EXECUTIVE SUMMARY

For

VEERAMANGALAM 'B' & MAHANKALIKAPURAM BLACK GRANITE QUARRY OVER AN EXTENT OF 15.47.5 Ha

At

Survey No: 331 (Veeramangalam'B')&148(Part) Mahankalikapuram

Villages: Veeramangalam'B'& Mahankalikapuram

Taluk: R.K.Pettai

District: Tiruvallur

State: Tamil Nadu

By

M/s. Tamil Nadu Minerals Limited

(Project termed under Schedule 1(a) Mining of Minerals 'B1' category as per EIA Notification 2006 and its Amendments

EIA Consultant

HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI

July 2023

1. Project Description

The proposed Black Granite Mine is over an extent of 15.47.5 Ha located at S.F.No.331 of Veeramangalam & 148(Part) of Mahankalikapuram, Veeramangalam & Mahankalikapuram Village, R.K.Pettai Taluk, Tiruvallur District, Tamil Nadu State is obtaining Environmental Clearance from SEIAA-Tamil Nadu Since, the project falls under B1 Category, The land use classification of the project site is government poramboke land. TAMIN obtained precise area communication letter vide Government letter No.3162481/MME.1/2022-1, dated: 31.10.2022. The Mining Plan has been prepared for quarrying Black Granite (Dolerite) over an extent 15.47.5 of Veeramangalam & Mahankalikapuram Village, R.K.Pettai Taluk, Tiruvallur District,Tamil Nadu State. Tamil Nadu obtained lease for 20 years.

Table- 1 Salient Features of the Project Site

Survey No.	331 of Veeramangalam & 148(Part) of Mahankalikapuram
Village	Veeramangalam & Mahankalikapuram Village
Taluk and District	R.K.Pettai Taluk, Tiruvallur District
State	TamilNadu
Toposheet No.	D44N8
Latitude	13°08'31.39320"N to 13°08'45.55966"N
Longitude	79°22'09.98429"E to 79°21'55.70592"E
Current Quarry Status	It is a fresh quarry
Extent Area	15.47.5 Ha
Lease Period	20 years
Estimated Geological Reserves (ROM) m3	Black Granite-13,11,180m3
Estimated Mineable Reserves (ROM) m3	Black Granite-6,46,064m3
Black Granite production per annum m3	Black Granite-7,500m3
Depth of Mining	40m from the surface level and the top surface of the granite body
Method of Mining	Open cast semi mechanized method

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 production will be Black Granite-7,500m3. 1 No. of Excavator having 300LC capacity Tata Hitachi will be used for excavation and 1 nos of 25 tones capacity Ashok Leyland Dumpers will be used during loading.

Conceptual Quarry Plan

Black Granite

The Geological reserves of Black granite have been computed based on the Geological Plan &Sections up to the economically workable average depth of 40m from the surface level and the top surface of the granite body works out to 13,11,180 m^3.

Mineable Reserves have been computed as 6,46,064 m^3 after deleting 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 1,29,213 m^3 by applying the recovery factor 20%. The annual peak production per year would be 7,500m^3 of ROM of saleable and 33,000m^3 of ROM during the first five year of Mining plan period at the rate of 20% recovery.

Table 2- Mine Year wise production as per Mining Plan

S. No	Year	ROM (m^3)	Recovery@20% (m^3)	Granite Waste @ 80 % (m^3)
1	1st Year	25000	5000	20000
2	2nd Year	30000	6000	24000
3	3rd Year	35000	7000	28000
4	4th Year	37500	7500	30000
5	5th Year	37500	7500	30000
Total		**165000**	**33000**	**132000**

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. Impacts- Soil Contamination

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. Poor management of such materials/wastes from the operations is a potential risk of soil contamination.

3.1.1. Soil – 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 pattern in the area has been and will be due to the following:

- 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.
- Exposure of topsoil to wind and water erosion.

3.2.2. Mitigation Measures

- Dust suppression on exposed areas using water tankers.
- Contour overburden dump to minimize erosion
- Plantation around service building, along road, in and around safety zone using native plant sapling.

3.3. Impact on Air Environment:

The main source of air pollution is from open cast mining activities is dust generation from excavation of granite, movement of vehicles for transportation of product to consumers, drilling, loading and unloading operation and wind erosion of dumps and also gaseous emission due to operation of diesel driven mining equipment. The sources of air emission are detailed below Table

Table-3 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

The major air pollution sources from the mining operations are DG sets, mining activities like drilling, 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.

3.3.1. 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 reduced by the following methods:
    - Use of adequate booster/primer.
    - Proper stemming of the blast hole.
    - Development of greenbelt.

Table-4 Fugitive dust control in mine

S. No	Activities	Best practices
1	Drilling	➢ 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	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

Table-5 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.
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.

3.3.2. Air Quality Modelling:

Total maximum GLCs from emissions as given below:

Table -6- Total maximum GLCs from emissions

Pollutant	Max. Base Line Conc. (µg/m³)	Estimated Incremental Conc. (µg/m³)	Total Conc. (µg/m³)	NAAQ standard	% contribution of concentration above Base line
TSPM	223.13	34.43	257.56	500	15.43
PM_{10}	89.25	6.88	96.13	100	7.71
$PM_{2.5}$	49.09	4.12	53.21	60	8.39

SO_2	10.26	0.06	10.32	80	0.58
NO_X	20.46	0.16	20.62	80	0.78

The maximum ground level concentration observed due to mining activities and traffic movement through Air Modelling for TSPM, PM_{10}, $PM_{2.5}$, SO_2 and NO_x are 173µg/m³, 69µg/m³, 39µg/m³17µg/m³, and 35µg/m³respectively.

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-7**

Table-7 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	252	457.85	1500	0.31	"A"	Free Flow Traffic
After implementation	272	505.8	1500	0.34	"A"	Free Flow Traffic

*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.
- Watering of haul roads and other roads at regular intervals
- Provision of green belt by vegetation for trapping dust.
- 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 process effluent generation. The domestic sewage of 1.2 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

- A safety distance of 50m has been provided in the Southern side of the applied area and running through Poramboke land of the Veeramangalam 'B' & Mahankalikapuram Village.
- 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 towards the middle of the mine to prevent water entering the mine working. The rainwater flows will also contain fines both from surface and waste dumps during seasonal flows. As such, it is proposed to have structures in such a way to act as settling pond and also for rainwater harvesting.
- Construct barriers at suitable intervals along the path of the drains.
- Divert the water to de-silting cum rainwater harvesting pond in the mine area.
- Provide necessary overflow arrangement to maintain the natural drainage system.

3.5.1.4.Drainage pattern and Hydrogeology

- Catchment area inside the mine will be affected.

3.5.1.5.Mitigation measures

- The study has recommended new alignment in line with upstream drainage slope of the area to facilitate smooth entry of water into the diversion channel and ultimate discharge of water into the original stream. No reduction in surface run-off is envisaged.

3.6. Impact of Noise / Vibrations & Mitigation Measures

3.6.1. Impact of Noise on Working Environment

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

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

3.6.2. 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 8**

Table -8 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

3.6.3. 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.

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.

3.6.4. Mitigate Measures

- 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. Further, the noise generated in the lease area will get attenuated due to plantation and green belt 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 when inducted will be medically examined. Further, they will also be medically examined at periodical interval.

3.9. Biological Environment

3.9.1. Mining activities and their impact on biodiversity

Table -9 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 unfavourable 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-10 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 lasting 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 programmes 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-11 Project cost

S. No	Description of the Cost	Amount in Rs.
A.	**Fixed Cost**	
1	Land Cost	Nil. Because Govt. land
2	Labour shed	50,000/-
3	Sanitary facilities	50,000/-
4	Fencing Cost	1,25,000/-
	Total	**2,25,000/-**
B.	**Operational Cost**	
1	Jack Hammers	1,98,000/-
2	Compressor	19,82,000/-
3	Diamond wire saw	4,87,000/-
4	Diesel General	4,00,000/-
5	Excavators	6,00,000/-
6	Tippers	58,00,000/-
7	Drinking water facilities for the labours	50,000/-
8	Safety kits	50,000/-

	Total Operational Cost	**95,67,000/-**
C.	**EMP Cost**	
1	Afforesation	30,000/-
2	Water Sprinkling	50,000/-
3	Water Quality test	25,000/-
4	Air Quality test	25,000/-
5	Noise/Vibration test	25,000/-
6	CSR activities	50,000/-
	Total EMP Cost	**2,05,000/-**
	Total Cost of the Project (A+B+C)	**99,97,000/- (Say 1 Crore)**

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-12 Project schedule

Particulars	Time Schedule
Preparation of PFR, FORM – I and obtaining ToR	22.06.2023
Baseline study stated as MoEFCC OM F.No- IA3 - 22/10/2022-IA.III dt. 08.06.2022	Mid of Jan 2023 to Mid of April 2023
Submission of DRAFT EIA/EMP	July 2023
Conduciting Public Hearing and submitting final EIA/EMP and PoD	August 2023
Presentation before SEAC and Obtaining EC	September 2023

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. Environmentally/Ecologically Sensitive areas

This section details with the environmentally sensitive areas present within the project site and surrounding environs. It included national parks, state forest, essential habitats etc. The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in below table.

Table – 13 Lists of Water Bodies

S.No	Water bodies	Distance (~km)	Direction
1.	Kalvai	Adjacent to Site	N
2.	Periya Nagapundi Lake	1.01	S
3.	Lake near Mahankalipuram	1.56	NNW
4.	Lake near Viramangalam	1.66	SSE
5.	Sholinghur Lake	5.06	SE
6.	Ramakrishnarajupet Lake	7.80	ENE
7.	Lake near Viranattur	8.67	E
8.	Nandi River	9.38	E
9.	Perunganji Lake	9.6	SSE
10.	Lake near Kondareddipalli	10.16	W
11.	Ponnai River	11.26	WSW
12.	Ponnai East Bank Main Canal	11.51	WSW
13.	Kallar River	12.06	SSE

Table – 14 Lists of Reserve Forests

S.No	Reserve Forests	Distance(km)	Direction
1	Amudala RF	4.42	NW
2	Pullur West PF	7.68	N
3	Pachigunta RF	9.31	NW
4	Vanganur RF	10.28	NE
5	Ammur RF	10.73	S
6	Santanavenugopalapuram Ext RF	11.17	ENE
7	Santanavenugopalapuram RF	11.2	ENE
8	Nochili Ext RF	12.63	NE
9	Nochili RF	12.98	NE

8. BASELINE STUDY

8.1. Study Period:

The baseline environmental surveys were carried out during **(mid January 2023 – mid April 2023)** within the study area.

8.2. Summary of Baseline Studies:

- Site has an undulating terrain with level 257m Above MSL.
- The project site falls under Zone- III (Low Risk Zone) as per IS 1893 (Part- I).
- The predominant wind direction is North East during study period.
- Max Temperature: 37^{0}CMin Temperature: 16^{0}C & Avg Temperature: 27.33^{0}C
- Average Relative Humidity: 65.85 %
- Average Wind Speed : 2.77 m/s

8.3. Ambient Air Quality

Table – 15 Summary of Ambient Air Quality Monitoring

S.No	Parameters (µg/m³)	Minimum	Maximum	NAAQ Standards
1.	PM10 (µg/m³)	35.05	75.1	100
2.	PM2.5 (µg/m³)	20.96	41.31	60
3.	SO2 (µg/m³)	6.79	8.64	80
4.	NO2 (µg/m³)	12.06	17.22	80

The ambient air quality has been monitored at 8 locations for 12 parameters as per NAAQS, 2009 within the study area.

8.4. 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.

Table – 16 Summary of Noise Monitoring

S.No	Noise level in dB(A) Leq		CPCB Standards	Environmental Setting
	Minimum	Maximum		
1.	42.9	49.8	55 dB(A) Day	Residential
2.	40.1	42.8	45 dB(A) Night	
3.	68.7		75 dB Day	Industrial
4.	45		70 dB Day	

- In residential area day time noise levels varied from 42.9 dB(A) to 49.8 dB(A) and night time noise levels varied from 40.1 dB(A) to 42.8 dB(A)across the sampling stations. The field observations during the study period the ambient noise levels except one Residential area noise is not within the limit prescribed by MoEF&CC (55 dB(A) Day time & 45 dB(A) Night time).

- In Industrial area (Project site), day time noise level was about 68.7 dB (A) and 45 dB(A) during night time, which is within prescribed limit by CPCB for Industrial area (75 dB(A) Day time & 70 dB(A)Night time).

8.5. Water Environment

The prevailing status of water quality at 08 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.

8.5.1 Surface water quality

Table – 17 Summary of Surface Water Quality Monitoring

S.No	Parameters	Minimum	Maximum	IS 2296:1992 Standards
1.	pH	7.24	7.83	6.5 – 8.5
2.	TDS (mg/l)	345	449	500
3.	COD (mg/l)	17	36	-
4.	BOD (mg/l)	3	5	2
5.	Total Hardness(mg/l)	142	193	-

8.5.2 Ground Water Quality

Table – 18 Summary of Ground Water Quality Monitoring

S.NO	Parameters	Minimum	Maximum	IS 10500: 2012 Standards	
				Acceptable Limit	Permissible Limit
1.	pH	7.14	8.47	6.5 – 8.5	NR
2.	Chloride	113.5	251.6	500	2000
3.	Total Hardness (mg/l)	112.7	301.2	200	600
4.	Sulphate	49.8	98.5	-	-
5.	TDS	647.6	957.3	-	-

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

8.6. Land Environment

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 eight (08) locations in the study area. It is observed that,

Table – 19 Summary of Soil Quality Monitoring

S.No	Parameters (µg/m³)	Minimum	Maximum
1.	pH	6.98	7.76
2.	Electrical conductivity (µmho/cm)	1080	1630
3.	Nitrogen (mg/kg)	80	120
4.	Phosphorus (mg/kg)	17	37
5.	Potassium (mg/kg)	66	104

9. HAZARD WASTE HANDLING

9.1. Solid Waste Management

The municipal solid waste generation and management details are given in **Table-21**.

Table-20 Municipal Solid Waste generation & Management

S. No	Type	Quantity Kg/day	Disposal method
1	Organic	8.1	Municipal bin including food waste
2	Inorganic	5.4	TNPCB authorized recyclers
	Total	**13.5**	

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 detailed in Table-22

Table-21 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

It is imperative that the Project Authorities set up regular monitoring stations to assess the quality of the neighbouring environment of the project. An environmental monitoring programme is important as it provides useful information and helps to:

- Verify the predictions on environmental impacts presented in this study
- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and

- Identify the effectiveness of mitigate measures suggested in the EMP.

Table-22 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 (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 Standard parameters

11. CONCLUSION

The proposed **"Veeramangalam 'B' & Mahankalikapuram black 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, and river banks will be implemented.

The CSR measures proposed to be adopted by the quarry management will improve the social, economic status of the nearby villages.

The overall impacts of the quarry will be positive and will result in overall socio- economic growth of nearby villages.