

EXECUTIVE SUMMARY

Thiru. K. RAJKUMAR

ROUGH STONE & GRAVEL QUARRY

S.F. Nos 469/1B, 2B, 3B, 4B, 5B, 6B, 476/1, 2, 3 & 476/4
Extent: 4.27.4 Ha

A.P.Nadanoor Village, Alangulam Taluk, Tenkasi District
Tamil Nadu State

“B1” CATEGORY – MINOR MINERAL – CLUSTER – NON-FOREST LAND*
CLUSTER EXTENT = 8.01.9 ha

Complied as per ToR Obtained vide

Letter No. SEIAA- TN/F.No.8412/SEAC/ToR-964/2021 Dated: 30.04.2021

Project Proponent

Thiru.K.Rajkumar,

S/o.Kalanjiam,

No.81/35, Selvi Nagar,

Sindupoondurai,

Tirunelveli District 627 001

Environmental Consultant

GEO EXPLORATION AND MINING SOLUTION 

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* Calculated as per MoEF & CC Notification – S.O. 2269(E) Dated: 01.07.2016

1. 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 project.

Rough Stone and Gravel is the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of proposed & existing quarries Thiru. K. Rajkumar Rough Stone & Gravel Quarry consisting of One Proposed and One Existing Quarry with total extent of Cluster of 8.01.9 ha in A.P.Nadanoor Village, Alangulam Taluk, Tenkasi District and Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

This EIA Report is prepared in compliance with ToR obtained vide Lr.No.SEIAA-TN/F.No.8412/SEAC/ToR-964/2021 Dated: 30.04.2021 and the Baseline Monitoring study has been carried out during the period of March – May 2022.

Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation for all areas from 5 to 25 ha falling in Category B- 1 and appraised by SEAC/ SEIAA as well as for cluster situation.

The proposed project is categorized under category “B1” Activity 1(a) (mining lease area in cluster situation) and will be considered at SEIAA – TN after conducting Public Hearing and Submission of EIA/EMP Report for Grant of Environmental Clearance.

“Draft EIA report prepared on the basis of ToR Issued for carrying out public hearing for the grant of Environmental Clearance from SEIAA, Tamil Nadu”

1.1 DETAILS OF PROJECT PROPONENT –

Name of the Project	K.Rajkumar Rough Stone & Gravel Quarry Project
S.F. No.	469/1B, 2B, 3B, 4B, 5B, 6B, 476/1, 2, 3 & 476/4
Extent	4.27.4 ha
Land Type	Patta Land
Village Taluk and District	A.P.Nadanoor Village, Alangulam Taluk, Tenkasi District

1.2 QUARRY DETAILS WITHIN 500 M RADIUS

PROPOSED QUARRY				
CODE	Name of the Owner	S.F. Nos	Extent	Status
P1	Thiru.K.Rajkumar, S/o.Kalanjiam, No.81/35, Selvi Nagar, Sindupondurai, Tirunelveli District 627 001	469/1B, 2B, 3B, 4B, 5B, 6B, 476/1, 2, 3 & 476/4	4.27.4 ha	ToR Obtained vide Lr.No.SEIAA-TN/F.No. 8412/SEAC/ToR-964/2021 Dated:30.04.2021
TOTAL			4.27.4 ha	
EXISTING QUARRY				
CODE	Name of the Owner	S.F. No	Extent	Lease Period
E1	Thiru.Mohammed Mahaboob, S/o Nagoor Pitchai, Pattal Pudur	434/4C, 4E, 4F, 4G, 4I, 4J,470/1, 471/2, 3, 472/1B & 472/1C	3.74.5 ha	16.04.2018 To 15.04.2023
			3.74.5 ha	
TOTAL CLUSTER EXTENT			8.01.9 ha	

* Cluster area calculated as per MoEF & CC Notification – S.O. 2269(E) Dated: 01.07.2016

As per above notification S.O.2269(E) dated : 01.07.2016 in para (b) in Appendix XI,- (ii)(5): The lease not operative for three years or more and leases which have got environmental clearance as on 15th January, 2016 shall not be counted for calculating the area of cluster, but shall be included in the Environment Management Plan and the Regional Environmental Management Plan”

TABLE 1.3 SALIENT FEATURES OF THE PROJECT

Name of the Quarry	Thiru K.Rajkumar Rough Stone & Gravel Quarry Project	
Toposheet No	58 – H/05	
Latitude between	08°48'01.94"N to 08°48'09.37"N	
Longitude between	77°26'04.45"E to 77°26'16.85"E	
Highest Elevation	98 m AMSL	
Proposed Depth of Mining	37 m (2m Gravel + 35m Roughstone)	
Geological Resources	Rough Stone in m ³	Gravel m ³
	17,09,600	85,480
Mineable Reserves	Rough Stone in m ³	Gravel m ³
	7,08,400	70,302
Yearwise Reserve	Rough Stone in m ³	Gravel m ³
	6,77,425	6,77,425
Ultimate Pit Dimension	Pit – I 162m (L) x 135m (W) x 42m (bgl) Pit – II 145m (L) x 99m (W) x 42m (bgl)	
Water Level in the surrounds area	65 – 70 m bgl	
Method of Mining	Opencast Mechanized Mining Method involving drilling and blasting	
Topography	The lease applied area is exhibits Elevated Terrain. The area has gentle sloping towards southwestern side. The altitude of the area is 414 m (max) above mean sea level. The area is covered by 2m thickness of Gravel Formation. Massive Charnockite is found after 2m (Gravel Formation) which is clearly inferred from the nearby existing quarrying pit.	
Machinery proposed	Jack Hammer	17 Nos
	Compressor	5 Nos
	Hydraulic Excavator	4 Nos
	Tippers	9 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	68 Nos	
Project Cost	Rs.1,03,56,000/-	
CER Cost	Rs 5,00,000/-	
Nearby Water Bodies	Tank Near Pappankulam	2.5km South
	Tank Near Edaikal	6km South East
	Tank Near Iluppaikurichi	8.5km south East
	Ambasamudram Lake	9.8km South East
	Tank Near Alngulam	9.3km North East
	Tank Near Sengulam	6.8km South East
	Ravanasamudram Lake	6.9km SE
	Adaichani Periyakulam	4.4km South East
	Tank Near A.P.Nadanoor	430m South West
	Tank Near Virasamudram	5.8km South West
	Tank Near Sadayandiyoor	1.85km south
	Odai	660m North
Tank Near Ayyanarkulam	8km South	
Greenbelt Development Plan	Proposed to plant 2200 trees in the 7.5 m Safety Zone, panchayat road & Village Road	
Proposed Water Requirement	5 KLD	
Nearest Habitation	650m Northwest	

1.3 STATUTORY DETAILS

- The proponent applied for Rough Stone and Gravel Quarry Lease Dated: 15.10.2019
- Precise Area Communication Letter was issued by the District Collector, Tenkasi R.C.No.M1/41113/2019 Dated:12.10.2020
- The Mining Plan was prepared by Recognized Qualified Person and approved by Assistant Director (i/c) Geology and Mining, Tenkasi District, vide R.C.No.M1/41113/2019 Dated:07.11.2020
- The proposed project falls under “B1” Category as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/61343/2021 Dated: 27.02.2021

2. PROJECT DESCRIPTION

One Proposed Quarry in A.P.Nadanoor Village, Alangulam Taluk, Tenkasi District and Tamil Nadu State fall under Cluster Situation as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 8.01.9 ha consisting of one proposed and one existing .

As the extent of cluster is more than 5 ha, the proposal falls under B1 Category as per the Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum

F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018, and requirement for EIA, EMP and Public Consultation for obtaining Environmental Clearance.

Rough Stone is proposed to be excavated by opencast mechanized method involving splitting of rock mass of considerable volume from the parent rock mass by jackhammer drilling and blasting, hydraulic excavators are used for loading the Rough Stone from pithead to the needy crushers and rock breakers to avoid secondary blasting.

2.1 SITE CONNECTIVITY TO THE PROJECT AREA

Nearest Roadway	National Highway (NH-744) Tenkasi – Madurai road–23.0Km- North West State Highway (SH-41A) Pottal pudur - Tirunelveli Road – 2Km South West
Nearest Village	Theertharappapuram – 1 km – North East
Nearest Town	Alangulam – 10.0 km – North East
Nearest Railway Station	Kadayam – 6 km – North West
Nearest Airport	Thiruvananthapuram –63 km –South West
Seaport	Thoothukudi - 77 km – East

2.2 LAND USE PATTERN OF THE PROPOSED PROJECTS

DESCRIPTION	PRESENT AREA (Ha)	AREA IN (Ha)
Area Under quarrying	Nil	3.37.8
Infrastructure	Nil	0.01.0
road	Nil	0.02.0
Green Belt	Nil	0.18.0
Undisturbed area	4.27.4	0.68.6
TOTAL	4.27.4	4.27.4

2.3 OPERATIONAL DETAILS OF LEASE APPLIED AREA

PARTICULARS	DETAILS	
	Rough Stone	Gravel
Geological Resources in m ³	14,95,900	85,480
Mineable Reserves in m ³	7,08,400	70,302
Yearwise Production for five years in m ³	6,77,435	70,302
Mining Plan Period	5 Years	3 Years
Number of Working Days	300 Days	300 Days
Production per day in m ³	452	78
No of Lorry loads (6m ³ per load)	75	13
Total Depth of Mining	37 m bgl (2 m Gravel + 35 m Rough Stone)	

eFIGURE – 1: GOOGLE IMAGE SHOWING PROJECT AREA

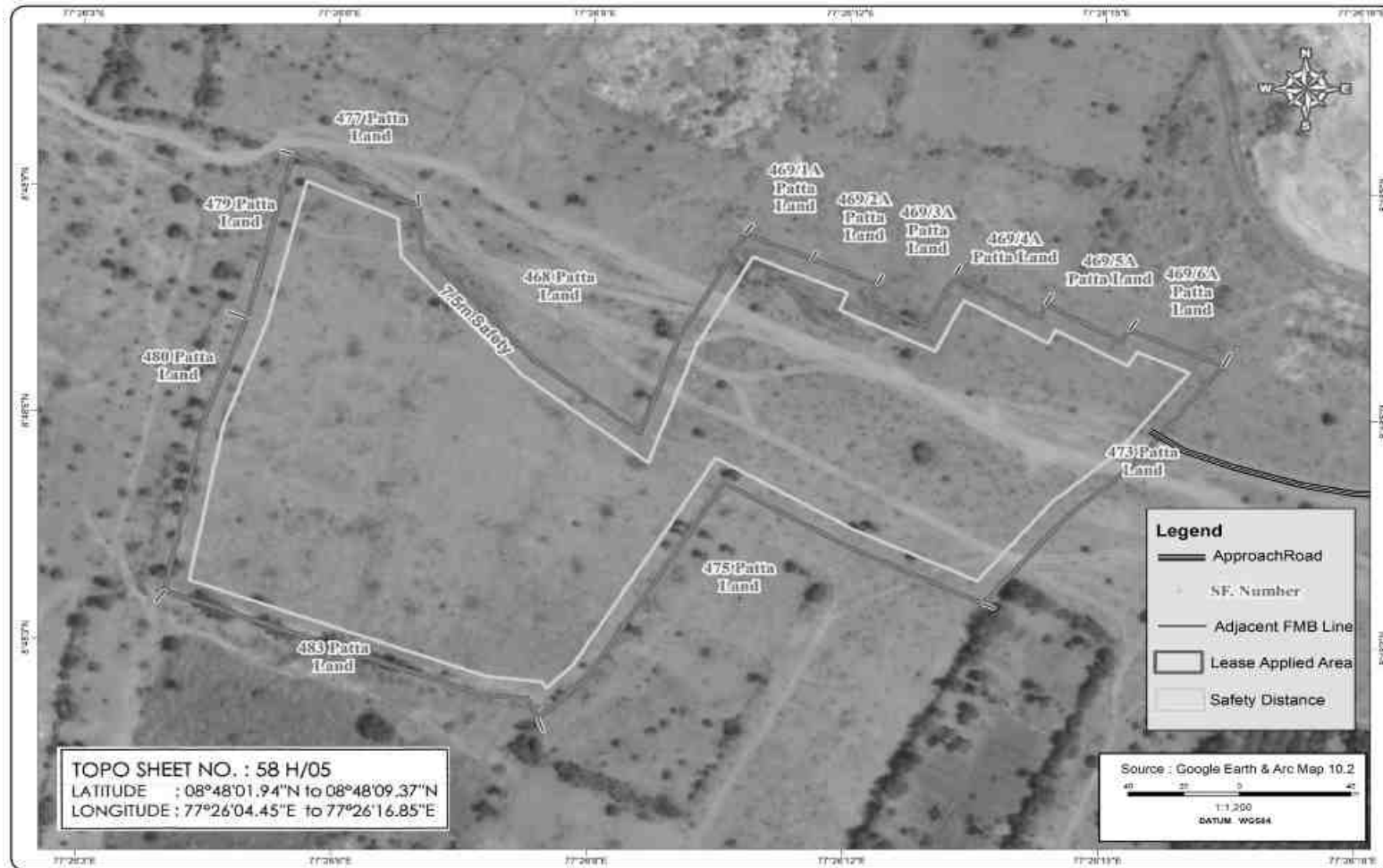
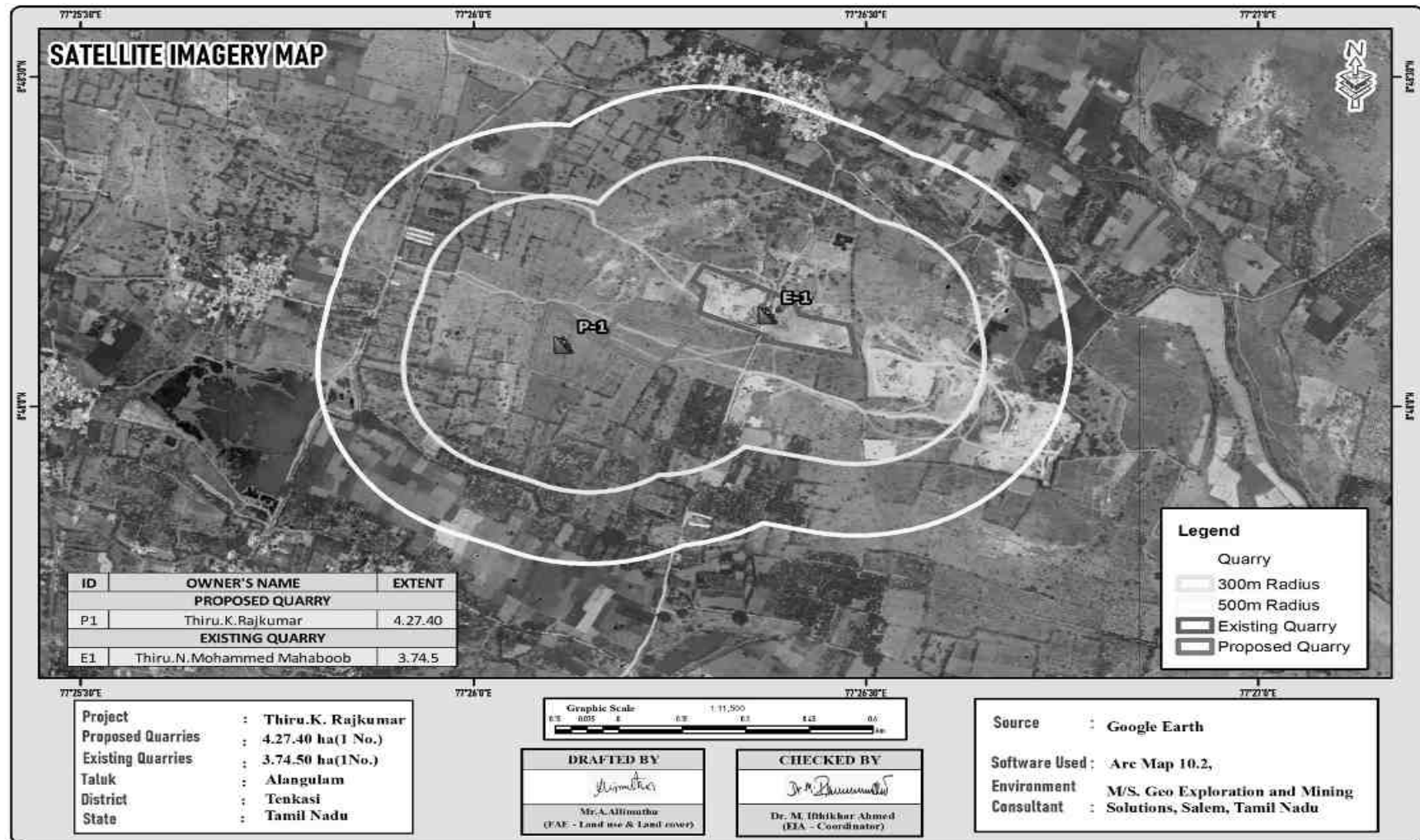


FIGURE – 2: GOOGLE IMAGE SHOWING CLUSTER (500 m QUARRIES)



- Cluster area is calculated as per MoEF & CC Notification – S.O. 2269 (E) Dated: 01.07.2016
 Note: As per above notification S.O.2269(E) dated : 01.07.2016 in para (b) in Appendix XI, - (i)(6) A cluster shall be formed when the distance between the peripheries of one lease is less than 500 meters from the periphery of other lease in a homogeneous mineral area which shall be applicable to the mine lease or quarry licenses granted on and after 9th September, 2013

FIGURE – 3: TOPOSHEET MAP COVERING 10 KM RADIUS

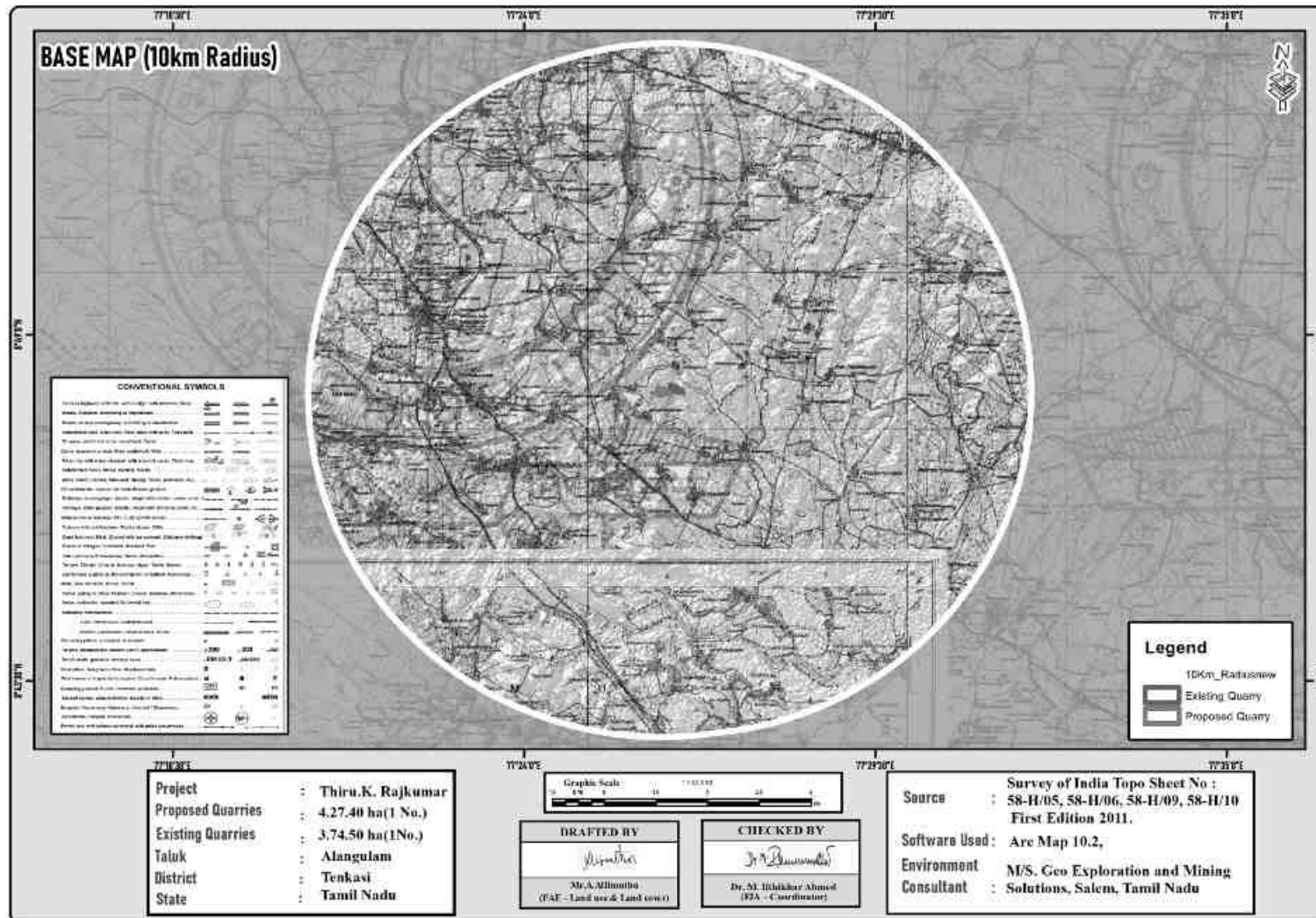
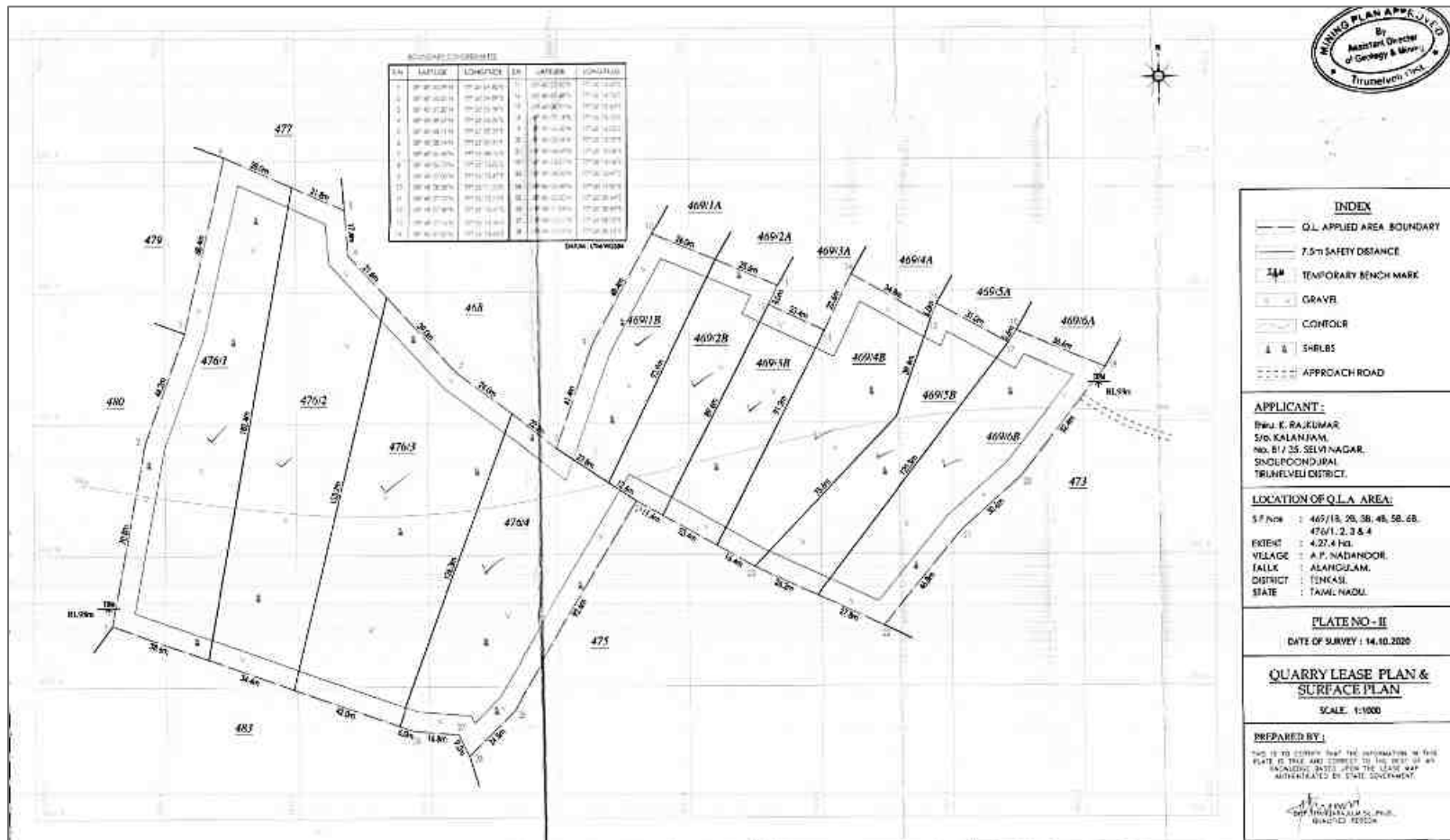


FIGURE – 4: QUARRY LEASE PLAN & SURFACE PLAN



2.4 METHOD OF MINING

The method of mining is Opencast Mechanized Mining Method is being proposed by formation of 5.0-meter height bench with a bench width not less than the bench height. However, as far as the quarrying of Rough Stone is concerned, observance of the provisions of Regulation 106 (2) (b) as above is seldom possible due to various inherent petro genetic factors coupled with mining difficulties. Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Director of Mines Safety for which necessary provision is available with the Regulation 106 (2) (b) of MMR-1961, under Mine Act – 1952.

The top layer of overburden (Gravel) will be Excavate directly by Hydraulic Excavators and loaded into tippers directly and sold to needy customers. The Rough Stone is a batholith formation and the splitting of rock mass of considerable volume from the parent rock mass will be carried out by deploying jackhammer drilling and Slurry Explosives will be used for blasting.

Hydraulic excavators are attached with rock breakers for fragmentation to avoid secondary blasting. The primary boulders are cleared from working face after blasting and further made to smaller sizes by rock breakers attached in excavators.

2.5 PROPOSED MACHINERY DEPLOYMENT

S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	17	1.2m to 2.0m	Compressed air
2	Compressor	5	400psi	Diesel Drive
3	Excavator with Bucket / Rock Breaker Unit 4	4	300 HP	Diesel Drive
4	Tippers / Dumpers	9	20 Tonnes	Diesel Drive

2.6 CONCEPTUAL MINING PLAN/ FINAL MINE CLOSURE PLAN

- ✚ At the end of life of mine, the excavated mine pit / void will act as artificial reservoir for collecting rain water and helps to meet out the demand or crises during drought season.
- ✚ After mine closure the greenbelt developed along the safety barrier and top benches and temporary water reservoir will enhance the ecosystem
- ✚ Mine Closure is a process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
- ✚ The principle closure objectives are for rehabilitated mines to be physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/ non-contaminating, and capable of sustaining an agreed post-mining land use

2.7 ULTIMATE PIT DIMENSION

Pit	Length (Max) (m)	Width (Max) (m)	Depth (Max)
I	162	135	42m bgl
II	145	99	42m bgl

3.0 DESCRIPTION OF THE ENVIRONMENT

Field monitoring studies to evaluate the base line status of the project site were carried out covering March 2022 – May 2022 as per CPCB guidelines. Environmental Monitoring data has been collected with reference to proposed mine by CHENNAI METTEX LAB Private Limited Approved by MoEF Notified Laboratory

3.1 ENVIRONMENT MONITORING ATTRIBUTES

Attribute	Parameters	Frequency of Monitoring	No. of Locations	Protocol
Land-use Land cover	Land-use Pattern within 10 km radius of the study area	Data's from census handbook 2011 and from the satellite imagery	Study Area	Satellite Imagery Primary Survey
*Soil	Physio-Chemical Characteristics	Once during the study period	6 (1 core & 5 buffer zone)	IS 2720 Agriculture Handbook - Indian Council of Agriculture Research, New Delhi
*Water Quality	Physical, Chemical and Bacteriological Parameters	Once during the study period	6 (2 surface water & 4 ground water)	IS 10500& CPCB Standards
Meteorology	Wind Speed Wind Direction Temperature Cloud cover Dry bulb temperature Rainfall	1 Hourly Continuous Mechanical/Automatic Weather Station	1	Site specific primary data& Secondary Data from IMD Station
*Ambient Air Quality	PM ₁₀ PM _{2.5} SO ₂ NOX Fugitive Dust	24 hourly twice a week (March – May 2019)	8 (2 core & 6 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	8 (2 core & 6 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrante & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio-Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

3.2 LAND ENVIRONMENT

A visual interpretation technique has been adopted for land use classification based on the keys suggested in the chapter – V of the guidelines issued by NNRMS Bangalore & Level III classification with 1:50,000 scale for the preparation of land use mapping. Land use pattern of the area was studied through LISS III imagery of Bhuvan (ISRO). The 10 km radius map of study area was taken for analysis of Land use cover.

TABLE 3.1: LAND USE / LAND COVER TABLE 10 KM RADIUS

S.No	CLASSIFICATION	AREA_Ha	AREA_%
BUILTUP			
1	Builtup-Urban	72.4162	0.21
2	Builtup-Rural	1443.07	4.33
3	Mining Area	407.301	1.22
AGRICULTURAL LAND			
4	Agricultural Land	104.562	0.31
5	Crop Land	19810.6	59.5
6	Fallow Land	8171.71	24.5
BARREN/WASTE LANDS			
7	Scrub Land	1020.52	3.06
8	Barren Rocky	461.784	1.38
WATER BODIES			
9	Water Bodies	1430.91	4.3
10	River	57.1252	0.17
FOREST			
11	Evergreen Forest	94.949	0.28
12	Scrub Forest	183.322	0.55
Total		33258.2694	100

From the above table, pie diagram and land use map it is inferred that the majority of the land in the study area is Agriculture land (includes crop land & fallow land) 84.31% followed by Built-up Lands (includes Urban & Rural) 4.54%, Barren Land 4.44%; Water bodies 4.47% and Mining – 1.22%.

The total mining area within the study area is 407.301 ha i.e., 1.22%. The cluster area of 8.01.9 ha contributes about 1.96% of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment

3.3 SOIL ENVIRONMENT

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 Clay Loam Soil and Bulk Density of Soils in the study area varied between 1.18 - 1.20 g/cc. The Water Holding Capacity and Porosity of the soil samples is found to be medium i.e. ranging from 31.0 – 40.0%.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 8.24 to 8.62

- The available Nitrogen content range between 170.0 to 214.0 kg/ha
- The available Phosphorus content range between 1.12 to 1.58 kg/ha
- The available Potassium range between 40.2 to 43.8 mg/kg

Wilting co efficient in significant level would mean that the soil would support the vegetation. The soil properties in the buffer zone reveal that the soil can sustain vegetation. If amended suitability the core area can also withstand plantation

3.4 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 water quality characteristics for critical 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.

There is no major surface water body in the study area and the rainfall over the area is moderate, the rainwater storage in open wells and trenches are in practice over the area and the stored water acts as source of drinking water for few months after rainy season

Surface Water

Ph:

The pH varied from 7.62 to 7.89 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH).

Total Dissolved Solids:

Total Dissolved Solids varied from 616 to 676 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride content is 220 to 224 mg/l. Nitrates varied from 15.2 to 28 mg/l, while sulphates varied from 44.0 to 78.0 mg/l.

Ground Water

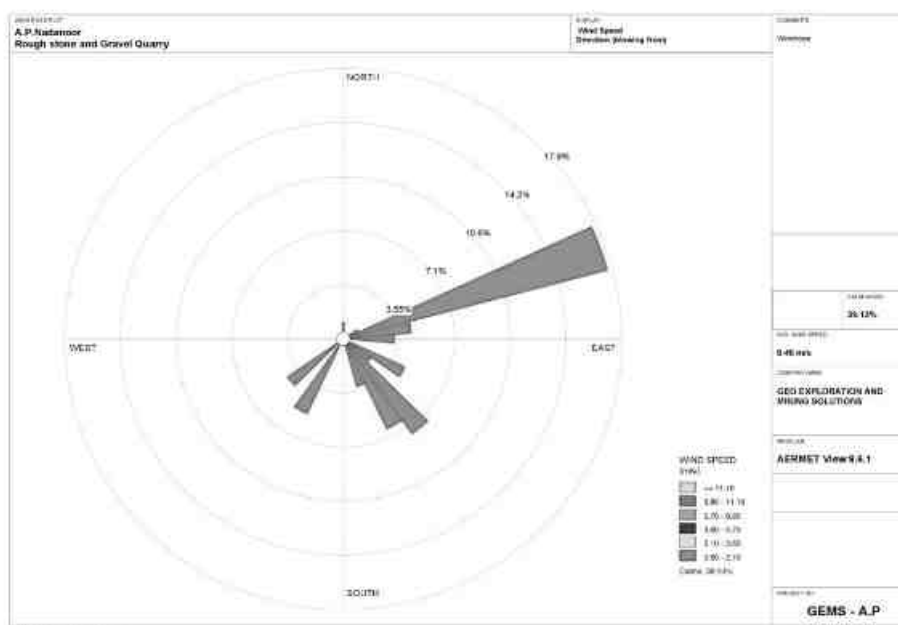
The pH of the water samples collected ranged from 7.38 to 7.86 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 492 - 558 mg/l in all samples. The Total hardness varied between 164.0 – 210.0 mg/l for all samples.

On Microbiological parameters, the water samples from all the locations meet the requirement. The parameters thus analysed were compared with IS 10500:2012 and are well within the prescribed limits.

3.5 AIR ENVIRONMENT

The baseline studies on air environment include identification of specific air pollution parameters and their existing levels in ambient air. The ambient air quality with respect to the study zone of 10 km radius around the cluster forms the baseline information

FIGURE – 6: WIND ROSE DIAGRAM



3.6 SUMMARY OF AMBIENT AIR QUALITY

The results of ambient air quality monitoring for the period (March 2022 – May 2022) are presented in the report. Data has been compiled for three months.

Interpretations & Conclusion

As per monitoring data, PM10 ranges from 50.9 $\mu\text{g}/\text{m}^3$ to 69.9 $\mu\text{g}/\text{m}^3$, PM2.5 data ranges from 20.9 $\mu\text{g}/\text{m}^3$ to 39.8 $\mu\text{g}/\text{m}^3$, SO2 ranges from 8.7 $\mu\text{g}/\text{m}^3$ to 10.7 $\mu\text{g}/\text{m}^3$ and NO2 data ranges from 20.7 $\mu\text{g}/\text{m}^3$ to 23.7 $\mu\text{g}/\text{m}^3$. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

3.7 NOISE ENVIRONMENT

Ambient noise levels were measured at 8 (Eight) locations around the proposed project area. Noise levels recorded in core zone during day time were from 62.3 to 62.7 dB (A) Leq and during night time were from 52.2 to 52.7 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 51.5 to 52.3 dB (A) Leq and during night time were from 40.5 to 42.9 dB (A) Leq.

The values of noise observed in some of the areas are primarily owing to quarrying activities due to cluster of quarries within 500m radius, movement of vehicles and other anthropogenic activities.

Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.8 ECOLOGICAL ENVIRONMENT

There is no Forest land, National Parks, Eco sensitive areas, Wild life sanctuaries within the radius of 10 km. An ecological survey of the study area was conducted particularly with reference to the listing of species and assessment of the existing baseline ecological (terrestrial) condition in the study area.

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

3.9 SOCIO ECONOMIC ENVIRONMENT

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 feature 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.

The socio-economic study of surveyed villages gives a clear picture of its population, average household size, literacy rate and sex ratio etc. It is also found that a part of population is suffering from lack of permanent job to run their day-to-day life. Their expectation is to earn some income for their sustainability on a long-term basis.

The proposed project will aim to provide preferential 28 persons to the local people there by improving the indirect employment opportunity in the area were around 15 persons in turn the social standards will improve

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans sustainable resource extraction.

4.1 LAND ENVIRONMENT:

ANTICIPATED IMPACT

The main anticipated impact on the Land Environment due to quarrying operation is change in Landscape, change in Land – use Pattern. The total extent of the cluster quarries is 6.86.0 ha including existing and proposed quarries in patta land. The ultimate depth of the quarrying is 47m. Maximum below the ground level and will not intersect the ground water table. The project is site specific.

MITIGATION MEASURES

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development of greenbelt etc.,
- Construction of garland drains all around the quarry pits and construction of check dam at strategic location in lower elevations to prevent erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area
- Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir
- In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 7.5 m safety barrier and other safety provided) so as to help minimise 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

IMPACT ON SOIL ENVIRONMENT

There is no top soil anticipated in these projects, the surface consists of gravelly formation followed by Rough stone which is proposed to excavate completely during the quarrying operation, hence preservation of top soil does not exist. Erosion of top layer (gravel), 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.

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 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

4.2 WATER ENVIRONMENT

ANTICIPATED IMPACT

The impact due to quarrying on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as quarrying is proposed in the cluster quarries is 37m and water table is found at a depth of 65- 70m BGL

MITIGATION MEASURES

The following mitigation measures are suggested for water management

The quarrying operation will be carried out well above the water table. There is no intersection of surface water bodies (Streams, Canal, Odai etc.,) in the proposed project areas. During rainy season rain water will be collected in the quarry pit and later used for greenbelt development and for the water sprinkling in the haul roads. There is no proposal for discharging of quarry pit water outside the project areas. There is no proposal Rough stone processing or workshop within the project area thus there is no effluent anticipated in the mines.

- With respect to Turbidity, Total Iron and Silica, Pre-treatment methods like settling or filtration, Water Softening (Ion Exchange) shall be adopted to make it fit for drinking purposes. But it can be used for other domestic purposes
- Rainwater will be collected in sump in the mining pit and will be allowed to store and pumped out to surface setting tank of 15 m x 10m x 3m to remove suspended solids if any. This collected water will be judiciously used for dust suppression onwards 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
 - Construction of garland drains to divert surface run-off into the quarrying area
 - Retaining walls with weep hole will be constructed around the dump to arrest silt wash off
 - Periodic analysis of quarry pit water and ground water quality in nearby villages
 - Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits
 - Wastewater 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 and analysing the quality of water in open well, bore wells and surface water

4.3 AIR ENVIRONMENT

The air borne particulate matter is the main air pollutant in this opencast mining. The mining operation will be carried out by jackhammer drilling (35mm dia) and Hydraulic Excavators will be utilized for excavation of Rough Stone

ANTICIPATED IMPACT

The air borne particulate matter generated by quarrying operation and transportation. The emissions of Sulphur dioxide (SO₂), Oxides of Nitrogen (NO₂) due to excavation/loading equipment and vehicles plying on haul roads are marginal. Loading - unloading and transportation of Rough stone and overburden, wind erosion of the exposed area and movement of light vehicles will be the main polluting source in the mining activities releasing Particulate Matter (PM₁₀) affecting Ambient Air of the area on air environment and net increase in emissions by Open pit source modelling in AERMOD Software.

Anticipated incremental concentration due to this quarrying activity and net increase in emissions due to quarrying activities within 500 meters around the project area is predicted by Open Pit Source modelling using AERMOD Software.

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 become very effective and the work environment will be improved from the point 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 –

- Establish time of blasting to suit the local conditions and water sprinkling on blasting face
- Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas
- Controlled blasting include Adoption of suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone and restricting blasting to a particular time of the day i.e. at the time lunch hours, controlled charge per hole as well as charge per round of hole
- 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 & 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 below 20 km/hr to avoid generation of dust.
- Water sprinkling on haul roads & 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 & makes reduction in the pollution.
- The un-metalled 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 certificate
- Grading of haul roads and service roads 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 dumpers/trucks
- Green belt of adequate width will be developed around the project areas

Occupational Health –

- Dust mask will be provided to the workers and their use will be strictly monitored
- Annual medical check-ups, trainings and campaigns will be arranged to ensure awareness about importance of wearing dust masks among all mine workers & tipper drivers
- Ambient Air Quality Monitoring will be conducted six month once to assess effectiveness of mitigation measures proposed

4.4 NOISE ENVIRONMENT**ANTICIPATED IMPACT**

Noise pollution poses a major health risk to the mine workers. Following are the sources of noise in the existing open cast mine project are being observed such as Drilling, & Blasting, Loading and during movement of vehicles

MITIGATION MEASURES

- Usage of sharp drill bits while drilling which will help in reducing noise;
- Secondary blasting will be totally avoided and hydraulic rock breaker will be used for breaking boulders;
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained;

- The blasting will be carried out during favourable atmospheric condition and less human activity timings by using nonelectrical initiation system;
- Proper maintenance, oiling and greasing of machines will be done every week to reduce generation of noise;
- Provision of sound insulated chambers for the workers working on machines (HEMM) producing higher levels of noise;
- Silencers / mufflers will be installed in all machineries;
- Green Belt/Plantation will be developed around the project area and along the haul roads. The plantation minimizes propagation of noise;
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and their use will be ensured through training and awareness.
- Regular medical check-up and proper training to personnel to create awareness about adverse noise level effects.

4.5 BIOLOGICAL ENVIRONMENT

ANTICIPATED IMPACT

- ✦ None of the plants will be cut during operational phase of the mine.
- ✦ 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.

Wild life is not commonly found in the cluster area and its immediate environs because of lack of vegetal cover and surface water. Except few domestic animals, reptiles, hares and some common birds are observed in the study area.

MITIGATION MEASURES

The project site has a land to develop greenbelt within the lease area, along roads and other vacant areas. The main objective of the green belt is 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 services. To avoid dust emissions, the mined materials will be covered with tarpaulin during transportation.

- Plants that grow fast will be preferred.
- Preference for high canopy covers plants with local varieties.
- Perennial and evergreen plants will be preferred.

The development of Green Belt is an important aspect for any plant because:

- It helps in noise abatement for the surrounding area.
- It maintains the ecological balance.
- It increases the aesthetic value of site

GREENBELT DEVELOPMENT PLAN

PROPOSAL					
Year	No. of trees proposed to be planted	Survival %	Area to be covered	Name of the species	No. of trees expected to be grown
I	2200	80%	Along safety distance, panchayat road , village road.	Neem, Pongamia Pinnata, Casuarina etc.,,	1,760

4.6 SOCIO ECONOMIC ENVIRONMENT**ANTICIPATED IMPACT**

Employment generation due to the project will provide direct employment for about 68 persons and indirectly will get employment around 40 persons.

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

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

The site has been selected based on geological investigation and exploration as below:

- Occurrence of minerals at the specific site.
- Transportation facility for materials & manpower.
- Overall impact on environment and mitigation feasibility
- Socio – economic background

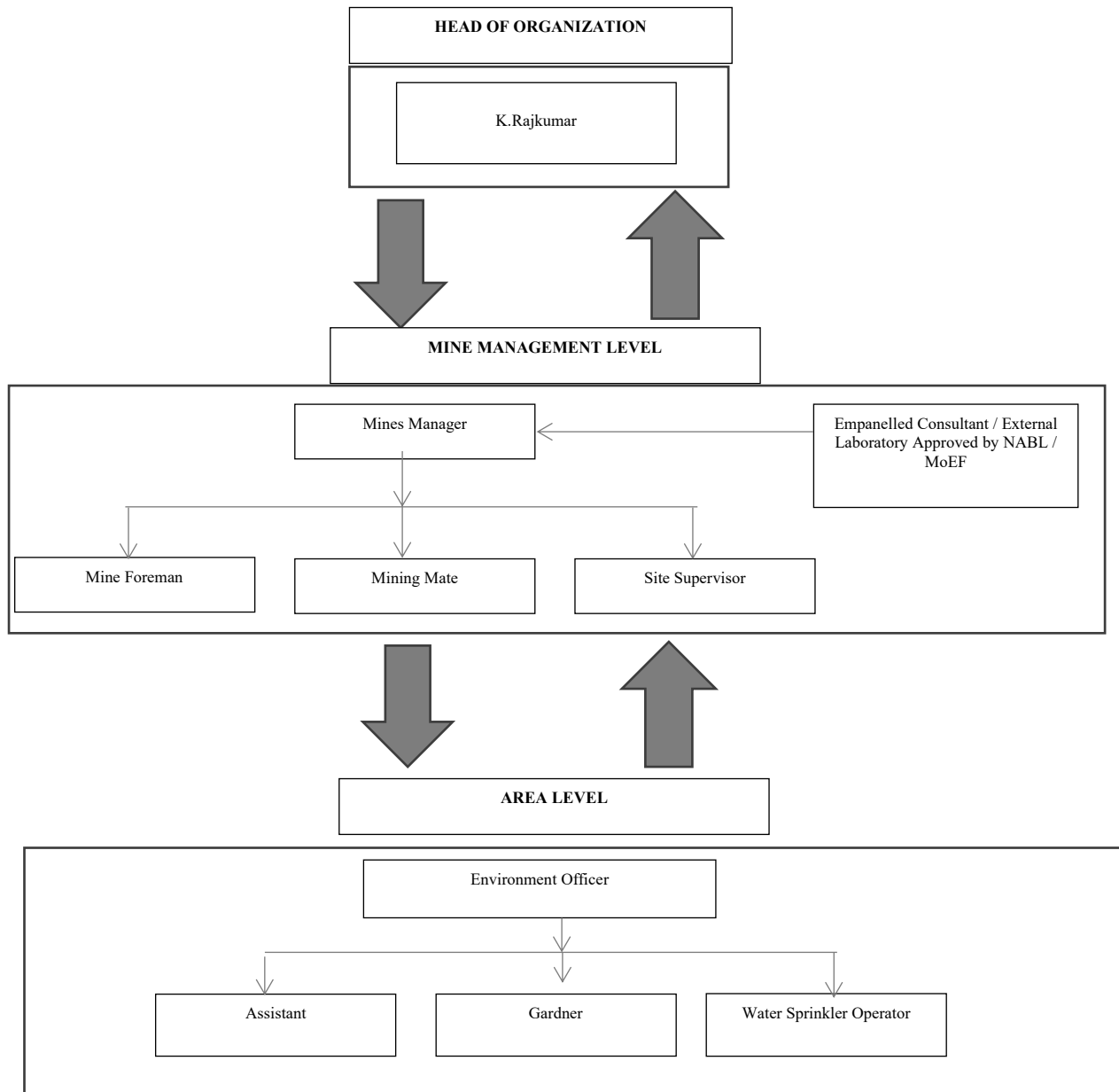
6. ENVIRONMENT MONITORING PROGRAM

Usually an impact assessment study is carried over short period of time and the data cannot bring out all variations induced by natural or human activities. Hence regular monitoring program of Environmental parameters is essential to take into account the changes in the Environment. The responsibilities of this cell will be:

The Objective of Monitoring -

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

6.1 ENVIRONMENTAL MONITORING CELL



6.2 POST ENVIRONMENTAL CLEARANCE MONITORING SCHEDULE

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	8 Locations (2 Core & 6 Buffer)	24 hours	Once in 6 months	Fugitive Dust, PM2.5, PM10, SO2 and NOx.

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	6 Locations (2SW & 4 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	8 Locations (2 Core & 6 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	6 Locations (1 Core & 5 Buffer)	-	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

7. ADDITIONAL STUDIES

7.1 RISK ASSESSMENT

The methodology for the risk assessment has been based on the specific risk assessment guidance issued by the Directorate General of Mine Safety (DGMS), Dhanbad, vide Circular No.13 of 2002, dated 31st December, 2002. The DGMS risk assessment process is intended to identify existing and probable hazards in the work environment and all operations and assess the risk levels of those hazards in order to prioritize those that need immediate attention. Further, mechanisms responsible for these hazards are identified and their control measures, set to timetable are recorded along with pinpointed responsibilities.

The whole quarry operation will be carried out under the direction of a Qualified Competent Mine Manager holding certificate of competency to manage a metalliferous mine granted by the DGMS, Dhanbad for all proposed projects. Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening.

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 achieve the following

- ☛ Rescue and medical treatment of casualties;
- ☛ Safeguard other people;
- ☛ Minimize damage to property and the environment;
- ☛ Initially contain and ultimately bring the incident under control;

- ✚ Secure the safe rehabilitation of affected area; and
- ✚ Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

7.3 CUMULATIVE IMPACT STUDY

CUMULATIVE PRODUCTION LOAD OF ROUGH STONE

Quarry	PROPOSED PRODUCTION DETAILS			
	5 Years in m ³	Per Year in m ³	Per Day in m ³	Number of Lorry Load Per Day
P1	6,77,435	1,35,487	452	75
E1	5,24,423	1,04,884	350	58
Grand Total	12,01,858	2,40,371	802	133

CUMULATIVE PRODUCTION LOAD OF GRAVEL

Quarry	PROPOSED PRODUCTION DETAILS			
	2 - 3 Years in m ³	Per Year in m ³	Per Day in m ³	Number of Lorry Load Per Day
P1	70,302	23,434	78	13
E1	23,031	7,677	25	17
Grand Total	93,333	25,910	103	30

PREDICTED NOISE INCREMENTAL VALUES FROM CLUSTER

Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	50.3	43.8	51.2	55
Habitation Near E1	52.1	47.4	53.4	

NEAREST HABITATION FROM EACH MINE

Location ID	Distance in Meters
Habitation Near P1	650
Habitation Near E1	430

GROUND VIBRATIONS AT 2 MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	196	650	1.077
E1	30	430	0.465

SOCIO ECONOMIC BENEFITS FROM 2 MINES

Location Code	Project Cost	CER @ 2%
P1	Rs.1,03,56,000/-	Rs.5,00,000/-
E1	Rs.83,43,000/-	Rs. 1,66,900/-
Grand Total	Rs.1,86,99,000/-	Rs.6,66,900/-

EMPLOYMENT BENEFITS FROM 2 MINES

Location Code	Employment
P1	68
E1	18
Grand Total	86

GREENBELT DEVELOPMENT BENEFITS FROM 2 MINES

CODE	No of Trees proposed to be planted	Survival %	Name of the Species	No. of Trees expected to be grown
P1	2200	80%	Neem	1760
E1	100	80%	Neem, Casuarina	80
Total	300	80%	Neem, Casuarina	1840

8. PROJECT BENEFITS

One Proposed Project for Quarrying Rough Stone at Thiru. K. Rajkumar aims to produce cumulatively 6,77,425m³ Rough Stone over a period of 5 Years. This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits

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

9. ENVIRONMENT MANAGEMENT PLAN

The Environment Monitoring Cell discussed under Chapter 6 will ensure effective implementation of environment management plan and to ensure compliance of environmental statutory guidelines through Mine Management Level of each Proposed Quarry.

The said team will be responsible for:

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

10. CONCLUSION

It can be concluded from overall assessment of the impacts, in terms of positive and negative effects on various environmental components, that the mining activities will not have any adverse effect on the surrounding environment.

To mitigate any impacts due to the mining activities, a well-planned EMP and a detailed post project monitoring system is provided for regular monitoring and immediate rectification at site. Due to the cluster quarrying activities, socio economic conditions in and around the project site will be improved substantially. Hence, the Prior Environmental Clearance shall be granted at the earliest