TOTAL				**50**	**1473750**	**1414800**	**58950**

Assistant Director * Geology and Mining * Erode

PLATE No-IIIA

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

GEOLOGICAL SECTIONS

SECTION HOR 1 : 1000 & VER 1: 500

Prepared By:

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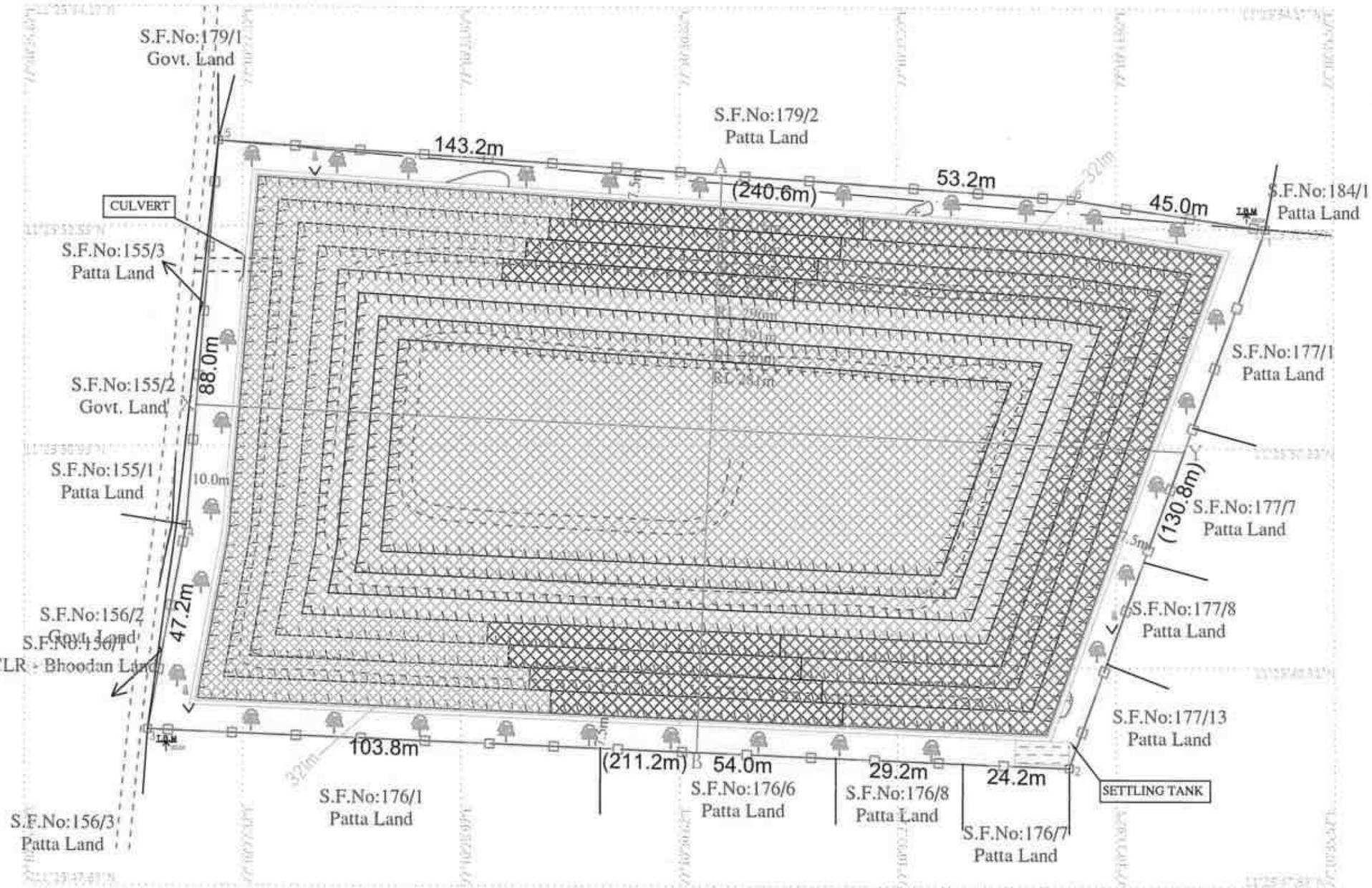
G. UMAMAHESWARAN,
QUALIFIED PERSON



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

N

Assistant Director
Geology and Mining
Erode

PLATE No-IV

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:

S.F.No	: 178
EXTENT	: 2.96.5Hect
VILLAGE	: KURUMBAPALAYAM
TALUK	: SATHYAMANGALAM
DISTRICT	: ERODE

INDEX

- QUARRY LEASE APPLIED AREA
- SAFETY AREA
- CART,APPROACH & QUARRY ROAD
- BOUNDARY PILLAR STONES
- GRAVEL & SHRUBS
- TEMPORARY BENCH MARKS
- CONTOUR LINES
- CULVERT
- PROPOSED BENCH
- FENCING
- DRAINAGE & SETTLING TANK
- OUT CROP

YEARWISE DEVELOPMENT & PRODUCTION PLAN

PLAN SCALE 1: 1000

Prepared By:

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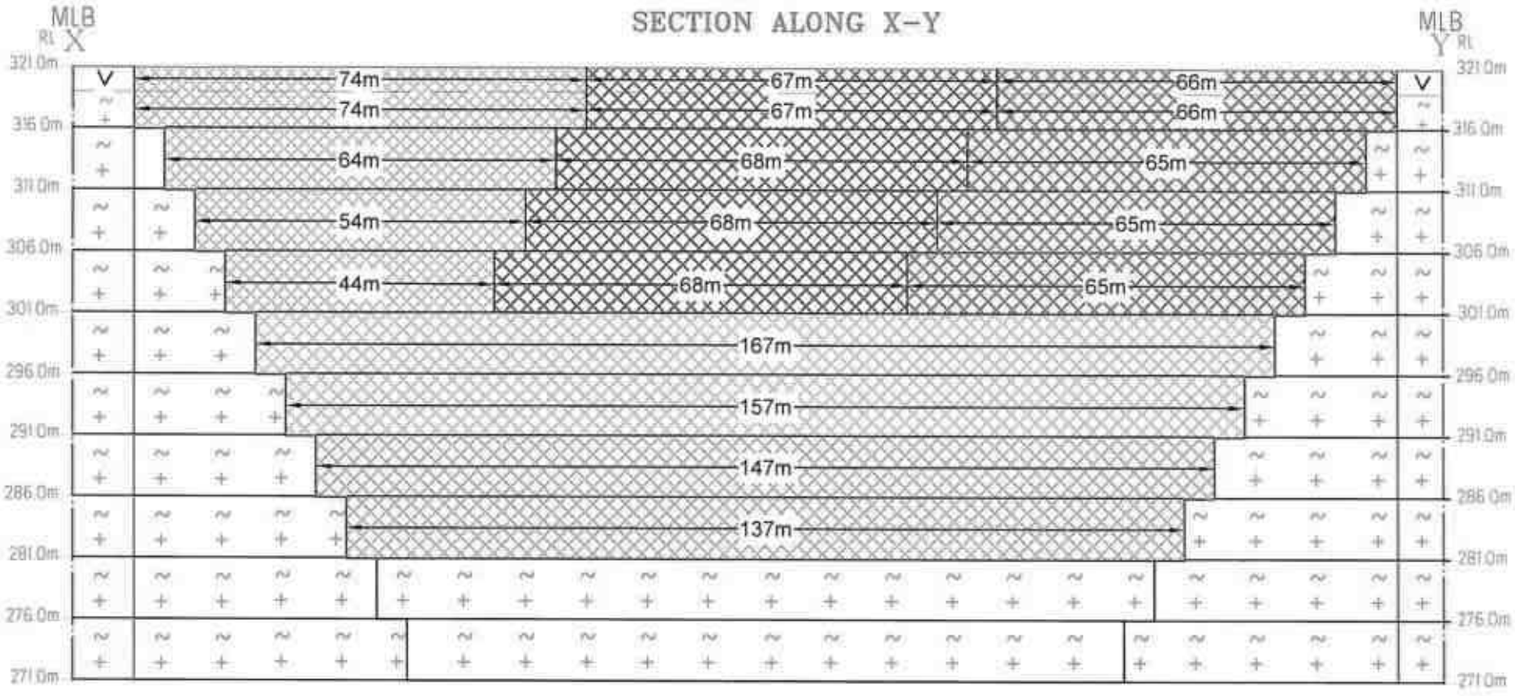
G. UMAMAHESWARAN,
QUALIFIED PERSON

SECTION ALONG X–Y



I - Year Proposed area to be Quarried

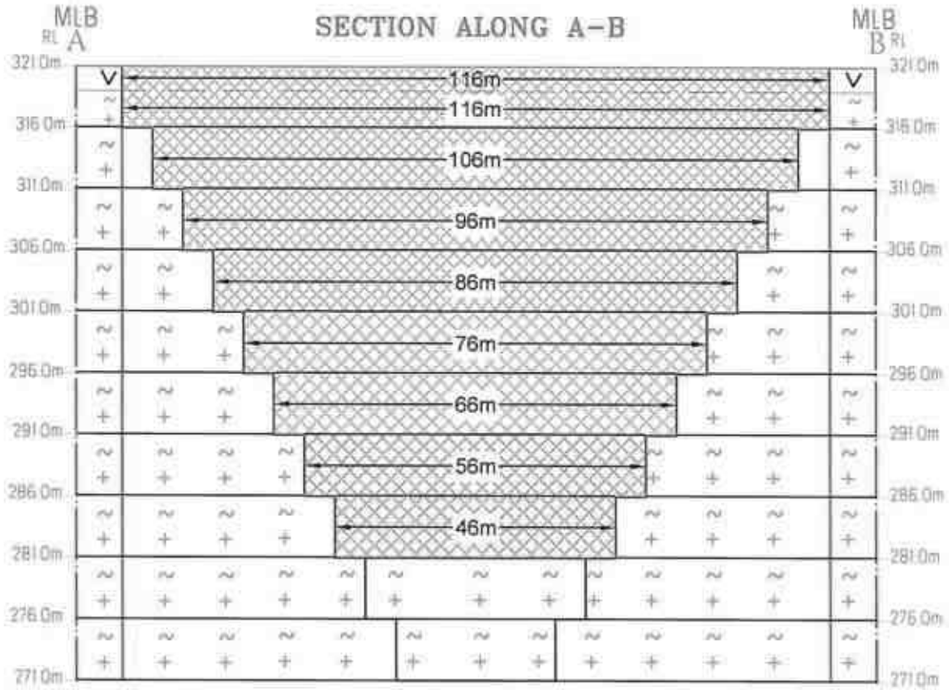
II - Year Proposed area to be Quarried

III - Year Proposed area to be Quarried

IV - Year Proposed area to be Quarried

V - Year Proposed area to be Quarried

SECTION ALONG A–B



YEARWISE PRODUCTIONS

Year	Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m^3	Rough Stone in m^3	Gravel in m^3
I-YEAR	XY-AB	I	74	116	2	17168	.....	17168
		I	74	116	3	25752	25752	.....
		II	64	106	5	33920	33920	.....
		III	54	96	5	25920	25920	.....
		IV	44	86	5	18920	18920	.....
TOTAL						**121680**	**104512**	**17168**
II-YEAR	XY-AB	I	67	116	2	15544	.....	15544
		I	67	116	3	23316	23316	.....
		II	68	106	5	36040	36040	.....
		III	68	96	5	32640	32640	.....
		IV	68	86	5	29240	29240	.....
TOTAL						**136780**	**121236**	**15544**
III-YEAR	XY-AB	I	66	116	2	15312	.....	15312
		I	66	116	3	22968	22968	.....
		II	65	106	5	34450	34450	.....
		III	65	96	5	31200	31200	.....
		IV	65	86	5	27950	27950	.....
TOTAL						**131880**	**116568**	**15312**
IV-YEAR	XY-AB	V	167	76	5	63460	63460	.....
		VI	157	66	5	51810	51810	.....
TOTAL						**115270**	**115270**	**0**
V-YEAR	XY-AB	VII	147	56	5	41160	41160	.....
		VIII	137	46	5	31510	31510	.....
TOTAL						**72670**	**72670**	**0**
GRAND TOTAL						**578280**	**530256**	**48024**

PLATE No-IVA

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

PROPOSED BENCH

ULTIMATE BENCH

YEARWISE DEVELOPMENT & PRODUCTION SECTIONS
SECTION HOR 1 : 1000 & VER 1: 500

Prepared By:

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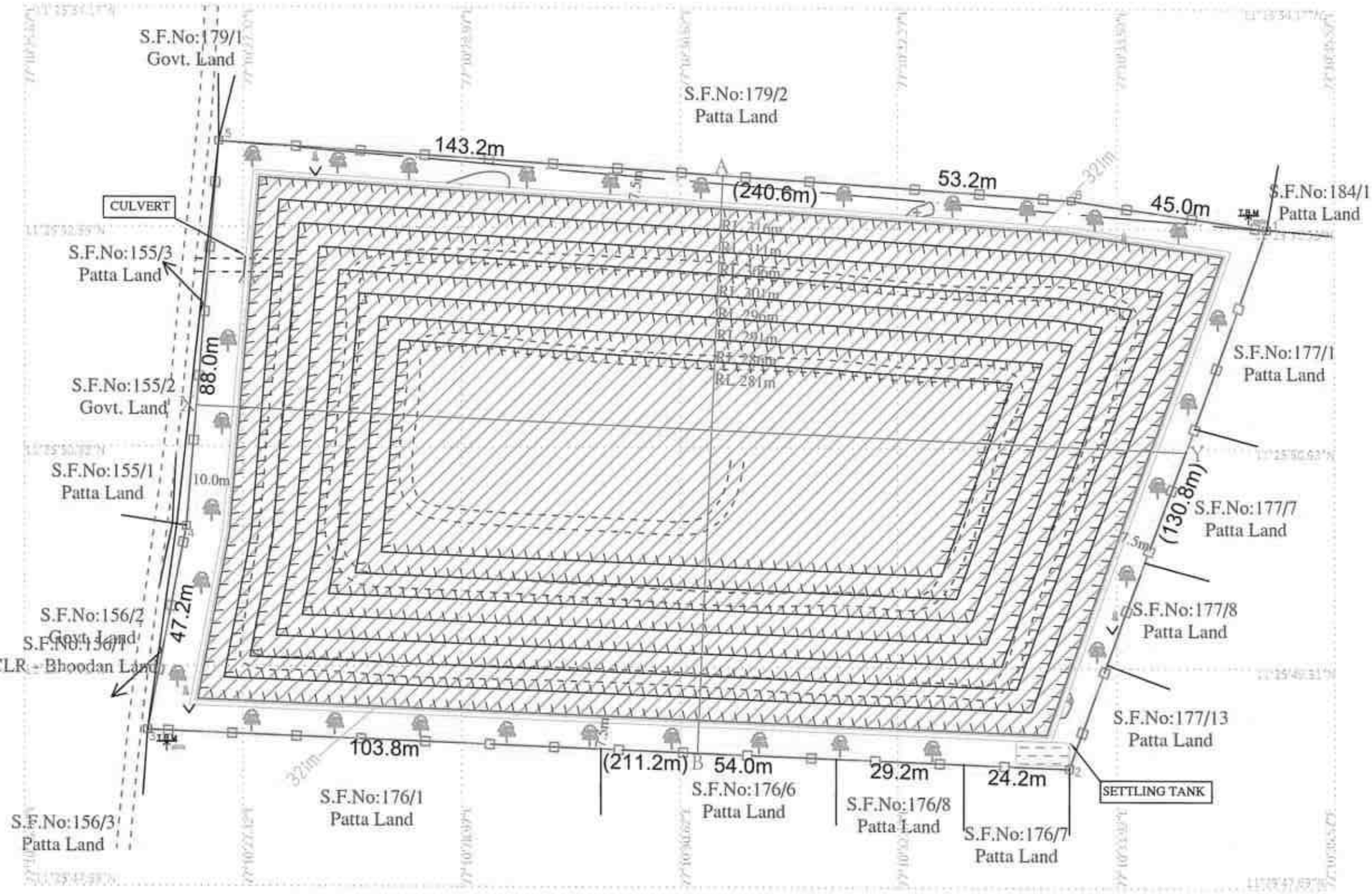
G. UMAMAHESWARAN,
QUALIFIED PERSON



I - Year Proposed area to be Planted

MINE LAYOUT LAND USE PATTERN

DESCRIPTION	PRESENT AREA (Hect)	AREA IN USE DURING THE QUARRYING PERIOD(Hect)	COLOR CODE
AREA UNDER QUARRYING	NIL	2.41.96	
INFRASTRUCTURE	NIL	0.03.00	
ROADS	NIL	0.05.00	
GREEN BELT & DUMP	NIL	0.39.64	
DRAINAGE & SETTLING TANK	NIL	0.06.90	
UN-UTILIZED AREA	2.96.50	NIL	NIL
GRAND TOTAL	2.96.50	2.96.50	NIL

N

Assistant Director * Geology and Mining * Erode

PLATE No-V

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

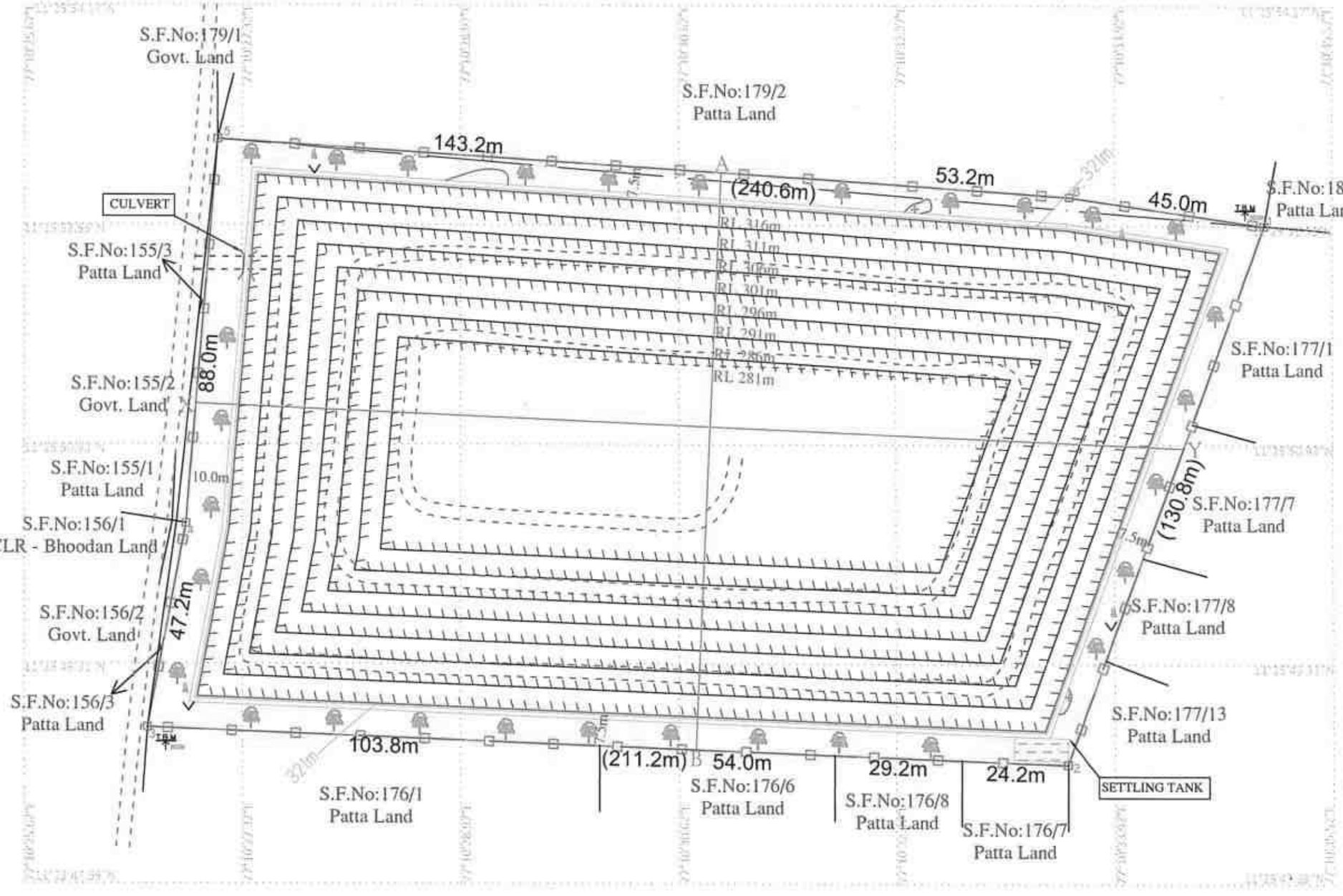
- QUARRY LEASE APPLIED AREA
- SAFETY AREA
- CART,APPROACH & QUARRY ROAD
- BOUNDARY PILLAR STONES
- GRAVEL & SHRUBS
- TEMPORARY BENCH MARKS
- CONTOUR LINES
- CULVERT
- PROPOSED BENCH
- FENCING
- DRAINAGE & SETTLING TANK
- OUT CROP

MINE LAYOUT PLAN AND LAND USE PATTERN
SCALE 1 : 1000

Prepared By:

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

G. UMAMAHESWARAN,
QUALIFIED PERSON



N

Assistant Director
Erode
Geology and Mining

PLATE No-VI

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

- QUARRY LEASE APPLIED AREA
- SAFETY AREA
- CART,APPROACH & QUARRY ROAD
- BOUNDARY PILLAR STONES
- GRAVEL & SHRUBS
- TEMPORARY BENCH MARKS
- CONTOUR LINES
- CULVERT
- PROPOSED BENCH
- FENCING
- DRAINAGE & SETTLING TANK
- OUT CROP

PROGRESSIVE MINE CLOSURE PLAN

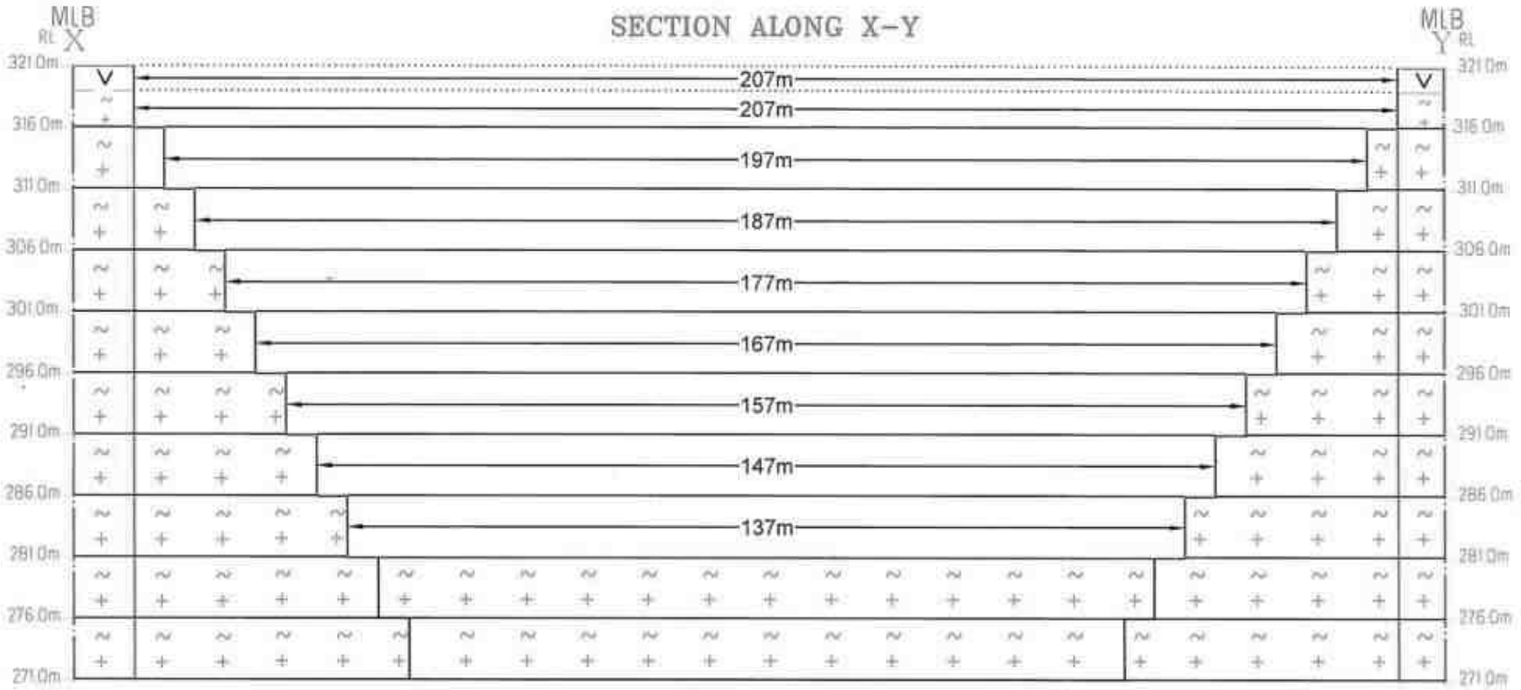
PLAN SCALE 1: 1000

Prepared By:

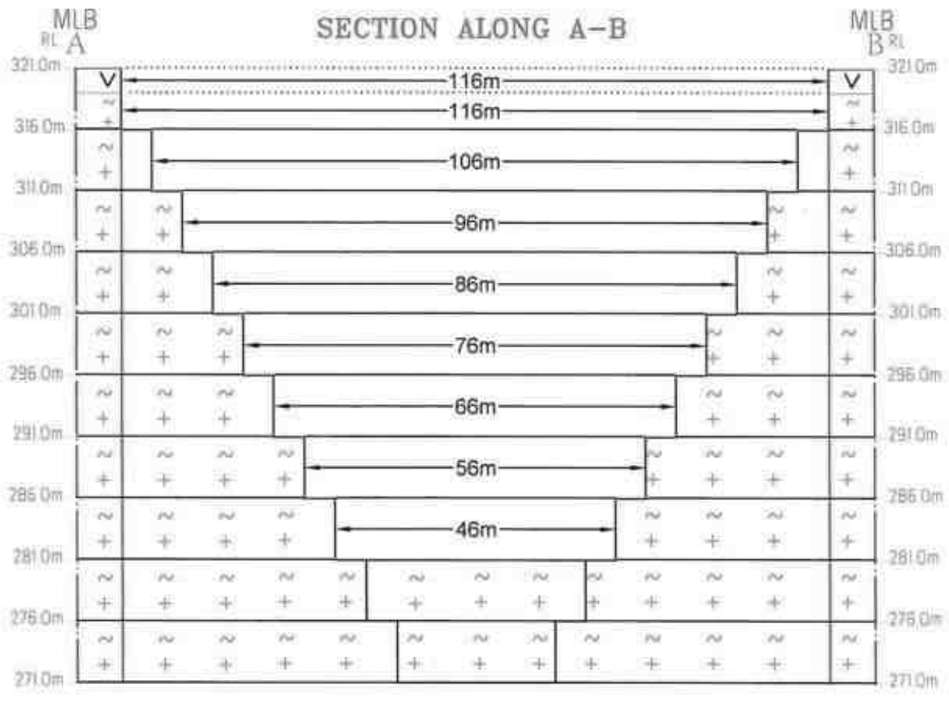
I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

G. UMAMAHESWARAN,
QUALIFIED PERSON

SECTION ALONG X–Y



SECTION ALONG A–B



PRODUCTION RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m^3	Rough Stone in m^3	Gravel in m^3
XY-AB	I	207	116	2	48024	.....	48024
	I	207	116	3	72036	72036	.....
	II	197	106	5	104410	104410	.....
	III	187	96	5	89760	89760	.....
	IV	177	86	5	76110	76110	.....
	V	167	76	5	63460	63460	.....
	VI	157	66	5	51810	51810	.....
	VII	147	56	5	41160	41160	.....
	VIII	137	46	5	31510	31510	.....
TOTAL					**578280**	**530256**	**48024**

N

Assistant Director * Geology and Mining * Erode

PLATE No-VIA

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

- MINE LEASE BOUNDARY
- SAFETY BOUNDARY
- GRAVEL
- ROUGH STONE
- PROPOSED BENCH
- ULTIMATE BENCH

PROGRESSIVE MINE CLOSURE SECTIONS
SECTION HOR 1 : 1000 & VER 1: 500

Prepared By:

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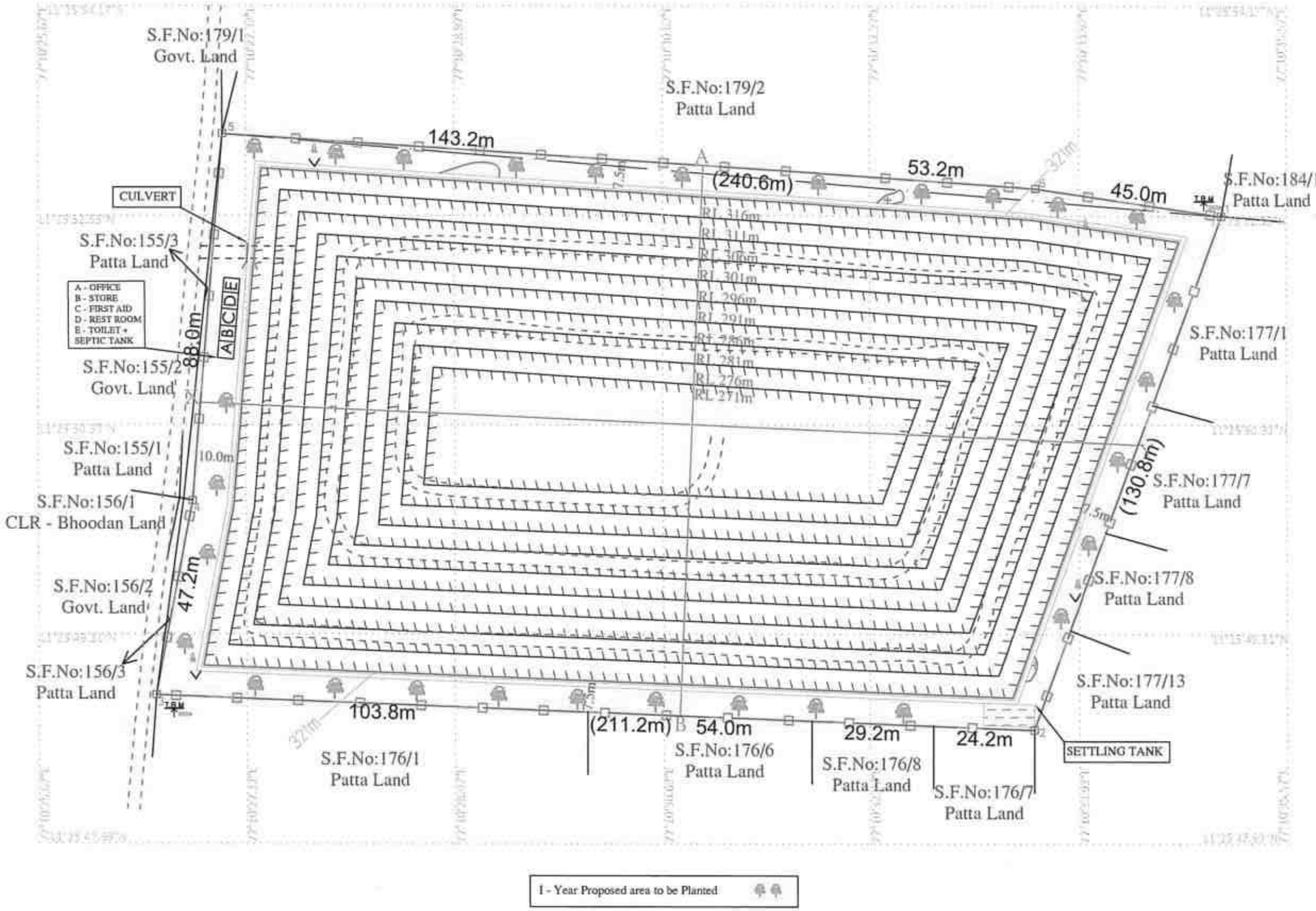
G. UMAMAHESWARAN,
QUALIFIED PERSON



N

Assistant Director
Geology and Mining
Erode

PLATE No-VII

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:

S.F.No	: 178
EXTENT	: 2.96.5Hect
VILLAGE	: KURUMBAPALAYAM
TALUK	: SATHYAMANGALAM
DISTRICT	: ERODE

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- QUARRY LEASE APPLIED AREA
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- GRAVEL & SHRUBS
- TEMPORARY BENCH MARKS
- CONTOUR LINES
- CULVERT
- ULTIMATE BENCH
- FENCING
- DRAINAGE & SETTLING TANK
- OUT CROP

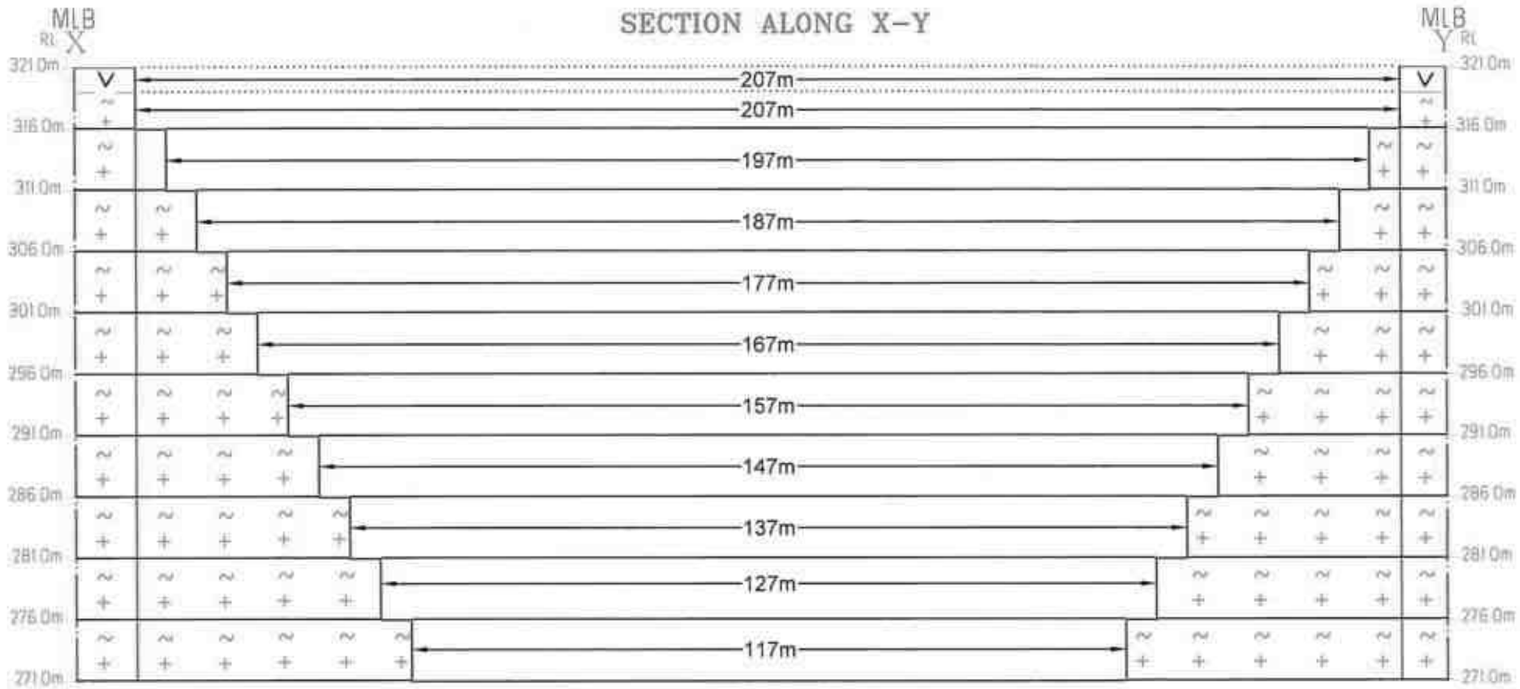
CONCEPTUAL PLAN
PLAN SCALE 1: 1000

Prepared By:

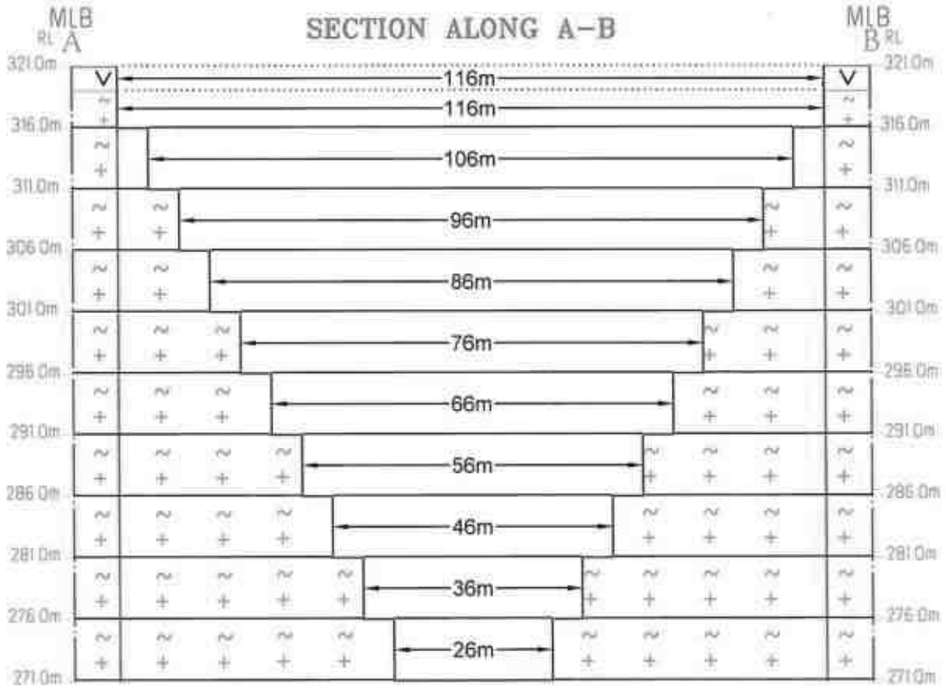
I DO HEREBY CERTIFY THAT THE PLATE HAS BEEN CHECKED BY ME AND IS CORRECT TO THE BEST OF MY KNOWLEDGE

G. UMAMAHESWARAN,
QUALIFIED PERSON

SECTION ALONG X–Y



SECTION ALONG A–B



MINEABLE RESERVES

Section	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in m^3	Rough Stone in m^3	Gravel in m^3
XY-AB	I	207	116	2	48024	.....	48024
	I	207	116	3	72036	72036	.....
	II	197	106	5	104410	104410	.....
	III	187	96	5	89760	89760	.....
	IV	177	86	5	76110	76110	.....
	V	167	76	5	63460	63460	.....
	VI	157	66	5	51810	51810	.....
	VII	147	56	5	41160	41160	.....
	VIII	137	46	5	31510	31510	.....
	IX	127	36	5	22860	22860	.....
	X	117	26	5	15210	15210	.....
TOTAL					**616350**	**568326**	**48024**

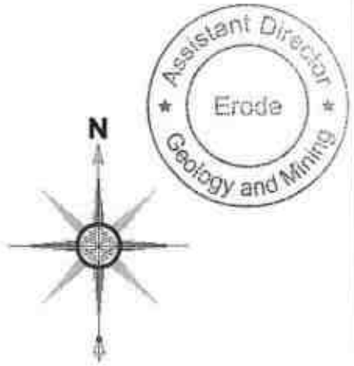


PLATE No-VIIA

APPLICANT:
Mr.S.VINEESH,
S/o. SUNDARARAJ,
115A, SOMAIYANUR
CHINNATADAGAM,
COIMBATORE - 641108.

LEASE APPLIED AREA:
S.F.No : 178
EXTENT : 2.96.5Hect
VILLAGE : KURUMBAPALAYAM
TALUK : SATHYAMANGALAM
DISTRICT : ERODE

INDEX

MINE LEASE BOUNDARY

SAFETY BOUNDARY

GRAVEL

ROUGH STONE

ULTIMATE BENCH

CONCEPTUAL SECTIONS
SECTION HOR 1 : 1000 & VER 1: 500

Prepared By:

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

G. UMAMAHESWARAN,
QUALIFIED PERSON

Annexure IV

கோயமுத்தூர் மாவட்டம், கோயமுத்தூர் வடக்கு வட்டம், நத்தக்கண்டாபுரம், சோலையப்பர், கதவு எண் 2/115A என்ற முகவரியில் வசித்துவரும் திரு. சந்தரராஜ் மகன் திரு. S. வினோத் என்பவர்க்கு சத்தியமங்கலம் வட்டம் கரும்பபாளையம் கிராமம் புல எண் 155/3, 156/3, 178 களைகளில் H. வை 2.99.00 பாத்தியப்பட்டு அனுபவத்தில் உள்ளது. மேற்படி புலஎண்களுக்கான பட்டா எண் 1538 ஆகும். மேற்படி புலஎண்கள் 155/3, 156/3, 178 - H. வை 2.99.00 ஏர்ஸ் நிலத்தைச் சுற்றிலும் 300 மீட்டர் சுற்றளவில் குடியிருப்புகள், கோயில்கள், பள்ளிக்கூடம் ஏதும் இல்லை என சான்றளிக்கப்படுகிறது.

14/06/2024.

கிராம நிருவாக அலுவலர்
44. கரும்பபாளையம்.
45. விண்ணப்பள்ளி.
சத்தியமங்கலம் வட்டம்.

தமிழ்நாடு வனத்துறை

Annexure V

☎ 04295 – 220312
Email-dfosathyamangalam@gmail.com

அனுப்புநர்:

திரு.குலால் யோகேஷ் விலாஷ், இ.வ.ப.,
துணை இயக்குநர்,
சத்தியமங்கலம் வனக்கோட்டம்,
சத்தியமங்கலம் புலிகள் காப்பகம்,
சத்தியமங்கலம் – 638 402.

பெறுநர்:

உதவி இயக்குநர்,
புவியியல் மற்றும் சுரங்கத்துறை,
ஈரோடு.

ந.க.எண்.6148/2024/வ, நாள்: 17–12–2024

ஐயா,

பொருள் : வனம் – கனிமங்களும் சுரங்கங்களும் – ஈரோடு மாவட்டம் – சத்தியமங்கலம் வட்டம் – குரும்பபாளையம் கிராமம் புல எண்.178 பட்டா நிலத்தில் 2.96.50 ஹெக்டர் பரப்பளவில் சாதாரண கற்கள் மற்றும் கிராவல் மண்களை வெட்டி எடுக்க 10 ஆண்டுகளுக்கு குவாரி குத்தகை உரிமம் கோரி திரு.சு.வினீஸ், த/பெ.சுந்தரராஜ் என்பவரால் விண்ணப்பம் சமர்ப்பிக்கப்பட்டது – தொடர்பாக.

பார்வை 1 துணை இயக்குநர், புவியியல் மற்றும் சுரங்கத்துறை, ஈரோடு ந.க.எண்.717/கனிமம்/2023 நாள்.28.06.2024
2 துணை இயக்குநர், சத்தியமங்கலம் வனக்கோட்டம் ந.க.எண்.61480/2024/வ நாள்.19.07.2024
3 வனச்சரக அலுவலர், விளாமுண்டி வனச்சரகம். ந.க.எண்.242/2024 நாள்.10.10.2024

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மேற்காண் பொருள் தொடர்பாக, பார்வை–1ல் கண்ட கடிதத்தின்படி ஈரோடு மாவட்டம் – சத்தியமங்கலம் வட்டம் – குரும்பபாளையம் கிராமம் புல எண்.178 பட்டா நிலத்தில் 2.96.50 ஹெக்டர் பரப்பளவில் சாதாரண கற்கள் மற்றும் கிராவல் மண்களை வெட்டி எடுக்க 10 ஆண்டுகளுக்கு குவாரி குத்தகை உரிமம் எடுக்க குவாரி அமைய உள்ள பகுதியிலிருந்து சத்தியமங்கலம் புலிகள் காப்பகம் காப்புக்காடு, பாதுகாக்கப்பட்ட பகுதி மற்றும் சுற்றுச்சூழல் உணர்திறன் பகுதி, புலிகள் காப்பகம் தொலைவு விபரம் கேட்கப்பட்டது தொடர்பாக, மேற்படி இடத்தினை களத்தணிக்கை மேற்கொண்டதில் குவாரி அமைக்கப்பட உள்ள இடமானது பின்வரும் விபரப்படி அமைந்துள்ளது.

வ. எண்.	காப்புக்காட்டின் விபரம்	இடைப்பட்ட தெலைவு விபரம்
1	விளாமுண்டி காப்புக்காடு, விளாமுண்டி பிரிவு, விளாமுண்டி கிழக்கு காவல்சுற்று நூற்றியெட்டு குமரன் கோவில் சராக எல்லையிலிருந்து உள்ள தொலைவு	172 மீட்டர்
2	சத்தியமங்கலம் புலிகள் காப்பகம், சத்தியமங்கலம் வனக்கோட்டம், பவானிசாகர் வனச்சரகம், கொத்தமங்கலம் பிரிவு, கொத்தமங்கலம் காவல்சுற்று எல்லையிலிருந்து உள்ள தொலைவு	8.79 கிலோ மீட்டர்
3	சத்தியமங்கலம் புலிகள் காப்பக சூழல் உணர்திறன் மண்டலத்தின் (Eco Sensitive Zone) வன எல்லையிலிருந்து உள்ள தொலைவு	7.79 கிலோ மீட்டர்

மேலும் கல்குவாரி குத்தகை உரிமம் கோரும் இடமானது சத்தியமங்கலம் புலிகள் காப்பகம் (ECO Sensitive Zone) சூழல் உணர்திறன் மண்டலத்திலிருந்து வெளியில் உள்ளது மற்றும் யானை மற்றும் பிற வன உயிரினங்கள கடக்கும் வலசை பாதையில் அமையவில்லை என்பதை தெரிவித்துக்கொள்கிறேன். மேற்படி கல் குவாரி அமையவுள்ள இடத்திலிருந்து சுமார் 25 கி.மீ தொலைவிற்குட்பட்ட பாதுகாக்கப்பட்ட பகுதி, சரணாலயங்கள் பறவைகள் சரணாலயங்கள் விபரங்கள் பின்வருமாறு அமைந்துள்ளது.

வ.எண்.	வனக்கோட்டம்	வனச்சரகம்	காப்புக்காட்டின் பெயர்	புலிகள் காப்பகம் / காப்புக்காடு பெயர்
1.	சத்தியமங்கலம்	விளாமுண்டி	விளாமுண்டி காப்புக்காடு	—
2.			நீலகிரி கிழக்கு சரிவு காப்புக்காடு	சத்தியமங்கலம் புலிகள் காப்பகம்
3.	சத்தியமங்கலம்	பவானிசாகர்	தலமலை காப்புக்காடு	சத்தியமங்கலம் புலிகள் காப்பகம்
4.			குத்தியாலத்தூர் காப்புக்காடு	சத்தியமங்கலம் புலிகள் காப்பகம்
5.			தலமலை விரிவாக்க காப்புக்காடு	சத்தியமங்கலம் புலிகள் காப்பகம்
6.	சத்தியமங்கலம்	சத்தியமங்கலம்	குத்தியாலத்தூர் காப்புக்காடு	சத்தியமங்கலம் புலிகள் காப்பகம்
7.	கோவை	சிறுமுகை	மோதூர் பெத்திக்குட்டை காப்புக்காடு	காப்புக்காடு
8.			நீலகிரி கிழக்கு சரிவு காப்புக்காடு	காப்புக்காடு
9.	மசினக்குடி	தெங்குமரஹடா	நீலகிரி கிழக்கு சரிவு காப்புக்காடு	முதுமலை புலிகள் காப்பகம்

மேலும் கல்குவாரி குத்தகை உரிமம் கோரும் இடத்திற்கு அனுமதி வழங்கும் பட்சத்தில் பின்வரும் நிபந்தனைகளை பின்பற்ற தெரிவிக்குமாறு கேட்டுகொள்ளபடுகிறது.

- மேலும் கல்குவாரி குத்தகை உரிமம் கோரும் இடத்தினை சுற்றி தமிழ்நாடு மின்வேலிகள் (பதிவு மற்றும் ஒழுங்குமுறை) விதிகள்–2023 –ன் படி அனுமதி பெற்று மின்வேலிகள் அமைக்கப்பட வேண்டும்.
- குவாரி பொருட்கள் எடுத்து செல்லும் போது சம்மந்தப்பட்ட வாகனத்தின் மீது முறையாக தூசி பறக்கா வண்ணம் மூடப்பட்டு எடுத்துச்செல்ல வேண்டும்

ஒம்/–குலால் போகேஷ் விலாஷ்,
துணை இயக்குநர்,
சத்தியமங்கலம் வனக்கோட்டம்.

நகல்: வனச்சரக அலுவலர், விளாமுண்டி வனச்சரகம்.

/ உண்மைநகல் / உத்திரவுப்படி /
வரைதொழில் அலுவலர்

Annexure VI

HYDROGEOLOGICAL REPORT

for

Rough stone Quarry Over an

extent of 2.96.5ha, S.F.No. 178,

Kurumbapalayam Village, Sathyamangalam Taluk,

Erode District, Tamilnadu.

HYDROGEOLOGICAL REPORT FOR KURUMBAPALAYAM ROUGH STONE QUARRY

1. INTRODUCTION

Name of the Applicant	**:**	**Mr. S. Vineesh**
Address	**:**	S/o. Sundararaj, 115A, Somaiyanur, Chinnatadagam, Coimbatore-641108.

Study Area Details

Land Classification	:	Patta Land
Survey Numbers	:	178
Extent in Heaters	:	2.96.5ha
Village	:	Kurumbapalayam
Taluk	:	Sathyamangalam
District	:	Erode
State	:	Tamil Nadu

The Client requires detailed information on Ground Water Occurrences at Proposed Project Site. The objective of the present study is to assess the availability of groundwater and comment on aspects of depth to potential aquifers, aquifer availability and type, possible yields and water quality. For this purpose, all available hydrogeological information of the areas has been analysed, and a geophysical survey was done.

The investigations involved hydrogeological, geophysical field investigations and a detailed study in which the available relevant geological and hydrogeological data were collected, analysed, collated and evaluated within the context of the Client's requirements. The data sources consulted were mainly:

a. Central Ground Water Board (CGWB) Data
b. State & District Geological and Hydrogeological Reports and Maps.
c. Technical reports of the area by various organizations.

2. SCOPE OF THE WORKS

The scope of works includes:

- Site visits to familiarize with the project areas. Identify any issues that might impact the Ground Water Scenario due to proposed mining activities.

- ❖ To obtain, study and synthesize background information including the geology, hydrogeology and existing borehole data, for the purpose of improving the quality of assessment and preparing comprehensive hydrogeological reports,
- ❖ To carry out hydrogeological evaluation and geophysical investigations in the selected sites in order to determine potential for groundwater at project site.
- ❖ To prepare hydrogeological survey reports in conformity with the provisions of the rules and procedure outlined by the Central Ground Water Board (CGWB), by Assessment of water quality and potential infringement of National standards, Assessment of availability of groundwater and Impact of proposed activity on aquifer, water quality and other abstractors.

3. GEOGRAPHICAL INFORMATION

Location

The investigated site falls in the Toposheet No: 58-E/03 Latitude between 11°25'48.65745"N to 11°25'53.20359"N and Longitude between 77°10'26.66416"E to 77°10'35.04812"E on WGS datum-1984.

4. Geomorphology

The Erode district forms part of the uplands of the state. Physiographically the district can be divided into hilly area, the upland area and plains area. The prominent geomorphic units identified in the district 1) Structural hills, 2) Inselberg, 3) Ridges, 4) Valley fill, 5) Pediments, 6) Shallow Pediments,

The hilly area is represented by the Western Ghats in the north western part of the district, the Biligiri Rangan hills in the north, Bodamalai Betta hills in the north western parts and Konbattarayan hills in the north central part of the district. Konbattarayan hill (1699 m above MSL) is the highest peak in the district while Moyar Gorge is a picturesque gorge in the Western Ghats through which Moyar river traverses.

The Kongunadu uplands lie south of Bhavani river and the Lower Bhavani canal passes through these uplands. Scattered hillocks and knolls of moderate elevations occur within these uplands. The plains area is characterised by an undulating topography with a general gradient due east and southeast. The plains are limited tothe east and southwestern border of the district. The plains west of Cauvery river are known as Lower Cauvery plains.

Soils

The soils of Erode district can be broadly classified into 6 major soils types viz., Red calcareous soil, Red non calcareous soil, Black Soil, Alluvial and Colluvial soils, Brown soil and Forest soil. Major part of the district covered by red calcareous soils.

They are mostly sandy to loamy and characterised by the hard and compact layer of lime. The red non-calcareous soils are seen in Erode, Perunthurai and Gopichettioalayam taluks. The black soils are occurring as patches in four taluks. Brown soil occupies only a small portion of Bhavani, Kangayam and Gopichettipalayam taluks. Alluvial soils are fund in small patches along the Noyil and Bhavani rivers and the Colluvial soils are found in the foothills of Western Ghats. Forest soil is confined to the reserve forest area in north western part of the district, where a surface layer of organic matter is present.

Rainfalls

The district receives the rain under the influence of both southwest and northeast monsoons. The northeast monsoon chiefly contributes to the rainfall in the district. The southwest monsoon is also reasonable. During the winter and hot seasons, the rainfall is scanty.

The normal annual rainfall over the district varies from about 575 mm to about 833mm. It is the minimum in the southern and south eastern parts of the district around Kodumudi (575.3 mm) Mulanur (581.0 mm) and Dharapuram (593.0 mm. It gradually increases towards north and northwest and reaches a maximum around Talavadi (833 mm).

Climate

The western part of the Erode district enjoys a salubrious climate because of the hilly region, whereas the central and eastern parts of the district are hot and humid. The cooler and pleasant climate prevails in the hilly regions. The weather is extremely pleasant during the period from November to February both in the plains and on the hills. Mornings in general are more humid than the afternoons. The relative humidity varies from 65 to 87 percent during the northeast monsoon period between October and November.

The hot weather begins early in March, the highest temperature being reached in April and May. Highest temperatures are recorded during the months of April and May with temperatures reaching 40°C. The weather in the plains during the summer i.e., from

April to June is generally dry and hot. Weather cools down progressively from about the middle of June and by December. The night temperatures are the lowest in the hills.

GEOLOGY

The rock types exposed in the erode district can be broadly grouped as

1) Granulite group of rocks

2) Migmatite Complex
3) Sathyamangalam Schist Complex
4) Peninsular Gneissic Complex
5) Alkali Complex
6) Acid Intrusive
7) Quaternary Alluvium.

The Granulite group of rocks comprise of Calc Granulite, Quartzite of Khondalite group, Charnockite, Pyroxene Granulite, Pyroxenite of Charnockite group, Migmatite gneiss, and Meta gabbro. Charnockite occurs as a major rock type in the northern part and as thin bands and enclaves in the southern part of the district. Quartzite and Calc Granulite, Pyroxene Granulite, Migmatite Gneiss occurs as thin bands and enclaves.

Hornblende gneiss, Gametiferous - Quartzo Feldspathic gneiss and granite are the important rock types of Migmatite Complex, of which, hornblende gneissoccupies the major part of the District, particularly in southern part andnorthwesten part. Garnetiferous quartzo feldspathic gneiss is located near BhavaniSagar reservoir and north of Anthiyur.

The Sathyamangalam Group includes fuchsite Quanrtzite, schistose-quartzite, sillimanite quartzite, ferruginous Quanrtzite, talc-tremolite / Actinolite schist / hornblende schist, Amphibolite and Gabbro anorthosite and Pyroxenite. Schistose rocks occur as enclaves near Sathyamangalam, west of Chennimalai. Quartzite occurs as thin beds near Kavilanattam, west of Chennimalai, Amphibolite occur as enclaves near Sathyamangalam, Gobi and around Perudnurai. A north site, Pyroxenite occurs as WSW-ENE trending bands in fissile hornblende gneiss of PGC (Bhavani Group) which occupies the ventral part of the district.

Granite bodies are located in the central part of the district around Punjai Puliyampatti and west of Erode. Quaternary fluvial deposits are restricted to the river beds of Cauveri, Noyyil, Amaravathi and Bhavani rivers.

The plains show a large number of ultramafic bodies along the E-W Bhavani lineament. WNW-ESE to NW-SE trending dykes is a common feature. The Cauveri River which has a NNE-SSW trending straight course between Mettur and Bhavani is considered to represent a major lineament, probably a deep seated fault zone.

The general E-W to ENE-WSW course of the Bhavani River flowing at the foot of the hills indicates a major lineament, probably a deep-seated fault zone.

The Moyyar - Bhavani, Noyyil - Cauveri lineaments belong to the NNW-SSE to E-W system. The Mettur fault is a NNE-SSW system. The N-S to NNE-SSW trending dykes show clear truncation against the E-W Bhavani lineament.

Stratigraphy of Erode district

Lithology	Group	Age
Soil Alluvium		Holocene
Laterite		
Kankar		
Granite	Acid intrusive	Proterozoic
Dolerite dyke / Meta dolerite / Basic intrusive		
Nephelene syenite Corrundum syenite	Alkaline complex	
Pink migmatite	Penninsular gneissic complex (Bhavani)	Proterozoic to Archaen
Fisshile Hornblende biotite gneiss		
Gabbro, anorthosite, pyroxenite	Sathyamangalam Group	
Amphibolite		
Talc - tremolite / Acitionite schist /Hornblende schist		
Fuchsite quartzite, schistose quartzite, Sillimanite quartzite, ferruginous quartzite		
Hornblende biotite gneiss	Migmatite Complex	Archaean
Gametiferous - Quartzofedspathicgneiss		
Metagabbo phrozenite	Charnockite Group	
Magnetite quartzite		
Pyroxene granulite		
Charnockite		
Calc granulite		
Quartzite Anorthosite located in wellcuttings	Khondalite Group	

3.2.3.1 Groundwater Levels and Flow Direction

Data regarding depth to groundwater levels are essential to infer the direction of groundwater movement within the study area. Knowledge of groundwater flow direction is must in choosing location for background groundwater quality monitoring well and in locating recharge and discharge areas. Therefore, data regarding groundwater elevations were collected

from 4 open wells and 8 bore wells at various locations within 1 km radius around the proposed project sites for the period from October through December 2024.

The open well water level data thus collected onsite are provided in Table. According to the data, average depths to the static water table in open wells range from 11.20 to 12.57m BGL in the study period. The bore well data thus collected onsite are provided in Tables. The average depths to static potentiometric surface in bore wells for the period of October through December vary from 53.89 to 55.14m BGL. Data on the depths to static water table and potentiometric surface were used to draw contour lines connecting groundwater elevation (also known as equipotential hydraulic head) to determine the groundwater flow direction perpendicular to the contour lines. 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.

Water Level of Open Wells within 1 km Radius

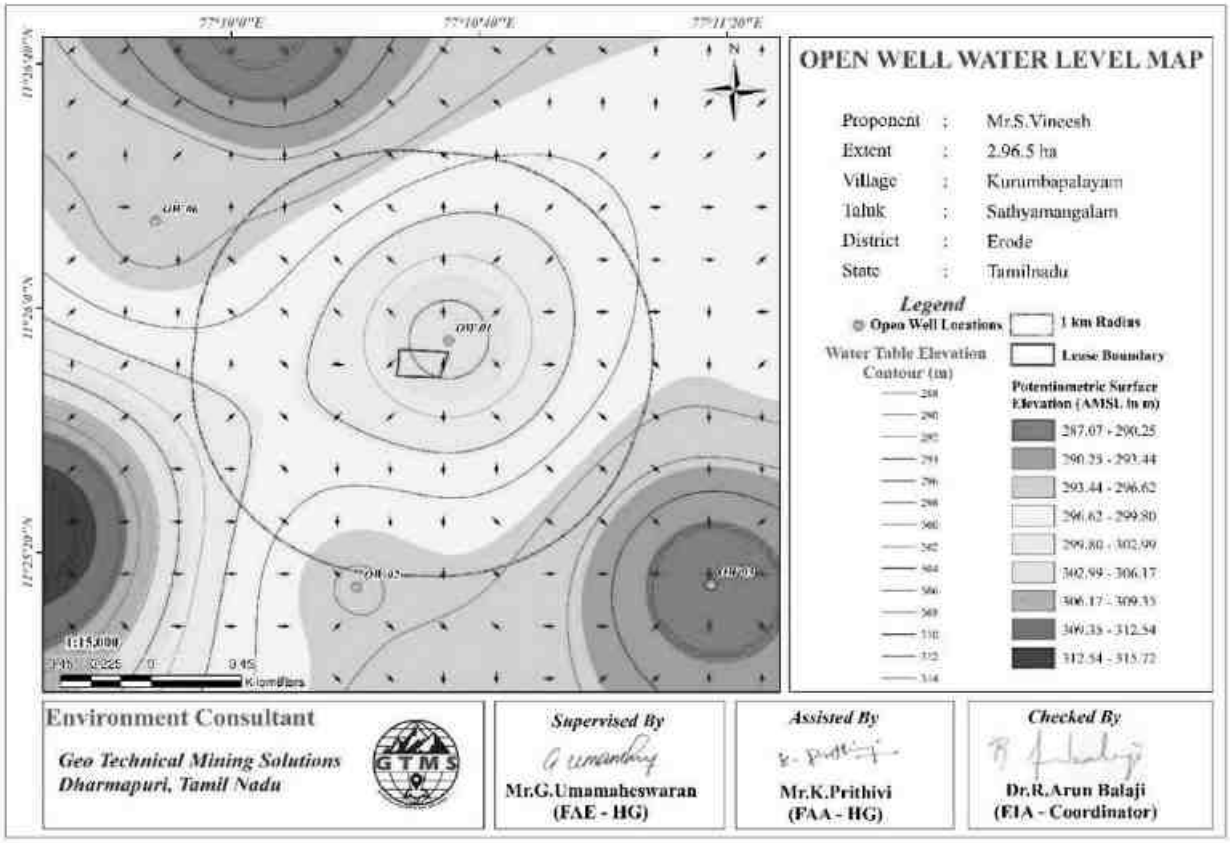
Station ID	Depth to Static Water Table BGL(m)				Latitude	Longitude
	Oct-2024	Nov- 2024	Dec-2024	Average		
OW01	12.37	11.88	9.35	11.20	11°25'54.68"N	77°10'35.05"E
OW02	13.65	12.55	10.11	12.10	11°25'14.35"N	77°10'20.21"E
OW03	14.85	12.62	10.25	12.57	11°25'14.77"N	77°11'17.39"E
OW06	12.65	11.42	10.08	11.38	11°26'14.15"N	77° 9'47.72"E

Source: Onsite monitoring data

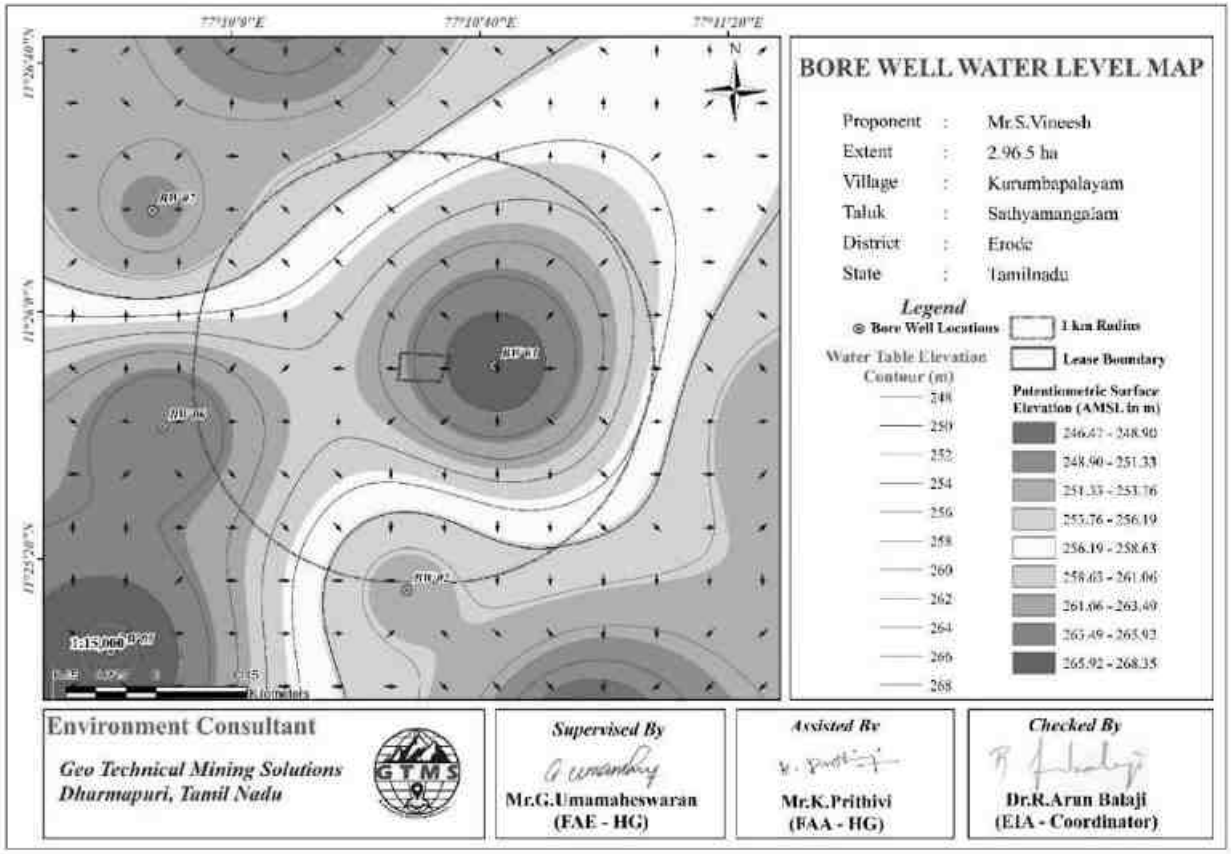
Water Level of Bore Wells within 1 km Radius

Station ID	Depth to Static Potentiometric Surface BGL(m)				Latitude	Longitude
	Oct-2024	Nov-2024	Dec-2024	Average		
BW01	58.85	55.12	51.45	55.14	11°25'51.21"N	77°10'42.43"E
BW02	57.33	53.22	51.12	53.89	11°25'14.91"N	77°10'28.18"E
BW06	58.23	55.58	51.56	55.12	11°25'41.29"N	77° 9'48.73"E
BW07	56.98	53.98	51.32	54.09	11°26'16.21"N	77° 9'47.11"E

Source: Onsite monitoring data



Open Well Static Showing Direction of water Flow



Borewell Static Showing Direction of water Flow

5. GEOPHYSICAL INVESTIGATION METHODS

A variety of methods are available to assist in the assessment of geological sub surface conditions. The main emphasis of the fieldwork undertaken was to determine the thickness and composition of the sub-surface formations and to identify water-bearing zones. This information was principally obtained in the field using, and vertical electrical soundings (VES). The VES probes the resistivity layering below the site of measurement. This method is described below.

Resistivity Method

Vertical electrical soundings (VES) were carried out to probe the condition of the sub surface and to confirm the existence of deep groundwater. The VES investigates the resistivity layering below the site of measurement.

Basic Principles

The electrical properties of rocks in the upper part of the earth's crust are dependent upon the lithology, porosity, and the degree of pore space saturation and the salinity of the pore water. Saturated rocks have lower resistivity than unsaturated and dry rocks. The higher the porosity of the saturated rock, or the higher the salinity of the saturating fluids, the lower is the resistivity. The presence of clays and conductive minerals also reduces the resistivity of the rock.

The resistivity of earth materials can be studied by measuring the electrical potential distribution produced at the earth's surface by an electric current that is passed through the earth. Current is moved through the subsurface from one current electrode to the other and the potential difference is recorded as the current passes. From this information, resistivity values of various layers are acquired and layer thickness can be identified.

The apparent resistivity values determined are plotted as a log function versus the log of the spacing between the electrodes. These plotted curves identify thickness of layers. If there are multiple layers (more than 2), the acquired data is compared to a master curve to determine layer thickness.

This method is least influenced by lateral in-homogeneities and capable of providing higher depth of investigation.

The resistance R of a certain material is directly proportional to its length L and cross sectional area A, expressed as:

$$R = Rs * L/A \text{ (in Ohm)}$$

Where Rs is known as the specific resistivity (characteristic of the material and independent of its shape or size)

With Ohm's Law,

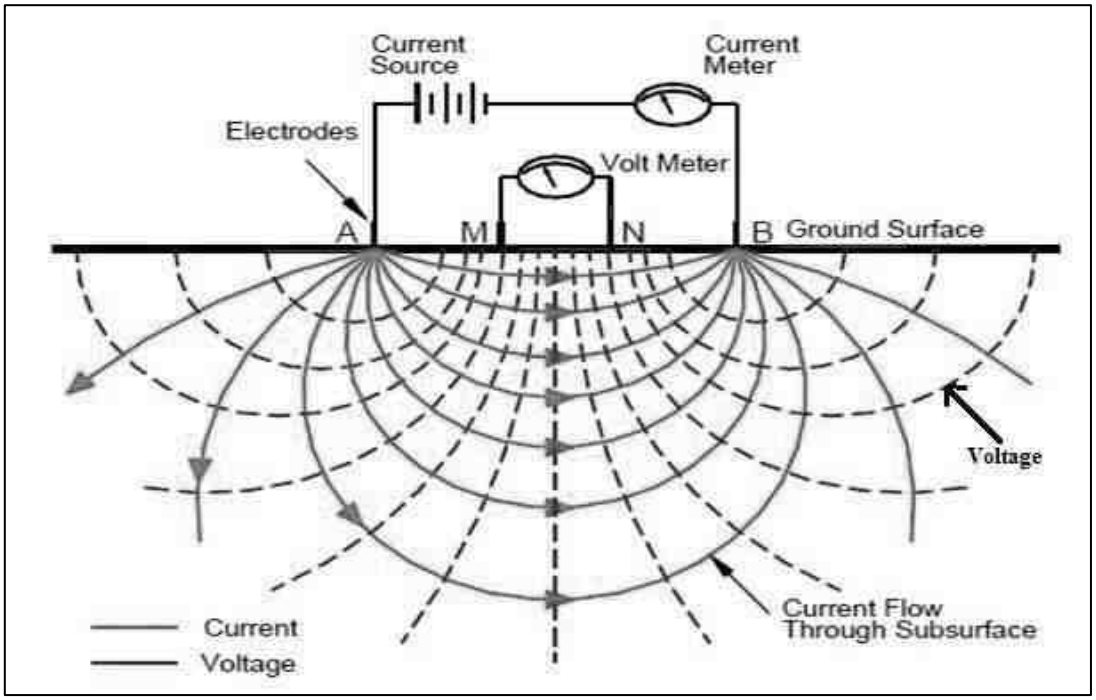
$$R = dV/I \text{ (Ohm)}$$

Where dV is the potential difference across the resistor and I is the electric current through the resistor. The specific resistivity may be determined by:

$$Rs = (A/L) * (dV/I) \text{ (in Ohm m)}$$

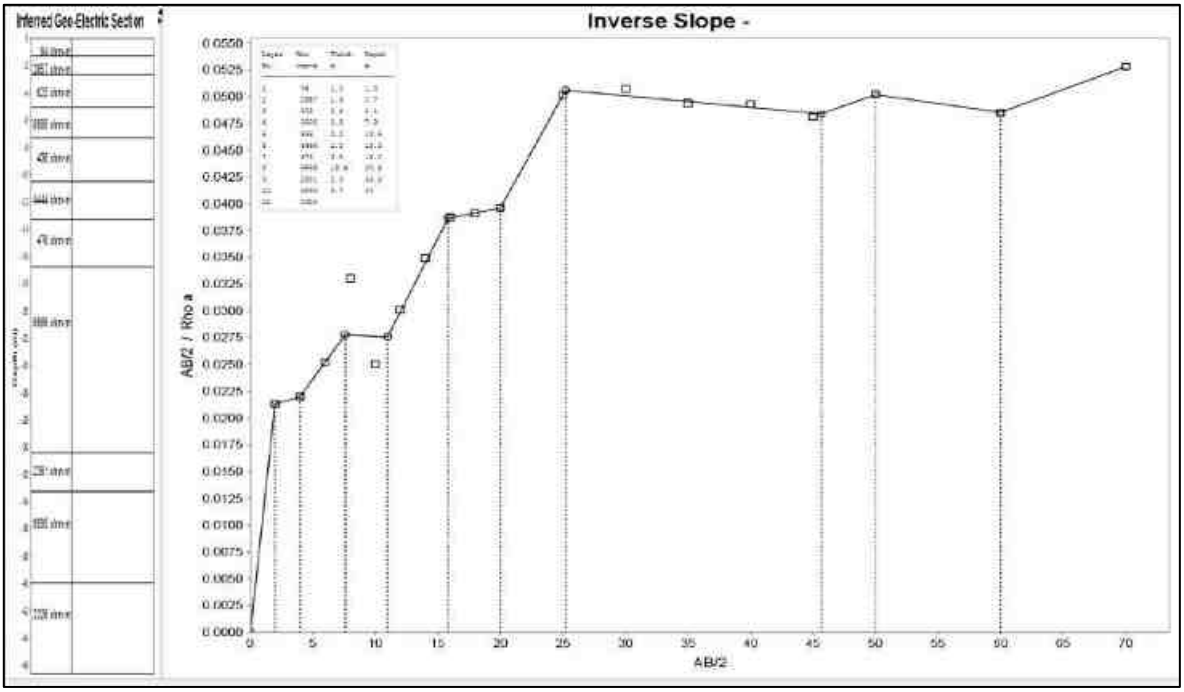
Vertical Electrical Sounding (VES)

When carrying out a resistivity sounding, current is led into the ground by means of two electrodes. With two other electrodes, situated near the center of the array, the potential field generated by the current is measured. From the observations of the current strength and the potential difference, and taking into account the electrode separations, the ground resistivity can be determined. During a resistivity sounding, the separation between the electrodes is step-wise increased (known as a Schlumberger Array), thus causing the flow of current to penetrate greater depths. When plotting the observed resistivity values against depth on double logarithmic paper, a resistivity graph is formed, which depicts the variation of resistivity with depth. This graph can be interpreted with the aid of a computer, and the actual resistivity layering of the subsoil is obtained. The depths and resistivity values provide the hydro geologist with information on the geological layering and thus the occurrence of groundwater.



Vertical Electrical Sounding Data

Location Coordinates - 11°25'50.88"N 77°10'28.73"E					
S. No.	AB/2 (m)	MN/2 (m)	Geometrical Factor (G)	Resistance in Ω	Apparent Resistivity in Ωm
1	2	1	4.71	19.91	93.90
2	4	1	23.57	7.71	181.91
3	6	1	55.00	4.33	238.61
4	8	1	99.00	2.45	243.40
5	10	2	75.43	5.38	406.18
6	12	2	110.01	3.63	400.25
7	14	2	150.86	2.66	402.68
8	16	2	198.01	2.09	414.07
9	18	2	251.44	1.83	460.20
10	20	2	311.16	1.62	505.74
11	25	5	188.58	2.64	499.21
12	30	5	275.01	2.15	592.50
13	35	5	377.16	1.88	712.85
14	40	5	495.02	1.63	811.52
15	45	5	628.60	1.46	919.66
16	50	5	777.89	1.28	999.95
17	60	10	550.03	2.25	1210.06
18	70	10	754.32	1.76	1327.04



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

Based on the available information and the geophysical investigations it is concluded that the project area is considered to have medium to good groundwater potential. The rock formation of low resistivity values indicates occurrence of water at the depth of about 60-65m below ground level. The ultimate depth of proposed project is 50m below ground level. Therefore, the mining operation will not affect the aquifer throughout the entire mine life period.

Prepared by

S. GOBALAKRISHNAN

EIA Coordinator

Environment Coordinator
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Annexure VII

NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Geo Technical Mining Solutions, Dharmapuri

5/1485-3, Salem Main Road, Elakkiyampatty, Dharmapuri, Tamil Nadu

The organization is accredited as ***Category-A*** *under the QCI-NABET* ***Scheme for Accreditation of EIA Consultant Organization, Version 3****: for preparing EIA/EMP reports in the following Sectors.*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals - including opencast and underground mining	1	1 (a) (i)	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated January 24, 2024, posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/24/3142 dated Feb 19, 2024. The accreditation needs to be renewed before the expiry date by Geo Technical Mining Solutions, Dharmapuri following due process of assessment.

Issue Date
Feb 19, 2024

Valid up to
Dec 31, 2026

Mr. Ajay Kumar Jha
Sr. Director, NABET

Certificate No.
NABET/EIA/23-26/RA 0319

Prof (Dr) Varinder S Kanwar
(CEO NABET)

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