

EXECUTIVE SUMMARY OF EIA DRAFT

FOR

SIRUTHAMUR ROUGH STONE AND GRAVEL QUARRY

Environmental Clearance under EIA Notification – 2006

“B1” CATEGORY – MINOR MINERAL – CLUSTER – NONFOREST LAND

CLUSTER EXTENT = 18.19.80 hectares

At

Siruthamur Village, Uthiramerur Taluk, Kancheepuram District, TamilNadu.

ToR issued vide Lr. No. SEIAA-TN/F. No. 8997/SEAC/ToR-1256/2022,

Dated:20.09.2022

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and Address	Extent & S.F. Nos.
Thiru. N. Kanniyappan, S/o. Narayanapillai, No.55, Mariyamman Kovil, Aanampakkam Post, Neerkundram, Uthiramerur Taluk, Kancheepuram District-603107.	1.62.00 hectares & 319/1, 319/2, 319/3, 319/4

Environmental Consultant

GEO TECHNICAL MINING SOLUTIONS



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

Oddapatti, Collectorate Post office,

Dharmapuri-636705, TamilNadu.

Mob. : +91 9443937841, +917010076633,

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

Website: www.gtmsind.com

NABET ACC. NO: **NABET/EIA/2023/IA0067**

Valid till : 29th Dec.2023



Environment Lab

ACCURACY ANALABS LABORATORY

ISO/IEC: 17025:2017 NABL

**(National Accreditation Board for
Testing and Calibration Laboratories)**

No:7, Sree Sakthi Vinayagar

Complex,

Ramalakshmi Nagar Extension,

Dindigul - 624004,

Tamilnadu.

Baseline Monitoring Period: March to May 2022

CHAPTER I

INTRODUCTION

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

As the proposed rough stone mining project, known as P1 falls within the 500m radius cluster of quarries with the total extent of >5 hectares, it is classified under category “B1” and requires submission of EIA report for grant of Environmental Clearance (EC) after conducting public hearing. The cluster with the extent of 18.19.80 ha contains four proposed projects, known as (P1, P2, P3, and P4) and three existing projects (E1, E2, E3). The cluster area was calculated as per MoEF & CC Notification S.O. 2269(E) dated 1st July 2016. This EIA report has been prepared by considering the cumulative load of two proposed quarries in a cluster in Siruthamur Village, Uthiramerur Taluk, Kancheepuram District, and Tamil Nadu State.

This EIA draft discusses the cumulative impacts of Kancheepuram proposed projects in a cluster on the environment and provides a detailed Environmental Management Plan (EMP) to minimize the adverse impacts of those projects situated in a cluster with the total extent of 18.19.80 ha in Siruthamur Village, Uthiramerur Taluk, Kancheepuram District and Tamil Nadu State. It has been prepared in compliance with ToR issued vide letter no. SEIAA-TN/F.No.8997/ToR-1256/2022 dated 20.09.2022, for the proposed project by conducting the baseline monitoring study during the period of March to May 2022.

Details of the project proponent and the list of quarries within the cluster of 500 m radius have been provided in Tables 1.1 and 1.2, respectively.

Table 1.1 Details of Project Proponent

Name and Address	
Name	Thiru. N. Kanniyappan
Address	S/o. Narayanapillai No,55, Mariyamman Koil Street, Neerkundram Village,Aanampakkam Post, Uthiramerur Taluk, Kancheepuram District
Mobile	9940551261
Status	Proprietor

Table 1.2 List of Quarries within 500 Meter Radius

Proposed Quarries					
ID	Name of the Owner	Name of the Village, and Taluk, & S.F. Nos.	Extent in (ha)	Status	Remarks
P1.	N. Kanniyappan , S/o. Narayanapillai, No.55, Mariyamman Koil Uthiramerur Taluk, Kancheepuram.	Sirudhamur Village, Uthiramerur Taluk 319/1,319/2,319/3, 319/4	1.62.00	-	Applied area
P2.	K. Prabakaran , S/o. N. Kanniyappan, No.43, Old State Bank Colony Road, West Tambaram, Chennai - 45.	Sirudhamur Village, Uthiramerur Taluk 320/5 Govt.Land	2.15.30	-	Under Processing
P3.	D. Arunkumar , No.30/31, Thirumalai Nagar, Hasthinapuram, Kancheepuram District	Sirudhamur Village, Uthiramerur Taluk 338/1 (Part-1)	4.95.00	-	Under Processing
P4.	K. Subramaniam , S/o. Karuppannan, No.40, Kamarajar Street, Tambaram west Chennai - 45.	Sirudhamur Village, Uthiramerur Taluk. 337/2,3,336/3	3.26.50	-	Under Processing
		Total	11.98.80		
Existing Quarries					
ID	Name of the Owner	Name of the Village, and Taluk, & S.F. Nos.	Extent (ha)	Lease Period	

E1.	D.Uma sankar S/o. Devaraj No.1, Thiru.Vi.Ka. Salai, Thiruvalluvar Nagar, Salavanpettai,Vellore.	Sirudhamur Village, Uthiramerur Taluk 334/1B	2.72.00	31.01.2017 To 30.01.2022	Operation
E2	S.Vaithialingam S/o. Sivaganapathy subramaniam, No.13, First street, Swamy Nagar Extn -1, Ullagaram, Chennai.	Sirudhamur Village, Uthiramerur Taluk 314/6B,314/7A,314/7 B,314/8,314/10	1.08.00	22.02.2018 To 21.02.2023	Operation
E3	N.Kanniyappan , S/o. Narayanapillai, Neerkundram Village, Uthiramerur Taluk, Kancheepuram.	Sirudhamur Village, Uthiramerur Taluk 320/3A, 3B, 4, 332/1A, 1B, 2	2.41.00	15.06.2018 To 14.06.2023	Operation
		Total	6.21.00		
Abandoned Quarries					
ID.	Name of the Owner	Name of the Village, and Taluk, & S.F. Nos.	Extent (ha)	Lease Period	
EX1.	S. Kothandaraman, Kancheepuram.	Sirudhamur Village, Uthiramerur Taluk 338(P) Q.No.1 (Govt. Land)	5.00.0	09.08.2005 To 08.08.2010	Lease Expired
EX2.	C. Ranganathan No.12, Thiruvalluvar Road, Unamancherry, Chennai - 48.	Sirudhamur Village, Uthiramerur Taluk338(P) Q.No.2 (Govt. Land)	5.00.0	04.10.2005 To 03.10.2010	Lease Expired
EX3.	K. Subramaniam, 5/o. Karuppannan, No.40, Kamarajar Street, Tambaram west, Chennai - 45.	Sirudhamur Village, Uthiramerur Taluk 337/2	1.93.00	22.09.2007 To 21.09.2012	Lease Expired
EX4.	PJR Sathishkumar PJR Bluemetals chennai pvt Ltd No.8, PJR Square, Sivashanmugam Salai, Tambaram, Chennai - 45	Sirudhamur Village, Uthiramerur Taluk 334/1	1.80.00	20.05.2010 To 19.05.2015	Lease Expired

EX5.	K.Subramaniam, Old No.198, New No.40, Kamarajar Street, West Tambaram, Chennai-45	Sirudhamur Village, Uthiramerur Taluk 336/3, 337/2,3, 5,6	3.26.50	12.09.2013 To 11.09.2018	Earlier leased out to 336/3 (1.93.00) K.Subramania m Applicant has applied including the same area & Other fields
Total			15.06.50		

Source: i). AD Letter – Rc.No.740/Q3/2018 dated 11.12.2020

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

CHAPTER II PROJECT DESCRIPTION

2.0 INTRODUCTION

The proposed project is rough stone and gravel quarrying project. The quarrying operation will be carried out by the opencast mining method involving drilling and blasting for splitting the massive rock, and excavators for loading the fragmented rocks. Details about the proposed projects have been given in Table 2.1.

Table 2.1 Brief Description of the Project

Name of the Quarry	Thiru. N. Kanniyappan Rough Stone & Gravel Quarry	
Toposheet No	57- P/14	
Latitude	12°43'04.71"N to 12°43'09.69"N	
Longitude	79°51'00.49"E to 79°51'07.15"E	
Highest Elevation	53m AMSL	
Proposed Depth of Mining five years period	20m BGL (3m Gravel +17mRoughstone	
Geological Resources	Rough Stone in m³	Gravel m³
	517376	48504
Mifiable Reserves	141596	27084
Five-year Production	98276	27084
Existing Pit Dimension	-	

Ultimate Pit Dimension	122m (L) x 74m (W) x 20m (D)	
Water Level in the surrounding area	50m BGL	
Method of Mining	Opencast Semi Mechanized Mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 53m maximum and minimum of 52m from the MSL. The area is sloping towards Southwestern side covered clayey soil with Rough Stone which does not sustain any type of vegetation.	
Machinery proposed	Jack Hammer	2
	Compressor	1
	Excavator	1
	Tippers	4
Blasting Method	Controlled blasting method by shot hole drilling and small dia. of 25mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of Rough Stone. No deep hole drilling is proposed.	
Project Cost	Rs. 60,96,000/-	
CER Cost @ 2% of Project Cost	Rs. 1,21,920/-	
Proposed Water Requirement	3.8 KLD	
Nearest Habitation	0.720 km South	

Source: Approved mining plan

2.1 LOCATION OF THE PROJECT

The proposed and existing quarry projects fall in Siruthamur Village, Uthiramerur Taluk and Kancheepuram District. The project area is located about 20km Southwest of Kancheepuram, 15km Southwest of Uthiramerur and 1km Southeast of Siruthamur Village. Boundary coordinates of corner pillars of the project site and accessibility details to the location of the project site have been given in Tables 2.2 and 2.3, respectively. The lease area of the project site has been overlaid on Google earth image (Figure 2.1) and the overall view of the project site has been shown in Figure 2.2.

Table 2.2 Corner Geographic Coordinates of Proposed Project

Pillar ID	Latitude	Longitude
1	12°43'9.69"N	79°51'7.15"E

2	12°43'6.62"N	79°51'6.38"E
3	12°43'4.71"N	79°51'5.37"E
4	12°43'6.95"N	79°51'0.49"E
5	12°43'8.61"N	79°51'1.16"E
6	12°43'8.53"N	79°51'4.52"E

Source: Approved Mining Plan

Table 2.3 Site Connectivity to the Project Area

Nearest Roadways	Melavalampattam-Nelvoy Road (MDR-789)	1.2 km West
	Salavakkam -Tirumukkudal village Road	2.14km NE
	Chengalpattu -kancheepuram Road (SH 132B)	6.6km North
Nearest Town	Chengalpattu	13 km NE
Nearest Railway Station	Palur	7.9 km NE
Nearest Airport	Chennai	45 km NE
Nearest Seaport	Chennai	62 km NE

2.3 OPERATIONAL DETAILS FOR PROPOSED PROJECT

Operational details of the project including yearly and daily production, and mine closure have been extracted from mining plans shown in Figures 2.1 and 2.2 and given in Table 2.4. Mine closure budget required for the closure of this project have been provided in Table 2.7.

Table 2.4 Estimated Resources and Reserves of the Project

Resource Type	Rough Stone in m ³	Gravel in m ³
Geological Resource in m ³	517376	48504
Mineable Reserves in m ³	141596	27084
Production for five-year plan period	98276	27084

Based on the year wise development and production plan and sections, the year wise production results have been given in Table 2.5.

Table 2.5 Year-Wise Production Details

Year	Rough Stone (m ³)	Gravel m ³
I	18056	27084
II	19200	-

III	18240	-
IV	21600	---
V	21180	---
Total	98276	27084

Source: Approved Mining Plan

2.3 LAND USE PATTERN

Land use and land cover information for the proposed project site has been given in Table 2.6.

Table 2.6 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	0.69.80
Infrastructure	Nil	0.01.00
Roads	Nil	0.01.00
Green Belt	Nil	0.48.23
Unutilized area	1.62.00	0.41.97
Total	1.62.00	1.62.00

Source: Approved mining plan



Figure 2.1 Google Earth Image Showing Lease Area with Pillars

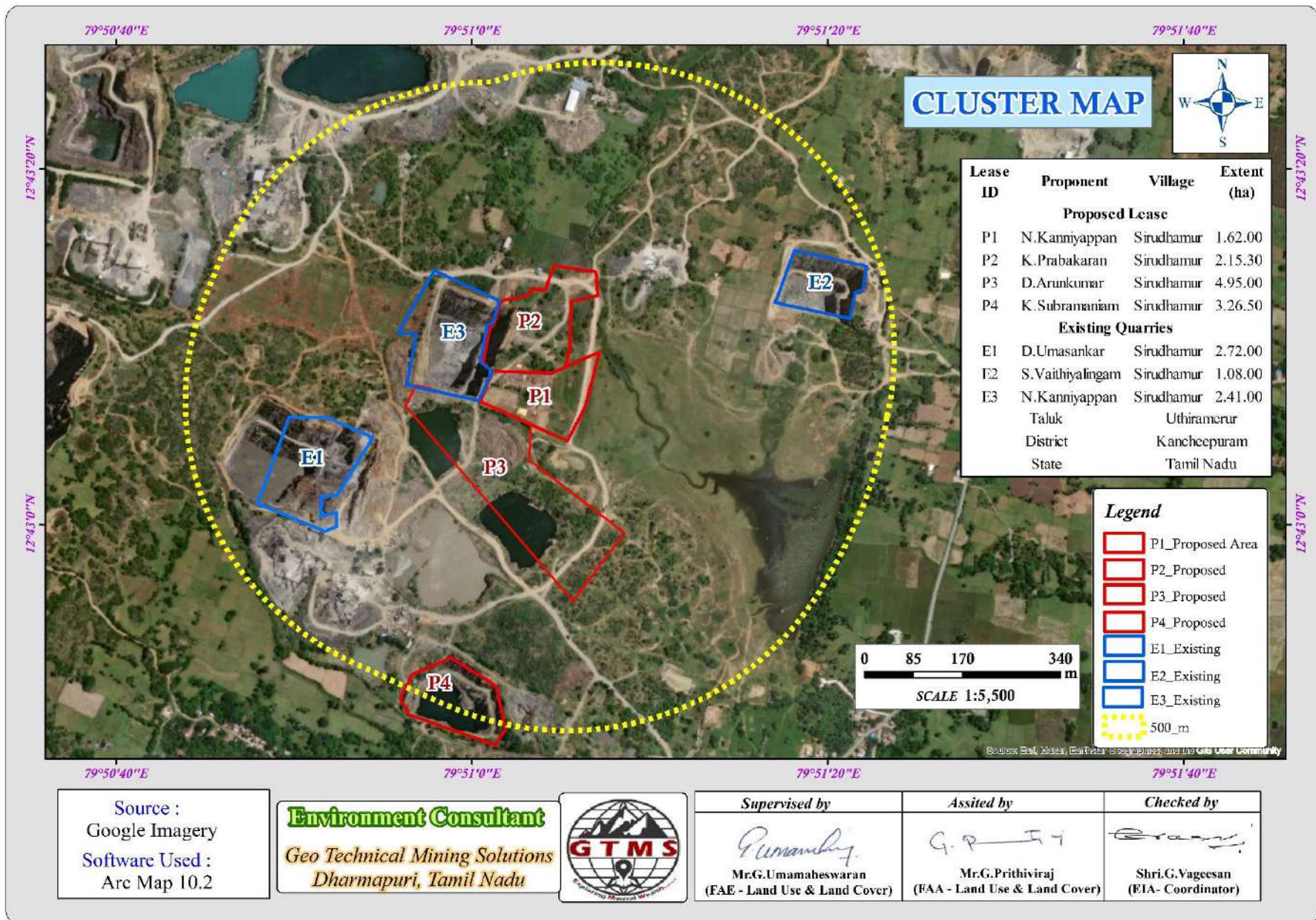


Figure 2.2 Google earth image showing 500m radius limits and the proposed project and existing quarries

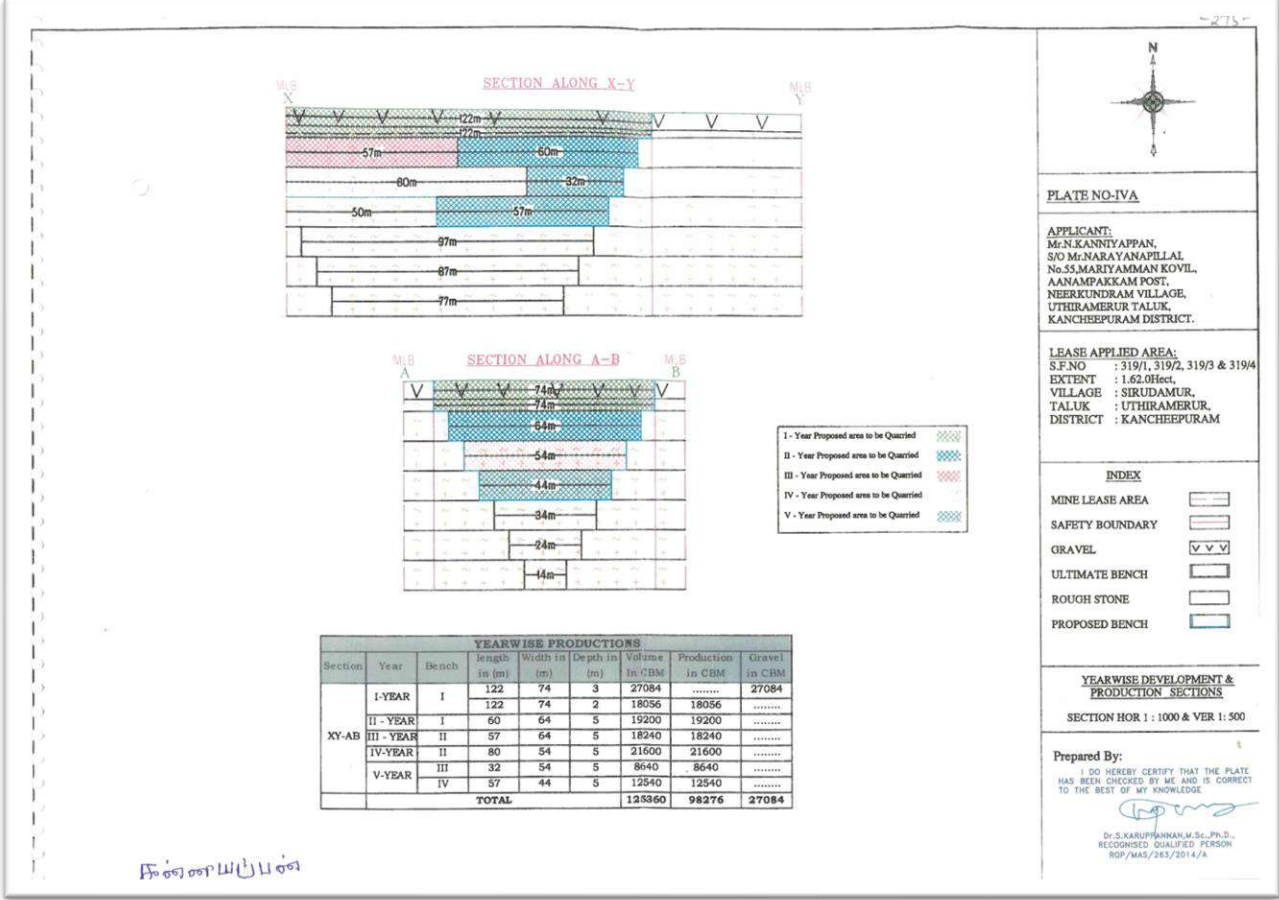
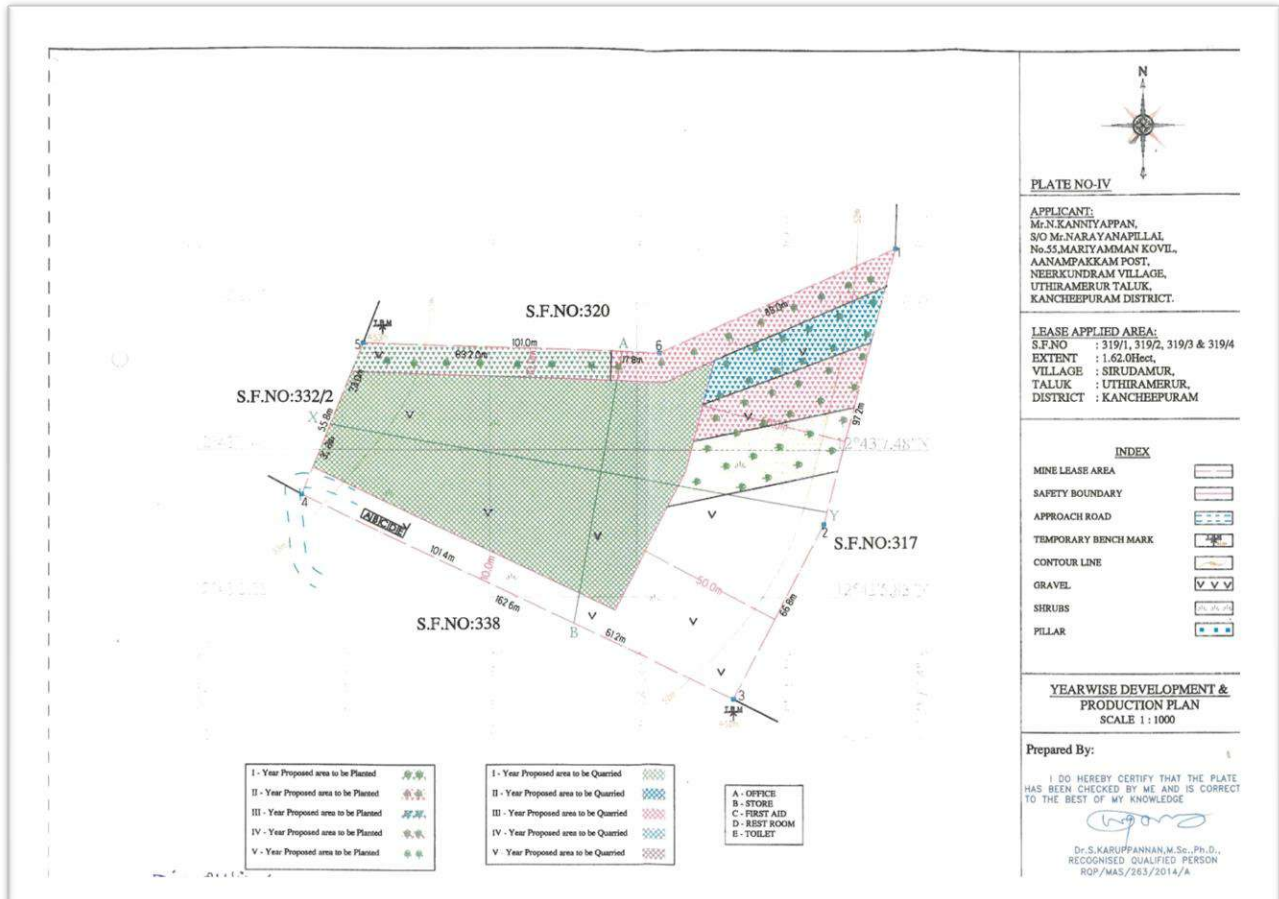


Figure 2.3 Year-Wise Development Production plan & Sections

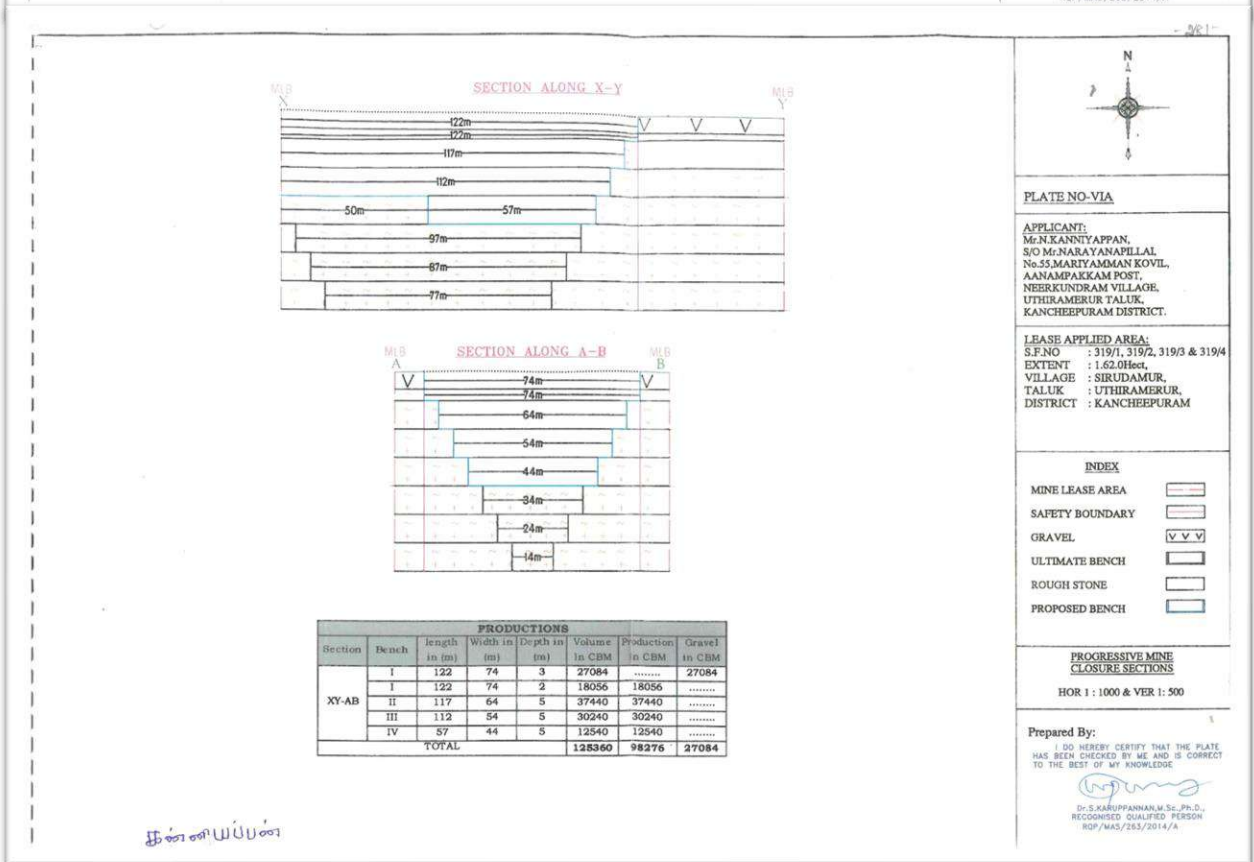
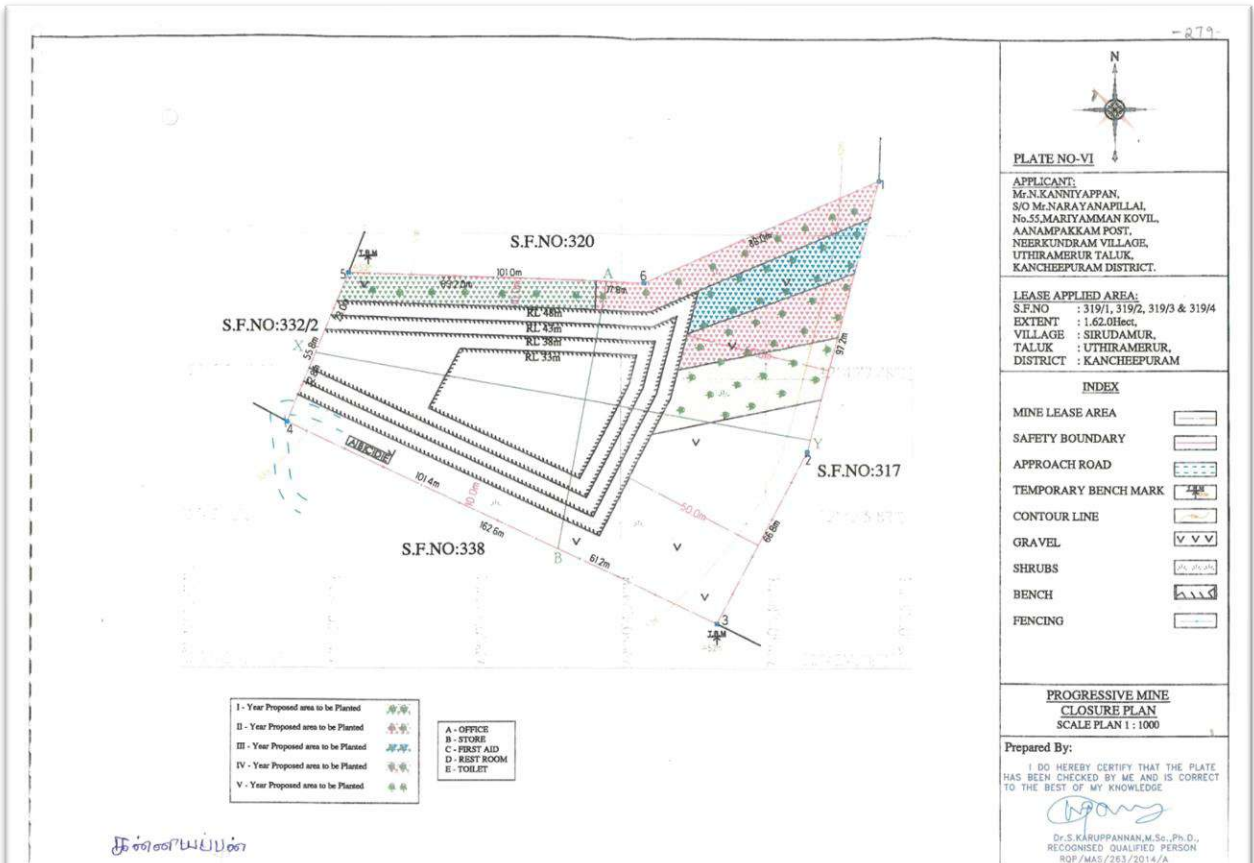


Figure 2.4 Progressive Mine Closure Plan and Sections

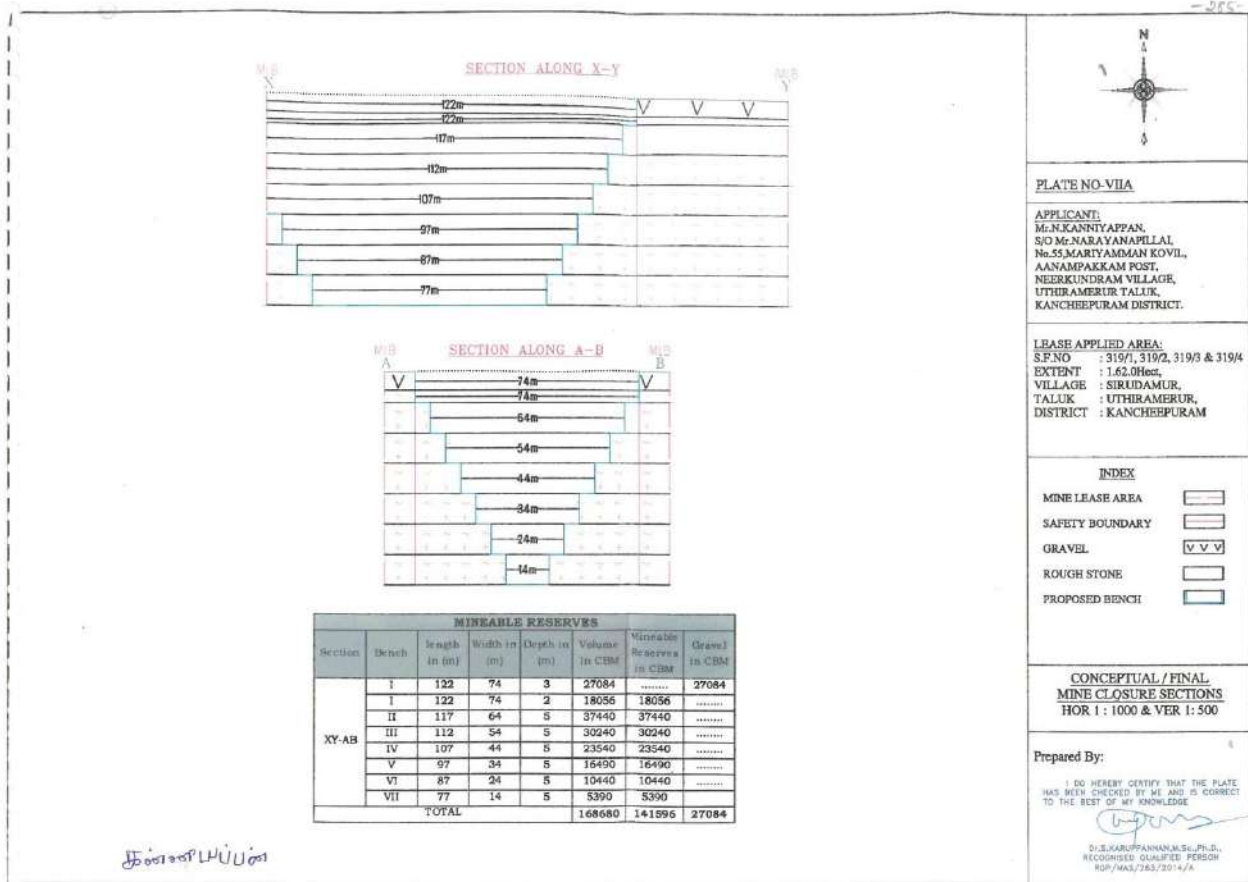


Figure 2.5 Conceptual Plan and Sections

Table 2.6 Mine Closure Budget

Activity	Capital Cost	Recurring Cost/Annum
324 plants inside the lease area	64800	9720
486 plants outside the lease area	145800	14580
Wire Fencing (1.62.0 ha)	324000	16200
Renovation of Garland Drain (1.62.0 ha)	16200	8100
Total	550800	48600

2.4 METHOD OF MINING

Opencast Semi Mechanized mining method has been proposed for the proposed project. It involves formation of benches with 5 m height and 5 m width. The rough stone will be mined using drilling, blasting, and excavators. The excavators attached with rock breaker will be used for breaking large boulders to blocks of required size and the excavators attached with bucket unit will be used for loading the rough stone into the tippers and then, the stone will be transported from the quarry to the nearby crushers. Machineries proposed for this project have been given in Table 2.8.

2.5 PROPOSED MACHINERY DEPLOYMENT

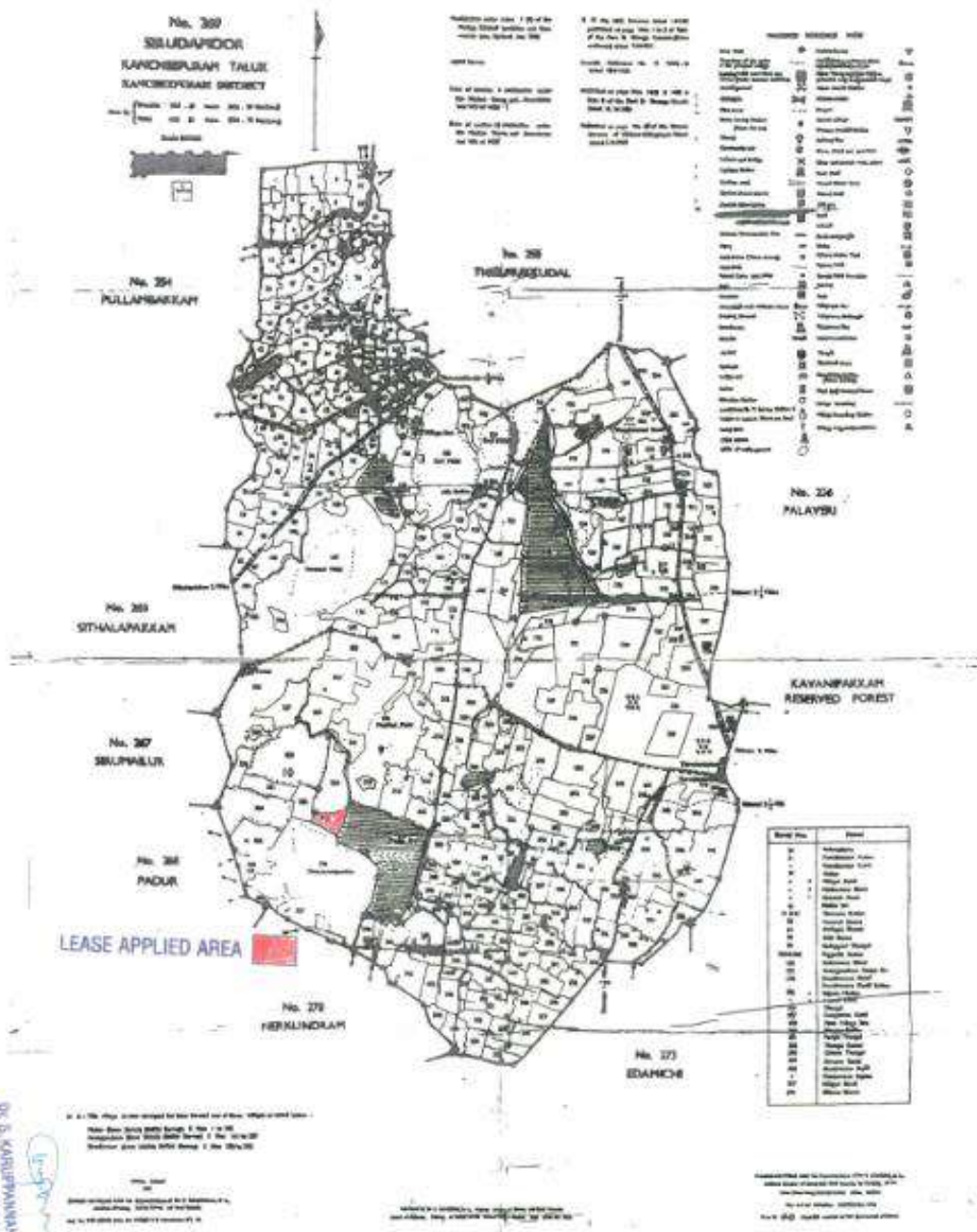
Table 2.8 Proposed Machinery Deployments

S. No.	Type	No of Unit	Capacity	Make	Motive Power
1	Jack Hammers	2	1.2 m to 2 m	Atlas Copco	Compressed Air
2	Compressor	1	400 psi	Escorts formtrac	Diesel Drive
3	Excavator with Bucket / Rock Breaker	1	300 HP	Tata Hitachi	Diesel Drive
Haulage & Transport Equipment					
4	Tipper	4	15tons	BMW	Diesel Drive

Source: Approved Mining Plan

2.5 CONCEPTUAL MINING PLAN/ FINAL MINE CLOSURE PLAN

- ❖ Mine closure is a process of returning a disturbed site to its natural state for other productive uses to minimize adverse effects on the environment or threats to humans' health and safety.
- ❖ The objective of the mine closure plan is to transform quarries to be physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting, and non-contaminating.
- ❖ At the end of mining life, the mine pit will act as an artificial reservoir for collecting rain water and will help to meet the water demand during drought season.
- ❖ After mine closure, the greenbelt will be developed along the safety barrier and over top benches. Water from the pit will be used to the greenbelt development and maintenance.



DR. S. KANUPRANAN, M.Sc. Ph.D.
 HOD, DEPARTMENT OF AGRICULTURE
 KANCHIPURAM DISTRICT

Figure 2.7 Village map showing proposed project lease area in red colour



தமிழக அரசு

வருவாய்த் துறை

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

மாவட்டம் : காஞ்சிபுரம்

வட்டம் : உத்திரமேரூர்

வருவாய் கிராமம் : சிறுதாமூர்

பட்டா எண் : 4109

உரிமையாளர்கள் பெயர்

1. நாராயண பிள்ளை

மகன்

கன்னியப்பிள்ளை



புல எண்	உட்பிரிவு	புன்செய்		நுன்செய்		மற்றவை		குறிப்புரைகள்
		பரப்பு	தீர்வை	பரப்பு	தீர்வை	பரப்பு	தீர்வை	
		ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	ஹெக் - ஏர்	ரூ - பை	
319	1	0 - 27.00	0.50	--	--	--	--	2018/0103/03/088114- -- -- 22-05-2018
319	2	0 - 54.00	1.00	--	--	--	--	2018/0103/03/088114- -- -- 22-05-2018
319	3	0 - 40.00	0.74	--	--	--	--	2018/0103/03/088114- -- -- 22-05-2018
319	4	0 - 41.00	0.76	--	--	--	--	2018/0103/03/088114- -- -- 22-05-2018
320	3A	0 - 3.00	0.06	--	--	--	--	2016/0103/03/017085- -- -- 04-09-2016
320	3B	0 - 23.50	0.44	--	--	--	--	2016/0103/03/013065- -- -- 10-08-2016
320	4	0 - 10.50	0.20	--	--	--	--	2016/0103/03/013065- -- -- 10-08-2016
332	1A	1 - 41.50	2.63	--	--	--	--	2016/0103/03/013065- -- -- 10-08-2016
332	1B	0 - 58.00	1.07	--	--	--	--	2016/0103/03/013065- -- -- 10-08-2016
332	2	0 - 4.50	0.08	--	--	--	--	2016/0103/03/013065- -- -- 10-08-2016
		4 - 3.00	7.48					

குறிப்பு 2 :



- மேற்கண்ட தகவல் / சான்றிதழ் நகல் விவரங்கள் மின் பதிவேட்டிலிருந்து பெறப்பட்டவை. இவற்றை தாங்கள் <https://eservices.tn.gov.in> என்ற இணைய தளத்தில் **03/03/083/04109/40324** என்ற குறிப்பு எண்ணை உள்ளீடு செய்து உறுதி செய்துகொள்ளவும்.
- இத் தகவல்கள் 23-11-2022 அன்று 11:00:46 AM நேரத்தில் அச்சடிக்கப்பட்டது.
- கைப்பேசி கேமராவின் 2D barcode படிப்பான் மூலம் படித்து 3G/GPRS வழி இணையதளத்தில் சரிபார்க்கவும்

Figure 2.8 Land Property ownership document

CHAPTER III
DESCRIPTION OF THE ENVIRONMENT

3.0 INTRODUCTION

Field monitoring studies were carried out to evaluate the existing environmental condition of the project site during March – May 2022 as per CPCB guidelines. Data on the existing environmental condition were collected by Accuracy Analabs Laboratory for the main environmental components including land, water, air, ecology, and socio-economy

3.1 LAND ENVIRONMENT

Land use pattern of the area of 10km radius was studied using LISS III imagery of ISRO. LULC types have been identified and given in Table 3.1.

Table 3.1 Land Use / Land Cover Statistics for the Area of 10km Radius

S. No.	Classification	Area (Hectare)	Area (%)
1	Barren Land	446	2
2	Crop Land	13858	47
3	Dense Forest	1482	5
4	Fallow Land	2919	10
5	Scrub Land	3293	11
6	Mining lands	167	1
7	Plantations	3712	12
8	Settlements	352	1
9	Water bodies	3521	12
Total Area		29751	100

Source: LISS III Satellite Imagery

3.2 SOIL ENVIRONMENT

Nine locations were selected for soil sampling on the basis of soil types, vegetative cover, and industrial and residential activities to assess the existing soil conditions such as physical and chemical properties in and around the project site.

3.2.1 Physical Characteristics

- ❖ The soil texture found in the study area is sandy loam.
- ❖ PH of the soil varies from 6.09 to 7.26 indicating slightly alkaline nature.
- ❖ Electrical conductivity of the soil varies from 58.97 to 120.4 $\mu\text{s/cm}$ and
- ❖ The water content varies from 5.13 to 10.24 %.

3.2.2 Chemical Characteristics

- ❖ Nitrogen ranges between 75.1 and 150 mg/kg.

- ❖ Phosphorus ranges between 0.89 and 1.90 mg/kg.
- ❖ Potassium ranges between 308 and 910 mg/kg.
- ❖ Sodium ranges between 420 and 654 mg/kg.
- ❖ Dry matter content ranges between 89.76 and 94.71.

3.3 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 critical water quality parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the norms in pre-treated sampling cans to laboratory for analysis.

Surface Water

- ❖ The pH of surface water sample is 6.9 and 7.1
- ❖ Turbidity is 5 NTU.
- ❖ TDS is 72-142 mg/l, whereas TH is 41-48 mg/l.
- ❖ Calcium is 21.6-54.72 mg/l and magnesium 18-27 mg/l.
- ❖ Chloride is 42-52 mg/l and sulphate 28-37 mg/l.

Ground Water

- ❖ The pH of the water samples ranges from 7.35 to 7.59.
- ❖ TDS are found in the range of 289 - 912 mg/l.
- ❖ The total hardness varies between 290 -561 mg/l.
- ❖ Calcium varies from 32 to 92mg/l and magnesium from 17 mg/l to 21.
- ❖ Chloride varies from 138 to 275 mg/l; sulphate from 32-84 mg/l; and fluoride from 0.41 to 0.72 mg/l.

When speaking about microbiological parameters, the water samples from all the locations meet the requirement.

When compared to IS 10500:2012 all the parameters thus analysed fall within the prescribed limits.

3.4 AIR ENVIRONMENT

The existing ambient air quality of the area is important for evaluating the impact of mining activities on the ambient air quality. The baseline studies on air environment include identification of specific air pollutants and their existing levels in ambient air. The ambient air quality in the study area of 5 km radius around the proposed quarry sites provides the baseline ambient air quality information.

3.4.1 Wind Pattern

Local wind pattern will largely influence the dispersive pattern of air pollutants and noise from the proposed project sites. Wind pattern study requires hourly site-specific data of wind speed and wind direction over a period of 3 months. The wind pattern analysis indicates the following information.

- ❖ The measured average wind velocity during the study period is 3.69m/s
- ❖ Predominant wind was dominant in the directions ranging from southwest to northeast.

3.4.2 Ambient Air Quality

As per the monitoring data, PM₁₀ ranges from 41.23 µg/m³ to 47.00µg/m³; PM_{2.5} from 20.81µg/m³ to 27.26 µg/m³; SO₂ from 6.42µg/m³ to 10.20 µg/m³; NO₂ from 17.08 µg/m³ to 24.17µg/m³. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB

3.5 NOISE ENVIRONMENT

Ambient noise levels were measured at 10 locations around the proposed project area. Noise levels recorded in core zone during day time was 50.05.6 dB (A) Leq and during night time was 37.11 dB (A) Leq. Noise levels recorded in buffer zone during day time varied from 38 to 48.6dB (A) Leq and during night time from 27.6 to 36.5 dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

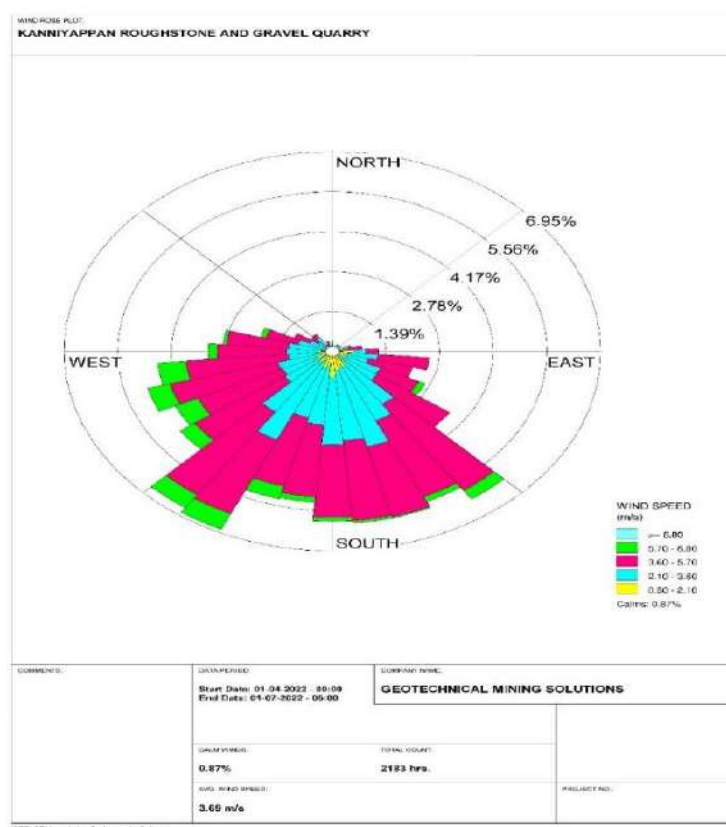


Figure 3.1 Onsite Wind Rose Diagram

3.6 BIOLOGICAL ENVIRONMENT

The main objective of biological study is to collect the baseline data regarding flora and fauna in the study area and identify ecologically sensitive areas and whether there are any rare, endangered, endemic or threatened (REET) species of flora and fauna in the core zone as well as buffer zone. The study has also been designed to suggest suitable mitigation measures, if necessary, to protect wildlife habitats and conservation of REET species if any.

From the study of biological environment, it is concluded that there was no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species were found in vulnerable, endangered or threatened category as per IUCN and that there is no endangered red list species found in the study area. Hence, this small mining operation over short period of time will not have any significant impact on the surrounding flora and fauna.

3.7 SOCIO ECONOMIC ENVIRONMENT

Socio-economic study is an essential part of environmental study. It includes demographic structure of the area, provision of basic amenities viz., housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as features like temples, historical monuments etc., at the baseline level. This will help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

It is also found that a part of population is suffering from lack of permanent job to run their day-to-day life. Their expectation is to earn some income for their sustainability on a long-term basis. The proposed project will aim to provide preferential employment to the local people there by improving the employment opportunity in the area and in turn the social standards will improve.

CHAPTER IV

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 INTRODUCTION

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 for sustainable resource extraction.

4.1 LAND ENVIRONMENT

4.1.1 Anticipated Impact

The main anticipated impact on the land environment due to quarrying operation is changes in landscape and land use pattern. The mining activities in the cluster occupies about 18.19.80. ha. The size of lands used for mining is insignificant when compared to the size of other LULCs. This small size of mining activities shall not have any significant impact on the land environment. While speaking the impact of the mining project on groundwater resources, the mining activity will not reach the groundwater aquifers. Therefore, it will not affect groundwater quality and quantity.

4.1.2 Mitigation Measures

The mining activity will be progressively implemented along with other mitigative measures as discussed below:

- ❖ Garland drains will be constructed all around the quarry pit and a check dam will be constructed at the suitable location in lower elevations to prevent erosion due to surface runoff during heavy rainfall and to collect the storm water for various uses.
- ❖ Green belt will be developed in safety zone. The water stored in the quarry will be used for greenbelt.
- ❖ Thick plantation will be done on unutilized area, top benches, safety barrier, etc.,
- ❖ At conceptual stage, the land use pattern of the quarry will be changed into greenbelt area and temporary reservoir.
- ❖ Natural vegetation surrounding the quarry will be retained to minimize dust emissions.
- ❖ Proper fencing will be established at the conceptual stage and security will be posted round the clock to prevent inherent entry of the public and cattle.

4.2 SOIL ENVIRONMENT

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

4.2.1 Impact on Soil Environment

The proposed project area is covered by thin layer of Gravel with the average thickness of about 1to 2m. The quarried-out topsoil will be preserved within the applied area and utilized for construction of bund and backfilled in the part of the quarry pit also spread out the quarried out top bench to facilitate the greenbelt development.

4.2.2 Mitigation Measures for Soil Conservation

- ❖ *Run-off diversion* – Garland drains will be constructed all around the project boundary to prevent surface flows from entering the quarry area. The water from garland drainage system 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 ponds trap sediments and reduce suspended sediment loads before runoff is discharged from the quarry sites. Sedimentation ponds will 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.
- ❖ *Retention of vegetation* – Retain existing vegetation or replant the vegetation at the site wherever possible.
- ❖ *Monitoring and maintenance* –Erosion control systems will be maintained to make sure seamless performance of the systems during rainy season.

4.3 WATER ENVIRONMENT

4.3.1 Anticipated Impact

The impact of mining on the water quality is insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as the proposed depth is 20m below ground level and water table is found at depths of 50 m below ground level.

There is no intersection of surface water bodies in the project area. As there is no proposal for rough stone processing or workshop within the project area there will be no effluent anticipated from the mines.

4.3.2 Mitigation Measures

- ❖ Water softening will be adopted to make it fit for drinking purposes. But it can be used for other domestic purposes.
- ❖ Rainwater will be collected in the mining pit and the water will be pumped out to surface settling tank of the dimension of 15m x 10m x 3m to remove suspended solids if any. The water stored in the settling tank will be used for dust suppression, greenbelt development and rainwater harvesting.
- ❖ A drainage network, known as garland drains will be constructed to divert surface run-off into the quarrying area.
- ❖ The quality of water in the quarry will be analysed periodically.

- ❖ Domestic sewage from site office and latrines in the mining site will be discharged to septic tanks followed by soak pits.
- ❖ Wastewater from the mining site will be treated in settling tanks before using it for dust suppression and tree plantation purposes.
- ❖ Desilting will be carried out before and immediately after the monsoon season.
- ❖ The quality of water in open and bore wells, and surface water bodies will be monitored regularly.

4.4 AIR ENVIRONMENT

The air borne particulate matter is the main air pollutant in the opencast mining involving drilling, blasting, and loading.

4.4.1 Anticipated Impact

The emission of sulphur dioxide (SO₂), oxides of nitrogen (NO₂) due to excavation and loading equipment and vehicles plying on haul roads are marginal. But, loading/unloading and transportation of rough stone, wind erosion of the exposed area and movement of vehicles will be the main polluting sources releasing Particulate Matter (PM₁₀) affecting ambient air quality of the area.

Anticipated increase of the air pollutants due to the proponents' quarrying activities and the existing quarrying activities within the area of 500m radius around the project sites have been predicted by modelling using AERMOD software and the modelling results shown in Tables 4.1 to 4.5 will be used in providing mitigation measures.

Table 4.1 Incremental & Resultant GLC of PM_{2.5}

Station Code	Location	Average Baseline PM _{2.5} (µg/m ³)	Incremental value of PM _{2.5} dueto mining (µg/m ³)	Total PM _{2.5} (µg/m ³)
AAQ1	12°43'19.87"N,79°51'35.87"E	32.40	1	33.4
AAQ2	12°42'48.39"N,79°50'46.86"E	25.08	0.5	25.58
AAQ3	12°41'53.58"N,79°49'51.00"E	20.27	0.1	20.37
AAQ4	12°44'30.33"N,79°52'56.85"E	22.30	0.5	22.8
AAQ5	12°44'19.05"N 79°51'12.97"E	24.39	0.5	24.89
AAQ6	12°44'10.33"N,79°49'20.52"E	20.10	0.5	20.6
AAQ7	12°41'20.08"N,79°52'28.96"E	23.30	0	23.3
AAQ8	12°45'30.23"N,79°51'37.33"E	23.52	0.5	24.02
AAQ9	12°43'05.93"N 79°51'03.91"E	33.05	6.16	39.21

Table 4.2 incremental and Resultant GLC OF PM₁₀

Station Code	Location	Average Baseline PM₁₀($\mu\text{g}/\text{m}^3$)	Incremental value of PM₁₀ dueto mining ($\mu\text{g}/\text{m}^3$)	Total PM₁₀ ($\mu\text{g}/\text{m}^3$)
AAQ1	12°43'19.87"N,79°51'35.87"E	52.23	1	53.23
AAQ2	12°42'48.39"N,79°50'46.86"E	45.23	0.5	45.73
AAQ3	12°41'53.58"N,79°49'51.00"E	39.58	0.5	40.08
AAQ4	12°44'30.33"N,79°52'56.85"E	40.99	0.5	41.49
AAQ5	12°44'19.05"N 79°51'12.97"E	43.43	1	44.43
AAQ6	12°44'10.33"N,79°49'20.52"E	38.86	1	39.86
AAQ7	12°41'20.08"N,79°52'28.96"E	44.68	0	44.68
AAQ8	12°45'30.23"N,79°51'37.33"E	42.18	0.5	42.68
AAQ9	12°43'05.93"N 79°51'03.91"E	53.02	10.41	63.43

Table 4.3 Incremental & Resultant GLC of SO₂

Station Code	Location	Average Baseline SO₂ ($\mu\text{g}/\text{m}^3$)	Incremental value due to mining ($\mu\text{g}/\text{m}^3$)	Total SO₂($\mu\text{g}/\text{m}^3$)
AAQ1	12°43'19.87"N,79°51'35.87"E	11.53	0.5	12.03
AAQ2	12°42'48.39"N,79°50'46.86"E	8.70	0.5	9.2
AAQ3	12°41'53.58"N,79°49'51.00"E	5.89	0.1	5.99
AAQ4	12°44'30.33"N,79°52'56.85"E	6.48	0.5	6.98
AAQ5	12°44'19.05"N 79°51'12.97"E	7.23	0.5	7.73
AAQ6	12°44'10.33"N,79°49'20.52"E	6.08	0.5	6.58
AAQ7	12°41'20.08"N,79°52'28.96"E	8.66	0	8.66
AAQ8	12°45'30.23"N,79°51'37.33"E	8.63	0.5	9.13
AAQ9	12°43'05.93"N 79°51'03.91"E	12.13	4.94	17.07

Table 4.4 Incremental & Resultant GLC of NO_x

Station Code	Location	Average Baseline NO_x (µg/m³)	Incremental value due to mining (µg/m³)	Total NO_x (µg/m³)
AAQ1	12°43'19.87"N,79°51'35.87"E	23.85	0.5	24.35
AAQ2	12°42'48.39"N,79°50'46.86"E	22.24	0.1	22.34
AAQ3	12°41'53.58"N,79°49'51.00"E	16.78	0.05	16.83
AAQ4	12°44'30.33"N,79°52'56.85"E	18.75	0.1	18.85
AAQ5	12°44'19.05"N 79°51'12.97"E	20.85	0.5	21.35
AAQ6	12°44'10.33"N,79°49'20.52"E	18.70	0.5	19.2
AAQ7	12°41'20.08"N,79°52'28.96"E	22.40	0	22.4
AAQ8	12°45'30.23"N,79°51'37.33"E	21.72	0.1	21.82
AAQ9	12°43'05.93"N 79°51'03.91"E	24.64	2.69	27.33

The values of cumulative concentration i.e., background + incremental concentration of pollutant in all the receptor locations are still within the prescribed NAAQ limits without effective mitigation measures. By adopting suitable mitigation measures, the pollutant levels in the atmosphere can be controlled further.

4.4.2 Mitigation Measures

4.4.2.1 Drilling

- ❖ Wet drilling will be practiced to control dust at source. Where water is unavailable, suitably designed dust extractor will be provided for dry drilling.

4.4.2.2 Blasting

- ❖ Blasting time will be determined according to the local conditions.
- ❖ Blasting will be avoided when temperature changes suddenly and strong wind blows towards residential areas.
- ❖ Controlled blasting will be done and the blasting will be restricted to a particular time of the day (i.e., at the time lunch hours).
- ❖ Before loading of rough stone, water will be sprayed on the blasted rough stone.
- ❖ Dust mask will be provided to the workers and their use will be strictly monitored.

4.4.2.3 Haul Road and Transportation

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

- ❖ Rough stone will be properly covered with tarpaulin and transported during the day time.
- ❖ The speed of tippers plying on the haul road will be limited to below 20 km/hr to avoid generation of dust.
- ❖ Main source of gaseous pollution will be from vehicle used for transportation of mineral; therefore, weekly maintenance of vehicles and other machines will be done to improve combustion process and reduce the emission of pollutants.
- ❖ The haul roads will be compacted weekly before being put into use.
- ❖ Over loading of tippers will be avoided to prevent spillage.
- ❖ It will be ensured that all transportation vehicles carry a valid PUC (Pollution Under Control) certificate.

4.4.2.4 Green Belt

- ❖ Trees will be planted all along the main haul roads and haul roads will often be levelled to prevent the generation of dust due to movement of tippers.
- ❖ Green belt of adequate width will be developed around the project areas.

4.4.2.5 Occupational Health

- ❖ Dust masks will be provided to the workers and their use will be strictly monitored.
- ❖ Annual medical check-ups, trainings and campaigns will be arranged to create awareness about the importance of wearing dust masks among all mine workers and tipper drivers.
- ❖ Ambient air quality monitoring will be conducted six months once to assess the effectiveness of mitigation measures proposed for the projects.

4.5 NOISE ENVIRONMENT

4.5.1 Anticipated Impact

Noise pollution poses a major health risk to the mine workers. Drilling, blasting, loading and movement of vehicles are the sources of noise in the existing open cast mining projects.

4.5.2 Mitigation Measures

- ❖ Sharp drill bits will be used while drilling to reduce noise.
- ❖ Secondary blasting will be avoided and rock breaker will be used for breaking boulders.
- ❖ The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system (NONEL).

- ❖ Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise.
- ❖ Sound insulated chambers will be provided for the workers working on machines producing higher levels of noise.
- ❖ Silencers / mufflers will be installed in all machineries.
- ❖ Green belt will be developed around the project area and along the haul roads to minimize propagation of noise.
- ❖ Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of heavy machines and persons working near the heavy machines and their use will be ensured through training and awareness.
- ❖ Regular medical check-up and proper training will be provided to personnel to create awareness about adverse noise level effects.

4.6 BIOLOGICAL ENVIRONMENT

4.6.1 Anticipated Impact

- ❖ None of the plants will be cut during operational phase of the projects.
- ❖ There shall be negligible air emissions or effluents from the project sites. Dust generation during loading will be a temporary effect and is not anticipated to affect the surrounding vegetation significantly.
- ❖ Most of the land in the buffer area consists of crop lands, grass patches and small shrubs. Hence, there will be no effect on the flora.
- ❖ Wildlife except few domestic animals, reptiles, hares and some common birds is not found in the cluster and its immediate surrounds because of lack of vegetal cover and surface water.

4.6.2 Mitigation Measures

The proposed projects will develop the green belt within the lease area, along roads and other vacant areas to provide a barrier between the source of pollution and the surrounding areas. Although the project will not lead to any tree cutting, it is proposed to improve the greenery of the locality by plantation. During green belt development,

- ❖ Plants that grow fast will be preferred.
- ❖ High canopy plants with local varieties will be preferred.
- ❖ Perennial and evergreen plants will be preferred.

Green belt development plan and the cost for the greenbelt development for the proposed project have been given in Table 4.6 and 4.7, respectively.

Table 4.6 Greenbelt Development Plan

No. of trees proposed for plantation	No. of trees expected to be grown@80% survival rate	Area to be covered(m ²)	Name of the species
Number of plants inside the mine lease area			<i>Azadirachta indica,</i> <i>Albizia lebbeck, Delonix regia, Tectona grandis,</i> etc.,
324	259	2916	
Number of plants outside the mine lease area			
486	389	4374	

Table 4.7 Budget required for greenbelt development

Activity	Plantation in the construction phase(3Months)	Cost	Capital Cost (Rs.)	Recurring Cost-per annum
Plantation inside the mine lease area (in safety margins)	324	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))"	64800	9720
Plantation outside the area	486	Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	145800	14580
Total			210600	24300

4.7 SOCIO ECONOMIC ENVIRONMENT

4.7.1 Anticipated Impact

The project will generate employment for about 26 persons and indirectly will get employment around 30 persons.

4.7.2 Mitigation Measures

- ❖ Good maintenance practices will be adopted for plant machinery and equipment to avert potential noise problems.

- ❖ Green belt will be developed in and around the project sites as per Central Pollution Control Board (CPCB) guidelines.
- ❖ Appropriate air pollution control measure will be provided 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 the mines act and rules.
- ❖ Both the State and the Central governments will be benefited through financial revenues by way of royalty, tax, DMF, NMET etc. from the projects directly and indirectly.

4.8 OCCUPATIONAL HEALTH MEASURES

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, Spiro metric 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

The overburden in the form of topsoil will be safely removed during the mining plan period. The quarried-out topsoil will be preserved within the applied area and utilized for construction of bund and backfilled in the part of the quarry pit also spread out the quarried out top bench to facilitate the greenbelt development. The Weathered rock will be directly loaded into tippers for filling and levelling of low-lying areas. No hazardous waste production is anticipated due to the development.

CHAPTER V

ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

The mineral deposits are site specific in nature; hence question of seeking alternate sites do not arise for the projects.

CHAPTER VI

ENVIRONMENT MONITORING PROGRAM

6.0 PURPOSE

Regular monitoring program of environmental components is essential to take into account the changes in the environmental components as shown in Table 6.1. The Objectives of monitoring is:

- ❖ To check or assess the efficiency of the controlling measures;
- ❖ To establish a data base for future impact assessment studies.

Table 6.1 Post Environmental Clearance Monitoring Schedule

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 locations (1 core & 1buffer)	24 hours	Once in 6 months	Fugitive dust, PM _{2.5} , PM ₁₀ , SO ₂ and NO _x .
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 locations (1Core & 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

6.2 BUDGETARY PROVISION FOR EMP

The cost in respect of monitoring of environmental components has been shown in Table 6.2.

Table 6.2 Environment Monitoring Budget

S. No.	Parameter	Capital Cost	Recurring Cost Per Annum
1	Air Quality	Rs. 3,20,000/-	Rs.64,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		Rs. 3,20,000/-	Rs. 64,000/-

Source: Approved Mining Plan

CHAPTER VII

ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

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 assess the risk levels of those hazards in order to prioritize those that need an immediate attention. Further, mechanisms responsible for these hazards are identified and control measures are recorded along with pinpointed responsibilities. The whole quarry operation will be carried out under the direction of a qualified competent mine manager certified by the DGMS, Dhanbad.

7.2 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.

7.3 CUMULATIVE IMPACT STUDY

This section deals with the cumulative impacts of the mining projects in the cluster area on the environment. For this study, the data provided in the tables 7.1-7.7 were used.

Table 7.1 Cumulative Production Load of Rough Stone

Quarry	Production for five years	Annual Production in m ³	Daily Production in m ³	Number of Lorry Load Per Day
P1	98276	19,655	66	11
P2	237284	47,457	158	26
P3	749746	149,949	500	83
Total	1085306	217,061	724	120

Table 7.2 Cumulative Production Load of Gravel

Quarry	Yearly Production(m ³)	Daily Production in m ³	Number of Lorry Load Per Day
P1	27084	90	15
P2	34176	114	19
P3	16724	56	9
Total	77984	260	43

Table 7.3 Predicted Noise Incremental Values from Cluster

Location ID	Distance (m)	Direction	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	720m	S	45.54	40.01	46.61	55
Habitation Near P2	830m	S	45.54	38.78	46.37	
Habitation Near P3	520m	S	45.54	42.84	47.41	
Cumulative Noise (dB(A))					51.60	

Source: Lab Monitoring Data

Table 7.4 Cumulative Impact Results from the 3 proposed projects

Pollutants	Baseline	Incremental Values ($\mu\text{g}/\text{m}^3$)			Cumulative Value ($\mu\text{g}/\text{m}^3$)
	Data($\mu\text{g}/\text{m}^3$)	P1	P2	P3	
PM _{2.5}	33.05	6.16	8.64	15.64	63.49
PM ₁₀	53.02	10.41	9.22	20.6	93.25
SO ₂	12.13	4.94	5.31	10.12	32.50
NO ₂	24.64	2.64	3.6	9.65	40.53

Table 7.5 Ground Vibrations At 6 Mines

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	21	720m	0.36
P2	52	830m	0.58
P3	166	520m	3.08
E1	69	930m	0.60
E2	21	770m	0.31
E3	28	880m	0.32
Total			5.25

Table 7.6 Socio Economic Benefits From 3 Mines

Location ID	Project Cost	CER @ 2%
P1	Rs. 60,96,000/-	Rs. 1,21,920/-
P2	Rs. 5,41,45,000/-	Rs. 10,82,900/-
P3	Rs. 6,95,80,000/-	Rs. 13,91,600/-
Total	Rs 12,37,25,000/-	Rs 25,96,420/-

Table 7.7 Employment Benefits From 3 Mines

Description of quarries	Employment
P1	26
P2	29
P3	30
Total	85

Table 7.8 Greenbelt Development Benefits From 3 Mines

CODE	No of Trees proposed to be planted	Survival %	Area Covered Sq.m	Name of the Species	No. of Trees expected to be grown
P1	810	80	7290	Neem, Casuarina, etc	648
P2	300	80	4000		240
P3	500	80	4500		400
Total	1610		15790		1288

7.4 PLASTIC WASTE MANAGEMENT PLAN

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.

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

CHAPTER VIII

PROJECT BENEFITS

The proposed project at Siruthamur Village aims to produce 98,276m³ rough stone over a period of 5 Years and 27084 m³ of Gravel over a period of 1 Year. This will enhance the socio-economic activities in the adjoining areas and will result in benefits as below:

- ❖ Employment will be increased;
- ❖ Socio-Economic welfare will be improved;
- ❖ Physical Infrastructure will be improved;
- ❖ Social infrastructure will be improved.

CHAPTER IX

ENVIRONMENT MANAGEMENT PLAN

The environment monitoring cell formed by the mine management will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through mine management level. The said team will:

- ❖ Monitor the water/ waste water quality, air quality and solid waste generated;
- ❖ Analyse the water and air samples collected through external laboratory;
- ❖ Implement and monitor the pollution control and protective measures/devices including financial estimation, installation of air pollution control equipment, waste water treatment plant, etc.;
- ❖ Co-ordinate the environment related activities;
- ❖ Collect health statistics of the workers and population of the surrounding villages;
- ❖ Develop green belt and monitor the progress of the environmental monitoring programme;
- ❖ Comply with statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance.

CHAPTER X

CONCLUSION

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental issues, environmental management plan (EMP) 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.