

**EXECUTIVE SUMMARY OF DRAFT ENVIRONMENTAL IMPACT
ASSESSMENT
AND
ENVIRONMENT MANAGEMENT PLAN
FOR OBTAINING**

Environmental Clearance under EIA Notification – 2006

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

“B1” CATEGORY – MINOR MINERAL – CLUSTER – NON-FOREST LAND

CLUSTER EXTENT = 8.78.50hectares

At

**Jagadevipalayam Village, Bargur Taluk,
Krishnagiri District, Tamil Nadu State**

ToR Lr. No. SEIAA-TN/F.No.10214/SEAC/ToR-1559/2023 dated 27.09.2023

NAME AND ADDRESS OF THE PROPOSED PROJECT PROPONENT

Name and Address	Extent & S.F.No.	Mineral Production
Tmt.M.Sadhana No.2/A2, 3rd Cross, Gopalakrishna Colony, Krishnagiri District –635 001	1.87.0 Ha & 366 (Part)	Granite 20% - 14031m³ Granite Waste@ 80% - 56123 m³

ENVIRONMENTAL CONSULTANT

GEO TECHNICAL MINING SOLUTIONS



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NABET ACC. NO: NABET/EIA/2124/SA 0184

Valid till: **April,02,2024**

ENVIRONMENTAL LAB

EXCELLENCE LABORATORY

**No.23/93, 5th Street Ram Nagar, S.S.Colony,
Madurai, Tamil Nadu**

NABL Certificate Number: TC-6932, Valid Until : 19.03.2024

Baseline Study Period – October 2023 through December 2023

CHAPTER I

INTRODUCTION

As the proposed colour granite mining project, known as P1 falls within the 500 m radius cluster of quarries with the total extent of >5 ha, it is classified under category “B1” and requires submission of EIA report for grant of Environmental Clearance (EC) after conducting public hearing. The cluster contains two proposed projects, known as P1, P2 and two existing quarry E1, E2. All the projects mentioned above have been taken for cluster extent calculation as per MoEF & CC Notification S.O. 2269 (E) Dated 1st July 2016, as shown in Figure 1.1. This EIA draft discusses the cumulative impacts of 2 proposed project 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 falling in Jagadevipalayam Village, Bargur Taluk, Krishnagiri District and Tamil Nadu. It has been prepared in compliance with ToR issued vide Letter No. SEIAA-TN/F.No.10214/SEAC/ToR-1559/2023 dated 27.09.2023, for the proposed project by conducting baseline study during the period of October to December-2023. 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 1.2 Details of Project Proponent

Name of the Project Proponent	Tmt.M.Sadhana
Address	No.2/A2, 3rd Cross, Gopalakrishna Colony, Krishnagiri District – 635 001
Status	Proprietor

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

Proposed Quarries					
Code	Name of the Lease	S.F. No	Village	Extent (ha)	Lease Period
P1	Tmt.M.Sadhana	366 (Part)	Jagadevipalayam	1.87.0	Proposed Area
P2	M/s. Pranita Granites	10 (Part)	Pasinayanapalli	3.46.0	Mining Plan forwarded to CGM
Existing Quarry					
E1	Thiru.K.Sekaran	367/1N1, 362/2N2 (P), 367/201 (P)	Jagadevipalayam	1.10.5	13.07.2012 to 12.07.2032
E2	Thiru.V.Venu	5	Jagadevipalayam	2.35.0	16.12.2015 to 15.12.2035
Expired Quarry					

Total Cluster Extent				8.78.5	---

Source:

DD Letter – Rc.No.1049/2020/Mines dated 22.05.2023

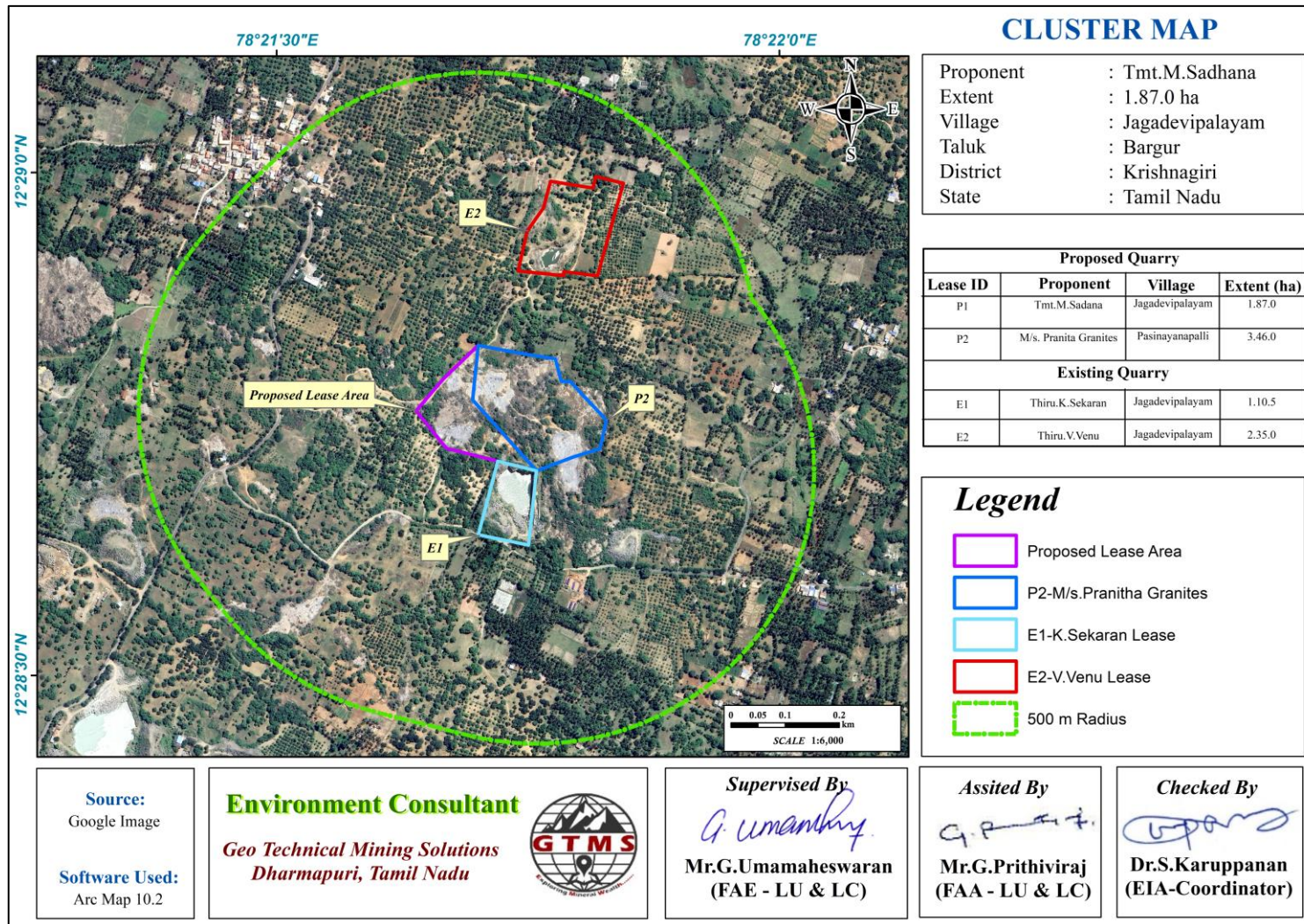


Figure 1.1 Location of Proposed and Existing Multi-Coloured Granite Quarries in the Cluster of 500m Radius.

CHAPTER II

PROJECT DESCRIPTION

The proposed project deals with excavation of colour granite which is primarily used as flooring stone in construction projects. The method adopted for granite excavation is a mechanized open cast mining method involving formation of benches with 5 m height and 5 m width. The proposed project area is located between latitude of 12°28'42.19792"N to 12°28'49.68820"N and a longitude of 78°21'38.32342"E to 78°21'45.51566"E in Jagadevipalayam Village, Bargur Taluk, Krishnagiri District and Tamil Nadu. The project site is a government land with the extent of 1.87.0 ha leased for the project proponent, **Tmt M.Sadhana Colour Granites**. The proponent had applied for quarry lease on 07.11.2020 to extract granite and obtained the precise area communication letter issued by Industries (MME.2) Department, Secretariat Chennai vide Rc.no.901/MME.2/2021-1, dated 26.02.2021. Based on the precise area communication letter, mining plan was prepared. The mining plan thus prepared was approved by Director of Geology and Mining, Chennai vide Rc.No.6943/MM4/2020, dated:12.05.2023.

According to the approved mining plan, about 14031 m³ of granite will be mined up to the depth of 30m (15AGL + 15 BGL) in the first five years. Of the total quantity, 14031 m³ of granite is marketable and the rest is stockpiled as wastes. To achieve the estimated production, 4 jack hammers, 2 compressors, 2 diamond wire saws, 1 line drilling machinery, 1 excavator and 2 tippers will be deployed. To operate the machineries and to extract the granite, about 22 persons will be employed. At the end of the quarry life, the dimension of the ultimate pit will be 109 m* 106 m* 45 m and at the end of the quarry life, about 1.04.00 ha of land would have been utilized for quarrying, 0.43.86 ha of land for waste dump, 0.02.00 ha for infrastructures, 0.04.0 ha for roads, 0.30.00 ha for green belt development, and the remaining 0.03.14 ha would have been left as unutilized area. Boundary coordinates of corner pillars of the project site and accessibility details to the location of the project site are given in Tables 2.1 & 2.2, respectively. The lease area of the project site overlaid on Google earth image is shown in Figure 2.1.

Table 2.1 Corner Geographic Coordinates of Proposed Project

Pillar ID	Latitude	Longitude
1	12°28'49.68820"N	78°21'42.02501"E
2	12°28'46.43263"N	78°21'41.69574"E
3	12°28'42.19792"N	78°21'45.51566"E
4	12°28'43.54916"N	78°21'40.12823"E
5	12°28'45.77887"N	78°21'38.32342"E
6	12°28'47.66583"N	78°21'39.92715"E

Table 2.2 Site Connectivity to the Project Area

Nearest Roadways	NH – 77 Krishnagiri - Uthangarai	2.59 km	SW
Nearest Railway Station	Kakankarai	17.6 km	SE
Nearest Town	Bargur	7.2 km	N
Nearest Airport	Salem	82.8 km	S
Nearest Port	Chennai	220.4 km	NE
Nearest Village	Bagimanur	0.52 km	NW
	Kappalvadi	2.5 km	NE
	Thogarapalli	2.9 km	S
	Jagadevipalayam	3.23 km	W

2.3 DETAILS OF RESERVES

Reserves were calculated using cross-section method after leaving the safety distance as shown in Figure 2.2. Details of resources and reserves of the project are given in Table 2.3.

Table 2.3 Estimated Resources and Reserves of the Project

Description	ROM in (m ³)	Granite Waste @ 80 % (m ³)	Colour Granite @ 20% Recovery(m ³)	Top Soil (m ³)	Weathered Rock (m ³)
Geological Resources	708238	519290	129823	3145	55980
Mineable Reserves	268892	180246	45062	1560	42024

Based on the year wise development and production plan and sections, as shown in Figures 2.3 & 2.3a, the year wise production results are given in Table 2.4.

Table 2.4 Year wise Production Details

Year	ROM in m ³	Colour Granite @ 20% Recovery in m ³	Granite Waste @ 80 % in m ³	Topsoil in m ³	Weathered Rock in m ³
I	32244	3119	12475	---	16650
II	34840	2780	11120	1560	19380
III	15200	3040	12160	---	---
IV	13740	2748	10992	---	---
V	11720	2344	9376	---	---
Total	107744	14031	56123	1560	36030

2.3 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 Land Use Area (ha)	Land Use Area at the end of mine life (ha)
Area under quarry	Nil	1.04.00
Infrastructure	Nil	0.02.00
Roads	Nil	0.04.00
Unutilized	1.87.0	0.03.14
Waste Dump	Nil	0.43.86
Green Belt + Topsoil + Weathered Rock	Nil	0.30.00
Total	1.87.0	1.87.0

Source: Approved mining plan

2.4 METHOD OF MINING

The quarrying operation is proposed to be carried out by opencast semi mechanized mining method involving drilling, blasting, and formation of benches. Machineries proposed for this project have been given in Table 2.6.

2.5 PROPOSED MACHINERY DEPLOYMENT

List of machineries proposed for the quarrying operation is given in Table 2.6.

Table 2.6 Proposed Machinery Deployments

Drilling Equipment					
Type	No. of Unit	Dia. of Hole (mm)	Size capacity	Make	Motive Power
Compressor	2	-	-	--	Compressor Air
Jack Hammer	4	32		--	--
Diamond wire saw machine	2	--	--	--	--
Line drilling machinery	1	--	--	--	--
Loading Equipment					
Excavator	1	-	--	--	Diesel/ Electrical
Haulage & Transport Equipment					
Tipper	2	--	--	--	Diesel

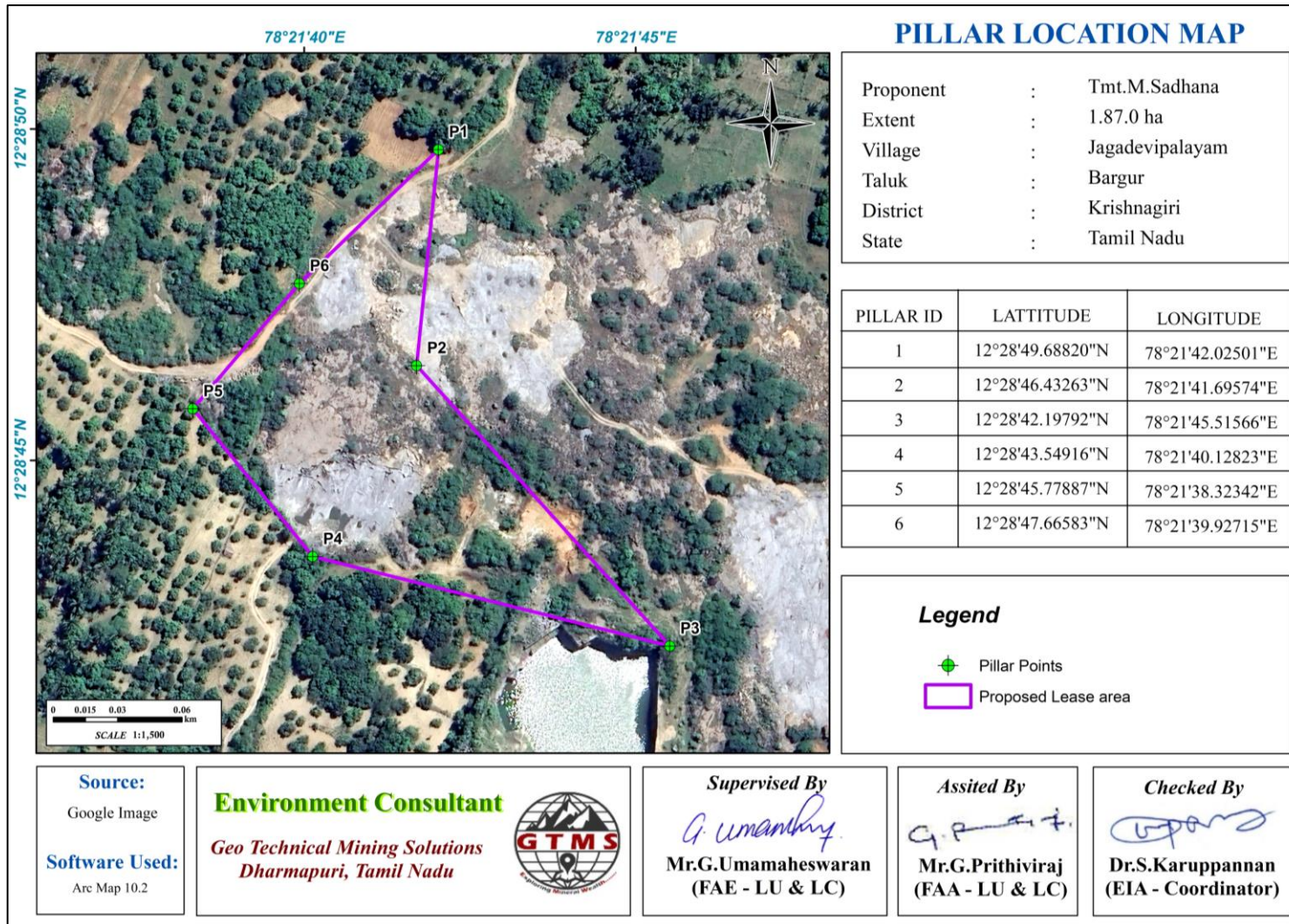


Figure 2.1 Google Earth Image Showing Lease Area with Pillars

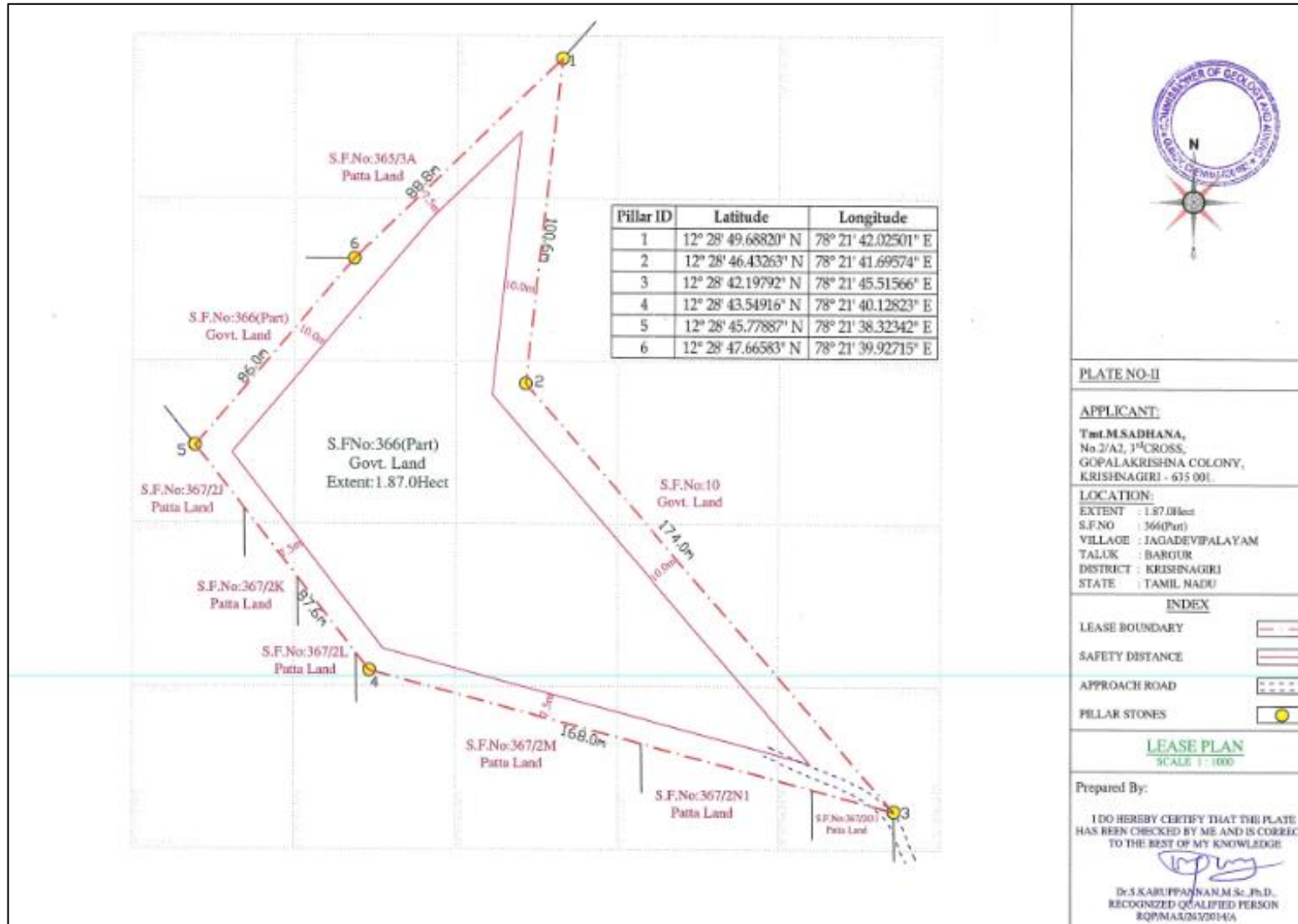


Figure 2.2 Mine Lease Plan

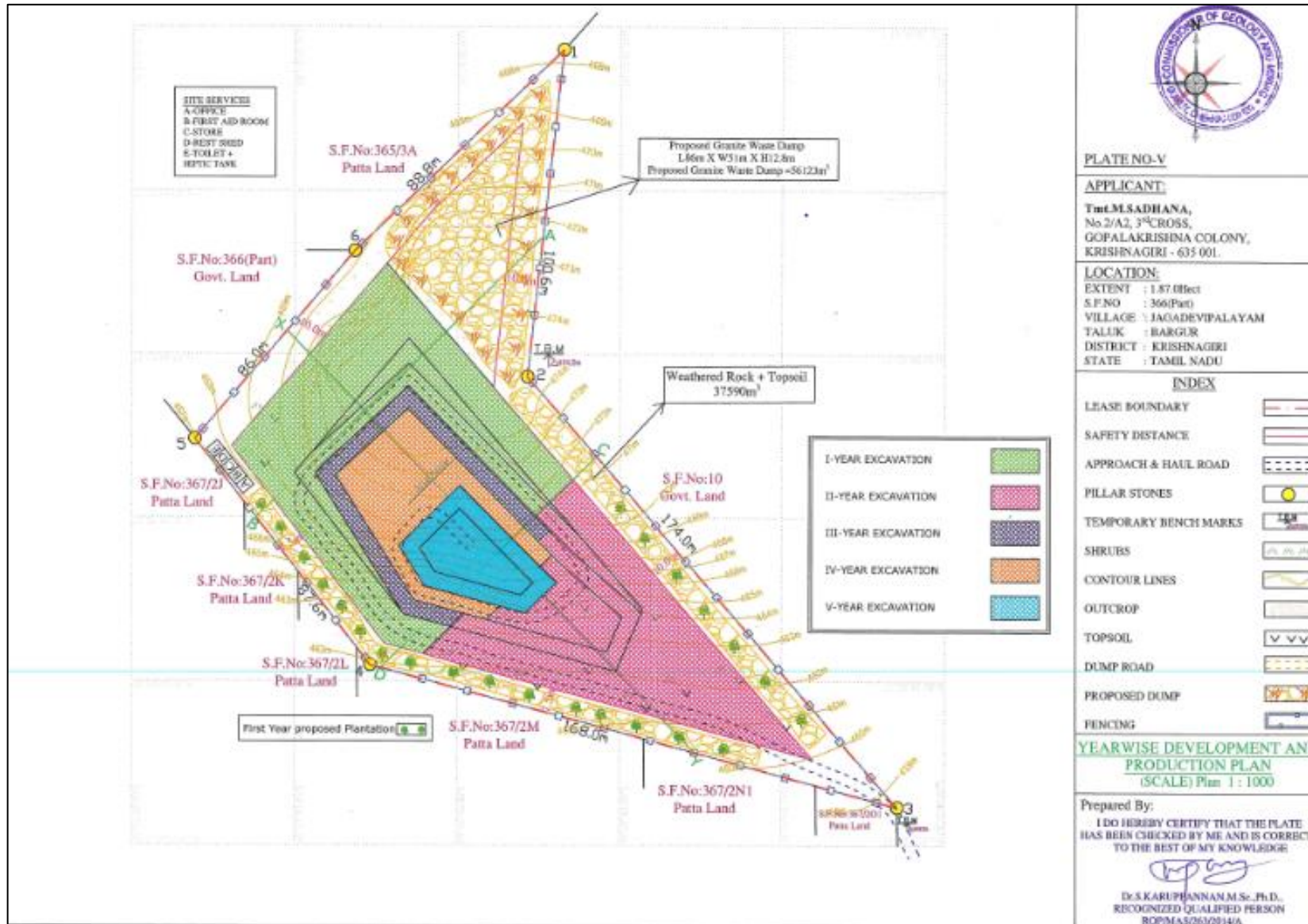


Figure 2.3 Yearwise development and production plan

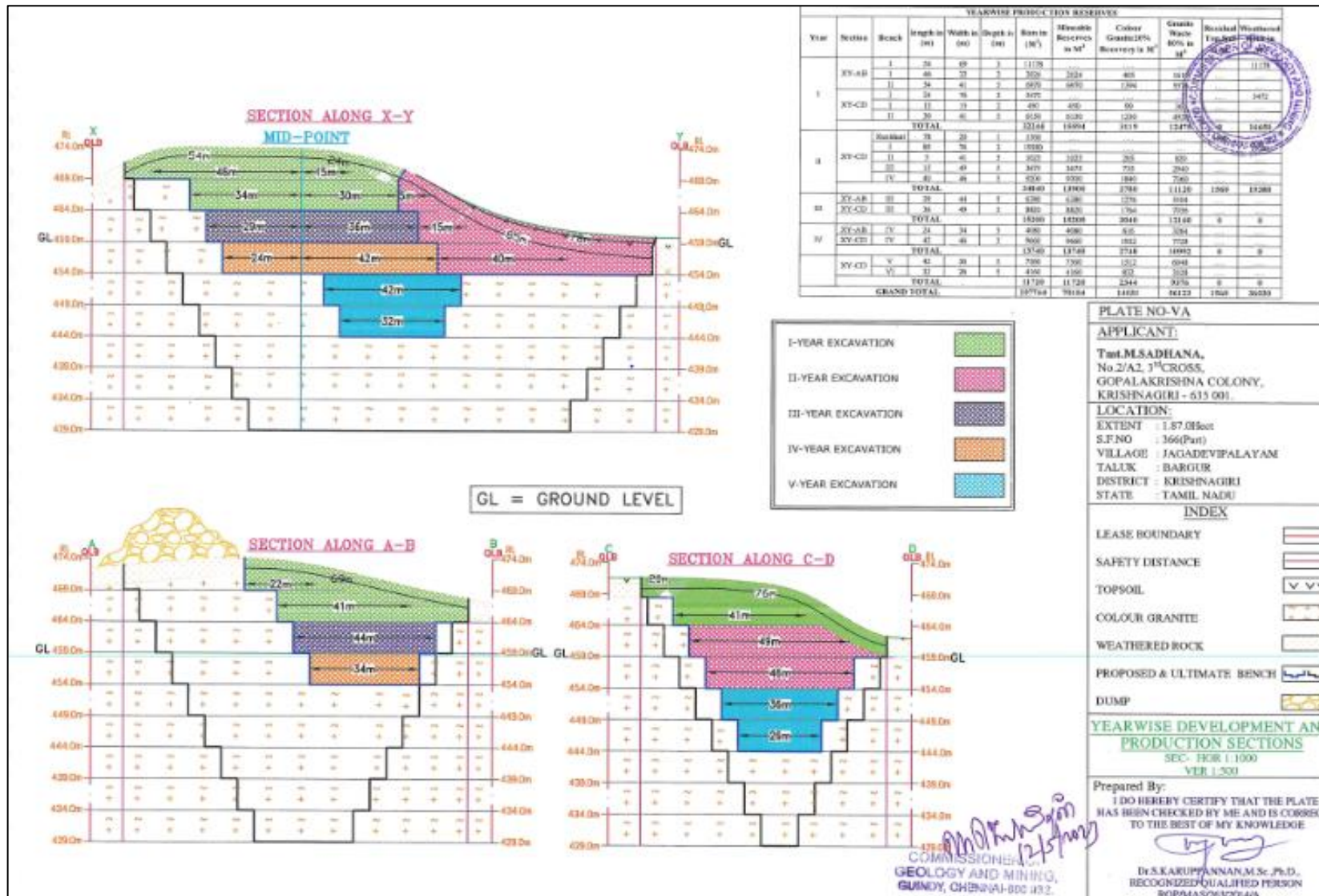


Figure 2.3a Yearwise development and production plan sections

2.5 CONCEPTUAL 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. Budgetary provision for mine closure is provided in Table 2.7.

Table 2.7 Mine Closure Budget

Activity	Capital Cost	Recurring Cost/Annum
374 plants inside the lease area	74800	11220
561 plants outside the lease area	168300	16830
Wire Fencing	374000	18700
Garland Drain	18700	9350
Total	6,35,800	56,100

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 **October through December,2023** 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, air and by FAE's 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 5 km Radius

S. No	Classification	Extent (ha)	Area (%)
1	Barren Rocky/stony waste	219.32	2.87
2	Crop Land	3357.04	43.99
3	Dense Forest	238.65	3.13
4	Land with or without scrub	1308.64	17.15
5	Mining / Industrial lands	12.83	0.17
6	Plantations	2482.33	32.53
7	Settlements	11.87	0.16
Total		7630.67	100.0

Source: Sentinel II Satellite Imagery

3.2 SOIL ENVIRONMENT

Seven locations were selected for soil sampling based on soil types, vegetative cover, and industrial & residential activities including infrastructure facilities. The physical and chemical characteristic results of soil samples are provided below.

Physical Characteristics

The soil samples in the study area show loamy textures varying between silty clay loam, silty loam and sandy loam. pH of the soil varies from 6.2 to 7.8 indicating slightly acidic to slightly alkaline nature. Electrical conductivity of the soil varies from 45 to 560 $\mu\text{s/cm}$ Water Content ranges between 1.2 and 5.9%.

Chemical Characteristics

Nitrogen ranges between 0.8 and 1.4 mg/kg. Phosphate ranges between 0.03 and 0.09%. Potassium ranges between 0.018 and 0.055% Calcium ranges between <1.0 and <1.0 mg/kg. Organic matter content ranges between 3.1 and 9.4 %.

3.3 WATER ENVIRONMENT

Surface Water

Mattur River, Bargur River and Kumaranganapalli Lakes are the three prominent surface water resources present in the study area. These are ephemeral in nature, which convey water only after rainfall events. Three surface water samples, known as SW1, SW2 and SW3 were collected from the three surface water bodies to assess the baseline water quality. Table 3.6a summarizes surface water quality data of the three samples.

Results for surface water samples in the Table 3.6a indicate that the physical, chemical and biological parameters, and heavy metals are within permissible limits in comparison with standards of IS10500:2012.

Ground Water Resources

Groundwater in the study area occurs in the Peninsular Gneiss and Charnockite Gneiss. The movement of the groundwater is controlled by the intensity of weathering and fracturing of crystalline rocks. Dug wells and bore wells are the most common ground water abstraction structures in the area. However, in dry season, people in the study area heavily rely on bore wells for their domestic and agriculture purpose.

Five groundwater samples, known as BW1, BW2, OW1, OW2 and OW3 were collected from open well and bore well and analysed for physico-chemical conditions, heavy metals and bacteriological contents in order to assess baseline quality of ground water. Ground water sampling locations and their distance and direction from the lease area are provided in Table 3.5 and the spatial occurrence of water sampling locations is shown in Figure 3.7. Table 3.6b summarizes ground water quality data of the five samples.

Results for ground water samples in the Table 3.6b indicate that the physical, chemical and biological parameters, and heavy metals are within permissible limits in comparison with standards of IS10500:2012.

Groundwater Levels and Flow Direction

Data regarding groundwater elevations were collected from 9 open wells and 9 bore wells at various locations within 2 km radius around the proposed project sites for the period from March through May, 2023 (Pre-Monsoon Season) and from October through December, 2023 (Post Monsoon Season). Average depths to the static water table in open wells range from 12.7 to 14.5 m BGL in pre monsoon and from 11.5 to 13.5 m BGL in post monsoon. The average depths to static potentiometric surface in bore wells for the period of October through December 2023 (Post-Monsoon Season) vary from 72.3 to 76.6 m and from 74.6 to 77.8 m for the period of March through May, 2023 (Pre-Monsoon Season). The groundwater flow studies indicate that in the two monsoon seasons groundwater flows towards the dug and bore well number 9, 8 located in eastern direction of the proposed project site.

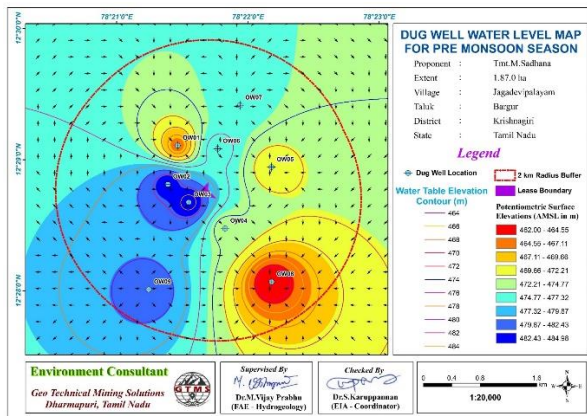


Figure 3.1 Open well static groundwater elevation map showing the direction of groundwater flow during pre-monsoon season

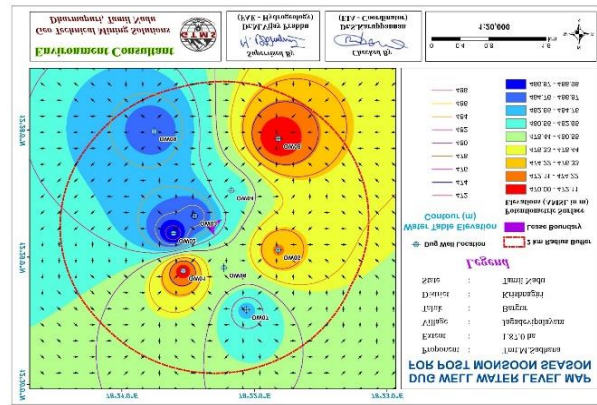


Figure 3.2 Open well static groundwater elevation map showing the direction of groundwater flow during post-monsoon season

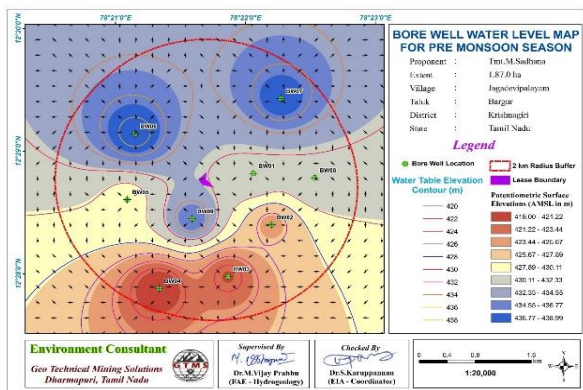


Figure 3.3 Borewell static groundwater elevation map showing the direction of groundwater flow during pre-monsoon season

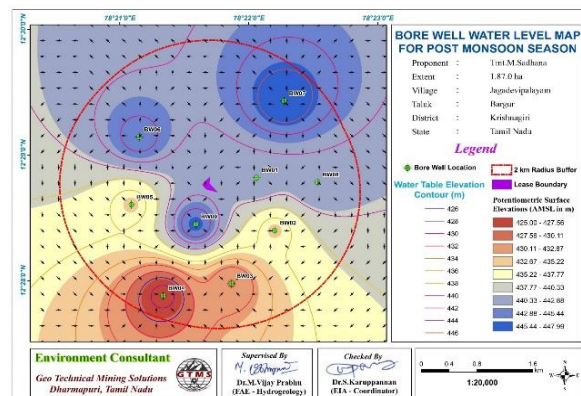


Figure 3.4 Borewell static groundwater elevation map showing the direction of groundwater flow during post-monsoon season

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.

Ambient Air Quality

As per the monitoring data, PM2.5 ranges from 15.5 µg/m³ to 21.5 µg/m³; PM10 from 35.7 µg/m³ to 43.5µg/m³; SO₂ from 11.9 µg/m³ to 16.2 µg/m³; NO₂ from 15.9 µg/m³ to 22.3 g/m³. The concentration levels of the pollutants fall within the acceptable limits of NAAQS prescribed by CPCB.

3.5 NOISE ENVIRONMENT

Noise level in core zone was 37.3dB (A) Leq during day time and 35.8 dB (A) Leq during night time. Noise levels recorded in buffer zone during day time varied from 39.5 to 45.8 dB (A) Leq and during night time from 35.9 to 43.3 dB (A) Leq. Thus, the noise level for industrial and residential area meets the requirements of CPCB.

3.6 BIOLOGICAL ENVIRONMENT

The main objective of biological study is to collect the baseline data regarding flora and fauna in the study area and identify ecologically sensitive areas and whether there are any rare, endangered, endemic or threatened (REET) species of flora and fauna in the core zone as well as buffer zone. 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.

3.7 SOCIO ECONOMIC ENVIRONMENT

Socio-economic study is an essential part of environmental study. It is a measure of an individual's or family's or group of people's economic and social position based on education, income, health, and occupation. Socio-economic most important determinant of livelihoods as levels of knowledge, skill and income conditions which mean for their living. The study 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, which will in turn improve the social standards.

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

Anticipated Impact

- Permanent or temporary change on land use and land cover.
- Change in topography of the mine lease area will change at the end of the life of the mine.
- Problems to agricultural land and human habitations due to dust, and noise caused by movement of heavy vehicles.
- Degradation of the aesthetic environment of the core zone due to quarrying.
- Soil erosion and sediment deposition in the nearby water bodies due to earthworks during the rainy season.
- Siltation of water course due to wash off from the exposed working area.

Mitigation Measures

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

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigate measures like phase wise development of greenbelt etc.
- Construction of garland drains all around the quarry pits and construction of check dam at strategic location in lower elevations to prevent erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area.
- Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt.
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir.

- In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 7.5m and 10m safety barrier and other safety provided) so as to help minimize dust emissions.
- Proper fencing will be carried out at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.2 SOIL ENVIRONMENT

Anticipated Impact

Following impacts are anticipated due to mining operations:

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

Mitigation Measures

- Run-off diversion – Garland drains will be constructed around the project boundary to prevent surface flows from entering the quarry works areas and will be discharged into vegetated natural drainage lines, or as distributed flow across an area stabilised against erosion.
- Sedimentation ponds - Run-off from working areas will be routed towards sedimentation ponds. These trap sediment and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.
- Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season.

4.3 WATER ENVIRONMENT

Anticipated Impact

- Generation of waste water from vehicle washing.
- Washouts from surface exposure or working areas
- Domestic sewage
- Disturbance to drainage course in the project area
- Mine Pit water discharge
- Increase in sediment load during monsoon in downstream of lease area
- This being a mining project, there will be no process effluent. Waste from washing of machinery may result in discharge of oil & grease, suspended solids.

- The sewage from soak pit may percolate to the ground water table and contaminate it.
- Surface drainage may be affected due to Mining
- As the proposed project acquires 3.3 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.

Mitigation Measures

- Garland drainage system and settling tank will be constructed along the proposed mining lease area. The garland drainage will be connected to settling tank and sediments will be trapped in the settling tanks and only clear water will be discharged to the natural drainage
- Rainwater from the mining pits will be collected in sump and will be allowed to store and pumped out to surface settling tank of 15 m x 10 m x 3 m to remove suspended solids if any. This collected water will be judiciously used for dust suppression and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judiciously utilize the rainwater as part of rainwater harvesting system
- Benches will be provided with inner slopes and through a system of drains and channels, rain water will be allowed to descent into surrounding drains to minimize the effects of erosion and water logging arising out of uncontrolled descent of water
- The water collected will be reused during storm for dust suppression and greenbelt development within the mines
- Interceptor traps/oil separators will be installed to remove oils and greases. Water from the tipper wash-down facility and machinery maintenance yard will be passed through interceptor traps/oil separators prior to its reuse
- Flocculating or coagulating agents will be used to assist in the settling of suspended solids during monsoon seasons
- Periodic (every 6 month once) analysis of ground water quality of quarry pit water and ground water of nearby villages will be conducted.
- Domestic sewage from site office and urinals/latrines provided in ML is discharged in septic tank followed by soak pits
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes
- De-silting will be carried out before and immediately after the monsoon season

- Regular monitoring (once every 6 months) and analysing the quality of water in open well, bore wells and surface water.

4.4 AIR ENVIRONMENT

Anticipated Impact

Anticipated increase of the air pollutants due to quarrying activities have been predicted using AERMOD software and the results shown in Tables 4.1 to 4.4 will be used in providing mitigation measures.

Table 4.3 Incremental & Resultant GLC of PM_{2.5}

Station ID	Distance to core area	Direction	PM _{2.5} concentrations(µg/m ³)			Comparison against air quality standard	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	17.2	8.3	25.5	Below standard	48.3	Not significant
AAQ2	1.08	N	15.0	1	16		6.7	
AAQ3	2.70	SW	19.8	0	19.8		0.0	
AAQ4	4.46	NW	21.3	0.5	21.8		2.3	
AAQ5	3.71	SSW	20.3	0	20.3		0.0	
AAQ6	3.72	NE	17.4	0.5	17.9		2.9	

Table 4.4 Incremental & Resultant GLC of PM₁₀

Station ID	Distance to core area	Direction	PM ₁₀ concentrations(µg/m ³)			Comparison against air quality standard	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	38.5	12.7	51.2	Below standard	33.0	Not significant
AAQ2	1.08	N	39.1	3	42.1		7.7	
AAQ3	2.70	SW	41.3	0	41.3		0.0	
AAQ4	4.46	NW	41.8	0.8	42.6		1.9	
AAQ5	3.71	SSW	42.5	0	42.5		0.0	
AAQ6	3.72	NE	34.1	0.8	34.9		2.3	

Table 4.5 Incremental & Resultant GLC of SO₂

Station ID	Distance to core area	Direction	SO ₂ concentrations(µg/m ³)			Comparison against air quality standard (80 µg/m ³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	11.7	3.93	15.63	Below standard	33.6	Not significant
AAQ2	1.08	N	11.0	0.5	11.5		4.5	
AAQ3	2.70	SW	16.9	0	16.9		0.0	
AAQ4	4.46	NW	17.0	0.5	17.5		2.9	
AAQ5	3.71	SSW	17.5	0	17.5		0.0	
AAQ6	3.72	NE	9.4	0.5	9.9		5.3	

Table 4.6 Incremental & Resultant GLC of NO_x

Station ID	Distance to core area (km)	Direction	NO _x concentrations(µg/m ³)			Comparison Against air quality standard (80 µg/m ³)	Magnitude of change (%)	Significance
			Baseline	Predicted	Total			
AAQ1	--	--	17.3	3.94	21.24	Below standard	22.8	Not significant
AAQ2	1.08	N	17.0	0.5	17.5		2.9	
AAQ3	2.70	SW	22.0	0	22		0.0	
AAQ4	4.46	NW	21.3	0.5	21.8		2.3	
AAQ5	3.71	SSW	20.3	0	20.3		0.0	
AAQ6	3.72	NE	15.8	0.5	16.3		3.2	

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

Mitigation Measures

Drilling

To control dust at source, wet drilling will be practiced. Where there is a scarcity of water, suitably designed dust extractor will be provided for dry drilling along with dust hood at the mouth of the drill-hole collar.

Advantages of Wet Drilling

- In this system dust gets suppressed close to its formation. Dust suppression becomes very effective and the work environment will be improved from the point of view of occupational comfort and health.
- Due to dust free atmosphere, the life of engine, compressor etc., will be increased.
- The life of drill bit will be increased.
- The rate of penetration of drill will be increased. Due to the dust free atmosphere visibility will be improved resulting in safer working conditions.

Blasting

- Suitable time of blasting will be chosen according to the local conditions and water will be sprinkled on blasting face.
- Blasting will be avoided when temperature inversion is likely to occur and strong wind blows towards residential areas.
- Controlled blasting will be carried out using suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone.
- Blasting will be restricted to a particular time of the day i.e., at the time of lunch hours.
- Before loading of material water will be sprayed on blasted material.
- Dust mask will be provided to the workers and their use will be strictly monitored.

Haul Road and Transportation

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

Green Belt

- Planting of trees all along main mine haul roads and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of tractors/tippers
- Green belt of adequate width will be developed around the project site

Occupational Health

- Dust mask will be provided to the workers and their use will be strictly monitored
- Annual medical checkups, trainings and campaigns will be arranged to ensure awareness about importance of wearing dust masks among all mine workers and tipper drivers
- Ambient air quality monitoring will be conducted every six months to assess effectiveness of mitigation measures proposed

4.5 NOISE ENVIRONMENT

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)
Core	100	37.3	39.38	41.47
Bagimanoor	420	43.2	26.91	43.30
Jagadevi	2700	45.6	10.75	45.60
Jagadevi	4460	45.8	6.39	45.80
Billakottai	3710	45.4	7.99	45.40
Sakilnatham	3720	39.5	7.97	39.50
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.

4.6 BIOLOGICAL ENVIRONMENT

Anticipated Impact

- There shall be negligible air emissions or effluents from the project site. During loading the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly
- Most of the land in the buffer area is undulating terrain with crop lands, grass patches and small shrubs. Hence, there will be no effect on flora of the region.
- Carbon released from quarrying machineries and tippers during quarrying would be 872 kg per day, 235386 kg per year and 1176932 kg over five years, as provided in Table 4.9.

Table 4.8 Carbon Released During Five Years of Granite Production

	Per day	Per year	Per five years
Fuel consumption of excavator	63	17041	85207
Fuel consumption of tipper	262	70789	353947
Total fuel consumption in liters	325	87831	439154
Co ₂ emission in kg	872	235386	1176932

Mitigation Measures

- During conceptual stage, the top bench will be re-vegetated by planting local /native species and lower benches will be converted into rainwater harvesting structure following completion of mining activities, which will replace habitat resources for fauna species in this locality over a longer time.
- Quarry approach roads are sprayed with water 3 times a day to control dust. Thus, the damage to the nearby farmlands is controlled.
- Existing roads will be used; new roads will not be constructed to reduce impact on flora.

Carbon Sequestration

- To mitigate carbon emission due to mining activities, we recommend planting trees around the quarry to offset the carbon emission during quarrying. A tree can sequester 22418 kg of carbon per year. Therefore, we recommend planting large number of trees around the quarry and near school campuses, government wasteland, roadsides etc.
- As per the greenbelt development plan as recommended by SEAC (Table 4.13), about 935 trees will be planted within three months from the beginning of mining. These trees, when grown up would sequester carbon of about 8874 kg of the total carbon, as provided in Table 4.10.

Table 4.9 CO2 Sequestration

CO ₂ sequestration in kg	83	22418	112088
Remaining CO ₂ not sequestered in kg	789	212969	1064845
Trees required for environmental compensation	8874		
Area required for environmental compensation in hectares	18		

4.7 SOCIO ECONOMIC ENVIRONMENT

Anticipated Impact

- Dust generation from mining activity can have negative impact on the health of the workers and people in the nearby area.
- Approach roads can be damaged by the movement of tippers.
- Increase in Employment opportunities both direct and indirect thereby increasing economic status of people of the region.

Mitigation Measures

- Good maintenance practices will be adopted for all machinery and equipment, which will help to avert potential noise problems.
- Green belt will be developed in and around the project site as per Central Pollution Control Board (CPCB) guidelines.
- Air pollution control measure will be taken to minimize the environmental impact within the core zone.
- For the safety of workers, personal protective appliances like hand gloves, helmets, safety shoes, goggles, aprons, nose masks and ear protecting devices will be provided as per mines act and rules.
- Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc., from this project directly and indirectly.
- From above details, the quarry operations will have highly beneficial positive impact in the area.

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

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 & 1 buffer)	24 hours	Once in 6 months	Fugitive dust, PM _{2.5} , PM ₁₀ , SO ₂ and NO _x .
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	2 locations (1 SW & 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 6 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 two proposed projects on air environment of the cluster do not exceed the permissible limits set by CPCB for air pollutants.
- The cumulative results of noise for the habitation in consideration do not exceed the limit set by CPCB for residential areas for day time.
- PPV resulting from two proposed projects is well below the permissible limit of Peak Particle Velocity of 8 mm/s.
- The proposed two project will allocate Rs.13,60,000/- towards CER as recommended by SEAC.
- The proposed two projects will directly provide jobs to about 49 local people.
- The proposed projects will plant about 2665 saplings in and around the lease area.
- The proposed projects will add 102 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.

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

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 22 local 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 Jagadevipalayam Village. CSR budget is allocated.
- ❖ Rs. 6,00,000 will be allocated for CER.

CHAPTER X

ENVIRONMENT MANAGEMENT PLAN

In order to implement the environmental protection measures, an amount of Rs.7759172 as capital cost and Rs.1144880 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 total recurring cost over 5 years is Rs.6389765 and the overall EMP cost for 5 years will be Rs.14148937.

CHAPTER XI

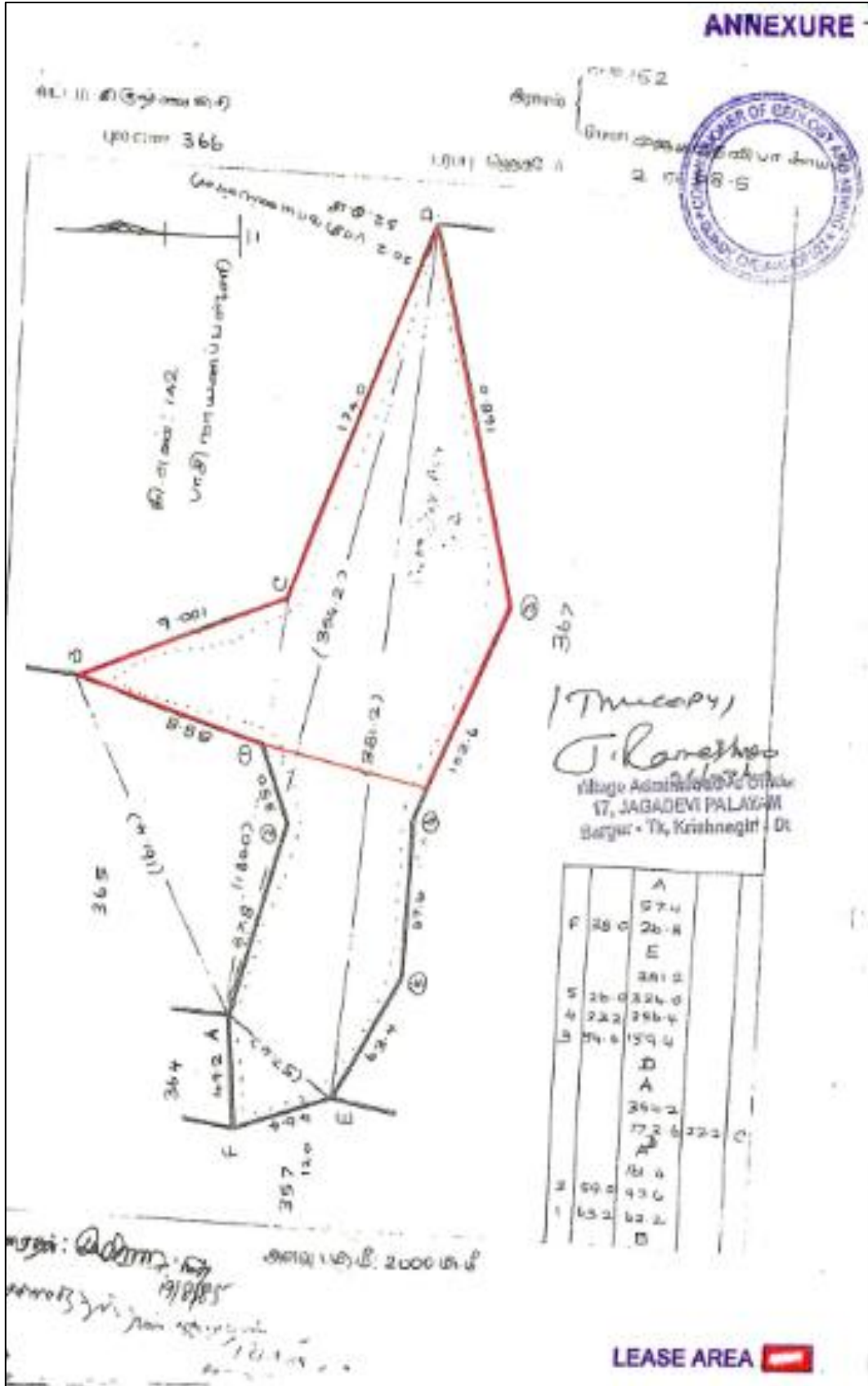
CONCLUSION

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.

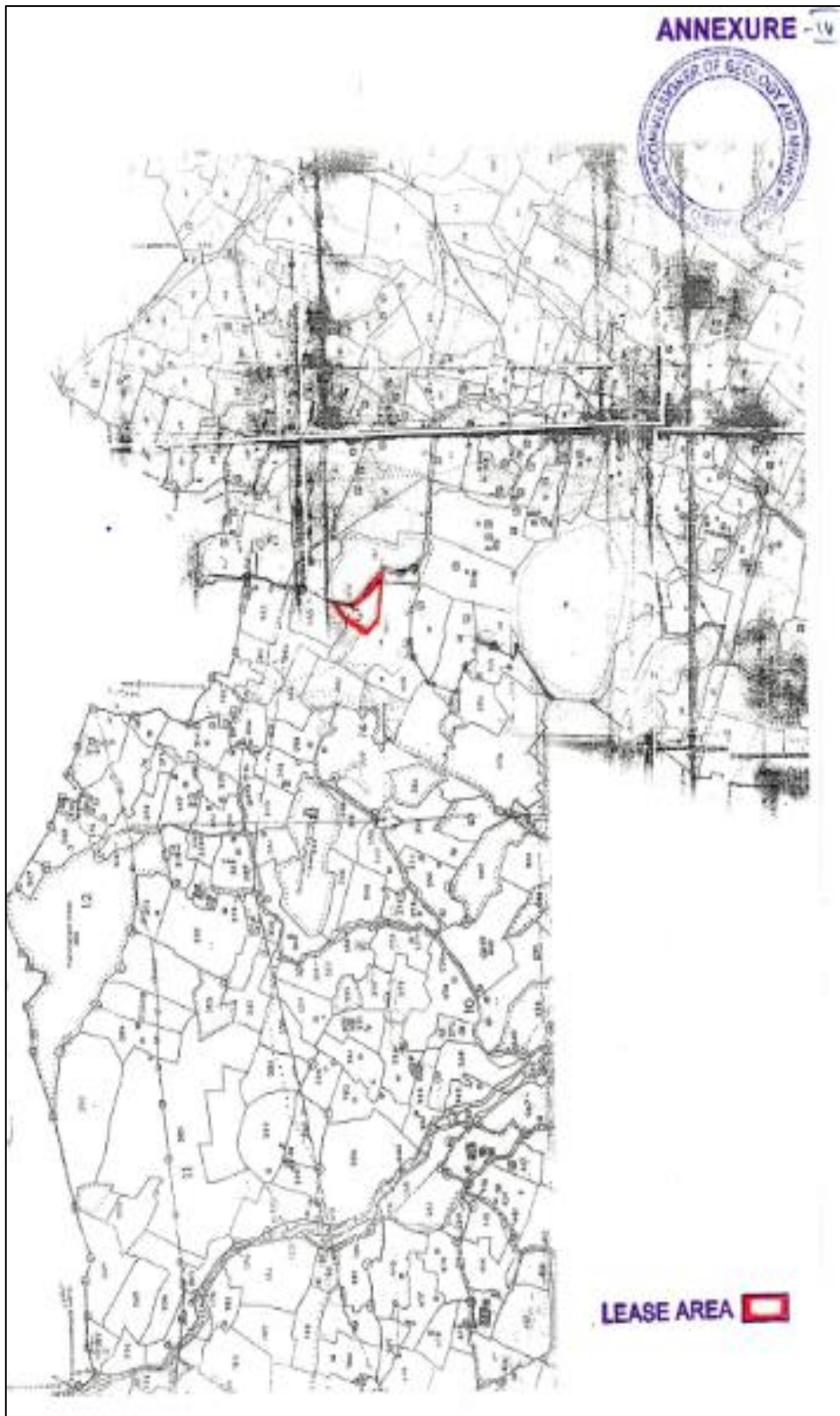
LAND DOCUMENTS

Some of the important land related documents are shown in below.

ANNEXURE



An FMP Sketch Showing Proposed Lease Area in Red Colour



An FMP Sketch Showing Proposed Lease Area in Red Colour