EXECUTIVE SUMMARY OF EIA DRAFT

FOR

G. KARUPPANAN ROUGH STONE QUARRY LEASE

At

Chockalingapuram Village, Melur Taluk,

Madurai District, Tamil Nadu State.

S.F. No. 471/1

Extent: 2.70.0 hectares

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

CLUSTER EXTENT= 10.15.0 hectares

Complied as per ToR Obtained vide

Lr. No. SEIAA-TN/F. No.9381/SEAC/ToR-1306/2022 dated 28.11.2022

NAME OF PROPOSED PROJECT PROPONENT

G. Karuppanan

S/o. Gandhithevar,
No.1/3A, TWAD Colony,
Thiruppalai,
Madurai-625014,
Mobile No. +91 9443382418

ENVIRONMENTAL CONSULTANT

GEO TECHNICAL MINING SOLUTIONS

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

Valid till : 29th Dec.2023

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 500 m 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 10.15.00 ha contains 3 proposed projects, known as P1, P2 and P3, 1 existing project known as E1 and 1 expired project, known as EX1. The cluster area was calculated as per MoEF & CC Notification S.O. 2269(E) dated 1st July 2016.

This EIA draft discusses the cumulative impacts of 3 proposed and 1 existing 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 the cluster with the total extent of 10.15.00 ha falling in Ayyapatti, Karungalakudi, and Chokkalingapuram Villages, Melur Taluk, Madurai District and Tamil Nadu State. It has been prepared in compliance with ToR issued vide letter no. SEIAA-TN/F.No.9382/ToR-1306/2022 dated 28.11.2022 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 of the Project Proponent	**G.Karuppanan**
Address	S/o. Gandhithevar, No.1/3A, TWAD Colony, Thiruppalai,Madurai-625014, Mobile No. +91 9443382418
Status	Proprietor

Table 1.2 Details of Quarries within the cluster area of 500 m radius

Proposed Quarries				
Code	**Name of the Owner**	**S.F. No and Village**	**Extent (ha)**	**Status**
P1	**G. Karuppanan**	471/1, Chockalingapuram	2.70.0	Proposed for ToR
P2	**K. Ilayaraja**	63, Ayyapatti	0.74.0	ToR obtained vide Lr. No. SEIAA-TN/F.No.8712/ToR-1147/2020 dated 23.05.2022
P3	**K. Ilayaraja**	619/5(part) Karungalakudi	2.02.5	ToR obtained vide Lr. No. SEIAA-TN/F.No.9063/SEAC/ToR-1174/2022 dated 14.06.2022
Existing Quarry				
E1	**J.Mohammed Raja**	472/1, etc., Chokkalingapuram	2.40.0	14.10.2020-13.10.2025 (Active)
Expired Quarry				
EX1	**K. Jothi**	482/2, etc., Ayyapatti	2.28.5	29.12.2016-28.12.2021 (Expired)
	Total Cluster Extent		**10.15.0**	---

Source:

i). AD Letter – Rc.No.74/Mines/2021, dated 16.07.2021

ii) AD Letter – Rc.No.75/Mines/2021, dated 28.07.2021

iii). AD Letter – Rc.No.85/Mines/2021, dated 18.02.2022

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 deals with excavation of rough stone which is primarily used in construction projects. The method adopted for rough stone excavation is a manual open cast mining method involving formation of benches with 5 m height and 5 m width and dimensional stone/secondary blasting. The proposed project area is located between latitudes from 10°10'53.79"N to 10°11'05.41"N and Longitudes from 78°23'1.31"E to 78°23'6.83"E in Chockalingapuram Village, Melur Tluk, and Madurai District. The project site is a Government Poromboke land in S.F.No.471/1 with the extent of 2.70.0 ha, leased for the project proponent, **G. Karuppanan**. The proponent had applied for quarry lease on 20.01.2021 to extract rough stone and obtained the precise area communication letter issued by Department of Geology and Mining, Madurai vide R.C. No.75/mines/2021 dated 04.02.2021. Based on the precise area communication letter, mining plan was prepared. The mining plan thus prepared was approved by Deputy Director of Geology and Mining, Madurai (R.c. No.75/mines/2021 dated 30.04.2021).

According to the approved mining plan report, about **3,28,975 m^3** of rough stone and about **612 m^3** of topsoil will be mined up to the depth of 20 m BGL in the first five years. To achieve the estimated production, 3 jack hammers, 1 compressor, 1 excavator and 4 tippers will be deployed. To operate the machineries and to break the rough stone to preferred dimension, about 28 persons will be employed. At the end of the quarry life, the dimension of the ultimate pit will be 179 m*109 m*45 m and about 1.23.0 ha of land will have been utilized for quarrying, 0.02.0 ha for infrastructures, 0.05.0 ha for roads, 0.23.50 ha for green belt development and dumping, and the remaining 1.16.50 ha will have been left as unutilized area. The final mine closure plan shows that about Rs. 9,18,000 with the annual recurring cost of Rs.81,000 will be spent towards mine closure.

Boundary coordinates of corner pillars of the project site and accessibility details to the location of the project site have been given in Table 2.1. The lease area of the project site has been overlaid on Google earth image (Figure 2.1) and the overall view of the cluster quarries are shown in Figure 2.2.

Table 2.1 Corner Geographic Coordinates of Proposed Project

Pillar ID	Latitude	Longitude	Pillar ID	Latitude	Longitude
1	10°11'5.41"N	78°23'3.04"E	9	10°10'55.30"N	78°23'5.47"E
2	10°10'59.57"N	78°23'6.56"E	10	10°10'55.29"N	78°23'4.32"E
3	10°10'57.93"N	78°23'6.01"E	11	10°10'55.88"N	78°23'3.26"E
4	10°10'57.23"N	78°23'5.42"E	12	10°10'55.10"N	78°23'2.48"E
5	10°10'56.25"N	78°23'5.04"E	13	10°10'53.79"N	78°23'1.87"E
6	10°10'56.13"N	78°23'6.72"E	14	10°10'54.19"N	78°23'1.31"E
7	10°10'55.85"N	78°23'6.83"E	15	10°10'59.52"N	78°23'2.54"E
8	10°10'55.89"N	78°23'6.09"E	---		

Table 2.2 Site Connectivity to the Project Area

Nearest Roadways	Madurai-Tiruchy Road (NH-45B)	2.18 km	E
	Pandangudi-Chockalingapuram Road (SH-35)	1.67 km	NE
Nearest Town	Melur	17.34 km	SW
Nearest Railway Station	Madurai	40 km	SW
Nearest Airport	Madurai	50 km	SW
Nearest Seaport	Thoothukudi	156 km	SE

2.1 DETAILS OF RESERVES

Reserves were calculated after leaving the safety distance, as shown in Figure 2.3. Details of resources and reserves of the project are given in Table 2.3.

Table 2.3 Estimated Resources and Reserves of the Project

Resource Type	Rough Stone in m^3	Topsoil in m^3
Geological Resource in m^3	12,14,510	2,952
Mineable Reserves in m^3	5,11,350	735
Proposed production for 5 years	3,28,975	612

Based on the year wise development and production plan and sections, as shown in Figure 2.4, the year wise production results are provided in Table 2.4.

Table 2.4 Year-Wise Production Details

Year	Rough Stone (m^3)	Gravel m^3
I	73,500	612
II	66,150	-
III	65,225	-
IV	65,025	-
V	59,075	-
Total	**3,28,975**	**612**

Source: Approved Mining Plan

2.2 LAND USE PATTERN

Land use and land cover information for the proposed project site has been given in Table 2.5.

Table 2.5 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	---	1.23.00
Infrastructure	---	0.02.00
Roads	0.03.0	0.05.00
Green Belt	---	0.23.50
Unutilized area	2.67.0	0.23.50
Total	**2.70.0**	**2.70.0**

Source: Approved mining plan

Table 2.6 Mine Closure Budget

Activity	Capital Cost	Recurring Cost/Annum
540 plants inside the lease area	1,08,000	16,200
810 plants outside the lease area	2,43,000	24,300
Wire Fencing	5,40,000	27,000
Renovation of Garland Drain	27,000	13,500
Total	**9,18,000**	**81,000**

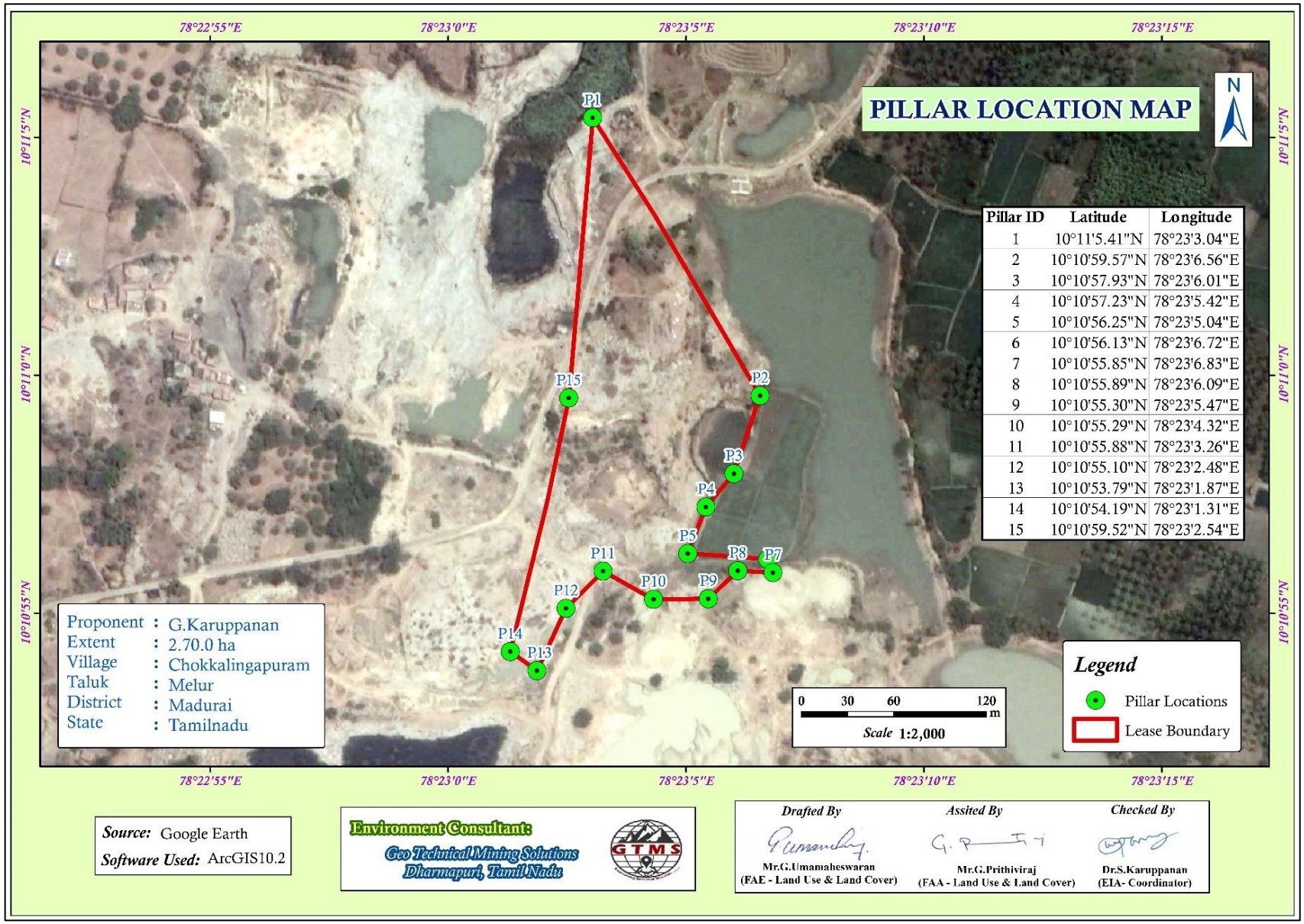


Figure 2.1 Google Earth Image Showing Lease Area with Pillars

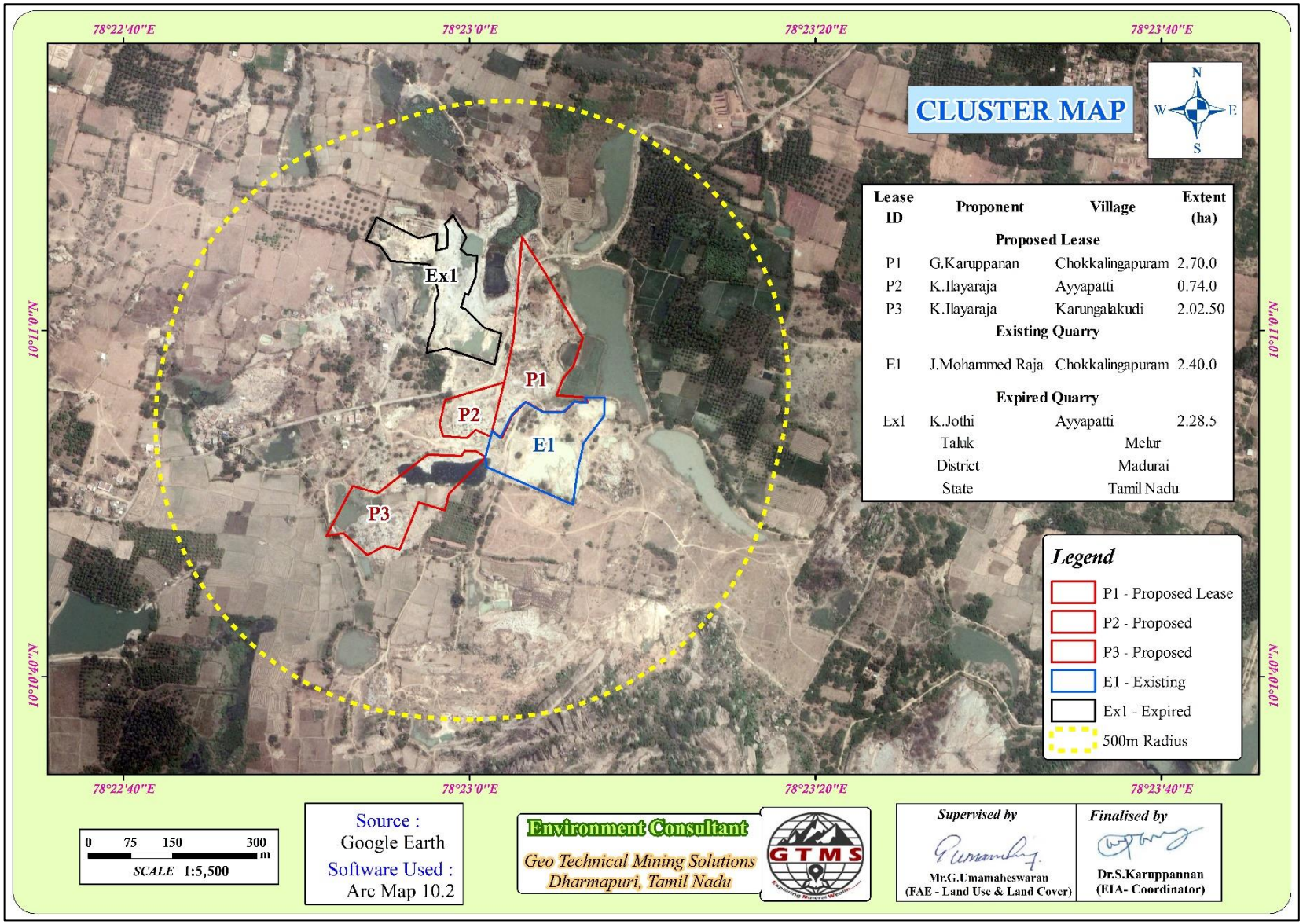
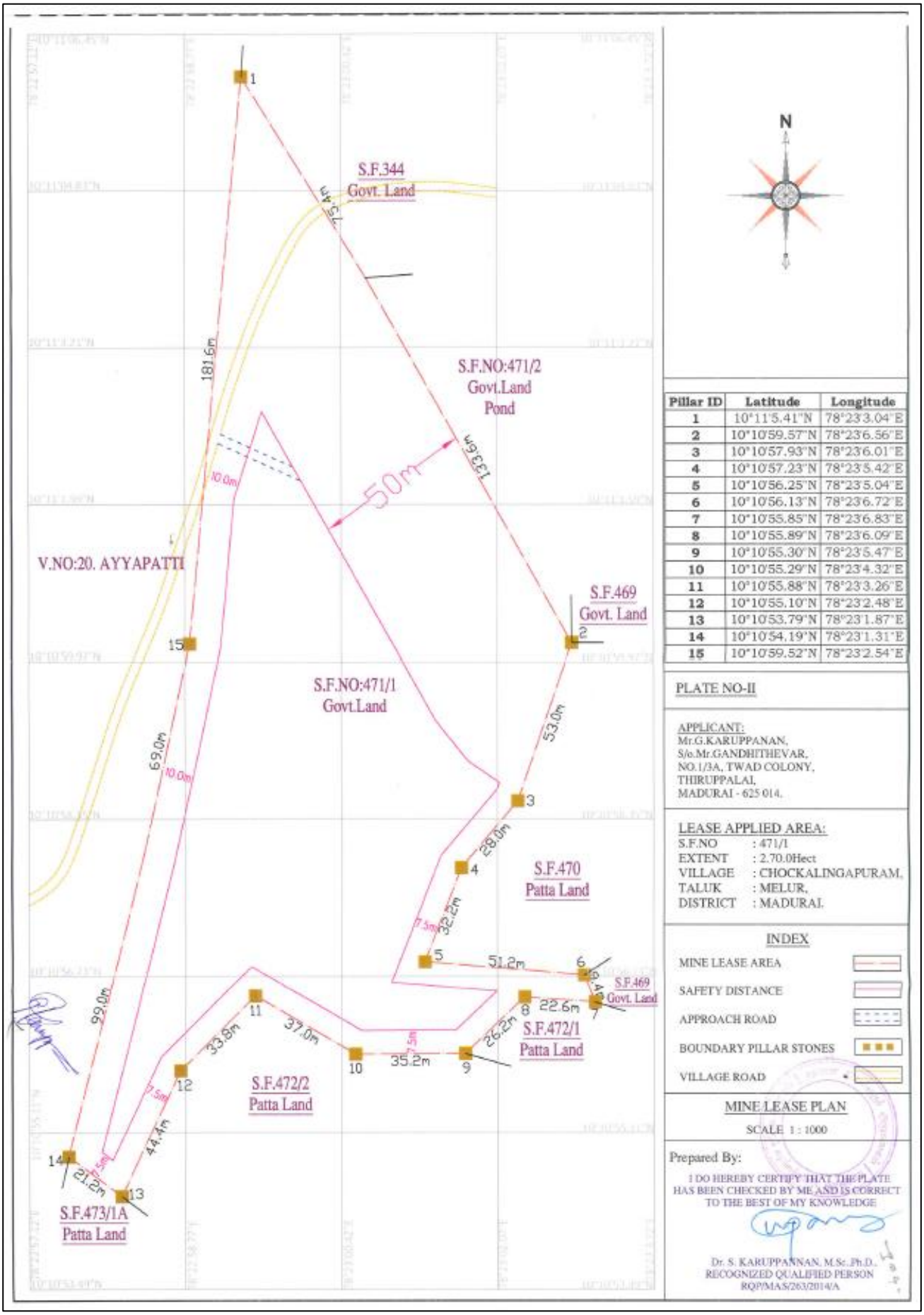


Figure 2.2 Google earth image showing 500m radius limit and the proposed, existing, and expired quarries within the limit



Pillar ID	Latitude	Longitude
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2	10°10'59.57"N	78°23'6.56"E
3	10°10'57.93"N	78°23'6.01"E
4	10°10'57.23"N	78°23'5.42"E
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6	10°10'56.13"N	78°23'6.72"E
7	10°10'55.85"N	78°23'6.83"E
8	10°10'55.89"N	78°23'6.09"E
9	10°10'55.30"N	78°23'5.47"E
10	10°10'55.29"N	78°23'4.32"E
11	10°10'55.88"N	78°23'3.26"E
12	10°10'55.10"N	78°23'2.48"E
13	10°10'53.79"N	78°23'1.87"E
14	10°10'54.19"N	78°23'1.31"E
15	10°10'59.52"N	78°23'2.54"E

PLATE NO-II

APPLICANT:
Mr.G.KARUPPANAN,
S/o.Mr.GANDHITHEVAR,
NO.1/3A, TWAD COLONY,
THIRUPPALAI,
MADURAI - 625 014.

LEASE APPLIED AREA:

S.F.NO	: 471/1
EXTENT	: 2.70.0Hect
VILLAGE	: CHOCKALINGAPURAM,
TALUK	: MELUR,
DISTRICT	: MADURAI.

INDEX

- MINE LEASE AREA
- SAFETY DISTANCE
- APPROACH ROAD
- BOUNDARY PILLAR STONES
- VILLAGE ROAD

MINE LEASE PLAN

SCALE 1 : 1000

Prepared By:

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

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

Figure 2.3 Mine Lease Plan

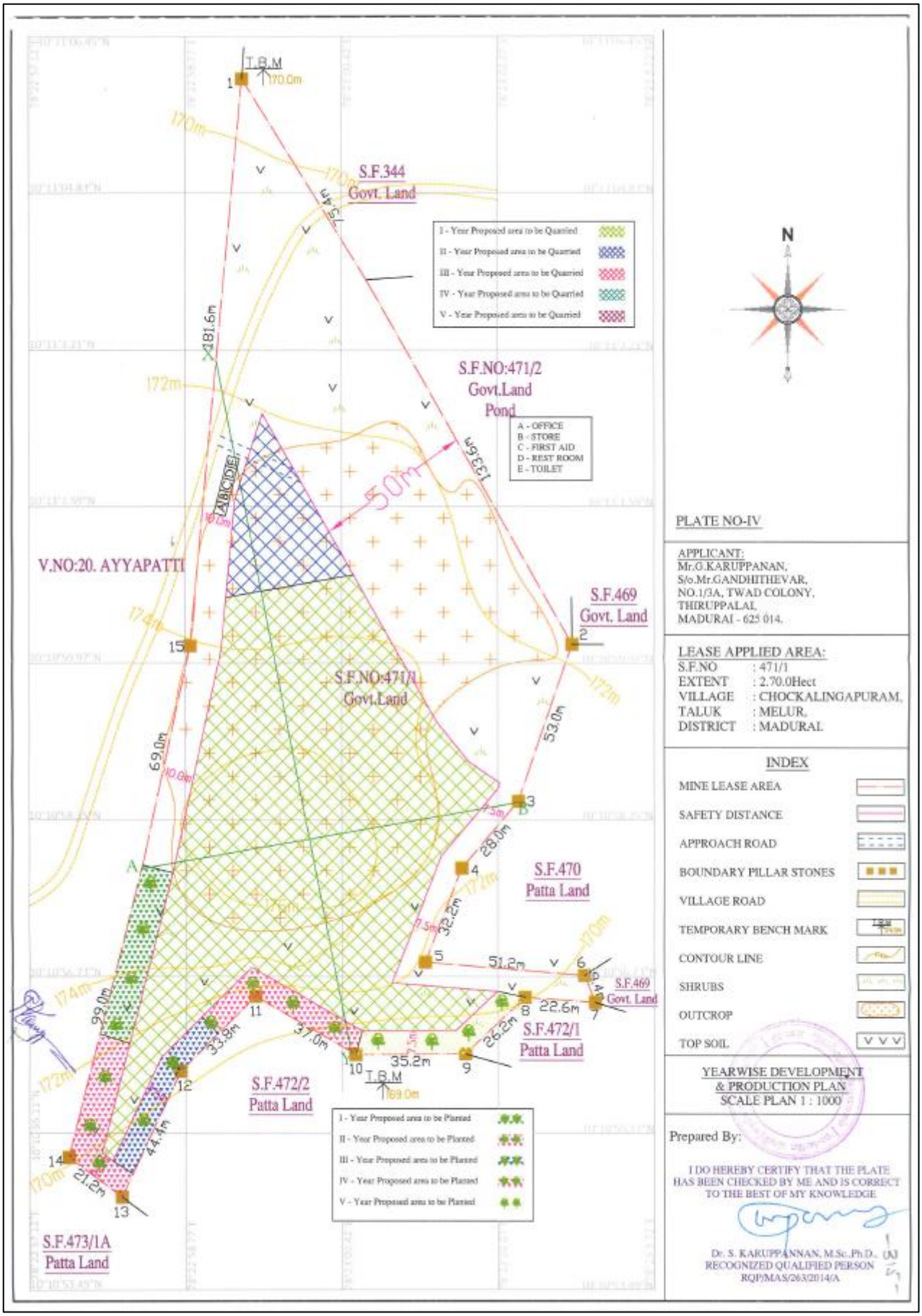
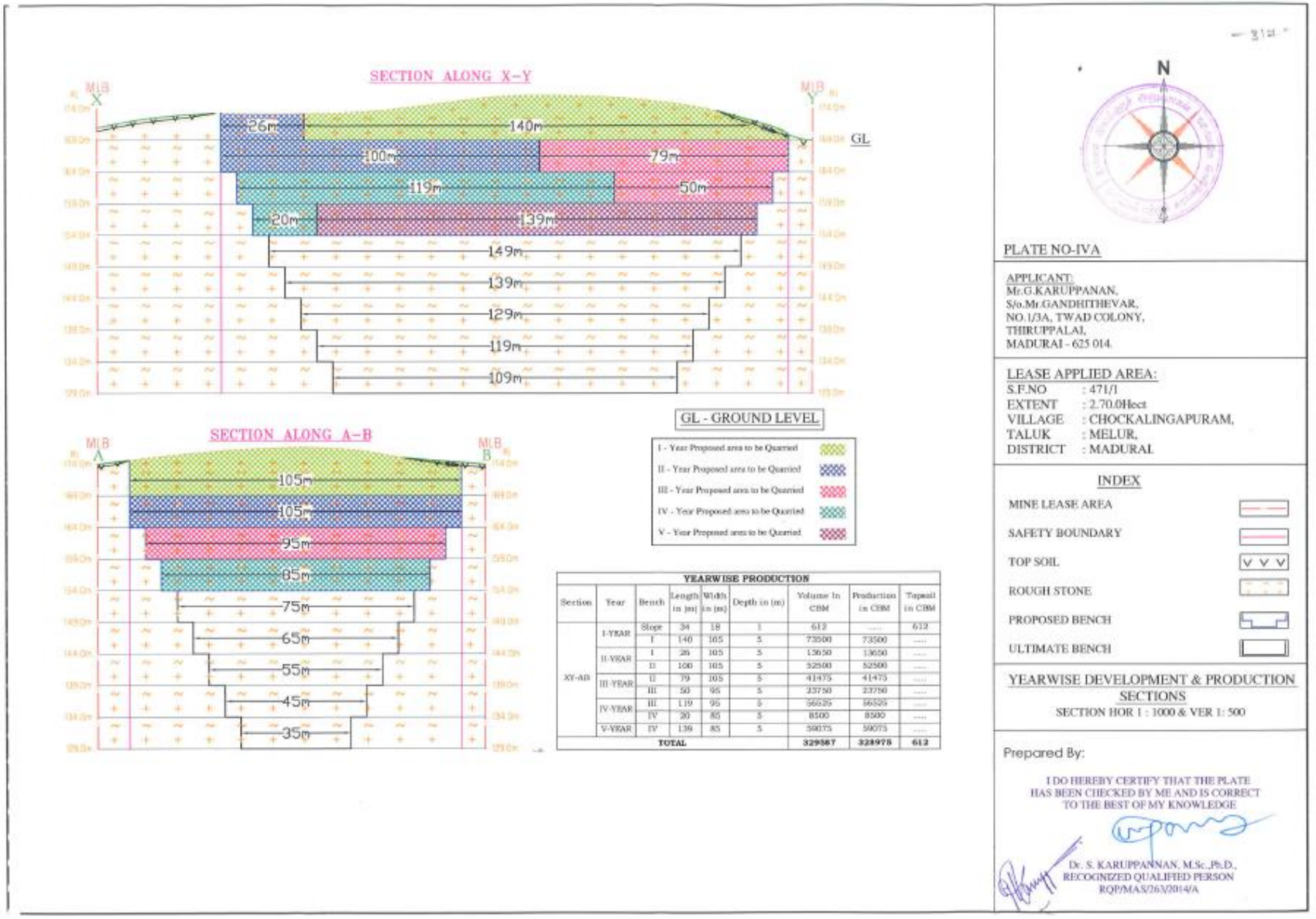


Figure 2.4 Yearwise development and production plan



YEARWISE PRODUCTION

Section	Year	Bench	Length in (m)	Width in (m)	Depth in (m)	Volume in CBM	Production in CBM	Topsoil in CBM
XY-AB	I-YEAR	Slope	34	18	1	612	.....	612
		I	140	105	5	73500	73500	.....
	II-YEAR	I	26	105	5	13650	13650	.....
		II	100	105	5	52500	52500	.....
	III-YEAR	II	79	105	5	41475	41475	.....
		III	50	95	5	23750	23750	.....
	IV-YEAR	III	119	95	5	56525	56525	.....
		IV	20	85	5	8500	8500	.....
	V-YEAR	IV	139	85	5	59075	59075	.....
TOTAL						329587	328975	612

Figure 2.4a Year wise production and development sections

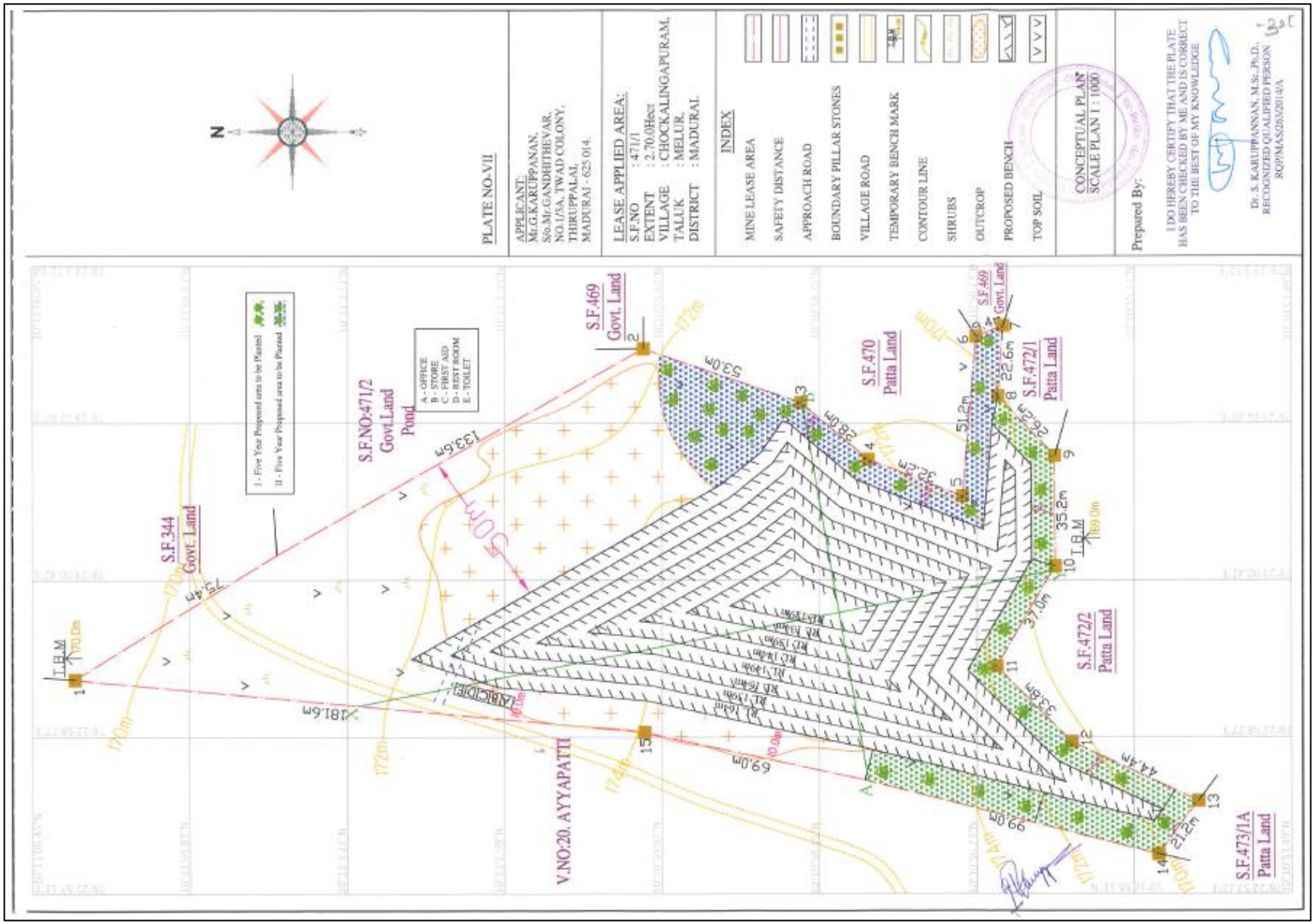


Figure 2.5 Conceptual mine plan

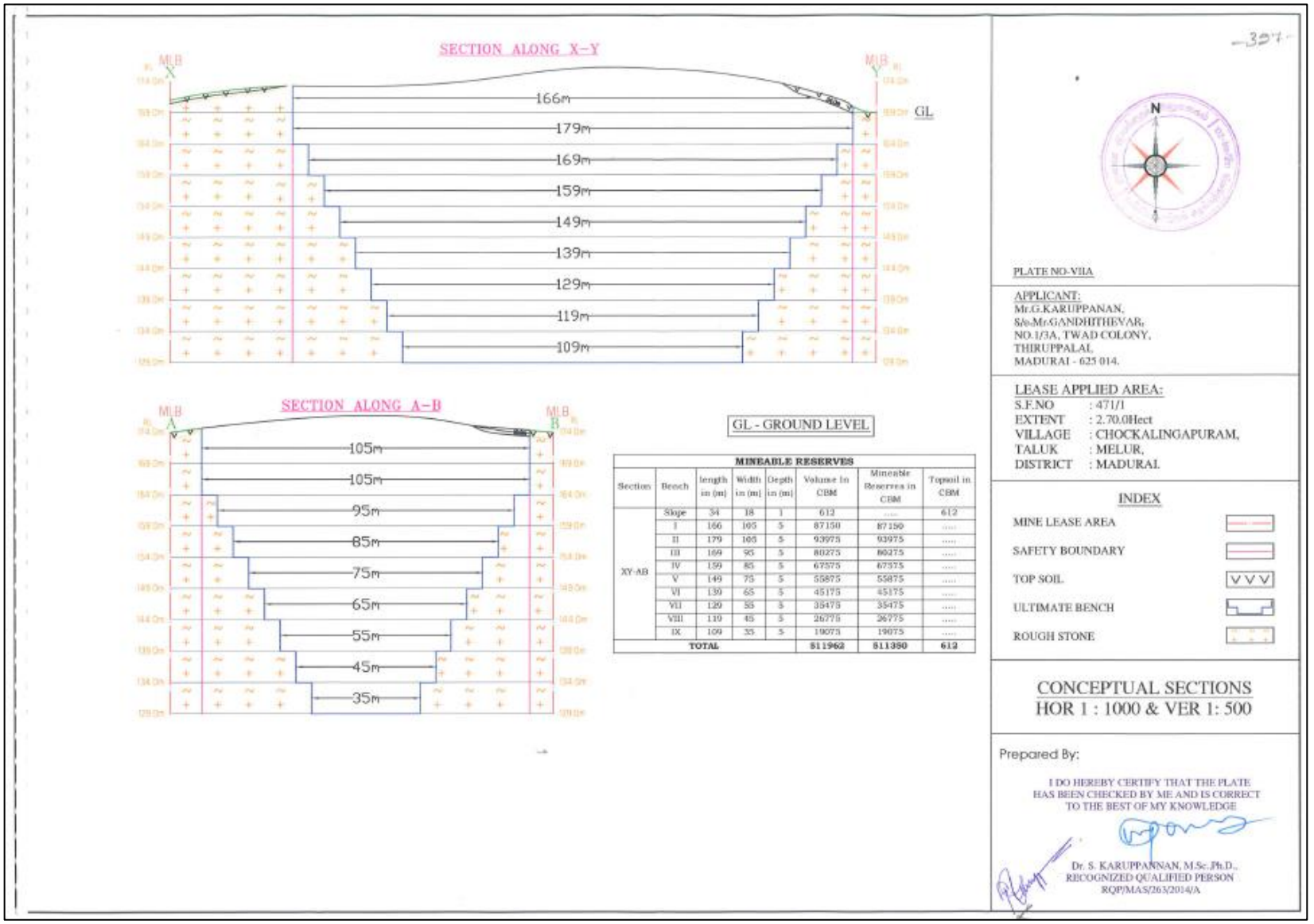


Figure 2.6 Conceptual mine plan sections

2.3 METHOD OF MINING

The quarrying operation is proposed to be carried out by opencast semi mechanized/manual mining method with the bench height and width of 5 m each. The open cast mining method offers several benefits to the proponent when compared to the more complex underground mining methods. The most important benefits include relatively smaller capital and operating costs, lesser safety hazards, ease of use for mass production, small closure costs, no restrictions on the use of heavy machinery if required, and easy drainage of subsurface water. Moreover, it provides a reasonable return on investments to the proponent and contributes to the growth of the local economy.

Blasting

This proposed project involves secondary blasting, known as dimensional stone blasting. In this kind of blasting, the shot holes will be placed in such a way that the rock will not shatter into useless pieces and a small quantity of explosives will be used to create cracks and loosen blocks of good size. Then the blocks will be post processed to make them suitable for construction projects.

2.4 PROPOSED MACHINERY DEPLOYMENT

Table 2.7 Proposed Machinery Deployments

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

Source: Approved Mining Plan

2.5 CONCEPTUAL PLAN

- Mine closure plan will be executed at the end of the quarry life when the lease area will look like what is shown in Figure 2.6.
- 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.

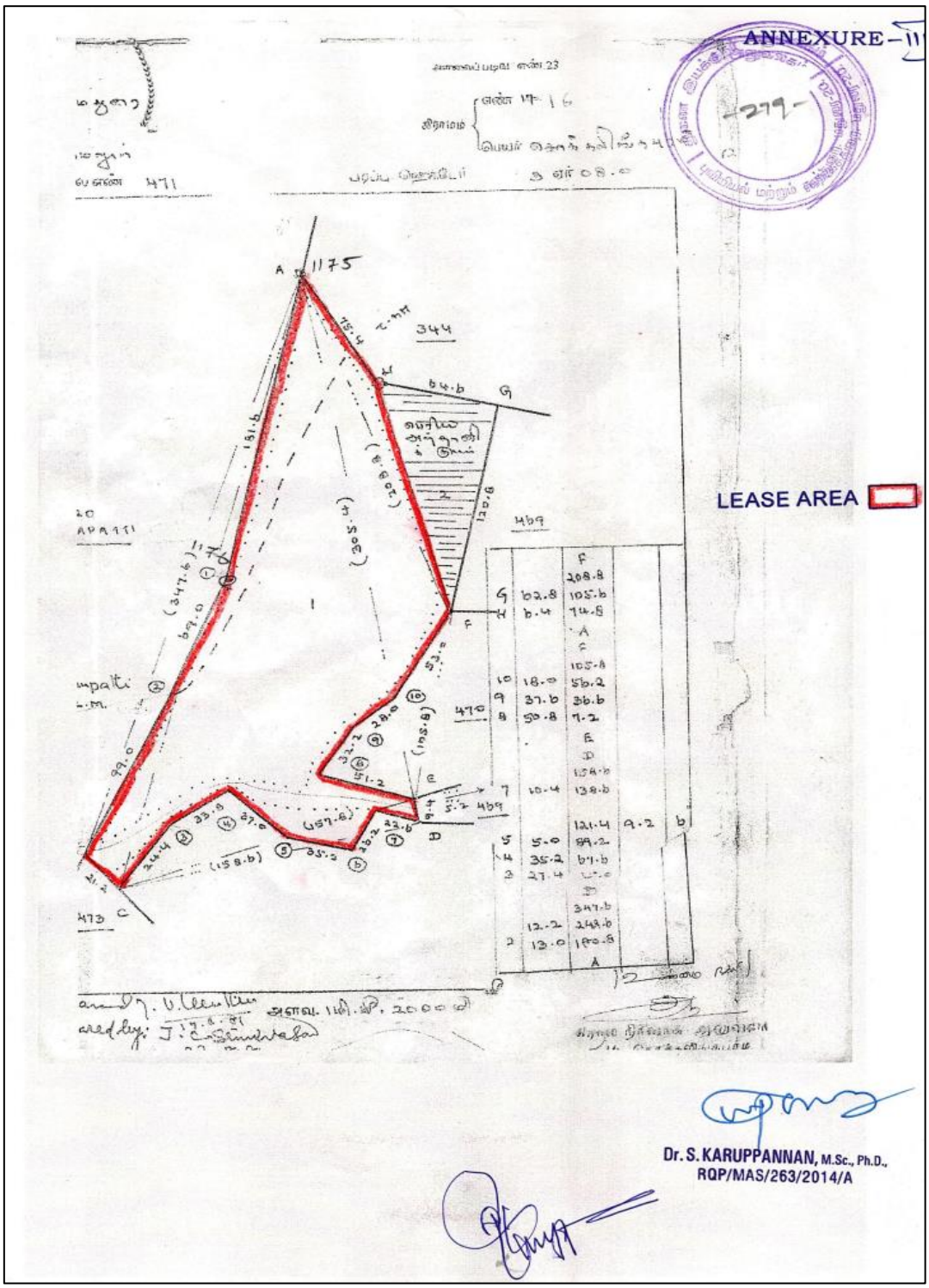


Figure 2.7 An FMP sketch showing proposed project lease area in red colour

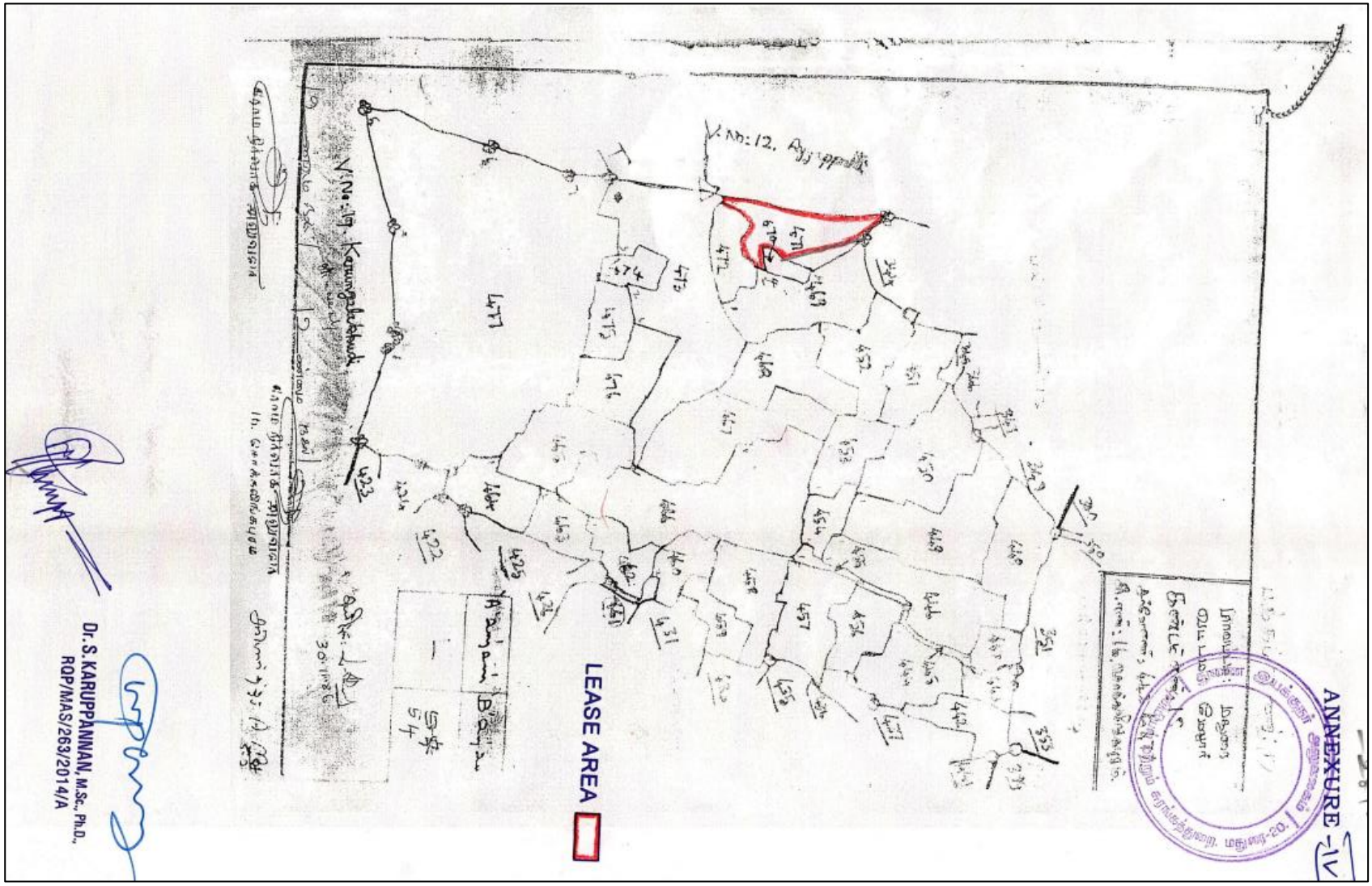
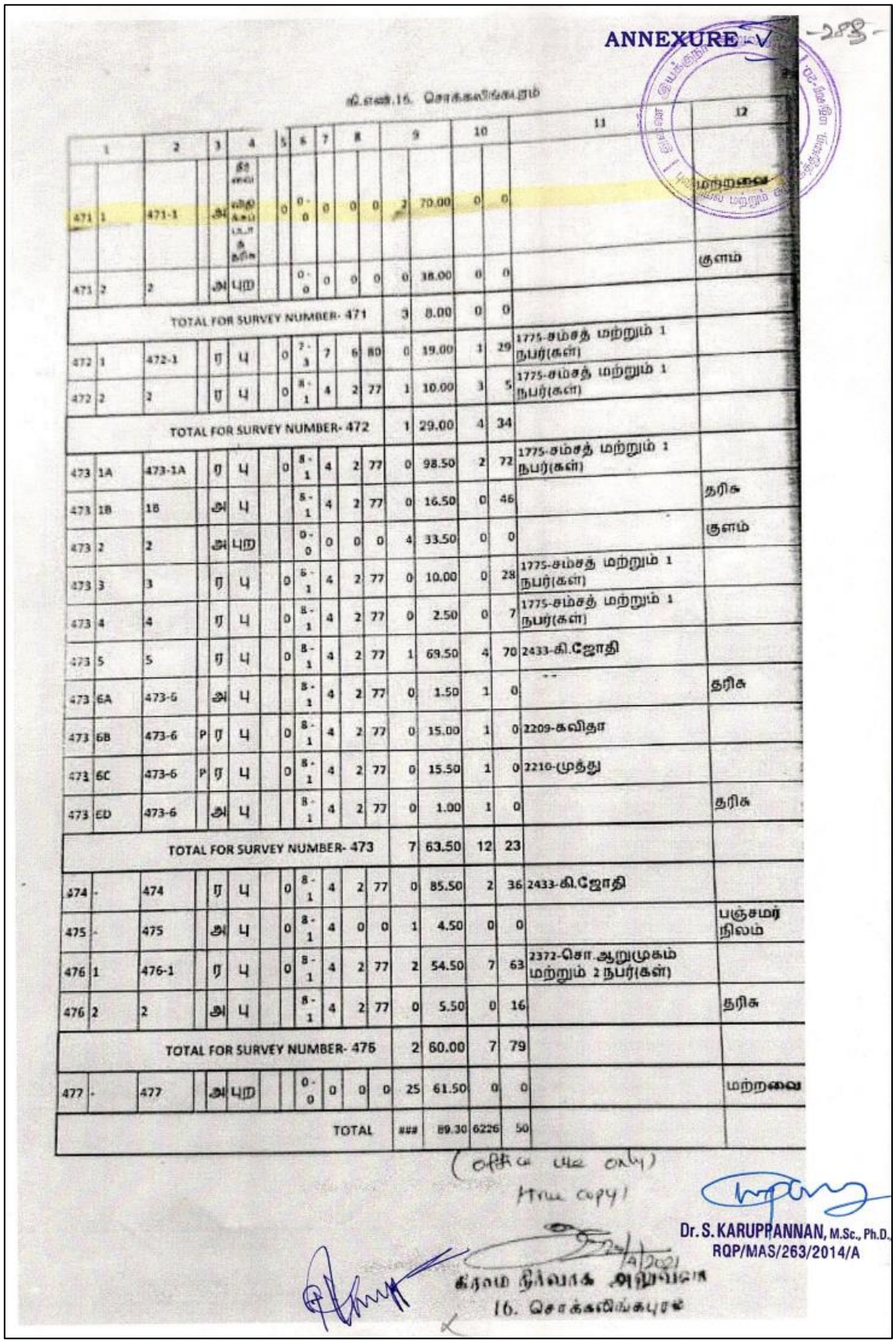


Figure 2.8 Village map showing proposed project lease area in red colour



ANNEXURE - V

வி.எண்.16. சொக்கலிங்கபுரம்

1	2	3	4	5	6	7	8	9	10		11	12
471	1	471-1	அ தரிசு நிலம்	0	0-0	0	0	0	2	70.00	0	0		மற்றவை
471	2	2	அ புற		0-0	0	0	0	0	38.00	0	0		குளம்
TOTAL FOR SURVEY NUMBER- 471									3	8.00	0	0		
472	1	472-1	ர பு	0	7-3	7	6	80	0	19.00	1	29	1775-சம்சத் மற்றும் 1 நபர்(கள்)	
472	2	2	ர பு	0	8-1	4	2	77	1	10.00	3	5	1775-சம்சத் மற்றும் 1 நபர்(கள்)	
TOTAL FOR SURVEY NUMBER- 472									1	29.00	4	34		
473	1A	473-1A	ர பு	0	8-1	4	2	77	0	98.50	2	72	1775-சம்சத் மற்றும் 1 நபர்(கள்)	
473	1B	1B	அ பு		8-1	4	2	77	0	16.50	0	46		தரிசு
473	2	2	அ புற		0-0	0	0	0	4	33.50	0	0		குளம்
473	3	3	ர பு	0	8-1	4	2	77	0	10.00	0	28	1775-சம்சத் மற்றும் 1 நபர்(கள்)	
473	4	4	ர பு	0	8-1	4	2	77	0	2.50	0	7	1775-சம்சத் மற்றும் 1 நபர்(கள்)	
473	5	5	ர பு	0	8-1	4	2	77	1	69.50	4	70	2433-கி.ஜோதி	
473	6A	473-6	அ பு		8-1	4	2	77	0	1.50	1	0	--	தரிசு
473	6B	473-6	P ர பு	0	8-1	4	2	77	0	15.00	1	0	2209-கவிதா	
473	6C	473-6	P ர பு	0	8-1	4	2	77	0	15.50	1	0	2210-முத்து	
473	6D	473-6	அ பு		8-1	4	2	77	0	1.00	1	0		தரிசு
TOTAL FOR SURVEY NUMBER- 473									7	63.50	12	23		
474	-	474	ர பு	0	8-1	4	2	77	0	85.50	2	36	2433-கி.ஜோதி	
475	-	475	அ பு	0	8-1	4	0	0	1	4.50	0	0		பஞ்சமர் நிலம்
476	1	476-1	ர பு	0	8-1	4	2	77	2	54.50	7	63	2372-சொ.ஆறுமுகம் மற்றும் 2 நபர்(கள்)	
476	2	2	அ பு		8-1	4	2	77	0	5.50	0	16		தரிசு
TOTAL FOR SURVEY NUMBER- 476									2	60.00	7	79		
477	-	477	அ புற		0-0	0	0	0	25	61.50	0	0		மற்றவை
TOTAL									###	89.30	6226	50		

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RQP/MAS/263/2014/A

கிராம நிர்வாக அலுவலர்
16. சொக்கலிங்கபுரம்

Figure 2.9 A Register document

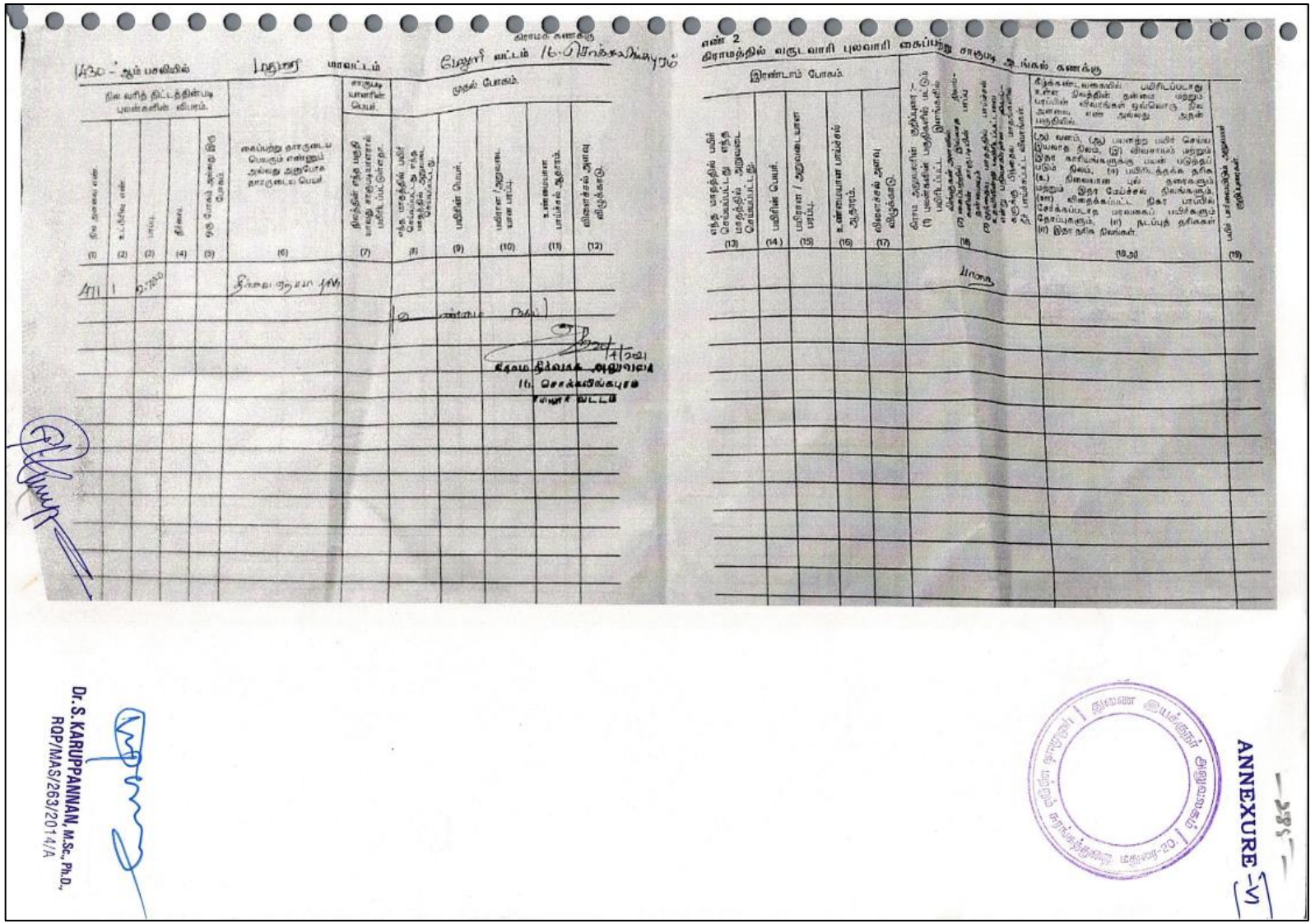

Figure 2.10 Adangal Document

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 through May, 2022 as per CPCB guidelines. Environmental baseline data were collected by an NABL accredited and MoEF notified Excellence Laboratory for the environmental attributes including soil, water, noise, by an NABL accredited and MoEF notified Accuracy Analabs for ambient air and by FAEs for ecology and biodiversity, traffic, and socio-economy.

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 3.1.

Table 3.1 Land Use / Land Cover Statistics for the Area of 5km Radius

S. No.	Classification	Area (Hectare)	Area (%)
1	Barren rocky land	173	2
2	Crop land	2284	30
3	Dense forest	500	7
4	Fallow land	2206	29
5	Scrub land	701	9
6	Mining lands	70	1
7	Plantations	1495	20
8	Settlements	139	2
9	Water bodies	28	0.4
Total Area		**7596**	**100**

Source: Sentinel II Imagery

3.2 SOIL ENVIRONMENT

Seven 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 samples in the study area show loamy textures varying between sandy loam and sandy clay loam. PH of the soil varies from 6.1 to 7.4 indicating slightly acidic to slightly

alkaline nature. Electrical conductivity of the soil varies from 210 to 354 µs/cm. Bulk density ranges between 1.12 and 1.36 and the moisture content varies from 11.96 to 16.34 %.

3.2.2 Chemical Characteristics

Nitrogen ranges between 12.1 and 24.0 mg/kg. Phosphorus ranges between 2.9 and 3.9 mg/kg. Potassium ranges between 9.5 and 15.3 mg/kg. Sodium ranges between 110.7 and 143.2 mg/kg. Organic matter content ranges between 0.93 and 1.98.

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 ranges between 6.8 and 7.1.
- Turbidity varies between 2.3 and 3.1 NTU.
- TDS varies between 184 and 310 mg/l.
- TH varies between 109 and 156 mg/l.
- Calcium varies between 26 and 36 mg/l.
- Magnesium varies between 14 and 29 mg/l.
- Chloride varies between 95 and 128 mg/l and sulphate varies between 12 and 28 mg/l.

Ground Water

- pH of water samples ranges between 7.1 and 8.1.
- TDS varies between 542 and 960 mg/l.
- TH varies between 211 and 357 mg/l.
- Calcium varies between 32 and 63 mg/l.
- Chloride varies between 101 and 213 mg/l.
- Sulphate varies between 32 and 53 mg/l and fluoride from 0.19 to 1 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 2.59m/s.
- Predominant wind was dominant in the directions ranging from northeast to southwest.

3.4.2 Ambient Air Quality

As per the monitoring results in Table 3.19, PM2.5 ranges from 17.42 µg/m^3 to 32.56 µg/m^3; PM10 from 31.09 µg/m^3 to 40.79 µg/m^3; SO2 from 4.36µg/m^3 to 7.73 µg/m^3; NO2 from 13.52 µg/m^3 to 22.79µg/m^3. When compared with the AAQ standards as shown in Table 3.16, concentration levels of the pollutants in all samples fall within the acceptable limits.

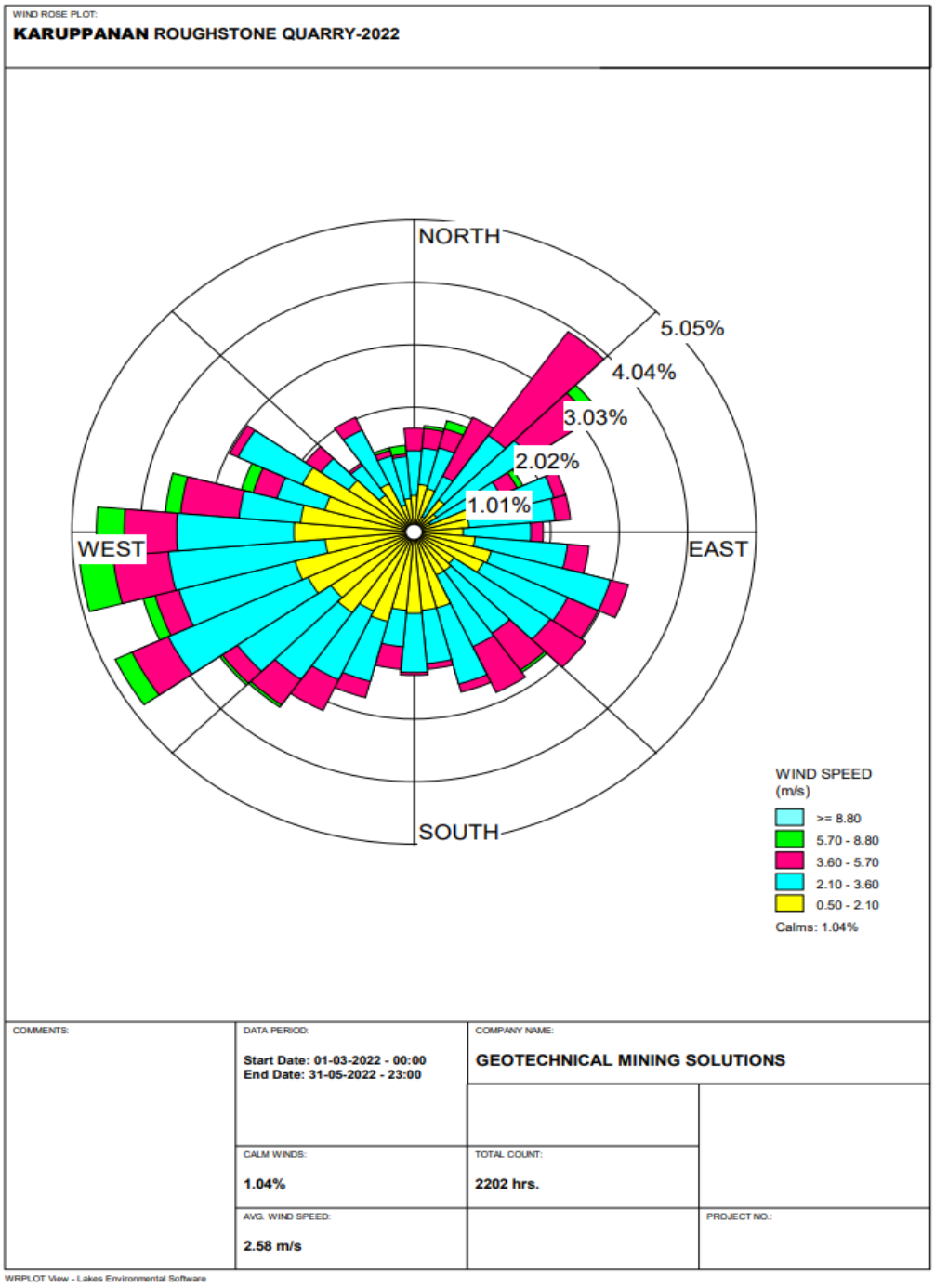

Figure 3.1 Onsite Wind Rose Diagram

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 40.8 dB (A) Leq and during night time was 35.8 dB (A) Leq. Noise levels recorded in buffer zone during day time varied from 36.3 to 44.5dB (A) Leq and during night time from 31.5 to 39.6 dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

3.6 BIOLOGICAL ENVIRONMENT

There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 and no species in vulnerable, endangered or threatened category as per IUCN. 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.

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

3.7 SOCIO ECONOMIC ENVIRONMENT

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

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

Of the total area, mining area covers only 70 ha in which cluster area of 10.15 ha contributes about 0.15 %. Some of the impacts are anticipated due to the mining as discussed below.

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 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

4.2.1 Impact on Soil Environment

Erosion of top soil stored in the lease area can result in substantial sediment loading to surface waters and drainage ways. During rainy season, surface run off may cause siltation in low lying areas. Therefore, following mitigation measures are proposed.

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

- As the proposed project acquires 3.76 KLD of water from water vendors, it will not extract water by developing abstraction structures in the lease area. Therefore, the project will not deplete aquifer beneath the lease area.
- 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 20 m below ground level and water table is found at depths of 40 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.

4.4 AIR ENVIRONMENT

4.4.1 Anticipated Impact

Anticipated increase of the air pollutants due to quarrying activities and the existing quarrying activities within the area of 500 m radius around the project sites have been predicted by modelling using AERMOD software and the modelling results shown in Tables 4.1 to 4.4 will be used in providing mitigation measures.

Table 4.1 Incremental & Resultant GLC of $PM_{2.5}$

Station ID	Distance to core area (km)	Direction	$PM_{2.5}$ concentrations(µg/m^3)			Comparison against standard (60 µg/m^3)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	0.09	SW	24.85	5	29.85	Below Standard	20.12	Not Significant
AAQ2	1.03	W	23.77	0.5	24.27		2.10	
AAQ3	3.05	W	24.29	0.5	24.79		2.06	
AAQ4	4.08	W	27.29	0	27.29		0.00	

AAQ5	4.54	SE	24.41	0.5	24.91		2.05	
AAQ6	3.90	NW	22.42	0.5	22.92		2.23	
AAQ7	1.96	NE	23.83	1	24.83		4.20	
AAQ8	2.71	SW	24.74	0	24.74		0.00	
AAQ9	0.05	W	25.51	6.66	32.17		26.11	

TABLE 4.2 Incremental and Resultant GLC of PM_{10}

Station ID	Distance to core area (km)	Direction	PM_{10} concentrations(µg/m^3)			Comparison against air quality standard (100 µg/m^3)	Magnitude of change (%)	Significance
			Base line	Predicted	Total			
AAQ1	0.09	SW	38.57	9.9	48.47	Below Standard	25.67	Not Significant
AAQ2	1.03	W	36.37	1	37.37		2.75	
AAQ3	3.05	W	36.40	0.5	36.9		1.37	
AAQ4	4.08	W	35.20	0.5	35.7		1.42	
AAQ5	4.54	SE	34.86	1	35.86		2.87	
AAQ6	3.90	NW	35.00	0.5	35.5		1.43	
AAQ7	1.96	NE	35.60	1	36.6		2.81	
AAQ8	2.71	SW	37.01	0.5	37.51		1.35	
AAQ9	0.05	W	37.85	9.9	47.75		26.16	

Table 4.3 Incremental & Resultant GLC of SO_2

Station ID	Distance to core area (km)	Direction	SO_2 concentrations(µg/m^3)			Comparison against air quality standard (80 µg/m^3)	Magnitude of change (%)	Significance
			Base line	Predicted	Total			
AAQ1	0.09	SW	6.14	5	11.14	Below Standard	81.43	Not Significant
AAQ2	1.03	W	5.43	0.5	5.93		9.21	
AAQ3	3.05	W	5.89	0.5	6.39		8.49	
AAQ4	4.08	W	6.56	0	6.56		0.00	
AAQ5	4.54	SE	5.43	0.5	5.93		9.21	
AAQ6	3.90	NW	5.56	0.5	6.06		8.99	
AAQ7	1.96	NE	5.24	0.5	5.74		9.54	
AAQ8	2.71	SW	7.28	0	7.28		0.00	
AAQ9	0.05	W	5.53	6.35	11.88		114.83	

Table 4.4 Incremental & Resultant GLC of NO_X

Station ID	Distance to core area (km)	Direction	NOx concentrations(µg/m^3)			Comparison against air quality standard (80 µg/m^3)	Magnitude of change (%)	Significance
			Base line	Predicted	Total			
AAQ1	0.09	SW	17.37	5	22.37	Below Standard	28.79	Not Significant
AAQ2	1.03	W	16.22	0.5	16.72		3.08	
AAQ3	3.05	W	16.58	0.5	17.08		3.02	
AAQ4	4.08	W	17.11	0	17.11		0.00	
AAQ5	4.54	SE	18.30	0.5	18.8		2.73	
AAQ6	3.90	NW	16.55	0.5	17.05		3.02	
AAQ7	1.96	NE	15.79	1	16.79		6.33	
AAQ8	2.71	SW	18.86	0	18.86		0.00	
AAQ9	0.05	W	18.03	7.76	25.79		43.04	

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

- 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.

4.4.2.1 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.

4.4.2.2 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

Table 4.5 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)
Nearby Core	100	40.6	39.38	43.04
Kadampatti	450	38.5	26.32	38.75
Karandipatti	3900	41.4	7.56	41.40
Vettayanpatti	1960	39.8	13.53	39.81
Kannamangalappatti	4540	36.3	6.24	36.30
Karungalakkudi	3620	44.5	8.21	44.50
Poomangalapatti	3050	40.1	9.69	40.10
Kottampatti	4390	43.7	6.53	43.70
Kilnattramangalam	4170	40.4	6.98	40.40
Core	100	40.8	39.38	43.16
NAAQ Standards	Industrial Day Time - 75 dB (A) & Night Time- 70 dB (A) Residential Day Time -55 dB (A) & Night Time- 45 dB (A)			

Total noise level in all the sampling areas is well below the CPCB standards for industrial and residential areas. By adopting suitable mitigation measures, the noise levels due to the project can be controlled further.

4.5.2 Mitigation Measures

- 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 though 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, about 1350 saplings will be planted by the project proponent both inside and outside the lease area in about three months. For this program, Rs.351000 will be invested as capital and Rs.40500 excluding 5% inflation will be spent for green belt maintenance.

4.7 SOCIO ECONOMIC ENVIRONMENT

4.7.1 Anticipated Impact

The project will generate employment for about 28 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.

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

6.1 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 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

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

- The results on the cumulative impact of the three proposed projects on air environment of the cluster do not exceed the permissible limits set by CPCB for air pollutants.
- The cumulative results of noise for the habitation in consideration do not exceed the limit set by CPCB for residential areas for day time.
- As all the proposed projects and existing project are intended for producing dimension stone, the projects will use a small quantity of explosives to create fractures in the massive rock and will produce a negligible magnitude of ground vibrations on the surrounding area. Therefore, cumulative PPV was not calculated and added in this report.
- The three proposed projects will allocate Rs. 1500000/- towards CER as recommended by SEAC.
- The three proposed projects will directly provide jobs to 80 local people, in addition to indirect jobs.
- The three proposed projects will plant about 2362 trees in and around the lease area.
- The three proposed projects will add 228 PCU per day to the nearby roads.

7.4 PLASTIC WASTE MANAGEMENT PLAN

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.

7.4.1 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.

Table 7.1 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

CHAPTER VIII

PROJECT BENEFITS

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

- Direct employment to 28 local people and indirect employment for 15 people
- Rain water harvesting structures to augment the water availability for irrigation and plantation and ground water recharge

- Creation of community assets (infrastructure) like school buildings, village roads/ linked roads, dispensary & health Centre, community Centre, market place etc.,
- Strengthening of existing community facilities through the Community Development Program
- Skill development & capacity building like vocational training
- Awareness program and community activities, like health camps, medical aids, sports & cultural activities, plantation etc.,
- CSR activities mainly contributing to education, health, training of women self-help groups and infrastructure etc., will be taken up in the Chokkalingapuram Village. CSR budget is allocated as 2.5% of the profit.
- Rs. 5,00,000 will be allocated for CER.

CHAPTER IX

ENVIRONMENT MANAGEMENT PLAN

In order to implement the environmental protection measures, an amount of Rs. 22,77,000 as capital cost and recurring cost as Rs. 11,88,800 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. 88,45,870.

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.