EXECUTIVE SUMMARY OF EIA DRAFT FOR ROUGH STONE QUARRY LEASE

At

Nadumandalam Village, Natham Taluk, Dindigul District, Tamilnadu

S.F. No. 569/1 (Part-4) Extent: 1.20.0 hectares

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

CLUSTER EXTENT= 10.45.0 Hectares

Prepared as per ToR obtained vide Lr.No. SEIAA- TN/F.No.8787/ToR-1151/2021 Dated: 23.05.2022.

NAME OF PROPOSED PROJECT PROPONENT

Thiru.A.GOVINDARAJAN

S/o. Amirhalingadoss,
D.No.6, Manmalai Kovil street,
K.Pudur, Madurai North,
Madurai District – 625007.

ENVIRONMENTAL CONSULTANT

GEO TECHNICAL MINING SOLUTIONS

No: 1/213-B, Ground Floor, Natesan Complex
Oddapatti, Collectorate Post office,
Dharmapuri-636705. TamilNadu.
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NABET ACC. NO: NABET/EIA/2023/IA0067

Valid till : 29th Dec.2023

ENVIRONMENTAL LAB

RICHARDSON & CRUDDAS (1972) LIMITED

NABL Accredited & Recognised Laboratory

No.1/61, VOC Nagar Main Road, Maduravoyal, Chennai, Tamilnadu

Baseline Study Period –March 2022 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 project falls within 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 the grant of Environmental Clearance (EC) after conducting public hearing. According to 500m radius letter, the cluster contains two proposed projects, known as P1 and P2 and two existing projects, known as Ex1and Ex2, and two expired projects known as Ep1 and Ep2.

The EIA draft has been prepared in compliance with ToR issued vide letter no. : SEIAA-TN/F.No.8787/SEAC/ToR-1151/2021, Dated:23.05.2022 for the proposed project by conducting the baseline monitoring study during the period of March to May, 2022 and discusses the cumulative impact of the 2 proposed project and the 2 existing project 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 **10.45.0ha** in Nadumandalam Village, Natham Taluk, Dindigul District, and Tamil Nadu State.

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

Table 1.1 Details of Project Proponent

Name and Address	
Name	**Thiru. A. Govindarajan**
Address	S/o.Amirhalingadoss, D.No.6, Manmalai Kovil street, K.Pudur, Madurai North, Madurai District – 625007.
Status	Proprietor

Table 1.2 List of Quarries within 500 Meter Radius

PROPOSED QUARRIES				
CODE	**Name of the Owner**	**Village Name & S.F. Nos**	**Extent**	**Lease Period**
P1	**A.Govindarajan,** S /o. Amirthalingados, 56-6, Manmalai Road, K.Pudur,Madurai District.	Nadumandalam SF.No. 569 / l(P)(B-4)	1.20.0	applied area
P2	**A. Lakshmipathy,** S/ o. Amirthalingadoss, 6(3), Manmalaisamy Street, K. Pudur, Madurai North, Madurai	Velampatty SF.No. 289/1 (P)	1.05.0	Tender cum Auction conducted Poramboke land
TOTAL			**2.25.0 ha**	
EXISTING QUARRIES				
Ex1	**R.Thiyagarajan,** S/o.Rengasamy Naidu, Sengulam Village, Natham Taluk, Dindigul	Nadumandalam SF.No. 569/ l(P)(B-3)	2.00.0	27.06.2019 to 26.06.2023
Ex2	**N.Nallamani,** S/o. Nallamani, Andaman, Madurai	Nadumandalam SF.No. 569/ l(P)(B-2)	1.20.0	10.06.2019 to 09.06.2029
TOTAL			**3.20.0ha**	
Abandoned/ Expired Quarry				
Ep1	**R.Thiyagarajan,** S/o.Rengasamy Naidu, Sengulam Village, Natham Taluk, Dindigul	Nadumandalam SF.No. 569 /l(P)(B-1)	4.00.0	**26.10.2015 to 25.05.2020**
Ep2	**Thiru.A. Lakshmipathy,** S /o. Amirthalingadoss, 6(3), Manmalaisamy Street, K. Pudur, Madurai North, Madurai	Nadumandalam SF.No. 569 / 1 (P)(B-2)	1.00.0	**29.02.2016 to 28.02.2021**
TOTAL			**5.00.0 ha**	
Total Cluster Extent			**10.45.0 ha**	

Source: i) A**D Letter – Rc.No.112/2021/Mines/ dated 12.07.2021.**

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 quarrying operations are to be carried out by Opencast Semi Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Jack Hammer Drilling & Slurry explosive during blasting. Hydraulic excavator and tippers are used for loading and transportation. Rock Breakers are deployed to avoid secondary blasting. Hence all the materials produced by the project will be utilized in construction projects, the project will not produce any solid, gaseous, and liquid wastes during its life time. The details about the proposed project have been given in Table 2.1.

Table 2.1 Brief Description of the Project

Name of the Quarry	**Thiru. A. Govindarajan** - Rough stone quarry	
Toposheet No	58-J/04	
Lattitude	10°14'34.88"N to 10°14'41.04"N	
Longitude	78°14'20.33"E to 78°14'23.92"E	
Highest Elevation	290m AMSL	
Ultimate depth of Mining as for Tor	35m (10m AGL+ 20m BGL)	
Geological Resources	Rough Stone in m^3	Topsoil m^3
	2,77,070	3367
Mineable Reserves	Rough Stone in m^3	Topsoil m^3
	1,05,820	1917
Proposed reserve for five years upto the depth of 35m (10m AGL + 25mBGL)	1,05,820	1917
Ultimate Pit Dimension as for ToR	142m (L) x 35m (W) x 35m (D)bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	Elevated terrain	
Machinery proposed	Jack Hammer	2 Nos
	Compressor	1 Nos
	Hydraulic Excavator	1 Nos
	Tippers	2 Nos
Blasting Method	Controlled Blasting Method by shot hole drilling and small dia of 25mm slurry explosive are	

	proposed to be used for shattering and heaving effect for removal and winning of Rough Stone. No deep hole drilling is proposed.
Proposed Manpower Deployment	26 Nos
Project Cost	Rs.38,95,000 /-
CER Cost @ 2% of Project Cost	Rs. 77,900/-
Proposed Water Requirement	3.3 KLD
Nearest Habitation	540m - South

Source: Approved Mining Plan

2.1 LOCATION OF THE PROJECT

The proposed and existing quarry projects fall in Nadumandalam Village, Natham Taluk and Dindigul District. The project area is located about 1.5km North side of Nadumandalam Village, the area is marked in the Survey of India, Toposheet No. 58-J/04. The area lies between the Latitudes of 10°14' 34.88"N to 10°14' 41.04"N and Longitudes 78°14' 20.33"E to 78°14' 23.92"E. The altitude of the project area varies from 280 to 290 m AMSL. Proposed Project Boundary corner pillars of Geographic coordinates and accessibility details to the location of the project site have been given in Tables 2.2 and 2.3, respectively. The lease area pillar locations Google earth image (Figure 2.1) and 300m and 500m radius cluster of quarry map has been shown in Figure 2.2.

Table 2.2 Proposed Project Boundary corner pillars of Geographic coordinates

Boundary Pillar No.	Latitude	Longitude
1	10°14' 41.04"N	78°14' 23.09"E
2	10°14' 34.88"N	78°14' 23.92"E
3	10°14' 35.30"N	78°14' 22.73"E
4	10°14' 36.30"N	78°14' 21.57"E
5	10°14' 40.42"N	78°14' 20.33"E

Table 2.3 Accessibility details to the project site

Nearest Roadway	Nearest State Highway – 383 Dindigul- Natham- Kottampatti – 8.5km South Village Road Natham to Nadumandalam-644– 0.70km east
Nearest Village	Nadumandalam – 1.5 km-North
Nearest Town	Natham – 2.20 km – South
Nearest Railway Station	Dindigul – 30 km – West
Nearest Airport	Madurai – 47 km- South
Nearest Seaport	Thoothukudi- 163 km – South

2.2 GEOLOGY OF THE PROJECT SITE

The area falling under 10 km radius boundary drawn from the project site mainly consists of granite gneiss and charnockite of Archean age.

2.3 OPERATIONAL DETAILS FOR PROPOSED PROJECT

Geological resources and production details of the project including yearly and daily production, and mine closure have been extracted from mining plans shown in Figure 2.9 and given in Table 2.4. Mine closure budget required for the closure of this project have been provided in Table 2.6.

Table 2.4 Production Details for the Proposed Project

Particulars	**Details**	
	Rough Stone in m^3 (5 Year Plan period)	**Topsoil in m^3**
Geological Resources in m^3	2,77,070	1917
Mineable Reserves in m^3	1,05,820	1917
Mining Plan Period	5 Years	
Number of Working Days	300 Days	
Production per day in m^3	71	12
No of Lorry loads ($6m^3$ per load)	6	1
Depth of Mining first five years plan of period	35m (10m AGL+ 25m BGL)	

Source: Approved Mining Plan

2.4 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 and Land Cover Pattern for the Proposed Project

Land Use Pattern		
Description	**Present area in (ha)**	**Area at the end of life of quarry (ha)**
Area under quarry	0.55.00	0.78.00
Infrastructure	Nil	0.01.00
Roads	Nil	0.03.00
Green Belt	Nil	0.24.00
Un – utilized area	0.65.00	0.14.00
Total	**1.20.00**	**1.20.00**

Source: Approved mining plan

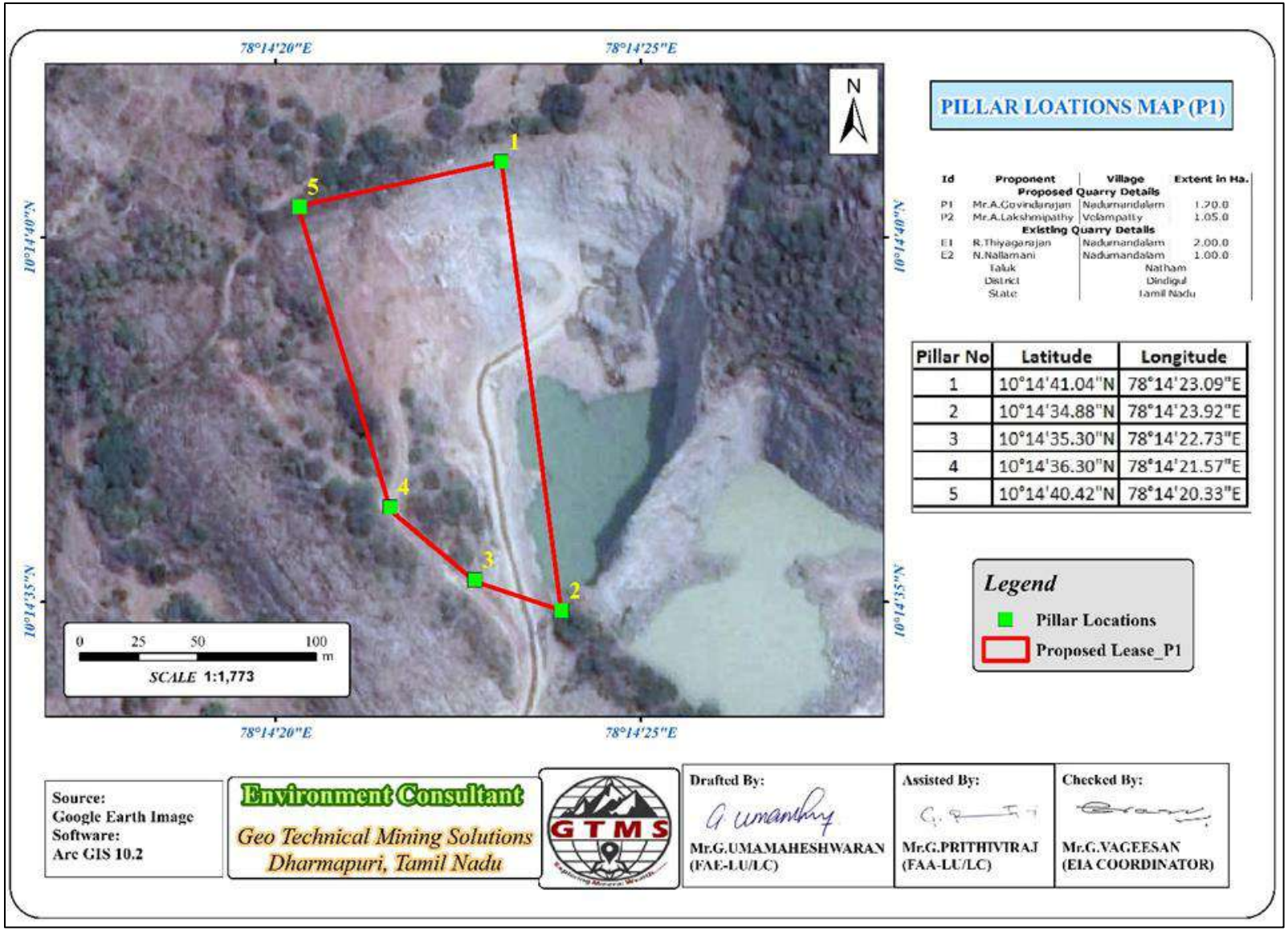


Figure 2.1 Google image showing the proposed project Lease boundary with Geographic coordinat

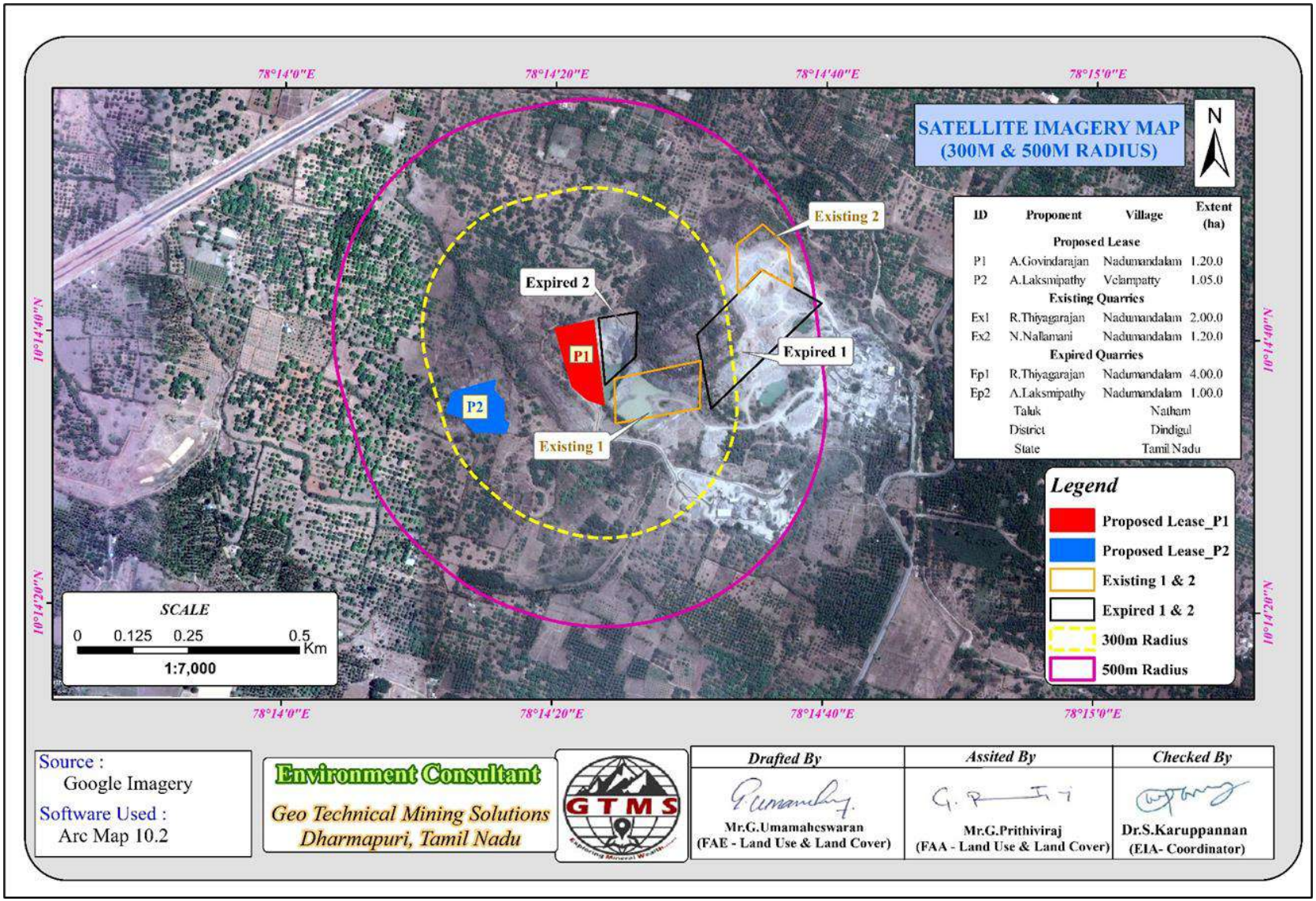
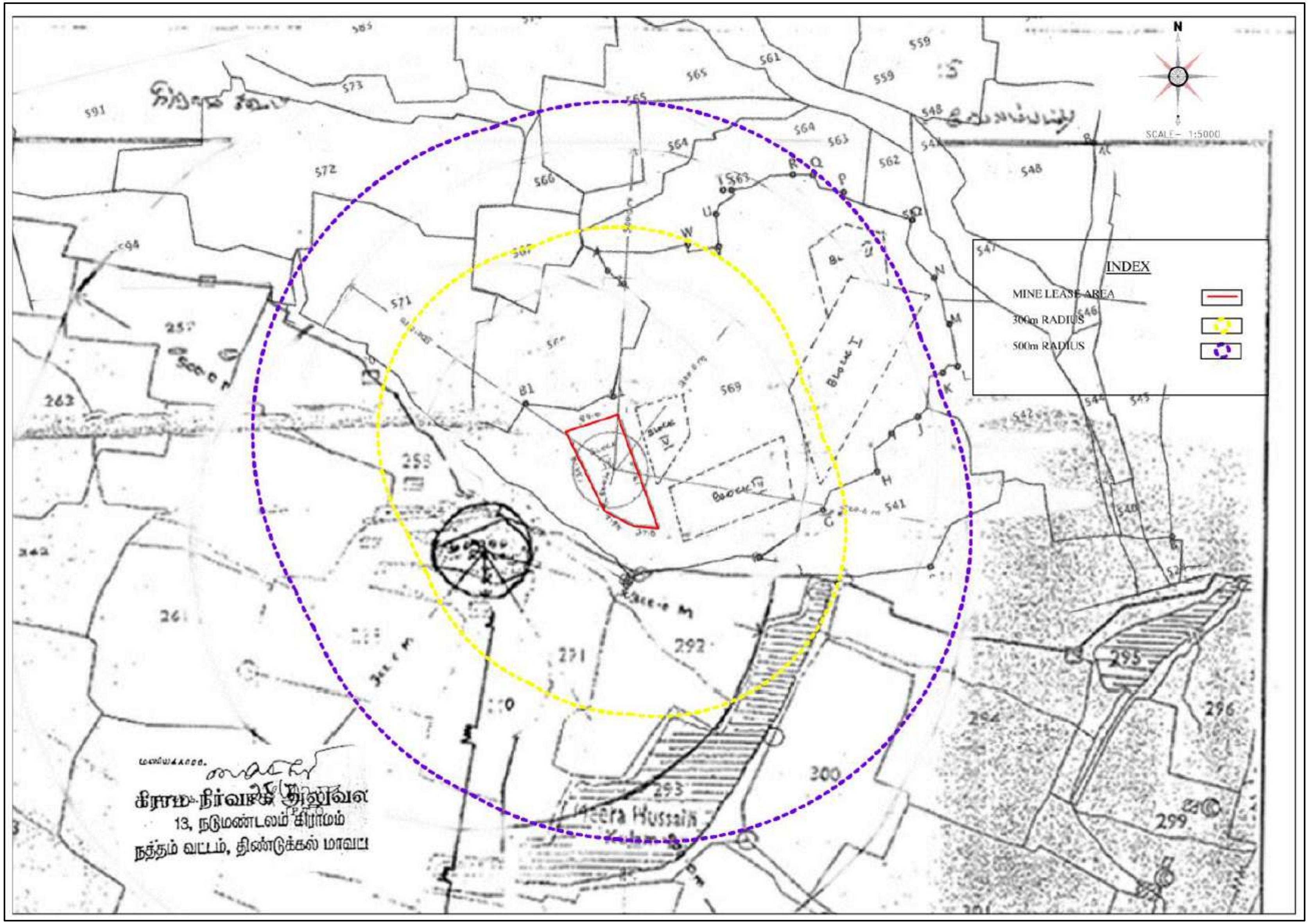


Figure 2.2 Google earth imagery showing cluster of quarry 300m and 500m radius

Figure 2.3 FMP sketch showing quarry lease area in red colour


N
SCALE - 1:5000
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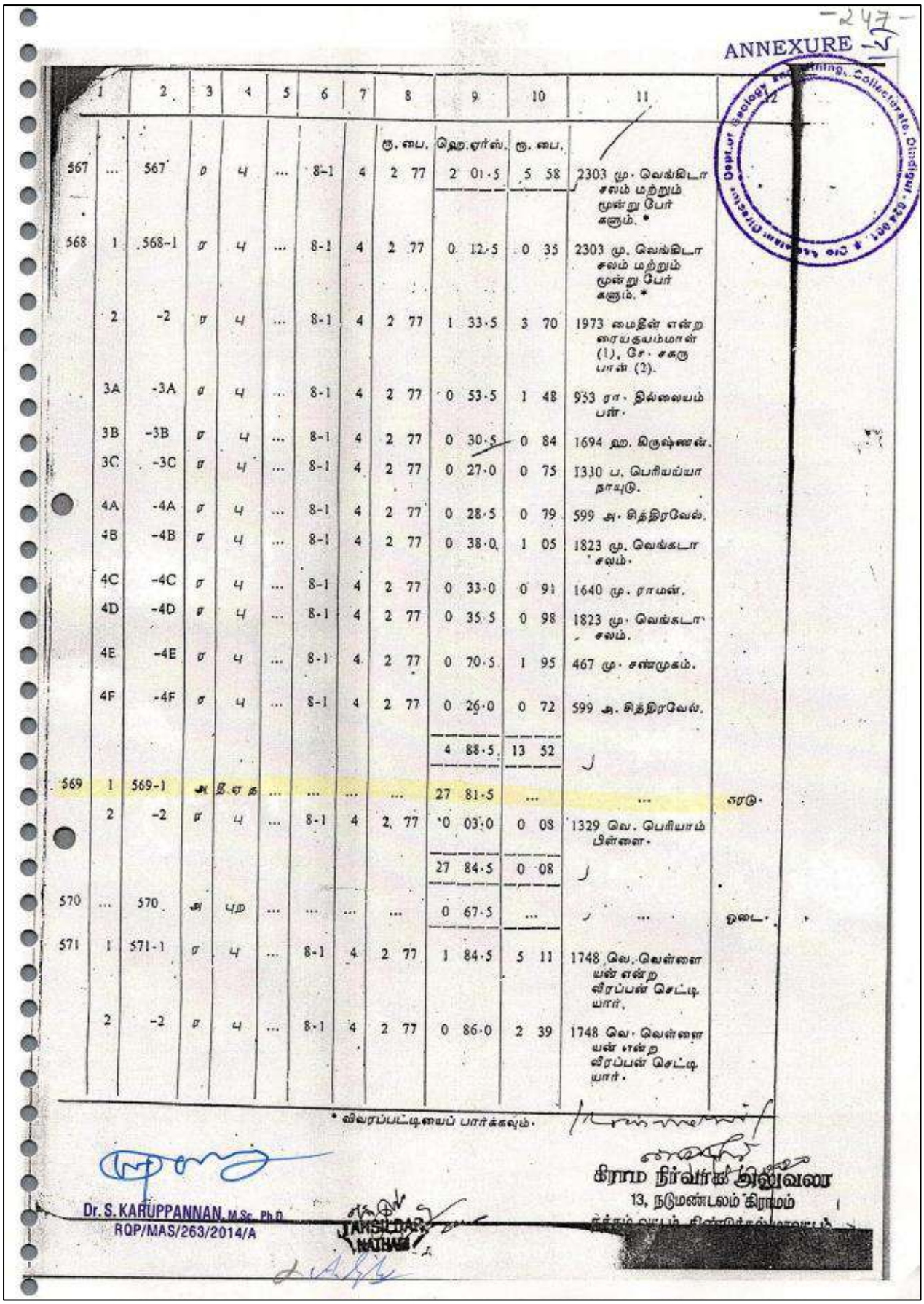
500m RADIUS
கிராம நிர்வாக அலுவல
13, நடுமண்டலம் கிராமம்
நத்தம் வட்டம், திண்டுக்கல் மாவட



ANNEXURE

1	2	3	4	5	6	7	8	9	10	11	12
							ரூ. பை.	ஹெ.ஏர்ஸ்.	ரூ. பை.		
567	...	567	ம	பு	...	8-1	4	2 77	2 01·5	5 58	2303 மு. வெங்கிடாசலம் மற்றும் மூன்று பேர்களும். *	
568	1	568-1	ர	பு	...	8-1	4	2 77	0 12·5	0 35	2303 மு. வெங்கிடாசலம் மற்றும் மூன்று பேர்களும். *	
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	3A	-3A	ர	பு	...	8-1	4	2 77	0 53·5	1 48	953 ரா. தில்லையம்பள்.	
	3B	-3B	ர	பு	...	8-1	4	2 77	0 30·5	0 84	1694 ஹ. கிருஷ்ணன்.	
	3C	-3C	ர	பு	...	8-1	4	2 77	0 27·0	0 75	1330 ப. பெரியய்யா நாயுடு.	
	4A	-4A	ர	பு	...	8-1	4	2 77	0 28·5	0 79	599 அ. சித்திரவேல்.	
	4B	-4B	ர	பு	...	8-1	4	2 77	0 38·0	1 05	1823 மு. வெங்கடாசலம்.	
	4C	-4C	ர	பு	...	8-1	4	2 77	0 33·0	0 91	1640 மு. ராமன்.	
	4D	-4D	ர	பு	...	8-1	4	2 77	0 35·5	0 98	1823 மு. வெங்கடாசலம்.	
	4E	-4E	ர	பு	...	8-1	4	2 77	0 70·5	1 95	467 மு. சண்முகம்.	
	4F	-4F	ர	பு	...	8-1	4	2 77	0 26·0	0 72	599 அ. சித்திரவேல்.	
									4 88·5	13 52		
569	1	569-1	அ.இ.க	...	...	...	...	27 81·5	...	...	...	ரது.
	2	-2	ர	பு	...	8-1	4	2 77	0 03·0	0 08	1329 வெ. பெரியாம்பிள்ளை.	
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570	...	570	அ	புற	...	...	...	...	0 67·5	...	...	டை.
571	1	571-1	ர	பு	...	8-1	4	2 77	1 84·5	5 11	1748 வெ. வெள்ளையன் என்ற வீரப்பன் செட்டியார்.	
	2	-2	ர	பு	...	8-1	4	2 77	0 86·0	2 39	1748 வெ. வெள்ளையன் என்ற வீரப்பன் செட்டியார்.	

* விவரப்பட்டியைப் பார்க்கவும்.

கிராம நிர்வாக அலுவலர்
13, நடுமண்டலம் கிராமம்

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

TAHSILDAR
NATHAM

Figure 2.5 A-register showing details of quarry lease area

Pillar ID	Latitude	Longitude
1	10°14'41.04"N	78°14'23.09"E
2	10°14'34.88"N	78°14'23.92"E
3	10°14'35.30"N	78°14'22.73"E
4	10°14'36.30"N	78°14'21.57"E
5	10°14'40.42"N	78°14'20.33"E

PLATE NO-II

APPLICANT:
Mr.A.GOVINDARAJAN,
S/O. Mr.AMIRTHALINGADOSS
NO.6,MANMALAI KOVIL STREET
K PUDUR
MADURAI - 625007

LEASE APPLIED AREA:
S.F.NO : 569/1 (PART-4)
EXTENT : 1.20.0 Hect,
VILLAGE : NADUMANDALAM,
TALUK : NATHAM,
DISTRICT : DINDIGUL.

MINE LEASE PLAN
SCALE 1: 1000

INDEX

MINE LEASE AREA
SAFETY AREA
APPROACH ROAD
PILLAR STONES

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 2.6 Quarry lease plan & surface plan

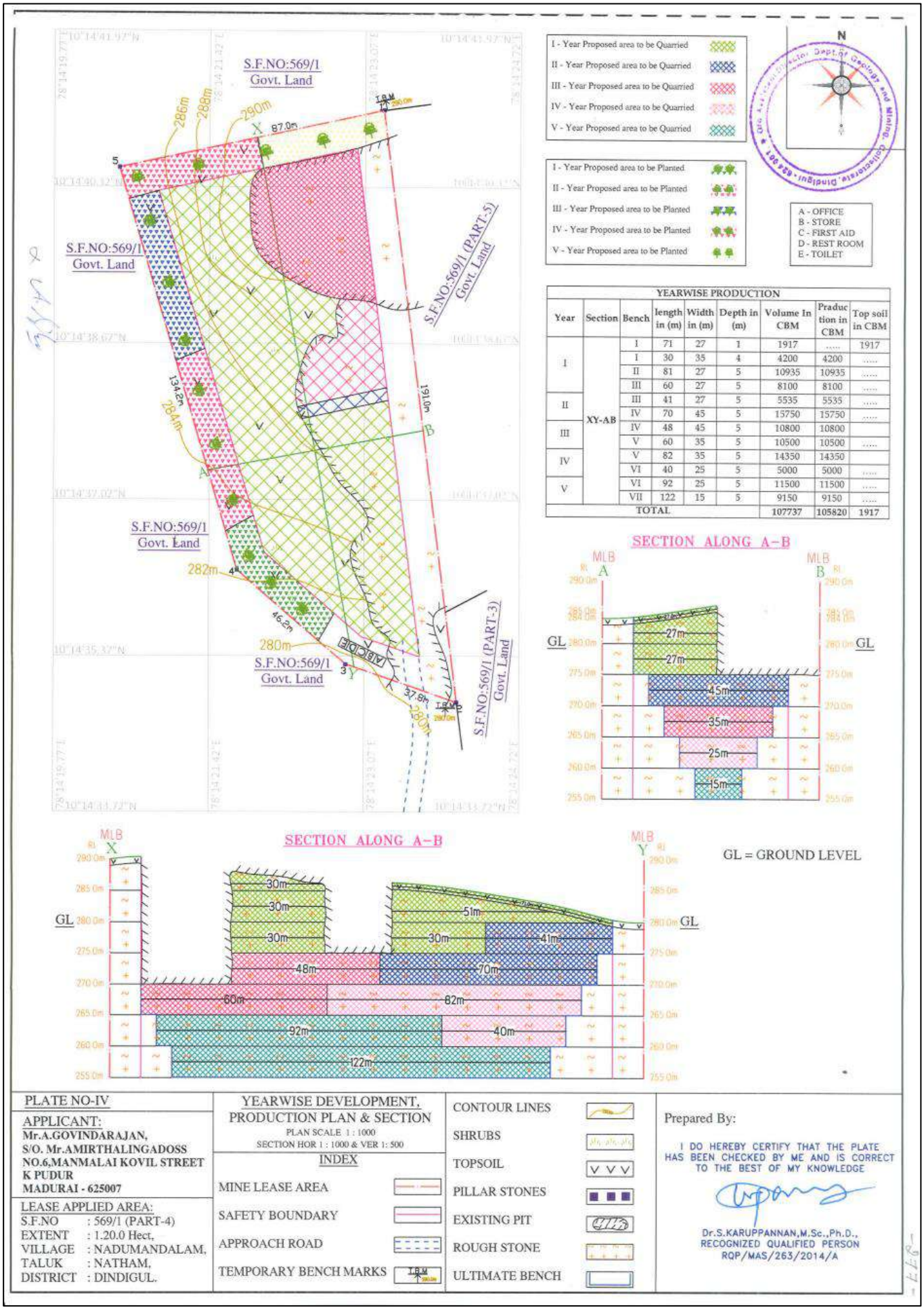
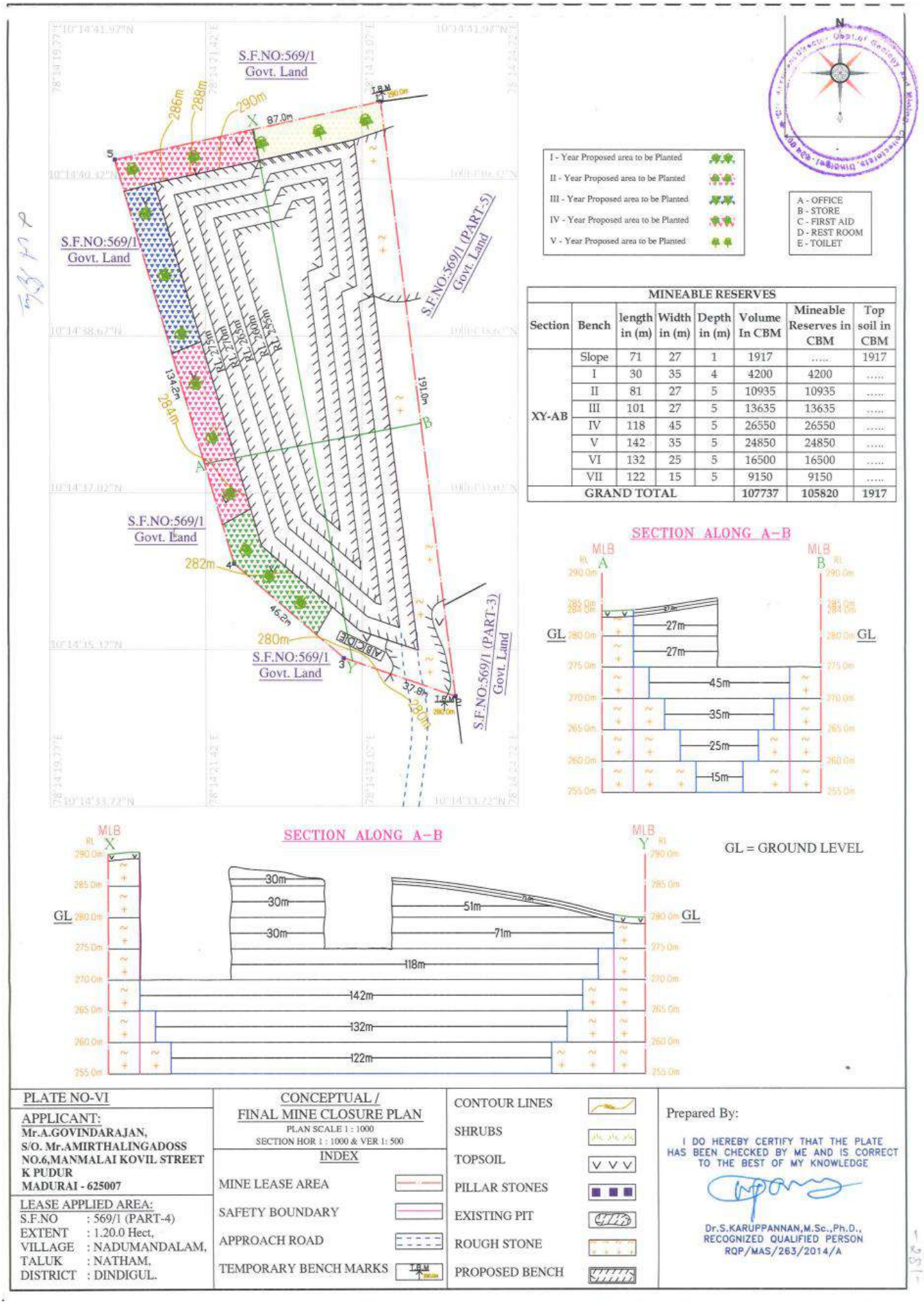


Figure 2.7 Year-wise development & production plan and section



MINEABLE RESERVES

Section	Bench	length in (m)	Width in (m)	Depth in (m)	Volume In CBM	Mineable Reserves in CBM	Top soil in CBM
XY-AB	Slope	71	27	1	1917	.....	1917
	I	30	35	4	4200	4200	.....
	II	81	27	5	10935	10935	.....
	III	101	27	5	13635	13635	.....
	IV	118	45	5	26550	26550	.....
	V	142	35	5	24850	24850	.....
	VI	132	25	5	16500	16500	.....
	VII	122	15	5	9150	9150	.....
GRAND TOTAL					107737	105820	1917

Figure 2.8 Conceptual and final Mine Closure Plan

Table 2.6 Mine Closure Budget

Activity	Plantation in the construction phase (3Months) Year	Cost	Total Cost
Plantation in 7.5m, 10m Safety distance (in Nos.)	420	@ Rs 300 Per Sapling	Rs.1,26,600
Plantation in quarry approach road	180		Rs.54,000
Renovation of Wire Fencing	1.2hect * 2,00,000 and maintenance 5*20,000	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 20,000/- per annum	Rs.3,20,000
Renovation of Garland Drain	1.2hect * 10,000 and maintenance 5*5,000	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	Rs. 37,000
Total			Rs.5,48,600

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.

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 Richardson & Cruddas (1972) Limited 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 image of Bhuvan (ISRO). LULC map was prepared using ArcGIS software and the information obtained from the LU/LC map has been provided in Table 3.1.

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

S. No.	Classification	Area (ha)	Area (%)
1	Barren Land	159	0.53
2	Crop Land	13337	44.22
3	Dense Forest	4680	15.52
4	Fallow land	3627	12.03
5	Land with Salinity	5	0.02
6	Land with / without scrub	1918	6.36
7	Plantations	6336	21.01
8	Settlement	99	0.33
	Total	**30161**	**100**

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 physical properties of the soil samples were examined for texture, bulk density, porosity and water holding capacity. The soil texture found in the study area is Sandy clay. The bulk density of soils in the study area varies between 1.12and 1.41 g/cc. The water holding capacity varies from 16.34 to 19.74.

3.2.2 Chemical Characteristics

- The nature of soil is slightly alkaline to strongly alkaline with pH ranging from 5.7 to 7.4
- The nitrogen ranges between 13.26 and 23.86 mg/kg
- The phosphorus ranges between 2.93 and 4.23 mg/kg
- The Sodium ranges between 108 and 146 mg/kg
- The potassium ranges between 11.45 and 19.23 mg/kg
- The Calcium ranges between 93.2 and 127.1 mg/kg
- The Magnesium ranges between 17.3 and 35.8 mg/kg

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.

3.3.1 Surface Water

The pH varies from 6.8 to 7.3, while turbidity is found within the acceptable limits. TDS including carbonates, bicarbonates, chlorides, phosphates, nitrates, calcium, magnesium, and sodium in the surface water varies from 381 to 484 mg/l. Total Hardness varies from 246 to 329 mg/l; Chloride varies from 124 to 212 mg/l; nitrate varies from 12 to 29 mg/l, whereas sulphate from 32 to 48 mg/l.

3.3.2 Ground Water

The pH of the water samples falls within the acceptable limit of 6.5 to 8.5, ranging from 7.1 to 8.0 Sulphates and chlorides of water samples from all the sources are within the acceptable limits as per the water quality standard. Turbidity in the water samples meets the requirement. TDS are found in the range of 967- 1069 mg/l in all samples. The water sample from (GW5) Nadumandalam Village has the highest TDS of 1069 mg/l. The total hardness varies between 452 - 561 mg/l for all samples. The water sample from (GW5) Nadumandalam Village has the highest total hardness 561 mg/l.

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 10 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 2.84 m/s
- Predominant wind direction during the study period is West to East.

3.4.2 Ambient Air Quality

Ambient air quality was monitored for the period of February 2022 – April 2022 at Six locations within 10 km radius from the project site. As per the monitoring data, PM2.5 ranges from 21.5 µg/m3 to 25.8 µg/m3; PM10 from 33.1 µg/m3 to 45.8 µg/m3; SO2 from 5.1 µg/m3 to 9.6 µg/m3; NO2 from 21.1 µg/m3 to 26.7 µg/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 6 locations around the proposed project area. Noise levels recorded in core zone during day time was 44.46 dB (A) Leq and during night time was 37.52 dB (A) Leq. Noise levels recorded in buffer zone during day time varied from 40.45 to 44.81 dB (A) Leq and during night time from 36.35 to 38.47 dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

3.6 ECOLOGICAL 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.

3.6.1 Flora

The result of flora studies in core zone 500m radius from lease area shows that Fabaceae, and Lamiaceae are the main dominating species in the study area. No species are found in threatened category. The result of flora studies in buffer zone shows that Fabaceae, Poaceae, and Cucurbitaceae are the main dominating species in the study area. There is no rare, endangered and threatened flora species in mining area and their surrounding area.

3.6.2 Fauna

The faunal survey was carried out as per the methodology to identify and count Mammals, Birds, Reptiles, Amphibians and Butterflies. In the faunal survey, 36 varieties of species were observed in the 500m radius zone from the periphery of lease area. Among them are 12 Insects, 5 Reptiles, 3 Mammals and 13 Avian, whereas in the buffer zone,48 species belonging to 34 families were recorded. Of the total species, there were 13 Birds, 7 Insects, 9 Reptiles, 3 Mammals, and 3 Amphibians.

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 10.45.00. 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 topsoil with the average thickness of about 1m.

4.2.1 Impact on Soil Environment

Mining operations routinely modify the surrounding landscape by exposing previously undisturbed earthen materials. There is no top soil anticipated in this project, the surface consists of 1m soil formation followed by rough stone which is proposed to excavate completely during the quarrying operation, Erosion of top layer (soil), extracted fine material

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.

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 first five years plan of period 35 m (10m AGL+ 25m BGL), water table is found at depths of 50m 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 (SO_2), oxides of nitrogen (NO_2) 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 (PM_{10}) 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 4.1Incremental & Resultant GLC of PM_{10}

Station Code	Location	Average Baseline $PM_{10}(\mu g/m^3)$	Incremental value of PM_{10} due to mining $(\mu g/m^3)$	Total PM_{10} $(\mu g/m)$
AAQ1	10°14'33.10"N, 78°14'23.15"E	42.30	10	52.3
AAQ2	10°13'31.63"N, 78°14'02.91"E	34.15	0	34.15
AAQ3	10°14'28.12"N, 78°13'03.17"E	36.34	0	36.34
AAQ4	10°15'3.92"N, 78°16'43.15"E	34.63	1	35.63
AAQ5	10°12'5.73"N, 78°15'29.29"E	35.11	0.5	35.61
AAQ6	10°14'22.50"N, 78°15'17.33"E	35.36	5	40.36

Table 4.2 Incremental & Resultant GLC OF $PM_{2.5}$

Station Code	Location	Average Baseline $PM_{2.5}$($\mu g/m^3$)	Incremental value of $PM_{2.5}$ due to mining ($\mu g/m^3$)	Total $PM_{2.5}$ ($\mu g/m^3$)
AAQ1	10°14'33.10"N, 78°14'23.15"E	24.62	7.72	32.34
AAQ2	10°13'31.63"N, 78°14'02.91"E	22.74	0	22.74
AAQ3	10°14'28.12"N, 78°13'03.17"E	23.21	0	23.21
AAQ4	10°15'3.92"N, 78°16'43.15"E	22.90	0.5	23.4
AAQ5	10°12'5.73"N, 78°15'29.29"E	21.94	0.5	22.44
AAQ6	10°14'22.50"N, 78°15'17.33"E	22.22	1	23.22

Table 4.3 Incremental & Resultant GLC of SO_2

Station Code	Location	Average Baseline So_2 ($\mu g/m^3$)	Incremental value of So_2 due to mining ($\mu g/m^3$)	Total So_2 ($\mu g/m^3$)
AAQ1	10°14'33.10"N, 78°14'23.15"E	8.88	8.0	16.88
AAQ2	10°13'31.63"N, 78°14'02.91"E	7.98	0	7.98
AAQ3	10°14'28.12"N, 78°13'03.17"E	6.74	0	6.74
AAQ4	10°15'3.92"N, 78°16'43.15"E	7.07	0.5	7.57
AAQ5	10°12'5.73"N, 78°15'29.29"E	6.14	0.5	6.64
AAQ6	10°14'22.50"N, 78°15'17.33"E	5.72	1	6.72

Table 4.4Incremental & Resultant GLC of NO_2

Station Code	Location	Average Baseline Nox ($\mu g/m^3$)	Incremental value of Nox due to mining ($\mu g/m^3$)	Total Nox ($\mu g/m^3$)
AAQ1	10°14'33.10"N, 78°14'23.15"E	26.15	6.18	32.33
AAQ2	10°13'31.63"N, 78°14'02.91"E	23.00	0	23
AAQ3	10°14'28.12"N, 78°13'03.17"E	22.82	0	22.82
AAQ4	10°15'3.92"N, 78°16'43.15"E	25.85	0.5	26.35
AAQ5	10°12'5.73"N, 78°15'29.29"E	21.77	0.5	22.27
AAQ6	10°14'22.50"N, 78°15'17.33"E	21.65	1	22.65

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 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,

- ❖ 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

<table>
<tr><th>S. No</th><th>No. of trees proposed to be planted</th><th>Survival %</th><th>Area to be covered in m^2</th><th>Name of the species</th><th>No. of trees expected to be grown</th></tr>
<tr><td rowspan="4">Plantation in the construction phase (3Months)</td><td colspan="3">Plantation under safety distance and dumb (In Nos.)</td><td rowspan="4">Azadirachta indica
Albizia lebbeck
Delonix regia
Techtona grandis,
etc.,</td><td rowspan="2"></td></tr>
<tr><td>420</td><td>80%</td><td>3800</td><td>336</td></tr>
<tr><td colspan="3">Plantation in quarry approach road Side and village road side (In Nos.)</td><td></td></tr>
<tr><td>180</td><td>80%</td><td>1600</td><td>144</td></tr>
</table>

Table 4.7 Budget required for greenbelt development

Activity	Plantation in the construction phase (3Months)	**Cost**	**Capital Cost (RS)**	**Recuring Cost**
Plantation in 7.5m, Safety distance and dumb (in Nos.)	420	@ 300 Rs/ saplings (including the cost of digging, and plantation, and the labour)	Rs 1,26,000	-
Plantation in Quarry Approach Road side (in Nos.)	180		Rs 54,000	-
Maintenance (Rs.) (Manuring, watering, gardener etc.)	600 plants *Rs 50 = Rs. 30000 per year		-	**Rs 1,50,000**
Total			**Rs 1,80,000**	**Rs 1,50,000**

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 25 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.
- .
- 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

There is no waste anticipated in this rough stone quarrying operation. The entire quarried out materials will be utilized.

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	$PM_{2.5}$, 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. 3,45,000/-	Rs. 69,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs. 3,45,000/-**	**Rs. 69,000/-**

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

PROPOSED PRODUCTION DETAILS				
Quarry	**5 Years in m^3**	**Per Year in m^3**	**Per Day in m^3**	**Number of Lorry Load Per Day**
P1	1,05,820	21,164	71	12
P2	99,186	19,837	66	11
E1	1,88,075	37,615	125	21
E2	66,285	11,946	40	7
Grand Total	**4,59,366**	**90,562**	**302**	**51**

Table 7.2 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	540m	SW	43.27	42.51	45.91	55
Habitation Near P2	390m	S	43.27	45.33	47.43	
Cumulative Noise (dB(A)					**49.75**	

Source: Lab Monitoring Data

Table 7.3 Ground Vibrations At 4 Mines

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	24	540m	0.60
P2	22	390m	0.96
E1	42	530m	0.98
E2	15	930m	0.17
Total			**2.71**

Source: Blasting Calculations

Table 7.4 Socio Economic Benefits From 4 Mines

Code	Project Cost	CER @ 2%
P1	Rs.38,95,000 /-	Rs. 77,900/-
P2	Rs. 43,15,000/-	Rs 86,300/-
E1	Rs. 47,25,000/-	Rs 94,500/-
E2	Rs. 54,00,000/-	Rs 1,080,00/-
Total	**Rs. 1,83,35,000**/-	**Rs. 3,66,700**/-

Table 7.5 Employment Benefits From 4 Mines

Code	Employment
P1	26
P2	27
E1	27
E2	18
Total	**98**

Table 7.6 Greenbelt Development Benefits From 4 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	600	80%	5400	Neem, Casuarina, Pongamia	480
P2	311	80%	2800	Neem, Casuarina, Pongamia	249
E1	600	80%	5400	Neem, Casuarina, Pongamia	480
E2	422	80%	3800	Neem, Casuarina, Pongamia	338
Total	**1933**		**17400**		**1547**

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 Nadumandalam Village aims to produce cumulatively 1,05,820 m^3 rough stone period of 5 Years. 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. In order to implement the environmental protection measures, an amount of Rs.15, 87,000 as capital cost and recurring cost as Rs. 18,58,000 as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

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.