Executive Summary

For

PROPOSED VEERIYAPALAYAM MULTI COLOUR GRANITE QUARRY

Extent of 2.30.0 Ha of Patta land

At

S.F. No.: 12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A,
Veeriyapalayam Village,
Krishnarayapuram Taluk,
Karur District,
Tamil Nadu State

Applicant

Thiru. K.Deivendran,
S/o. Karuthaiah Thevar,
Door No. 4/143, Lake Area,
Uthangudi,
Madurai District

(Project termed under Schedule of 1(a) Mining of Minor Minerals 'B2' category as per EIA Notification 2006 and its Amendments thereafter and As per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals 'B1' Category)

Proposal No: SIA/TN/MIN/430716/2023
ToR File No: SEIAA/TN/F.No.10272/SEAC/ToR-1621/2023 dated: 28.11.2023
Base Line Monitoring: March 2023 - May 2023

EIA Consultant & Laboratory

HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI
NABET Certificate No & Validity: NABET/EIA/2224/SA0190, valid up to 27.07.2024
NABL Certificate No: TC-12310 Dated: 25.09.2023 Valid Till 24.09.2025

June 2024

1. PROJECT DESCRIPTION

The Veeriyapalayam Multi Colour granite Quarry is over an extent of 2.30.0Ha. The project falls under Schedule 1(a) Mining of Minor Minerals, B2 category as per EIA Notification 2006 and its Amendments thereafter and the proposed project is termed under Schedule 1(a) Mining of Minor Minerals, B1 category, as per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster mines area more than 5.00 Ha.

The Additional Chief Secretary, Chennai had issued the precise area communication letter to produce the approved Mining Plan vide **Lr.No.13192/MMB.2/2017-1**, dated 25.01.2018. The Environmental Clearance has obtained from the District Level Environment Impact Assessment Authority, Karur District vide letter **No.DEIAA-DIA/TN/MIN/13050/2018-KRR EC.No.95/2018/Mines,** Dated:06.02.2018.

The quarry lease was granted vide **G.O. (3D) No.7**, Industries (MMB.2) department dated: 21.02.2018 for a period of 20 years. The quarry lease deed was executed on 20.03.2018 and the lease period is valid up to 19.03.2038. The quarry operation was commenced after the execution of lease deed, i.e.17.04.2018. After commencement of quarry operation, there was huge demand for this multi colour granite dimensional stone in the international market and construction industry. Hence, the proponent has proposed to enhance the production and a Modified Mining Plan was prepared on 18.09.2018 and submitted to the Department of Geology and Mining, Guindy, Chennai. The same was approved by the Director, Department of Geology and Mining, Guindy, Chennai vide **Letter No. 373/MM2/2011** dated: 08.10.2018 (Production schedule for the period of five years (2018-19 to 2022-23). Subsequently the proponent has obtained Environmental Clearance from the District Level Environment Impact Assessment Authority, Karur district vide letter No **DEIAA-DIA/TN/MIN/18428/2018-KRR Ec.No.131/2018/Mines,** Dated: 02.11.2018. As per the MoEF & CC Office Memorandum F.No.IA3 - 22/11/2023- IA.III(E-208230), Dated:28.04.2023, the EC obtained from DEIAA is cancelled.

ToR application submitted to TN SEIAA vide online proposal No. **SIA/TN/MIN/4 30716/2023**, dated: **25.05.2023**, Hardcopy submitted vide File No.10272/2023, The proposed production capacity of the quarry was **1,24,703 m³** of Colour granite for the period of five years, for the depth of 39.5m (2m top soil+1.5m weathered rock+36m Multi colour granite) from below ground level as per the approved mining plan.

The proposal was appraised during 409th SEAC meeting held on 21.09.2023 and 676th SEIAA meeting held on 128.11.2023 and ToR was issued vide **Letter No. SEIAA-TN/F.No.10272/SEAC/ToR-1621/2023, dated: 28.11.2023**.

Table-1 Salient Features of the Project Site

Survey No.	12/1A, 12/1B, 12/1C, 12/1D, 12/1E, 12/2A, 12/2B, 12/2C, 12/3A, 12/3B, 12/3C, 12/3D, 12/3E, 12/4A, 12/4B and 12/5A
Village	Veeriyapalayam
Taluk and District	Krishnarayapuram Taluk , Karur District
State	Tamil Nadu
Toposheet No.	C44G1&5
Latitude	10°52'40.64"N to 10°52'47.86"N
Longitude	78°16'58.79"E to 78°17'04.43"E
Extent Area	2.30.0 Ha
Lease Period	20 years
Estimated Geological Reserves (ROM) m^3	Colour Granite-7,38,502m^3
Estimated Mineable Reserves (ROM) m^3	Colour Granite-1,87,835m^3
Colour Granite production m^3	Colour Granite-1,24,703m^3
Depth of Mining	39.5m below ground level
Method of Mining	Open cast semi mechanized method
Nearest Roads	➢ MDR-625 (Mahadhanapuram-Mylampatti) ~0.17km, W ➢ SH-199 (Vaiyampatti-Karur road) ~ 10.41km, WSW ➢ NH-81 (Coimbatore-Karur-Chidambaram)~ 8.27km, N
Nearest Railway station	➢ Railway Station - Mahadhanapuram Railway Station ~ 8.31km, N ➢ Railway Track - (Sithalavai RS- Mahadhanapuram RS) ~ 8.31km, N
Nearest Airport	➢ Tiruchirappalli International Airport ~47.40km, ESE
Nearest Town / City	Tiruchirappalli ~ 38km, ESE Thottiyam~13km, NNE
Water Requirement	1.8 KLD
Source of Water	Approved water vendors
Power Requirement	125kVA
Fuel Requirements	1,99,520 liters
Approved Quantity as per EC	51,712 Cbm
Permit Issued Quantity	5,360.757 Cbm
Balance Quantity	46,351.243 Cbm

Table-2 Cluster Details within 500m Radius

S.No	Name of the lessee	Area (Ha)	S.F.No	Lease Peeriod
1.	Mr. Deivendran (Current Proposal)	2.30.0	12/1A, 12/1B, 12/1C, 12/1D, 12/1E,12/2A, 12/3A, 12/3B, 12/3C,12/3D, 12/3E, 12/4A, 12/4/B, 12/5A	20.03.2023 to 19.03.2028
2.	Mr. Deivendran	2.86.5	11/3F, 12/4C, 12/5B, 12/5C, 12/5D and 12/5E	06.03.2023 to 05.04.2043

2. PROJECT PROCESS DESCRIPTION

2.1. Method of Quarrying

An open cast quarrying by semi-mechanized method will be adopted to operate the quarry. Annual Peak production will be Colour Granite-25,596m^3. 2 No. of Excavator having 300LC capacity Tata Hitachi will be used for excavation and 1 nos of 20 tones capacity Tata Tippers will be used during loading.

Conceptual Quarry Plan

Colour Granite

The Geological reserves of Colour granite have been computed based on the Geological Plan & Sections up to the economically workable average depth of 39.5m from the surface level and the top surface of the granite body works out to 7,38,502 m^3. By applying 40% recovery the effective Geological reserves works out 2,95,402m^3.

Mineable Reserves have been computed as 1,87,835 m^3 after leaving the reserves locked up in safety barrier and benches based on the Conceptual Plan and sections, the effective(Saleable) Mineable Reserves have been worked out as 75,134 m^3 by applying the recovery factor 40%. The annual peak production per year would be 25,596 m^3 of ROM of saleable and 10,238m^3 of ROM during the first five year of Mining plan period at the rate of 40% recovery.

Table-3 Proposed and Achieved Production Details (2018 – 2023)

Proposed						
Year	**ROM (m^3)**	**Production 40% (m^3)**	**Granite waste 60% (m^3)**	**Top soil (m^3)**	**Weathered rock (m^3)**	**Period**
20.03.2018-17.09.2018	11,655	4,662	6,993	Nil	Nil	**Approved Mining plan**
Total	**11,655**	**4,662**	**6,993**	**Nil**	**Nil**	
20.09.2018 - 19.03.2019	16,417	6,567	9,850	2,838	1,800	**Approved Modified Mining Plan**
2019-20	26,772	10,138	16,634	Nil	Nil	
2020-21	27,450	10,980	16,470	5,978	3,935	
2021-22	32,094	12,838	19,256	5,246	3,935	
2022-23	27,972	11,189	16,783	5,124	3,843	
Total	**1,30,705**	**51,711**	**78,994**	**19,186**	**13,513**	
Grand Total	**1,42,360**	**56,373**	**85,987**	**19,186**	**13,513**	-

Achieved							
Previous lease period (Tmt.S. Shanthi excavation (Overburden+Mineral)	**ROM (m^3) (a)**	**Production and dispatch (m^3)**	**Recovery (%)**	**Granite waste (m^3)**	**Gravel (m^3) (b)**		**Total excavated Volume (m^3) (a+b)**
	13,385	13,385	100	nil	10,140		23,525
Year (Present lease)	**Granite**				**Over Burden**		**Total excavate d volume (a+b+c) (m^3)**
	ROM in m^3 (a)	**Production and dispatch (m^3)**	**Recovery (%)**	**Granite waste (m^3)**	**Top soil (m^3)**	**W.Rock**	
2018-19	25,563	4225.223	16.5	21,337.77	1,480	1,840	28,883
2019-20	4,261	945.784	22.2	3,315.216	934	519	5,714
2020-21	687	153.797	22.4	533.203	1,190	753	2,630
2021-22	86	20.451	23.8	65.549	1,650	688	2,424
2022-23	-	-	-	-	1,136	978	2,114
Total	**30,597**	**5,345.255**	-	**25,251.745**	**6,390**	**4,778**	**41,765**
Grand Total							**65,290**

Table-4 Year wise production and development details (2023-2028)

Year	Section	Bench	Length (m)	width (m)	Depth (m)	ROM in m^3	Recovery 40% (m^3)	Granite waste 60% (m^3)	Weathered rock (m^3)	Top soil (m^3)
I	XIYI–CD		40	14	3	1,680	672	1,008	-	-
		iii	40	57	1.5	3,420	1,368	2,052	-	-
		iv	37	53	6	11,766	4,706	7,060	-	-
		v	25	41	6	6,150	2,460	3,690	-	-
		vi	13	28	6	2,184	874	1,310	-	-
		Total				**25,200**	**10,080**	**15,120**	**-**	**-**
II	XIYI–CD	ii	44	14	0.5	308	123	185	-	-
			27	14	1.5	567	227	340	-	-
		iii	40	14	4.5	2,520	1,008	1,512	-	-
		iv	37	16	6	3,552	1,421	2,131	-	-
		V	25	22	6	3,300	1,320	1,980	-	-
		vi	13	29	6	2,262	905	1,357	-	-
	XY–CD	i	14	20	3.5	-	-	-	-	-
		ii	17	26	4	-	-	-	**1,768**	**980**
		iii	42	22	6	5,544	2,218	3,326	-	-
		iv	42	12	6	3,024	1,210	1,814	-	-
		v	42	7	6	1,764	706	1,058	-	-
		Total				**22,841**	**9,136**	**13,705**	**1,768**	**980**
III	XY–CD	i	73	40	3.5	-	-	-	-	10,220
		ii	63	29	4	-	-	-	7,308	-
		iii	59	26	6	9,204	3,682	5,522	-	-
		iv	45	30	6	8,100	3,240	4,860	-	-
		v	33	25	6	4,950	1,980	2,970	-	-
		vi	21	26	6	3,276	1,310	1,966	-	-
		Total				**25,530**	**10,212**	**15,318**	**7,308**	**10,220**
IV	XY–CD	i	73	46	3.5	-	-	-	-	11,753
		iii	63	52	4	-	-	-	13,104	-
		iv	59	27	6	9,558	3,823	5,735	-	-
		v	45	27	6	7,290	2,916	4,374	-	-
		vi	33	27	6	5,346	2,138	3,208	-	-
		vii	21	27	6	3,402	1,361	2,041	-	-
		Total				**25,596**	**10,238**	**15,358**	**13,104**	**11,753**
V	XY–AB	i	15	31	3.5	-	-	-	-	1,628
		ii	5	10	4	-	-	-	200	-
	XY–CD	iii	59	28	6	9,912	3,965	5,947	-	-
		iv	45	28	6	7,560	3,024	4,536	-	-
		v	33	28	6	5,544	2,218	3,326	-	-
		vi	21	20	6	2,520	1,008	1,512	-	-
		Total				**25,536**	**10,215**	**15,321**	**200**	**1,628**
Grand Total						**1,24,703**	**49,882**	**74,821**	**22,380**	**24,581**

Total Proposed ROM : 1,24,703 m^3

Total Recoverable Reserves @ 40% : 49,882 m^3

Granite waste @60% : 74,821 m^3

Weathered rock (WR) : 22,380 m^3

Total waste (Granite waste+WR) : 97,201 m^3

Top soil : 24,581 m^3

Granite waste ratio : 1:1.95

Land Use Pattern

Land Use Pattern of the Mining lease area is given in below table

Table-5 Land Use Pattern

S. No	Description	Present Area (Ha.)	Area in use during the quarrying period (Ha)	Area at the end of life of quarry (Ha)
1	Area under quarry	0.71.32	0.74.11	1.86.70
2	Waste dump	0.34.00	0.20.80	nil
3	Infrastructure	nil	nil	nil
4	Roads	0.02.00	0.01.00	0.03.00
5	Green Belt	0.03.00	0.14.26	0.38.50
6	Stocking blocks	1.19.68	0.09.51	0.01.80
Total		**2.30.00**	**1.19.68**	**2.30.00**

3. IMPACTS AND MITIGATION MEASURES

Impacts due to Mining Activity:

Various environmental impacts, which have been identified due to the mining operations proposed project, are discussed in the following sections. The environmental parameters most commonly affected by mining activities are:

3.1. Soil Environment

3.1.1. Impacts

Potential impacts on land environment are envisaged due to hazardous and non-hazardous wastes generated due to various operations in the project site like municipal waste from domestic use and waste diesel oil from quarry machineries.

3.1.2. Mitigation Measures

Good housekeeping and best practices of waste handling shall be adopted to eliminate/minimize the risks of soil contamination. The wastes generated will be stored in temporary storage facility and transferred to nearby municipal disposal bins. Waste oil generated from quarry machineries and the same is disposed through TNPCB Authorized dealers.

3.2. Land Environment:

3.2.1. Land Degradation

The impact on land will be due to the following aspects:

- Land degradation due to disposal of large volume of waste materials.
- Creation of infrastructural facilities like office, rest shelter, first-aid centre and other service facilities.

3.2.2. Mitigation Measures

- Dust suppression using water sprinklers.
- Contour overburden dump to minimize erosion.
- Greenbelt around infrastructures within the mine lease area and along the road by using native plants.

3.3. Air Environment:

3.3.1. Impacts on Air Environment

The major air pollution sources from the mining operations are DG sets, mining activities like drilling, blasting and transportation. The DG sets are provided with stacks of adequate height to disperse the emanating flue gases containing suspended particulate matter, oxides of Sulphur and nitrogen without affecting the ground level concentrations. The emissions mainly generated from the mining activities are Blasting, Drilling, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling. The sources of air emission are detailed below in **Table 6**.

Table-6 Sources of air pollution at quarry

S. No	Source of emission	Pollutant
1.	Excavation of Granite	PM
2.	Operation of diesel driven equipment	Gaseous emission
3.	Transportation of product	PM

3.3.2. Mitigation measures

- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Delay blasting under unfavourable wind and atmospheric conditions
- The production of blast fumes containing noxious gases will be redused by the following methods:
  - Use of adequate booster/primer.
  - Proper stemming of the blast hole.
  - Development of greenbelt.

Table-7 Dust control measures in quarry

S. No	Operation or source	Control options
1	Drilling	➢ Liquid injection (water or water plus a wetting agent) ➢ Capturing and venting emissions to a control device. ➢ Drills should be provided with dust extractors (dry or wet system).
2	Blasting	➢ Water spray before blasting ➢ Water spray on blasted material prior to transportation ➢ Use of control blasting technique
3	Loading	Water spray
4	Hauling (emissions from roads)	Water spray, treatment with surface agents, soil stabilization, paving, traffic control.
5	Transportation of mined material	➢ Covering of the trucks/dumpers to avoid spillage ➢ Compacted haul road ➢ Speed control on vehicles ➢ Development of a green belt of suitable width on both sides of road, which acts as wind break and traps fugitive dust

3.3.3. Air Quality Modelling:

Total maximum GLCs from emissions as given below:

Table -8 Total maximum GLCs from emissions

S.No	Pollutant	Max. Base Line Conc. (µg/m^3)	Estimated Incremental Conc. (µg/m^3)	Total Conc. (µg/m^3)	NAAQ standard
1.	PM_{10}	63.76	4.71	68.47	100
2.	$PM_{2.5}$	39.53	2.82	42.35	60
3.	SO_2	12.9	0.85	13.75	80
4.	NO_X	25.8	1.46	27.26	80

The maximum ground level concentration observed due to mining activities and traffic movement through Air Modelling for PM_{10}, $PM_{2.5}$, SO_2 and NO_x are 68.47µg/m^3, 42.35µg/m^3, 13.75µg/m^3 and 27.26µg/m^3 respectively.

3.4. Impacts due to Transportation

The Granite is transported to consumer directly as per buyer's requirement. The granite will be transported through existing road by tippers and approx. no. of trips required is 2 times per week. This minimum trip does not create impact on existing transportation. The vehicular movement for the proposed project is given in **Table-9**

Table-9 Traffic Volume after Implementation of the Project

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	538	1022	6000	0.17	"A"	Free Flow
After implementation	540	1027	6000	0.17	"A"	Free Flow

*LOS (Level of Service) categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow

Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.

3.4.1. Mitigation Measures

- Regular water sprinkling on haul and access roads.
- Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.

3.5. Wastewater Generation

There is no effluent generation. The domestic sewage of 0.4 KLD will be disposed through septic tank followed by soak pit.

3.5.1. Mitigation Measures

3.5.1.1. Surface Water Pollution Control Measures

- Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas.
- During monsoon season, the rain water will be collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development.
- The dump tops will be provided with inner slopes to control water flow to prevent erosion washouts. The dumps tops and slopes of in active areas will be covered with grasses, shrubs, mulching, etc, to prevent erosion, till final backfilling of dumps into mined out areas.

3.5.1.2. Ground Water Pollution Control Measures

- The domestic sewage from the toilets will be routed to septic tanks.
- Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.

3.5.1.3. Rain Water Harvesting

The rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities.

3.5.1.4. Mitigation Measures

- Construct barriers at suitable intervals along the path of the drains.
- Provide necessary overflow arrangement to maintain the natural drainage system.

3.6. Impact of Noise / Vibrations & Mitigation Measures

3.6.1. Impact of Noise

The main sources of noise in the mine are as follows:

- Transportation vehicles
- Loading & unloading of minerals
- Drilling
- Blasting

3.6.1.1. Noise due to Drilling, Excavation and Transportation

The noise levels in the working environment will be maintained within the standards prescribed by Occupational Safety and Health Administration (OSHA). These standards were established with the emphasis on reducing the hearing loss. The permissible limits, as laid down by OSHA, are presented in **Table 10**

Table -10 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)

S. No	Sound Level (dB A)	Continuous Duration (Hours)
1	85	8
2	88	4
3	91	2
4	94	1
5	97	0.5
6	100	0.25

3.6.1.2. Noise Due to Blasting

Blasting activities are involved in this Quarry as green belt will be developed around the mine which restricts the propagation of noise. The main source of noise in quarrying is due to usage of machinery like excavators, mining tippers and compressors and diesel generators.

3.6.2. Mitigate Measures

Following mitigation measures should be taken to control noise pollution:

- Wherever the noise levels exceed 85 dB (A), workers should be provided with earmuffs, ear plugs etc.
- All vehicles and machinery will be properly lubricated and maintained regularly.
- Speed of the Vehicles entering and leaving the quarrying lease will be limited to 25 kmph.
- Unnecessary use of horns by the drivers of the vehicles shall be avoided.
- Controlled blasting with proper spacing, burden and stemming will be maintained
- No secondary blasting.
- Minimum quantity of detonating fuse will be consumed by using alternatively Excel non-electrical initiation system.
- The blasting will be carried out during favourable atmospheric condition and less human activity timings.

3.7. Impact of Vibration

Blasting activities are involved in Granite Quarry operations. The vibration during the moment of machinery will be minimal for a short span that will be well within the prescribed limits. Proposed Peripheral green belt will be developed in 7.5m safety zone around the quarry. This will mitigate the Vibration.

3.7.1. Mitigation Measures

- Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting.
- Safe blasting zones are kept around the periphery of the quarry.
- Overcharging will be avoided. The charge per delay will be minimized and preferably more number of delays will be used per blasts.

3.8. Impact on Human Settlement

There are no monuments or places of worships in mine area. Ground vibration and noise pollution is maintained minimal and confined to the mine area. The quality of water both surface and ground water is good and all parameters of drinking water are as per IS standards. Water quality analysis will be carried out at periodical intervals during post project monitoring.

The PM, NOx and SO_2 have been observed to be below the prescribed limit. Noise levels have also been found to be below the permissible limits at all the locations.

3.8.1. Mitigation Measures

- The noise generated in the lease area will get attenuated due to plantation all around the lease area.
- As preventive measures, greenbelt development around the mine lease area will be further strengthening for control of air emission to environment.
- All the employees will be periodically medically examined.

3.9. Biological Environment

3.9.1. Mining activities and their impact on biodiversity

Table -11 Impacts on Biodiversity

S. No	Activity	Examples of aspects	Examples of biodiversity impact
1	Extraction	Land clearing	Loss of habitat, introduction of plant diseases, Siltation of water courses
2	Blasting, Digging and hauling	Dust, noise ,vibration, water pollution	Disruption of water courses ,impacts on aquatic ecosystems due to changes in hydrology and water quality
3	Waste dumping	Clearing, water and soil pollution	Loss of habitat, soil and water contamination, sedimentation.
4	Air emissions	Air pollution	Loss of habitat or species
5	Waste disposal	Oil and water pollution	Encouragement of pests, disease transfer, contamination of groundwater and soil
6	Access roads	Land clearing	Habitat loss or fragmentation, water logging upslope and drainage shadows down slope
7	Water supply (potable or industrial)	Water abstraction or mine dewatering	Loss or changes in habitat or species composition

3.9.2. Mitigate Measures

To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

3.10. Impacts on Occupational Health due to project operations

Anticipated occupational illness sequel to mining activities involved in the project. Occupational health problems due to dust & noise and Occupational illness by quarry activities are as follows;

- Dust related pneumonia
- Tuberculosis
- Rheumatic arthritis

- Segmental vibration

3.10.1. Mitigate Measures for Occupational Health

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- Plantation
- Avoid blasting during unfavorable wind & atmospheric conditions.
- Use of personal protective equipment. Compliance with DGMS circulars.
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.

Table-12 Mitigation for occupational health and safety

S. No	Activity	Mitigation measures
1	Excavation	➢ Planned excavation, avoid haphazard mining
2	Drilling and blasting	➢ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs.
3	Safety zone	➢ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width. ➢ Restricted entry, use of sirens and cordoning of the blasting area are some of the good practices to avoid accidents.
4	Overburden stabilization	➢ Accidents are known to happen due to overburden collapse. ➢ Therefore, slope stabilization and dump stability are critical issues for safety and environment. Proper measures will be taken care.
5	Worker"s health surveillance	➢ Health survey programmers for workers and local community. ➢ Regular training and awareness of employees to be conducted to meet health and safety objectives.

3.11. Mitigate Measures for Safety Aspects

- To reduce pollution emanation from quarry operations, carry out splitting of sheet rock by diamond wire saw which largely reduces the dust and noise generation.
- Water sprinkling on haul roads and dumping yards, etc.
- Green belt creation wherever possible to arrest dust and reduce noise propagation.
- All staff and workers will be provided with PPE to guard against excess noise levels
- Provision of safety Helmets, goggles, safety boots, ear muffs, gas masks, etc.
- To provide appropriate instruction, training, retraining, vocational training, etc.
- Organization of safety contests and safety campaigns regularly to update knowledge of safe operational procedures, etc.
- Observation and compliance of all precautions, control measures and stipulations on above lines will ensure that in this project, health and safety problems will be minimal.

4. PROJECT COST & ESTIMATED TIME OF COMPLETION

4.1. Project Cost

The estimated project cost is given below

Table-13 Project Cost

S.No	Description of the Cost	Amount in Rs.
A. Operational Cost		
1.	Land Cost S.F.Nos.12/1A to 12/3E and 12/5A=2.13.0HaxRs.1,91,000/Ha=4,06,830/- S.F.Nos.12/4A to 12/4B=0.17.0HaxRs.2,12,500/Ha=36,125/-	4,43,000
2.	Labourers shed (already constructed)	2,00,000
3.	Sanitary facilities	75,000
4.	First aid room and Accessories & safety kits	50,000
5.	Excavator (2nos)	35,00,000
6.	Crawler crane (1 no)	15,00,000
7.	Diesel generator (1 no)	7,50,000
8.	Tipper (1 no)	12,00,000
9.	Diamond wire saw (2 nos)	6,00,000
10.	Compressor with loose tools (2 nos) & jack hammer (4 nos)	12,00,000
11.	Wagon drill (2 nos)	8,00,000
12.	Drinking water facility & water sprinkling	1,00,000
13.	Fencing cost (700m lengthxRs.300/- per meter)	2,10,000
14.	Garland Maintenance	1,00,000
15.	Greenbelt development under safety zone during this scheme period (200m saplimgxRs.200/-per saplimg)	40,000
	Total	**1,07,68,000**
B. EMP Cost		
1.	Air Environment	9,03,000
2.	Noise	50,000
3.	Water Environement	23,000
4.	Waste Management	1,10,000
5.	Implementation of EC, Mining Plan & DGMS Condition	16,44,000
6.	Greenbelt	2,50,000
	Total	**29,80,000**
	Total Project Cost	**1,37,48,000**

4.2. Proposed schedule for approval and implementation

The time schedule for the completion of the proposed mining project is given in the below as,

Table-14 Project schedule

Particulars	Time Schedule
Submission of Draft EIA/EMP for PH	May 2024
Conduction of Public Hearing and submitting final EIA/EMP	July 2024
Presentation before SEAC and Obtaining EC	August 2024

The project will be implemented after Obtaining EC from SEIAA and CTO from PCB.

5. MINING CLOSURE PLAN

5.1. Progressive Mine Closure Plan

The various schedules for mining activities regarding mining of granite block, waste disposal, proposed land use pattern, environmental preservation measures, disaster management plan, etc. have been fully covered in the EIA/EMP report. Pit boundaries shall be safely fenced and used for agriculture purpose then the pit is filled with underground seepage or rain water. Afforestation and green belt development will be maintained in all the boundaries, till the trees attained the stabilized level.

6. REHABILITATION AND RESETTLEMENT

There will be no Rehabilitation and Resettlement in this proposed project.

7. SITE ANALYSIS

Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features are given below.

7.1 Environmental Sensitive areas

The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in below table.

Table-15 List of Water Bodies

S.No	Water bodies	Distance (~km)	Direction
1	Pond near Project Site	0.19	W
2	Pungar R	3.28	SE
3	Kovakkulam Lake	4.35	NNW
4	Stream near Vadavambadi	5.37	SSW
5	Panjappatti Lake	5.43	S

6	Kattalai High Level Canal	5.87	NNE
7	Vayalur Lake	6.50	ESE
8	Mayanur Barrage Right Canal	8.33	N
9	Kaveri/Cauvery R	8.87	NNE
10	North Bank Canal	10.03	N
11	Mullippadi Canal	10.44	N
12	Odaiyappatti Lake	10.54	SSW
13	Kattuvari Canal	10.81	NE
14	Karaipottanur R	10.94	NNW
15	Irumbudippatti Lake	11.81	ESE
16	Virarakkiyam Lake	12.72	WNW
17	Kattaputtur Channel	13.46	NW
18	Amaravati R	14.08	NW
19	Karunamkulam	14.13	SW
20	Nerur Channel	14.61	NW

Table-16 List of Monuments

S.No	Monuments	Distance (~km)	Direction
1	Kundankal Jain Monument	11.57	E
2	Sirnivasanallur Koranganatha Temple	13.38	NE

Table-17 List of Reserved Forest

S.No	Reserved Forest	Distance (~km)	Direction
1	Mahadanapuram RF	8.46	NNE
2	Sittalavay RF	8.55	N
3	Lalappettai RF	8.58	NNE
4	Mayanur RF	9.87	NW
5	Nattam RF	10.42	N
6	RF near Sippalaputtur	11.06	NNW
7	RF near Mel Vadiyam	14.03	NE
8	RF near Kattalai	14.18	NW
9	Manattattai RF	14.75	NE

Table-18 List of Villages/Settlements

S.No	Villages	Distance (km)	Direction	Population
1	Kaikaluviyur	0.14	NNW	120
2	Uthuppatti	0.41	ENE	100
3	Ellammankovilpatti	0.80	WNW	250
4	Lakshmanapatti	0.89	N	1,000
5	Bommakkavundanur	1.23	WSW	100

8. BASELINE STUDY

8.1. Study Period

The baseline environmental surveys were carried out during March 2023-May 2023 with in the study area

8.2. Ambient Air Quality

Table-19 Summary of Ambient Air Quality Monitoring

S.No	Parameters	Minimum of Average	Maximum of Average	NAAQ Standards
1	PM10 (µg/m³)	44.93	53.65	100
2	PM2.5 (µg/m³)	24.27	33.27	60
3	SO2 (µg/m³)	8.43	10.86	80
4	NO2 (µg/m³)	16.86	21.71	80

The ambient air quality has been monitored at 8 locations for 13 parameters as per NAAQS, 2009 within the study area.

8.3. Noise Environment

Ambient noise levels were monitored using precision noise level meter in and around the project site at 10 km radius at 8 locations during study period.

- In Industrial areas day time noise levels was about 63.8 dB (A) and 42.6 dB (A) during night time, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Night time).
- In residential areas day time noise levels varied from 50.6 dB (A) to 54.1 dB (A) and night time noise levels varied from 40.2 dB (A) to 43.7 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise level is within the prescribed limit by CPCB (55 dB (A) Day time & 45 dB (A) Night time).

8.4. Water Quality

The prevailing status of water quality at 8 locations for surface water and 8 locations for ground water have been assessed during the study period. The standard methods prescribed in IS were followed for sample collection, preservation and analysis in the laboratory for various physiochemical parameters.

8.4.1 Surface water quality

Table -20 Summary of Surface Water Quality Monitoring

S.No	Parameters	Minimum	Maximum	IS 2296:1992 Standards
1	pH	7.21	7.81	6.5 – 8.5
2	TDS (mg/l)	388	418	500
3	COD (mg/l)	14.8	33	-
4	BOD (mg/l)	6.3	7.3	2
5	Total Hardness	175	211	-

8.4.2 Ground Water Quality

Table-21 Summary of Ground Water Quality Monitoring

S.No	Parameters	Minimum	Maximum	IS 10500: 2012 Standards	
				Acceptable Limit	Permissible Limit
1	pH	7.31	7.66	6.5 – 8.5	NR
2	Total Hardness (mg/l)	151	257	200	600

It is observed that all the collected ground water samples meets the drinking water standards (IS 10500:2012) and can be used for drinking.

8.5. Soil Quality

Assessment of soil characteristics is of paramount importance since the vegetation growth, agricultural practices and production is directly related to the soil fertility and quality. Soil sampling was carried out at 8 locations in the study area. The summary of the Soil quality is given below.

Table-22 Summary of Soil Quality Monitoring

S.No	Parameters	Minimum	Maximum
1	pH	4.51	5.54
2	Electrical conductivity (µmhos/cm)	101	197
3	Nitrogen (mg/kg)	103.58	134.57
4	Phosphorus (mg/kg)	6.94	9.01
5	Potassium (mg/kg)	107.28	139.38

9. WASTE HANDLING

9.1. Solid Waste Management

The municipal solid waste generation and management details are given in **Table-23**.

Table-23 Municipal Solid Waste generation & Management

S.No	Type	Quantity Kg/Day	Disposal Method
1	Organic	9.45	Municipal Bin
2	Inorganic	6.30	TNPCB authorized recyclers
	Total	**15.75**	

As per CPHEEO guidelines: MSW per capita/day =0.45

9.2. Hazardous waste Management

The type of hazardous waste and the quantity generated are given in **Table-24**

Table-24 Hazardous Waste Management

Waste Category No	Description	Quantity (L/Year)	Mode of Disposal
5.1	Waste Oil	3.0	Will be Collected in leak proof containers and disposed to TNPCB Authorized Agencies for reprocessing/Recycling

10. POST PROJECT MONITORING

10.1. Post Project Environmental Monitoring

The Project proponent set up regular monitoring stations to assess the quality of the environment.

Table-25 Post Project Environmental Monitoring Program

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
1	Meteorology	One	Hourly and Daily basis	Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall.
2	Ambient Air Quality	2 Stations (One in upwind and one in downwind)	Twice a week:24 hourly period	PM10, PM2.5, SO2, and NO2
3	Noise	2 (two within core area and two in buffer area)	Once every season	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4	Exhaust from DG set	Stack of DG set	Quarterly	PM10, PM2.5, SO2 & CO
5	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU

6	Soil	Two Locations within the Project Site	Yearly Once	Physico chemical properties,Nutrients, Heavy metals
7	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants
8	Surface/ Ground water quality	Two Locations Within Project Site	Yearly Once	As per ISO 10500 2012 & IS 2296 - 1992 Standard parameters

11. CONCLUSION

The proposed **"Veeriyapalayam Multi Colour Granite Quarry"** will be beneficial for the development of the nearby villages. Some environmental aspects like dust emission, noise, siltation due to surface run-off, etc. will have to be controlled within the permissible limit to avoid impacts on the surrounding environment. Necessary pollution control equipment like water sprinkling, plantation, personal protective equipments, etc., will form regular practice in the project. Additional pollution control measures and environmental conservation measures will be adopted to control/minimize impacts on the environment and socio-economic environment of the area. Measures like development of green belt and plantation along with transport road will be implemented. The CER measures proposed to be adopted by the quarry management will improve the social, economic status of the nearby villages.