DRAFT ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENT MANAGEMENT PLAN

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

Total Extent of Cluster – 21.07.0 Ha

DEVANNAGOUNDANUR AND THANGAYUR MULTI COLOUR GRANITE QUARRY

At

Devannagoundanur & Thangayur Village, Edappadi & Sankari Taluk, Salem District

Code	Name of the Proponent	S.F.No	Extent (Ha)
P1	Thiru. P.Jayaraj	90/1(P) & 90/2(P),	**2.00.5**
P2	Thiru. B. Venkatesh	1/1(P) & 1/2B(P)	**2.31.5**
P3	Thiru. B. Venkatesh	1/2B(P) & 1/3B(P)	**3.12.0**

For Obtaining
Environmental Clearance under EIA Notification – 2006 Schedule Sl. No. 1 (a) (i): Mining Project

Compiled as per Tor Obtained Vide

P1- Lr No.SEIAA-TN/F.No.8360/SEAC/ToR- 1315/2022 Dated: 21.12.2022
P2- Lr No. SEIAA-TN/F.No.9848/ToR- 1439/2023 Dated: 21.04.2023
P3- Lr No. SEIAA-TN/F.No.9855/ToR-1435/2023 Dated:24.04.2023.

Environmental Consultant

GEO EXPLORATION AND MINING SOLUTIONS

Old No. 260-B, New No. 17,
Advaitha Ashram Road, Alagapuram,
Salem – 636 004, Tamil Nadu, India

Accredited for sector 1 Category 'A', 31 Category 'B' & 38 Category 'B'
Certificate No : NABET/EIA/2225/RA 0276 Dated: 06.08.2025

Email: ifthiahmed@gmail.com, geothangam@gmail.com
Web: www.gemssalem.com

ENVIRONMENTAL LAB

EHS 360 LABS PRIVATE LIMITED,
10/2 Ground floor, 50th street, 7th Avenue,
Ashok Nagar, Chennai – 600 083.

Baseline Monitoring Period – March 2023-May 2023

JUNE 2023

For easy represantation of Proposed and Existing Quarries in the Cluster are given unique codes and identified and studied in this EIA/EMP Report.

PROPOSED QUARRIES				
CODE	**Name of the Owner**	**S.F.Nos & Village**	**Extent**	**Status**
P1	Thiru. P.Jayaraj, No.252, 1st Cross Street Periyasamy Nagar, Alagapuram Pudur, Salem – 636 016.,	90/1(Part) & 90/2(Part), of Devannagoundanur Village, Sankari Taluk	2.00.5	Lr No. SEIAA-TN/F.No.8360/SEAC/ToR- 1315/2022 Dated: 21.12.2022
P2	Thiru. B. Venkatesh, No.255, Kanakapura Main Road, 7th Block, Jayanagar, Bengaluru, Karnataka – 560 070,	1/1(Part) and 1/2B(Part) Thangayur Village, Edappadi Taluk	2.31.5	Lr No. SEIAA-TN/F.No.9848/ToR-1439/2023 Dated: 21.04.2023
`P3	Thiru. B. Venkatesh, No.255, Kanakapura Main Road, 7th Block, Jayanagar, Bengaluru, Karnataka – 560 070,	1/2B(PART) AND 1/3B(PART) Thangayur Village, Edappadi Taluk	3.12.0	Lr No. SEIAA-TN/F.No.9855/ToR-1435/2023 Dated:24.04.2023
P4	M/s. Classic Mines, No.2/140E, Mankuttaikadu, Morur Post, Tiruchengode Taluk, Namakkal District.	2/2A1B2, 2/2A2, 2/2B (P), 2/2A1C (P), Thangayur Village, Edappadi Taluk	2.83.0	Application under process
TOTAL			**10.27.0 Ha**	
EXISTING QUARRIES				
CODE	**Name of the Owner**	**S.F. Nos & Village**	**Extent**	**Status**
E-1	KMB Granite P Ltd, 4/59, Bharathi street, Swarnapuri Salem- 636004	76/2B, 76/7 Devannagoundanur Village, Sankari Taluk	2.10.5	17/03/2006 To 16/03/2026
E-2	M/s.Gem granites 58, Cathedral Road, Chennai -86	74/1B,74 /2B, 91/1	4.37.0	04.12.2008 to 3.12.2028
E-3	R.Navinladdha, S/o. (Late) Sri Rameshwarladha, 31/1 Chandramuki Pattalama Temple street, South end Circle, Basavanagudi, Bengaluru-560004.	9/1A1, 9/2A2, 9/2A3, 9/2B	4.32.5	22.12.2016-21.12.2036
Total			**10.80.0 Ha**	
EXPIRED QUARRIES				
Ex-1	B. Venkatesh S/o.Babu, Sivasakthi, 255, Kanakapura Main Road, 7th Block, Jaya Nagar Bangalore-70	100/2A & 2B Devannagoundanur Village, Sankari Taluk	3.74.5	01/03/2001 To 28/02/2021
Ex-2	M/s.Gem granites, 58, Cathedral Road, Chennai -86	104, Devannagoundanur Village, Sankari Taluk	1.77.0	30.9.1998 to 29.9.2018
Ex-3	M/s.Gem granites, 58, Cathedral Road, Chennai -86	106/1 Devannagoundanur Village, Sankari Taluk	4.87.0	30.9.1998 to 29.9.2018
Ex-4	KMB Granite P Ltd, 4/59, Bharathi street, Swarnapuri Salem- 636004	88/1P, Devannagoundanur Village, Sankari Taluk	1.75.5	19.8.1998 to 18.8.2018
Ex-5	Syhims Granites, No.4/59, Bharathi street, Swarnapuri, Five roads, Salem-4	89/3, Devannagoundanur Village, Sankari Taluk	1.39.3	08.9.1995 to 07.9.2005
TOTAL			**13.53.3 Ha**	
ABANDONED QUARRIES				
A1	Atlas Granite	2/2B, Thangayur Village, Edappadi Taluk	4.00.0	25.4.1994 to 24.4.2004
	Total		**4.00.0 Ha**	
TOTAL CLUSTER EXTENT			**21.07.0 Ha**	

Note: -

- **Cluster area is 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"

TERMS OF REFERENCE (ToR) COMPLIANCE

Thiru. P.Jayaraj -P1

"ToR issued vide Lr No. SEIAA-TN/F.No.8360/SEAC/ToR- 13l5/2022 Dated: 21.12.2022

SPECIFIC CONDITIONS		
1	The PP shall include the letter received from DFO concerned stating the proximity details of Reserve forest, Protected Areas sanctuaries, Tiger reserve etc., Up to radius 25km from the Proposed site	Noted and agreed
2	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall prepare and submit an 'Action Plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director of Geology and Mining during the time of appraisal for obtaining the EC.	Noted and agreed
3	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent ill the past, either in the same location or elsewhere in the State with video and photographic evidences.	Noted and agreed
4	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines a) what was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? b) Quantity of minerals mined out c) Highest production achieved in any one year d) Detail of approved depth of mining e) Actual depth of the mining achieved earlier f) Name of the person already mined in that leases area g) If EC and CTO already obtained' the copy of the same shall be submitted h) whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	It is an Existing quarry Thiru.P.Jayaraj, S.F.No.90/1(P) & 90/2(P) G.O.No.3(D) No.20, dated 16.04.2015 Lease Period: 22.05.2015 to 21.05.2035. **Existing Pit Dimensions** Pit-I = 85m x 32m x 21m Pit-II = 26m x 06m x 05m Pit-III =18m x 16m x 05m Pit-IV = 12m x 08m x 04m Pit-V = 93m x 36m x 16m Pit-VI = 40m x 37m x 10m **EC details:** Lr.No. SEIAA-TN/F.No.3362/EC/1(a)/2170/2014, dated 01.04.2015 **CTO Details**: Proc.No.F.No.0268SLM/RS/DEE/TNPCB/SLM/A/2016 dated 08/12/2016
5	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Noted and agreed. Project area boundary coordinates superimposed on Toposheet – Figure No. 1.3.
6	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	Noted and agreed
7	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance	Noted and agreed

	between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	
8	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.	Details of Geological Resources and Proposed reserves are discussed under Chapter No. 2.
9	The Project Proponent shall provide the organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Discussed about Organization chart in Chapter 6,
10	The project proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD/TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation are this regard may be provided.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3.
11	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & Flora/fauna including traffic/vehicular movement study.	Baseline Data were collected for One Season (Pre-Monsoon) March to May 2023 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3
12	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil, health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	The Cumulative impact study due to mining operations is explained in chapter – 7
13	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed
14	Issues relating to Mine safety, including slope geometry in case of granite quarrying, blasting parameters etc. should be detailed the proposed safeguard measures in each case should also be provided.	Noted and agreed
15	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 should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational,	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational

	operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	phases are discussed in Chapter No. 2, Table No 2.3.
16	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	Not applicable
17	Since non-saleable waste /OB / intermediate waste etc. is huge in the Granite quarry, the Proponent sharll provide the details pertaining to management of the above material with year wise utilization and average moving inventor be submitted.	Noted and agreed
18	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
19	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Mine Closure in Chapter -2
20	Impact on local transport infrastructure due to the Project should be indicated.	Transportation details mentioned in Chapter -2
21	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	Details of the trees in the buffer zone given in Chapter No.3.
22	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure plan is detailed in Chapter:4.
23	Public Hearing points raised and commitments of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC with regard to the Office Momentum of MoEF& CC accordingly.	Noted and agreed
24	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	Noted and agreed
25	The PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing io Tamil Language also.	Noted and agreed
26	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	Noted and agreed
27	The purpose of green belt around the project is to capture the fugitive emissions. Carbon sequestration	Species are proposed to plant in the safety barrier as mentioned in the Tor appendix.

	and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of Small medium/tall trees alternating with shrubs should be planted to a mixed manner.	Proposed species are given in the Chapter No 4
28	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted in proper emplacement as per the advice of local forest authorities / botanist / Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.	It is an Existing quarry. Around 1200 trees are proposed to plant
29	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan details in Chapter-7
30	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan Chapter- 7
31	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts chapter- 10
32	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	It is explained in Chapter -3
33	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details are listed in Chapter:3.
34	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending
35	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Noted and agreed
36	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall	It is an Existing quarry

	duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	
37	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed
ADDITIONAL CONDITIONS-Annexure-B		
Cluster Management committee		
1.	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Details in chapter 7 salient features of quarry with existing quarry.
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling. tree plantation, blasting etc..	Noted & agreed
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	Noted & agreed
4	Detaited operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situatcd in the cluster, the usage of haul roads by the individual quarry in the form ofroute map and network.	Transport details in chapter-2
5	The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation ofthe cluster and evacuation plan	Noted & agreed
6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	Noted & agreed
7	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	Noted & agreed
8	The committee shall furnish the Emergency Management plan within the cluster.	Details discussed in chapter 7.
9	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.	Details discussed in chapter 10.
Impact study of mining		
10	Detailed study shall be caried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise	Species Recommended for Plantation in chapter 3&10.

	arca communication order issued from reputed research institutions on the following a) Soil health & bio-diversity, physical land chemical features. b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature' & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health' e) Agriculture, Forestry & Traditional practices. 1) Hydrothermal/Geothermal effect due to destruction in the Environment' g) Bio-geochemical processes and its foot prints including environmental stress' h) Sediment geochemistry in the surface steams.	
11	The committee shall Furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.	Noted & agreed
12	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	Detailed discussed in chapter 7.
13	The measures taken to control Noise, Air, waler, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Noted and agreed
14	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	Noted and agreed
15	Impact on surrounding agricultural fields around the proposed mining Area.	Detailed discussed in chapter 4.
16	Erosion Control measures.	Noted and agreed
17	Impact on soil flora & vegetation around the project site.	Detailed discussed in chapter 4.
18	Detailed study shalt be carried out in regard to impact of mining around the proposed mine lease area on the nearby villages, water-bodies/ Rivers. & any ecological fragile areas.	Details in Chapter 2,
19	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations. schools. Archaeological sites. Structures. railway lines, roads. Water bodies such as streams, odai, vaari, canal, channel. river, lake pond, tank etc.	Noted & agreed. Detailed under Chapter 4
20	As per the MoEF& CC office memorandum tr.No.22-65/201 7-lA.lll dated: 30.09.2020 and 20.10.2020 the proponents shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management PIan.	Noted and agreed
21	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature	Details of carbon emission and mitigation activities are given int the Chapter No.4

	reduction including control of other emission and climate mitigation activities.	
22	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora. fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Details in Chapter 3
23	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted & agreed
24	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	Details in Chapter 2 and 4 impact of bio diversity
25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil, physical, chemical components and microbial components.	Details in Chapter 3 soil environment.
26	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	Ecology and Biodiversity environment deals in Chapter-3
27	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	Ecology and Biodiversity environment deals in Chapter-3
28	The Environmental impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Nearest agriculture activity is coconut plantation located North side of the project area. Proponent erected fencing in the previous lease period. The same will be reconstructed around the quarry pits
29	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	Details in Green belt development in chapter 4
30	The Environmental impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Details in Chapter-3 for meteorological and climate/weather data representation of graphs.
31	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
32	The project proponent shall study and furnish the impact of Project on plantations in adjoining patta land Horticulture Agriculture and livestock'	Noted and agreed
33	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment by the activities.	Noted & agreed
34	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	Noted and agreed
35	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	Details of carbon emission and mitigation activities are given int the Chapter No.4

36	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	Noted and agreed, there is no reserve forest and wildlife in the buffer zone.
37	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks. canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	Hydro-geological study considering the contour map of the water table detailing Chapter-3
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Details study 7.3 Disaster Management Plan in Chapter -7
39	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Noted and agreed
40	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Details in Chapter 2 mine closure plan Detailed under Chapter 10

Thiru. B. Venkatesh -P2

"ToR issued vide Lr No. SEIAA-TN/F.No.9848/ToR- 1439/2023 Dated: 21.04.2023

	SPECIFIC CONDITIONS	
1	The proponent is requested to submit the valid registered lease document during the EIA appraisal after the previous lease granted for the mining operations is legally surrendered (or) lapsed with the consent of the competent authority.	Noted and agreed
2	The Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Integrated Regional Office, Chennai.	Noted and agreed
3	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Noted and agreed
4	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to	The hydro-geological study is explained in chapter-3

	mining activity. Necessary data and documentation in this regard may be provided.	
5	The proponent shall submit the details regarding the nature of blasting activity which will be carried out.	Noted and agreed
6	The PP shall include the letter received from DFO concerned stating the proximity details of Reserve forest,Protected Areas sanctuaries, Tiger reserve etc., Up to radius 25km from the Proposed site	Noted and agreed
7	The PP shall provide individual notice regarding the Public Hearing to the nearby house owners located in the vicinity of the project site.	Noted and agreed
8	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall prepare and submit an 'Action Plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director of Geology and Mining during the time of appraisal for obtaining the EC.	Noted and agreed
9	The Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry indicating the proposed stabilizing measures during the appraisal while obtaining the EC, as the depth of the proposed working is extended beyond 30 m below ground level.	Noted and agreed
10	If the blasting operation is to be carried out, the PP shall present a conceptual design for carrying out the NONEL initiation based controlled blasting operation involving line drilling & muffle blasting and Simulation Model indicating the anticipated Blast-induced Ground Vibration levels in the proposed quarry as stipulated by the DGMS Circular No.7 of 1997, during EIA Proposal.	Noted and agreed
11	Details of Green belt & fencing shall be included in the EIA Report.	Noted and agreed
12	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent ill the past, either in the same location or elsewhere in the State with video and photographic evidences.	Noted and agreed

13	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines a) what was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? b) Quantity of minerals mined out c) Highest production achieved in any one year d) Detail of approved depth of mining e) Actual depth of the mining achieved earlier f) Name of the person already mined in that leases area g) If EC and CTO already obtained' the copy of the same shall be submitted h) whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	It is an Existing quarry. Existing pit- I: 223m (L) *98m(W)*41m(D) **EC**:Lr.No.SEIAA-TN/ F.No.5016 /1(a) /EC.No.3309/2016 dated:15.07.2016 **CTO:**Proceedings No.F.1153SLM /RS/DEE/ TNPCB/SLM/W/2016 Dated:03/10/2016
14	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Noted and agreed. Project area boundary coordinates superimposed on Toposheet – Figure No. 1.3.
15	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	Noted and agreed
16	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.	Details of Geological Resources and Proposed reserves are discussed under Chapter No. 2.
17	The Project Proponent shall provide the organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Discussed about Organization chart in Chapter 6,
18	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & Flora/fauna including traffic/vehicular movement study.	Baseline Data were collected for One Season (Pre-Monsoon) March to May 2023 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3
19	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil, health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	The Cumulative impact study due to mining operations is explained in chapter – 7

20	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed
21	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 should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3.
22	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	Not applicable
23	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
24	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Mine Closure in Chapter -2
25	Impact on local transport infrastructure due to the Project should be indicated.	Transportation details mentioned in Chapter -2
26	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	Details of the trees in the buffer zone given in Chapter No.3.
27	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure plan is detailed in Chapter:4.
28	Public Hearing points raised and commitments of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC with regard to the Office Momentum of MoEF& CC accordingly.	Noted and agreed
29	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	Noted and agreed
30	The PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing io Tamil Language also.	Noted and agreed
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance	Noted and agreed

	of preserving local flora and fauna by involving them in the study, wherever possible.	
32	The purpose of green belt around the project is to capture the fugitive emissions. Carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of Small medium/tall trees alternating with shrubs should be planted to a mixed manner.	Species are proposed to plant in the safety barrier as mentioned in the Tor appendix. Proposed species are given in the Chapter No 4
33	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted in proper emplacement as per the advice of local forest authorities / botanist / Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.	It is an Existing Quarry. Around 1400 trees are proposed to plant
34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan details in Chapter-7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan Chapter- 7
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts chapter- 10
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	It is explained in Chapter -3
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details are listed in Chapter:3.
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Noted and agreed

41	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	Noted and agreed
42	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

ADDITIONAL CONDITIONS-Annexure-B		
Cluster Management committee		
1.	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Details in 7 salient features of quarry with existing quarry.
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling. tree plantation, blasting etc..	Noted & agreed
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	Noted & agreed
4	Detaited operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situatcd in the cluster, the usage of haul roads by the individual quarry in the form ofroute map and network.	Transport details in chapter-2
5	The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan	Noted & agreed
6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	Noted & agreed
7	The committee shall Furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	Noted & agreed
8	The committee shall Furnish the Emergency ManaBement plan within the cluster.	Details discussed in chapter 7.
9	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health ofthe public.	Details discussed in chapter 10.
10	The committee shall Furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.	Noted & agreed

11	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	Detailed discussed in chapter 7.
Impact study of mining		
12	Detailed study shall be caried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise arca communication order issued from reputed research institutions on the following a) Soil health & bio-diversity b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature' & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health' e) Agriculture, Forestry & Traditional practices. 1) Hydrothermal/Geothermal effect due to destruction in the Environment' g) Bio-geochemical processes and its foot prints including environmental stress' h) Sediment geochemistry in the surface steams.	Species Recommended for Plantation in chapter 3&10.
Agriculture & Agro-Biodiversity		
13	Impact on surrounding agricultural fields around the proposed mining Area.	Detailed discussed in chapter 4.
14	Impact on soil flora & vegetation around the project site.	Detailed discussed in chapter 4.
15	Details of type ofvegetations including no. oftrees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall commit mentioned in EMP.	Details in Chapter 2,3 and 7
16	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora. fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Details in Chapter 3
17	Action should specifically suggest lbr sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted & agreed
18	The project proponent shall srudy and Furnish the impact of project on plantations in adjoining patta lands. Horticulture, Agriculture and livestock.	The project area is bounded by Existing quarries on the East and west side . Proponent proposed to erect green mesh along with fencing on the South side besides, Budgetary allocation given in the Chapter No. 10.
Forest		
19	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	Noted and agreed, there is no reserve forest and wildlife in the buffer zone.
20	The Environmental Impact Assessment should study impact on forest, vegetation, endemic,	Ecology and Biodiversity environment deals in Chapter-3

	vulnerable and endangered indigenous flora and fauna.	
21	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	Ecology and Biodiversity environment deals in Chapter-3
22	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
23	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks. canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect roundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	Hydro-geological study considering the contour map of the water table detailing Chapter-3
24	Erosion Control measures.	Noted & agreed
25	Detailed study shalt be carried out in regard to impact of mining around the proposed mine lease area on the nearby villages, water-bodies/ Rivers. & any ecological fragile areas.	Details in Chapter 2
26	The project proponenl shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	Details in Chapter 2 and 4 impact of bio diversity
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural envhonment by the activities.	Noted & agreed
28	The project proponent shall study and Furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	Noted & agreed. Detailed under Chapter 3.
29	The Terms ol Reference should specifically study impact on soil health, soil erosion, the soil, physical, chemical components and microbial components.	Details in Chapter 3 soil environment.
30	The Environmental lmpact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Nearest agriculture activity is coconut plantation located North side of the project area. Proponent erected fencing in the previous lease period. The same will be reconstructed around the quarry pits
Energy		
31	The measures taken to control Noise. Air, Water. Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Details in Chapter 3 environmental monitoring details.

Climate Change		
32	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigale carbon emission including development ofcarbon sinks and temperature reduction including control ofother emission and climate mitigation activities.	Details of carbon emission and mitigation activities are given int the Chapter No.4
33	The Environmenlal lmpact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Details in Chapter-3 for metorological and climate/weather data representation of graphs.
Mine Closure Plan		
34	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Details in Chapter 2 mine closure plan
EMP		
35	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Detailed under Chapter 10
36	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	Details in Green belt development in chapter 4
Disaster Management Plan		
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Details study 7.3 Disaster Management Plan in Chapter -7
Others		
39	The project proponent shall furnish VAO certiticate with retbrence to 300m radius regard to approved habitations. schools. Archaeological sites. Structures. railway lines, roads. Water bodies such as streams, odai, vaari, canal, channel. river, lake pond, tank etc.	Noted & agreed. Detailed under Chapter 4
40	As per the MoEF& CC office memorandum tr.No.22-65l201 7-lA.lll dated: 30.09.2020 and 20.10.2020 the proponenr shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management PIan.	Noted and agreed
41	The project proponent shall study and Furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	Details of carbon emission and mitigation activities are given int the Chapter No.4

Thiru. B. Venkatesh -P3

"ToR issued vide Lr No. SEIAA-TN/F.No.9855/ToR-1435/2023 Dated:24.04.2023.

	SPECIFIC CONDITIONS	
1	The project proponent shall submit a certified compliance report for the EC dated.04.0l .2016 obtained earlier.	Noted and agreed
2	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance	Noted and agreed

	between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.	Noted and agreed
4	The PP shall explore the possibility of carrying out the amalgamation with adjacent mine and its consequences during the EIA appraisal.	Noted and agreed
5	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within I km of the proposed quarry.	The hydrological report is detailed in chapter-3
6	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Noted and agreed
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall prepare and submit an 'Action Plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director of Geology and Mining during the time of appraisal for obtaining the EC.	Noted and agreed
8	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/l Class mines manager appointed by the proponent.	Noted and agreed
9	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	Noted and agreed
10	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.	Noted and agreed

11	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines a) what was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? b) Quantity of minerals mined out c) Highest production achieved in any one year d) Detail of approved depth of mining e) Actual depth of the mining achieved earlier f) Name of the person already mined in that leases area g) If EC and CTO already obtained' the copy of the same shall be submitted h) whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	It is an Existing quarry Existing Pit dimension Pit I: 30m(L)*76m(W)*8m(D) Pit II: 50m(L)*27m(W)*1m(D) Pit III: 80m(L)*84m(W)*8m(D)
12	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Noted and agreed. Project area boundary coordinates superimposed on Toposheet – Figure No. 1.3.
13	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	Noted and agreed
14	The pp shall furnish the revised manpower including the statutory & competent persons as required under the provisions of the MMR 196 I lor the prosed quarry based on the volume of rock handled & area of excavation.	Noted and agreed
15	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.	Details of Geological Resources and Proposed reserves are discussed under Chapter No. 2.
16	The Project Proponent shall provide the organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Discussed about Organization chart in Chapter 6,
17	The project proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD/TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation are this regard may be provided.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3.

18	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & Flora/fauna including traffic/vehicular movement study.	Baseline Data were collected for One Season (Pre-Monsoon) March to May 2023 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3
19	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil, health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	The Cumulative impact study due to mining operations is explained in chapter – 7
20	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Noted and agreed
21	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 should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3.
22	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	Not applicable
23	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
24	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Mine Closure in Chapter -2
25	Impact on local transport infrastructure due to the Project should be indicated.	Noted and agreed
26	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	Noted and agreed
27	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure plan is detailed in Chapter:4.
28	Public Hearing points raised and commitments of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement	Noted and agreed

	the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC with regard to the Office Momentum of MoEF& CC accordingly.	
28	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	Noted and agreed
30	The PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing io Tamil Language also.	Noted and agreed
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	Noted and agreed
32	The purpose of green belt around the project is to capture the fugitive emissions. Carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of Small medium/tall trees alternating with shrubs should be planted to a mixed manner.	Species are proposed to plant in the safety barrier as mentioned in the Tor appendix. Proposed species are given in the Chapter No 4
33	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted in proper emplacement as per the advice of local forest authorities / botanist / Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.	It is an existing quarry. Around 1900 trees are proposed to plant (cumulatively added cluster quarries)
34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan details in Chapter-7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan Chapter-7
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts chapter- 10
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	It is explained in Chapter -3
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and	Details are listed in Chapter:3.

	influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Noted and agreed
41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	It is an existing quarry
42	The PP shall prepare the EMP for the entire life/lease of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	Noted and agreed
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

ADDITIONAL CONDITIONS-Annexure-B		
Cluster Management committee		
1.	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Details in chapter:7 salient features of quarry with existing quarry.
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling. tree plantation, blasting etc..	Noted & agreed
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	Noted & agreed
4	Detaited operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situatcd in the cluster, the usage of haul roads by the individual quarry in the form ofroute map and network.	Transport details in chapter-2
5	The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation ofthe cluster and evacuation plan	Noted & agreed

6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	Noted & agreed
7	The committee shall Furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	Noted & agreed
8	The committee shall furnish the Emergency Management plan within the cluster.	Details discussed in chapter 7.
9	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public.	Details discussed in chapter 10.
10	The committee shall Furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.	Noted & agreed
11	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	Detailed discussed in chapter 7.
Impact study of mining		
12	Detailed study shall be caried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise arca communication order issued from reputed research institutions on the following a) Soil health & bio-diversity b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature' & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health' e) Agriculture, Forestry & Traditional practices. 1) Hydrothermal/Geothermal effect due to destruction in the Environment' g) Bio-geochemical processes and its foot prints including environmental stress' h) Sediment geochemistry in the surface steams.	Species Recommended for Plantation in chapter 3&10.
Agriculture & Agro-Biodiversity		
13	Impact on surrounding agricultural fields around the proposed mining Area.	Detailed discussed in chapter 4.
14	Impact on soil flora & vegetation around the project site.	Detailed discussed in chapter 4.
15	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall commit mentioned in EMP.	Details in Chapter 2,3 and 7
16	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora. fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Details in Chapter 3

17	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Noted & agreed
18	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands. Horticulture, Agriculture and livestock.	The project area is bounded by Existing quarries on the East and west side. Proponent proposed to erect green mesh along with fencing on the South side besides, Budgetary allocation given in the Chapter No. 10.
Forest		
19	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	Noted and agreed, there is no reserve forest and wildlife in the buffer zone.
20	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	Ecology and Biodiversity environment deals in Chapter-3
21	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	Ecology and Biodiversity environment deals in Chapter-3
22	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
23	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks. canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	Hydro-geological study considering the contour map of the water table detailing Chapter-3
24	Erosion Control measures.	Noted & agreed
25	Detailed study shalt be carried out in regard to impact of mining around the proposed mine lease area on the nearby villages, water-bodies/ Rivers. & Any ecological fragile areas.	Details in Chapter 2
26	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	Details in Chapter 2 and 4 impact of bio diversity
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment by the activities.	Noted & agreed
28	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	Noted & agreed. Detailed under Chapter 3.

29	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil, physical, chemical components and microbial components.	Details in Chapter 3 soil environment.
30	The Environmental impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Nearest agriculture activity is coconut plantation located North side of the project area. Proponent erected fencing in the previous lease period. The same will be reconstructed around the quarry pits
Energy		
31	The measures taken to control Noise. Air, Water. Dust Control and steps adopted to efficiently utilize the Energy shall be furnished.	Details in Chapter 3 environmental monitoring details.
Climate Change		
32	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control other emission and climate mitigation activities.	Details of carbon emission and mitigation activities are given int the Chapter No.4
33	The Environmental impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Details in Chapter-3 for meteorological and climate/weather data representation of graphs.
Mine Closure Plan		
34	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Details in Chapter 2 mine closure plan
EMP		
35	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Detailed under Chapter 10
36	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	Details in Green belt development in chapter 4
Disaster Management Plan		
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Details study 7.3 Disaster Management Plan in Chapter -7
Others		
39	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations. schools. Archaeological sites. Structures. railway lines, roads. Water bodies such as streams, odai, vaari, canal, channel. river, lake pond, tank etc.	Noted & agreed. Detailed under Chapter 4
40	As per the MoEF& CC office memorandum No.22-65l2017-lA.lll dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management PIan.	Noted and agreed

41	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	Details of carbon emission and mitigation activities are given int the Chapter No.4

STANDARD TERMS OF REFERENCE		
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable. this is not a violation category project. This proposal falls under B1 Category (Cluster Condition).
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The applied land for quarrying is a Patta Land. Document is enclosed along with Approved Mining Plan as Annexure Volume 1.
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Noted & agreed.
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Map showing – Project area is superimposed on Satellite imagery is enclosed in Figure No. 2.1 Project area boundary coordinates superimposed on Toposheet – Figure No. 1.3 Surface Features around the project area covering 10km radius – Figure No. 2.2 Geology map of the project area covering 10km radius - Figure No. 2.7. Geomorphology Map of the Study Area covering 10 km radius – Figure No. 2.8.
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Map showing Geology map of the project area covering 10km radius - Figure No. 2.7. Geomorphology Map of the Study Area covering 10 km radius – Figure No. 2.8.
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The applied area was inspected by the officers of Department of Geology along with revenue officials and found that the land is fit for quarrying under the policy of State Government.
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/conditions? The	The proponent has framed their Environmental Policy and the same is discussed in the Chapter No 10.1.

	hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90^0 bench angles. Quarrying activities will be carried out under the supervision of Competent Persons like Mines Manager, Mines Foreman and Mining Mate. Necessary permissions will be obtained from DGMS after obtaining Environmental Clearance.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	Noted & agreed. The study area considered for this study is 10 km radius and all data contained in the EIA report such as waste generation etc., is for the Life of the Mine / lease period.
10	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 should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3.
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	Not Applicable. There is no waste anticipated during this quarry operation. The entire quarried out Multicolour granite quarry will be transported to the needy customers. No Dumps is proposed outside the lease area.
12	Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Not Applicable. There is no Forest Land involved in the proposed project area. The proposed project area is a patta land. Approved Mining Plan is enclosed as Annexure Volume 1.

13	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land.
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No Reserve Forest within the Study Area.
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 KM of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area. Suriyamalai R.F 2.5km -SW Vellode Bird Sanctuary -40km-SW
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3. 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.
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in ‘Critically Polluted’ Area and does not come under ‘Aravalli Range.
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the	Not Applicable.

	mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	The project doesn't attract The C. R. Z. Notification, 2018.
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Not Applicable. There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for One Season March – May 2023 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.
23	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD view 9.6.1 Model. Details in Chapter No. 4.
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Total Water Requirement: 7.3 KLD (Cumulatively cluster quarries) Discussed under Chapter 2, Table No 2.13.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not Applicable. Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in

		mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved water vendors.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Part of the working pit will be allowed to collect rain water during the spell of rain will be used for greenbelt development and dust suppression. The Mine Closure Plan is prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for the project village during draught season.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Environment including Surface Water and Ground Water are discussed in Chapter 4.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	Not Applicable. The ground water table inferred 64-59m below ground level. The ultimate depth of quarry is 37m agl. This proposal of 30 m below ground level will not intersect the ground water table, which is inferred from the hydro-geological carried out at the project site. Discussed under Chapter 3.
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Not Applicable. There is no stream, seasonal or other water bodies passing within the project area. Therefore, no modification/ diversion of water bodies is anticipated.
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and Bgl. A schematic diagram may also be provided for the same.	The ground water table inferred 64-59m below ground level. The ultimate depth of quarry is 37m agl.
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Greenbelt Development Plan is discussed under Chapter 4.

32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details in Chapter 2.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2 .
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Discussed under Chapter 2. Mine Closure Plan is a part of Approved Mining Plan enclosed as Annexure Volume – 1.
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health Impacts of the project and preventive measures are detailed under Chapter 4, Page No.127.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No Public Health Implications anticipated due to this project. Details of CER and CSR are discussed under Chapter 8.
37	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	No Negative Impact on Socio Economic Environment on the Study Area is anticipated and this project shall benefit the Socio-Economic Environment by ways of employment for 35 people directly and 50 people indirectly. Details in Chapter 2.
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Detailed Environment Management Plan for the project to mitigate the anticipated impacts described under Chapter 4 is discussed under Chapter 10.
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The outcome of public hearing will be updated in the final EIA/AMP report.
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.

41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost -P1 is Rs.2,44,92,382/- CER Cost is Rs 5,00,000/- Project Cost -P2 is Rs.3,60,67,000/- CER Cost is Rs 5,00,000/- Project Cost -P3 is Rs.4,05,27,000/- CER Cost is Rs 5,00,000/-
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Details in Chapter 7.
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Details in Chapter 8.
44	**Besides the above, the below mentioned general points are also to be followed: -**	
a	Executive Summary of the EIA/EMP Report	Enclosed as separate booklet.
b	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
c	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are indicated.
d	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Baseline monitoring reports are enclosed with This report in Chapter 3. Original Baseline monitoring reports will be submitted in the final EIA report during appraisal.
e	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
f	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Will be enclosed along with Final EIA/ EMP Report.
g	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA. II(I) Dated: 4th August, 2009, which are available on the website of this Ministry, should be followed.	Noted & agreed. Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) Dated: 4th August, 2009 are followed.
h	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	Noted & agreed.
i	As per the circular no. J-11011/618/2010-IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of	Not Applicable.

	the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	
j	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Surface Plan – Figure No. 2.2. Geological Plan – Figure No 2.9. Working Plan – Figure No 2.9. Closure Plan – Figure No.2.10.

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CHAPTER – 1: INTRODUCTION

1.0 Preamble

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.

This EIA report is prepared by considering Cumulative load of all proposed & existing quarries around Devannagoundanur and Thangayur Multicolor Granite quarry (Total Cluster 21.07.0 Ha) lease at Devannagoundanur and Thangayur Village, Sankari and Edappadi Taluk, Salem District, 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

P1- Lr No. SEIAA-TN/F.No.t360/SEAC/ToR- 13l5/2022 Dated: 21.12.2022
P2- Lr No. SEIAA-TN/F.No.9848/ToR- 1439/2023 Dated: 21.04.2023
P3- Lr No. SEIAA-TN/F.No.9855/ToR-1435/2023 Dated:24.04.2023

The Baseline Monitoring study has been carried out during the period of summer season March 2023 to May 2023 and this EIA / EMP report is prepared for considering cumulative impacts arising out of these projects, the Cumulative Environmental Impact Assessment study is undertaken, which is followed by preparation of a detailed Environmental Management Plan (EMP) individually to minimize those adverse impacts.

1.1 Purpose of the Report

The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14th August 2018, Mining Projects are classified under two categories i.e., A (> 100 Ha) and B (≤ 100 Ha), and Schematic Presentation of Requirements on Environmental Clearance of Minor Minerals including cluster situation in Appendix–XI.

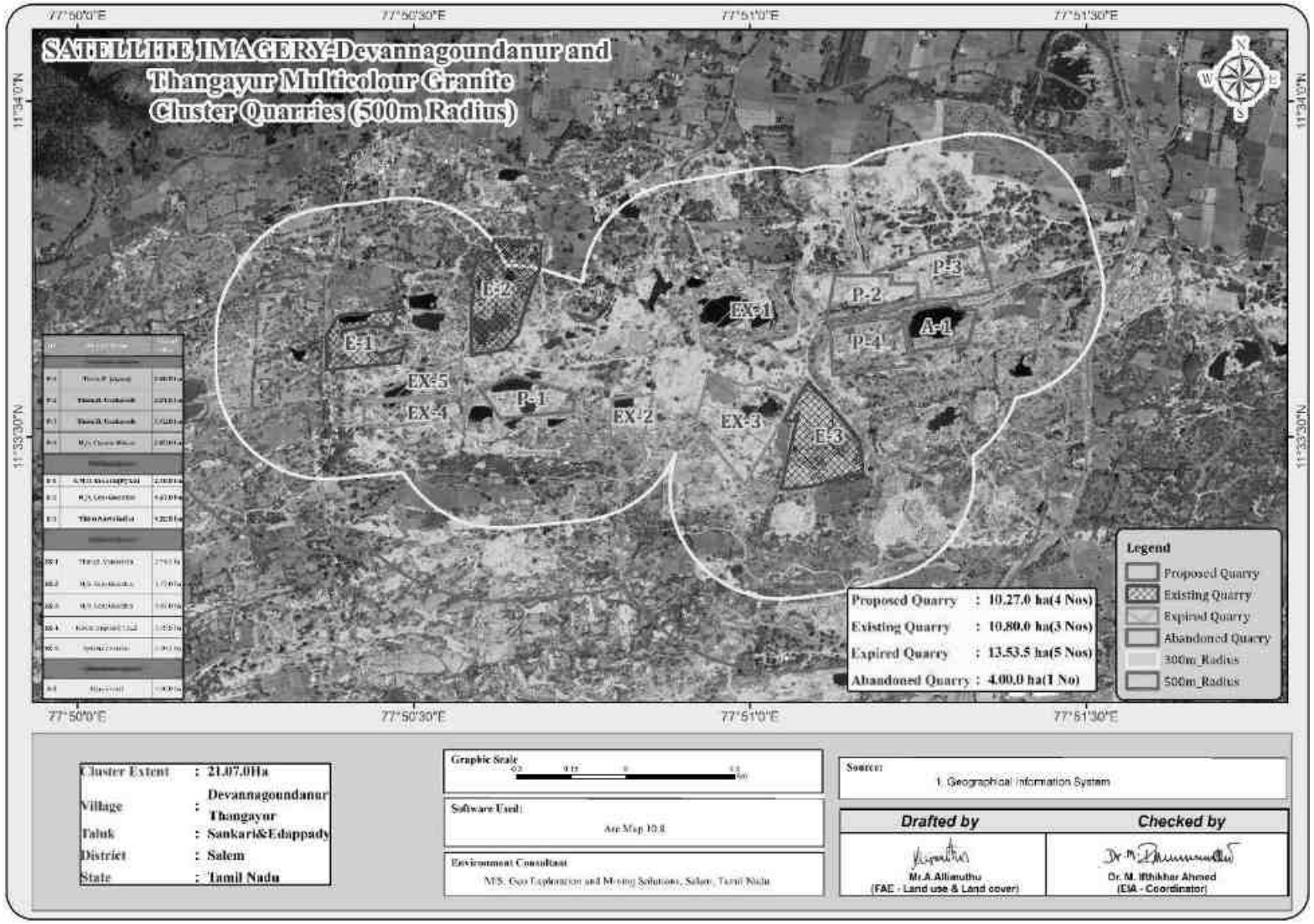
Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation 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 projects are 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.

Application to The Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the district was submitted vide Ref: Nil,.

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

Figure1.0: Cluster Quarries Map



1.2 Identification of Project and Project Proponent-P1

1.2.1 Identification of Project

- The Project area is located in S.F. Nos 90/1(Part) & 90/2(Part), Devannagoundanur Village, Sankari Taluk and Salem District.
- Proponent applied for Multi colour Granite quarry lease Dated 23.12.2020.
- The quarry lease was granted in G.O. (3D) No.20, Industries (MMB.2) Department Dated 16.04.2015 for a period of twenty years.
- The mining plan was prepared in respect of Multi colour granite quarry and the same was approved by the State Geology and Mining Department, Guindy, Chennai vide letter No.11697/MM5/2012 dated 14.02.2014.
- As per the direction issued in the precise area communication letter the lessee has obtained Environmental clearance from the SEIAA, Tamil Nadu letter No. SEIAA-TN/F. No,3362/EC/1(a)/2170/2014 dated 01.04.2015.
- The mining plan is valid up to 21.05.2020. now, the first scheme of quarrying is prepared and submitted to obtain approval for the period of 2020-2021 to 2024-2025 (Five years).

1.2.2 Identification of Project Proponent

Name of the Project Proponent	:	P.Jayaraj,
Address	:	No.252, 1st Cross Street Periyasamy Nagar, Alagapuram Pudur, Salem – 636 016.
State	:	Tamil Nadu
Pin code	:	636 016
Mobile No	:	+91 94429 49999
Designation	:	Proprietor

1.3 Identification of Project and Project Proponent-P2

1.3.1 Identification of Project

- The Project area is located in S.F. Nos 1/1(Part) and 1/2B(Part), Thangayur Village, Edappadi Taluk, Salem District, Tamil Nadu State
- Proponent applied for Multicolour Granite quarry lease Dated 26.02.2010.
- The quarry lease was granted vide G.O.(3D) No.15, Industries (MMB.2) Department Dated 18.03.2010 for a period of twenty years.
- The quarry lease deed was executed on 09.4.2010 and the lease period is valid up to 08.04.2030.
- The first scheme of quarrying prepared and submitted to the state department of geology and mining, Guindy, Chennai for the period of 2015-2016 to 2019-2020.
- As per direction issued by the District Collector's letter vide Rc.No. 235/2015/Mines-A, dated: 04.05.2015 the lessee has obtained Environmental Clearance from the SEIAA, Tamil Nadu vide **letter No. SEIAA-TN/F.No.5016/1(a)/EC. No:3309/2016, dated: 15.07.2016**. Now, **the second scheme of quarrying is prepared and submitted to obtain approval for the period of 2020-21 to 2024-25 (Five years).**
- The Second Scheme of Mining plan was approved by the Director of Geology and Mining, Chennai Vide Rc. No. 7862/MM4/2022, dated: 05.01.2023 for an approval scheme period of five years from 2020-21 to 2024 - 25.

1.3.2 Identification of Project Proponent

Name of the Project Proponent	:	B. Venkatesh, S/o. Babu, Shivasakthi
Address	:	No.255, Kanakapura Main Road, 7th Block, Jayanagar, Bengaluru, Karnataka – 560 070,
State	:	Karnataka
Pin code	:	560 070,
Mobile No	:	91 94425 17105, 97877 48008

Designation	:	Proprietor

1.4 Identification of Project and Project Proponent-P3

1.4.1 Identification of Project

- The Project area is located in S.F. Nos 1/2B(P)& 1/3B(P), Thangayur Village, Edappadi Taluk, Salem District, Tamil Nadu State
- Proponent applied for Multicolour Granite quarry lease Dated 08.02.2016
- The quarry lease was granted vide G.O.(3D) No.18, Industries (MMB.2) Department Dated 08.02.2016 for a period of twenty years (Refer Annexure No. I). The quarry lease deed was executed on 03.03.2016 and the lease period is valid up to 02.03.2036.
- As per the direction issued in the precise area communication letter the lessee has obtained prior environmental clearance from the SEIAA, Tamil Nadu vide letter no. SEIAA-TN/F.No.3049/EC/1 (a)/2662/2015, dated: 04.01.2016.
- The mining plan is valid up to 02.03.2021. **now, the first scheme of quarrying is prepared and submitted to obtain approval for the period of 2021-2022 to 2025-2026 (Five years).**
- The mining plan was prepared in respect of Multi Colour granite quarry and the same was approved by the Commissioner, Department of Geology and Mining, Guindy, Chennai vide letter No. 5271/MM5/2014 dated 16.09.2014.

1.4.2 Identification of Project Proponent

Name of the Project Proponent	:	B. Venkatesh, S/o. Babu, Shivasakthi
Address	:	No.255, Kanakapura Main Road, 7th Block, Jayanagar, Bengaluru, Karnataka – 560 070,
State	:	Karnataka
Pin code	:	560 070,
Mobile No	:	91 94425 17105, 97877 48008
Designation	:	Proprietor

1.5 Brief Description of the Project -P1

1.5.1 Nature and Size of the Project

The quarrying operation is proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Hydraulic Excavator, Eco-friendly Diamond Wire Saw Cutting and minor amount of blasting only for removal of overburden and weathered portions.

On the basis of available reserves the life of the mine is computed and approved as 20 Years.

Proposed production for the Scheme of Mining Period (5 years) is described below–

Proposed Project

Mineable ROM		= **2,19,107** m^3
Total Mineable Recoverable Reserves of Granite @ 20%	=	43,821m^3
Average Production per year @ 30%	=	9,134m^3/5 Years = 1,827 m^3
Estimated Life of the quarry	=	43,821m^3/ 1,827 m^3 = 24 Years
Life of the quarry	=	20 Years

Table 1.2: Resources and Reserves of Project

Description	ROM in m^3	Granite recovery @20 % in m^3	Granite waste @80% recovery	Top Soil in m^3
Geological Resources	7,56,490	1,51,298	6,05,192	20,396
Mineable Reserves	2,19,107	43,821	1,75,286	13,722

Source: Approved Scheme of Mining Period

1.6 Brief Description of the Project -P2

1.6.1 Nature and Size of the Project

The quarrying operation is proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Hydraulic Excavator, Eco-friendly Diamond Wire Saw Cutting and minor amount of blasting only for removal of overburden and weathered portions.
On the basis of available reserves the life of the mine is computed and approved as 20 Years.

Proposed production for the Scheme Mining Period (5 years) is described below–

Proposed Project

Mineable ROM	**=**	**1,79,035** m^3
Total Mineable Recoverable Reserves of Granite @ 60%	=	1,07,421m^3
Average Production per year @ 60%	=	75,132m^3/5 Years = 15,026 m^3
Estimated Life of the quarry	=	75,132m^3/ 15,026 m^3=7 years
Life of the quarry	=	20 Years

Table 1.3: Resources and Reserves of Project

Description	ROM in m^3	Granite recovery @60 % in m^3	Granite waste @40% recovery	Weathers Rock	Total waste	Side Burden in m^3	Top Soil in m^3
Geological Resources	5,84,140	3,50,484	2,33,656	-	-	2,57,550	4,530
Mineable Reserves	1,79,035	1,07,421	71,614	-	-	-	13,722

Source: Approved Scheme of Mining Period

1.7 Brief Description of the Project -P3

1.7.1 Nature and Size of the Project

The quarrying operation is proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Hydraulic Excavator, Eco-friendly Diamond Wire Saw Cutting and minor amount of blasting only for removal of overburden and weathered portions.

On the basis of available reserves the life of the mine is computed and approved as 20 Years.

Proposed production for the Scheme of Mining Period (5 years) is described below–

Proposed Project

Mineable ROM	**=**	**4,10,870** m^3
Total Mineable Recoverable Reserves of Granite @ 40%	=	1,64,348 m^3
Average Production per year @ 40%	=	75,332m^3/5 Years = 15,066 m^3
Estimated Life of the quarry	=	1,64,348m^3/ 15,066 m^3=11 years
Life of the quarry	=	20 Years

Table 1.4: Resources and Reserves of Project

Description	ROM in m^3	Granite recovery @40 % in m^3	Granite waste @60% recovery	Weathers Rock	Total waste (Granite waste + Weathered)	Side Burden in m^3	Top Soil in m^3
Geological Resources	9,38,535	3,75,414	5,63,121	41,538	6,04,659	-	20,769
Mineable Reserves	4,10,870	1,64,348	2,46,522	31,204	2,77,726	-	16,083

Source: Approved Scheme of Mining Period

Table 1.5: Salient Features of the Proposed Projects -P1

Name of the Quarry		**Thiru. P.Jayaraj,**
Lease period		20 years
Mining Lease area		2.00.5 Ha
Location		90/1(Part) & 90/2(Part), of Devannagoundanur Village, Sankari Taluk, Salem District
First Scheme of Period		5 Years (2020-2025)
Life of the Mine		20 years
Existing Depth (As per Pit letter)		1) Pit 1 = 85m x 32m x21m 2) pit 2 = 26mx 06m x 05m 3) Pit 3 = 18m x l6m x 05m 4) Pit 4 = 12m x 08m x 04m 5) Pit 5 = 93 m x36m x l6m 6) Pit 6 = 40m x 37m x l0m
Previous lease particulars		It is a patta land registered in the name of Applicant (Thiru.P.Jayaraj) vide patta nos.1157 & 815
Proposed Depth for five years plan period		47m
Ultimate Depth		213m(L) x 89m (W) x 47m (D) (2m Topsoil + 45m Multicolour Granite)
Toposheet No		58 E/14
Latitude between		11°33'31.55"N to 11°33'35.45"N
Longitude between		77°50'36.05"E to 77°50'44.49"E
Topography		The area is exhibits in elevated topography and the gradient towards Northwest side. The altitude of the area is ranges from 239m - 250m above from MSL.
Machinery proposed	Jackhammer	4
	Compressor	1
	Hydraulic drilling machine	-
	Hydraulic/Crawler crane	1
	Mobile crane	-
	Excavator	1
	Tipper	2
	Diesel Generator	2
	Diamond wire saw	1
	Water pump	-
	Water tanker	-
Proposed manpower deployment		22
A. Project cost		Rs. 2,44,92,382
B.EMP Cost		Rs. 3,80,800/-
C.CER cost		Rs. 5,00,000/-
Total Project cost		Rs.2,53,69,882/-
Nearest Habitation		600m-NW

Table 1.6: Salient Features of the Proposed Projects -P2

Name of the Quarry	**Thiru. B. Venkatesh**
Lease period	20 years
Mining Lease area	2.31.5 Ha
Location	1/1(Part) and 1/2B(Part) Thangayur Village, Edappadi Taluk
Second Scheme of Mining Period	5 Years (2020-2025)
Life of the Mine	20 years
Existing Depth (As per Pit letter)	223m(L) x 98m (W) x 41m (D)
Previous lease particulars	It is a Own patta land
Proposed Depth for five years plan period	66m (1m topsoil + 65m Multi Colour granite)
Ultimate Depth	233m(L) x 98m (W) x 66m (D) ((8m AGL + 58m BGL)
Toposheet No	58 E/14
Latitude between	$11^0$33’40.25’’ N to $11^0$33’44.42’’N
Longitude between	77º51’06.75’’E to 77º51’15.15’’E

Topography		The area exhibits slightly elevated topography. The gradient is gentle towards Northwest and altitude of the area is ranges from 236m to 244m above from MSL
Machinery proposed	Jackhammer	7
	Compressor	2
	Wagon drilling machine	1
	Derric crane	1
	Mobile crane	-
	Excavator	2
	Tipper	2
	Diesel Generator	2
	Diamond wire saw	3
	Water pump	-
	Water tanker	-
Proposed manpower deployment		41
A. Project cost		Rs. 3,60,67,000/-
B.EMP Cost		Rs. 3,80,800/-
C.CER cost		Rs. 5,00,000/-
Total Project cost		Rs.3,64,47,000/-
Nearest Habitation		660m-NW

Table 1.7: Salient Features of the Proposed Projects -P3

Name of the Quarry		**Thiru. B. Venkatesh**
Lease period		20 years
Mining Lease area		3.12.0 Ha
Location		1/2B(P) & 1/3B(P) Thangayur Village, Edappadi Taluk
First Scheme of Mining Period		5 Years (2021-2026)
Life of the Mine		20 years
Existing Depth (As per Pit letter)		1) Pit 1 = 30m x 76m x 8m 2) pit 2 = 50m x 27m x 01m 3) Pit 3 = 80m x 84m x 08m
Previous lease particulars		It is an Own patta land
Proposed Depth for five years plan period		38m
Ultimate Pit Dimension		233m(L) x 121m (W) x 38m (D)
Toposheet No		58 E/14
Latitude between		11°33’41.03’’ N to 11°33’46.32’’N
Longitude between		77°51’10.02’’E to 77°51’20.75’’E
Topography		The area exhibits flat topography. The gradient is gentle towards North and altitude of the area is 243m above from MSL.
Machinery proposed	Jackhammer	7
	Compressor	2
	Wagon drilling machine	1
	Derric crane	1
	Crawl crane	1
	Excavator	2
	Tipper	2
	Diesel Generator	2
	Diamond wire saw	3
	Water pump	-
	Water tanker	-
Proposed manpower deployment		41
A. Project cost		Rs. 4,01,47,000
B.EMP Cost		Rs. 3,80,800/-
C.CER cost		Rs. 5,00,000/-
Total Project cost		Rs.4,05,27,000/-
Nearest Habitation		660m-NW

1.8 Location of the Project -P1

- The area is located in ***90/1(Part) & 90/2(Part), of Devannagoundanur Village, Sankari Taluk, Salem District***
- The entire quarry lease area falls in the Patta land, the area is situated in an elevated terrain.
- The Altitude of the area is ranges from **239m – 250m above from MSL**
- The area is mentioned in GSI Topo sheet No. **58-E/14**
- The Latitude between of **11°33'31.55"N to 11°33'35.45"N**
- The Longitude between of **77°50'36.05"E to 77°50'44.49"E** on WGS 1984 datum.

1.9 Location of the Project -P2

- The area is located in ***1/1(Part) and 1/2B(Part) Thangayur Village, Edappadi Taluk, Salem District***
- The entire quarry lease area falls in the Patta land, the area is situated in an elevated terrain.
- The Altitude of the area is ranges from **236m – 244m above from MSL**
- The area is mentioned in GSI Topo sheet No. **58-E/14**
- The Latitude between of **$11^0$33'40.25'' N to $11^0$33'44.42''N**
- The Longitude between of **$77^0$51'06.75''E to $77^0$51'15.15''E** on WGS 1984 datum.

1.10 Location of the Project -P3

- The area is located in ***1/2B(P) & 1/3B(P) Thangayur Village, Edappadi Taluk, Salem District***
- The entire quarry lease area falls in the Patta land, the area is situated in an elevated terrain.
- The Altitude of the area is ranges from **243m above from MSL.**
- The area is mentioned in GSI Topo sheet No. **58-E/14**
- The Latitude between of **$11^0$33'41.03'' N to $11^0$33'46.32''N**
- The Longitude between of **77^o51'10.02''E to 77^o51'20.75''E** on WGS 1984 datum.

Figure 1.1: Key Map Showing the Location of the Project Site

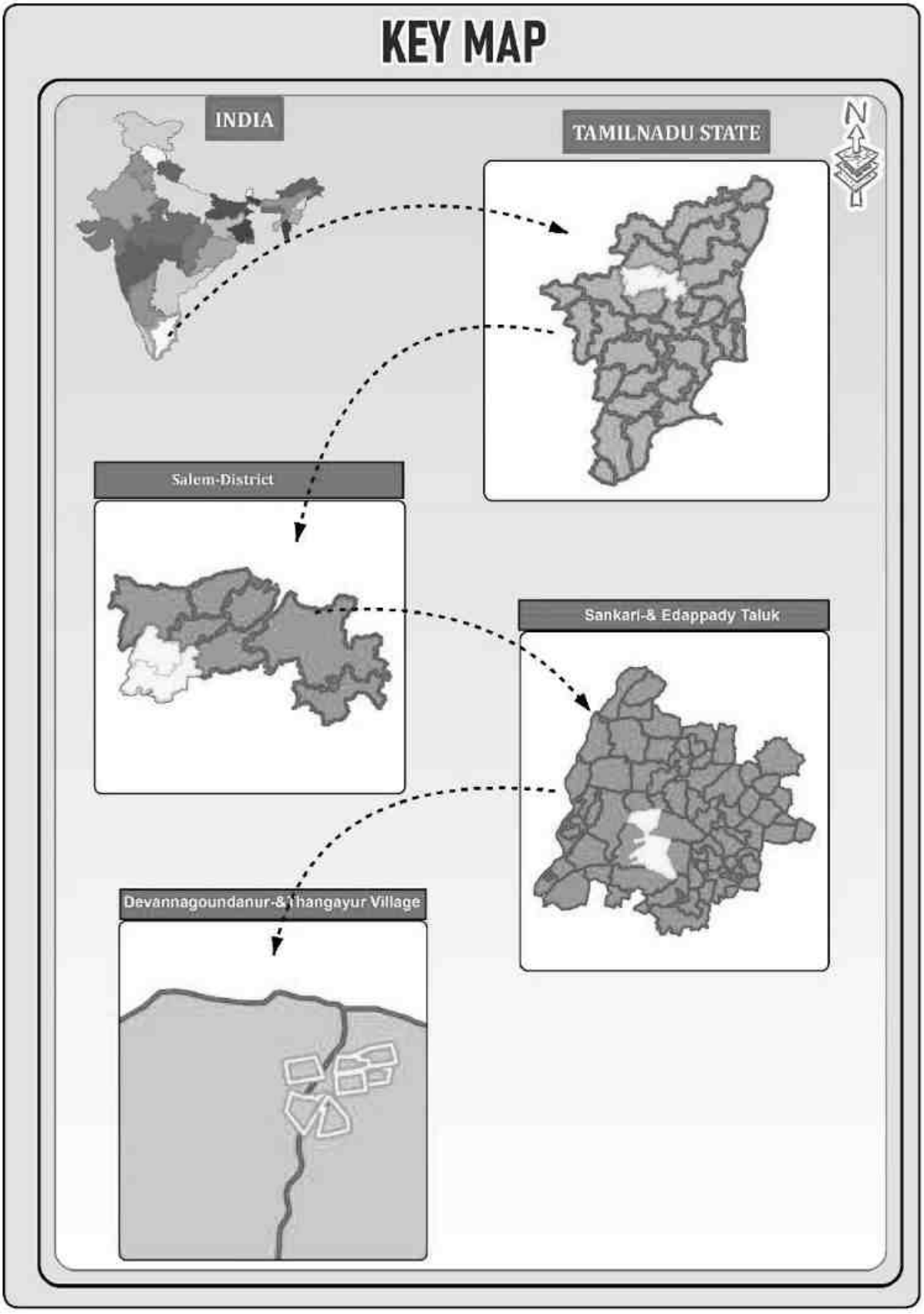
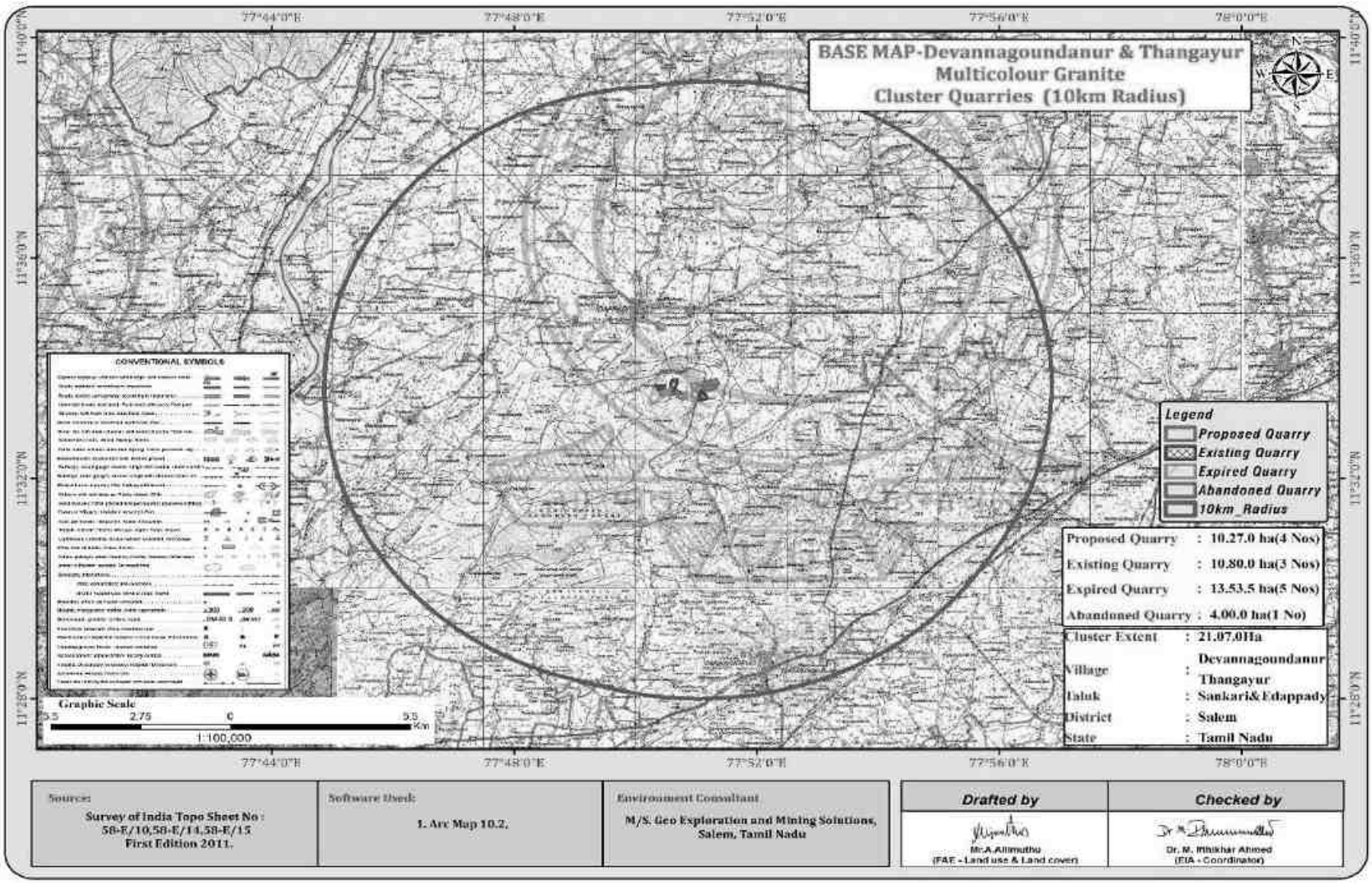


Figure 1.2: Toposheet Map of the Study Area 10 Km Radius



1.11 Environmental Clearance

The Environmental Clearance process for the project will comprise of four stages. These stages in sequential order are given below: -

1. Screening,
2. Scoping
3. Public consultation &
4. Appraisal

SCREENING –P1

- The proponent applied for Granite Quarry Lease, Dated: 23.12.2020.
- The quarry lease was granted in G.O. (3D) No.20, Industries (MMB.2) Department Dated 16.04.2015 for a period of twenty years.
- The mining plan was prepared in respect of Multi coloured granite quarry and the same was approved by the State Geology and Mining Department, Guindy, Chennai vide letter No.11697/MM5/2012 dated 14.02.2014.
- Proponent applied for ToR to get Environmental Clearance vide online Proposal No. SIA/TN/MIN/66915/2021 Dated: 25.08.2021 .

SCOPING –P1

- The proposal was placed in 286^{t} SEAC meeting held on 17.06.2022 and the committee recommended for issue of ToR.
- The proposal was considered in 580^{h} SEIAA meeting held on 21.12.2022 and issued ToR vide - Lr No.SEIAA-TN/F.No.8360/SEAC/ToR- 13l5/2022 Dated: 21.12.2022.

SCREENING –P2

- Proponent applied for Multicolour Granite quarry lease Dated 26.02.2010.
- The quarry lease was granted vide G.O.(3D) No.15, Industries (MMB.2) Department Dated 18.03.2010 for a period of twenty years.
- As per direction issued by the District Collector's letter vide Rc.No.235/2015/Mines-A, dated: 04.05.2015 the lessee has obtained Environmental Clearance from the SEIAA, Tamil Nadu vide letter No. SEIAA-TN/F.No.5016/1(a)/EC. No:3309/2016, dated: 15.07.2016. Now, the second scheme of quarrying is prepared and submitted to obtain approval for the period of 2020-21 to 2024-25 (Five years).
- The Mining plan was approved by the Director of Geology and Mining, Guindy, Chennai Vide Rc. No. No. 7862/MM4/2022, dated: 05.01.2023 for an approval scheme period of five years from 2020-21 to 2024 - 25.
- Proponent applied for ToR to get Environmental Clearance vide online Proposal No. SIA/TN/MIN/418907/2023 Dated: 21.02.2023.

SCOPING –P2

- The proposal was placed in 366th SEAC meeting held on 30.03.2023 and the committee recommended for issue of ToR.
- The proposal was considered in 613^{h} SEIAA meeting held on 21.04.2023 and issued ToR vide Lr.No. SEIAA-TN/F.No. 9848/TOR-1439/2023, Dated :21/04/2023.

SCREENING –P3

- The proponent applied for Granite Quarry Lease, Dated: 08.02.2016
- The quarry lease was granted vide G.O.(3D) No.18, Industries (MMB.2) Department Dated 08.02.2016 for a period of twenty years (Refer Annexure No. I). The quarry lease deed was executed on 03.03.2016 and the lease period is valid up to 02.03.2036.
- The mining plan was prepared in respect of Multi Colour granite quarry and the same was approved by the Commissioner, Department of Geology and Mining, Guindy, Chennai vide letter No. 5271/MM5/2014 dated 16.09.2014.
- Proponent applied for ToR to get Environmental Clearance vide online Proposal No. SIA/TN/MIN/418957/2023 Dated: 20.02.2023.

SCOPING –P3

- The proposal was placed in 367th SEAC meeting held on 31.03.2023 and the committee recommended for issue of ToR.
- The proposal was considered in 614th SEIAA meeting held on 24.04.2023 and issued ToR vide Lr.No. SEIAA-TN/F.No. 9855/TOR-1435/2023, Dated :24/04/2023

PUBLIC CONSULTATION –

Application to The Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the district is submitted along with this Draft EIA/ EMP Report and the outcome of public hearing proceedings will be detailed in the Final EIA/EMP Report.

APPRAISAL –

Appraisal is the detailed scrutiny by the State Expert Appraisal Committee (SEAC) of the application and other documents like the final EIA & EMP Report, outcome of the Public Consultations including Public Hearing Proceedings, submitted by the proponent to the regulatory authority concerned for grant of environmental clearance.

The report has been prepared using the following references:

- Guidance Manual of Environmental Impact Assessment for Mining of Minerals, Ministry of Environment and Forests, February, 2010
- EIA Notification, 14th September, 2006

ToR vide Lr No.SEIAA-TN/F.No.8360/SEAC/ToR- 13l5/2022 Dated: 21.12.2022 -P1
ToR vide Lr No. SEIAA-TN/F.No.9848/ToR- 1439/2023 Dated: 21.04.2023 -P2
ToR vide Lr No.SEIAA-TN/F.No.9855/ToR-1435/2023 Dated:24.04.2023 -P3

- Approved Mining Plan of this project
- In addition, other relevant standards for individual activities such as Sampling and Testing of Environmental attributes have been followed.

1.5 Post Environment Clearance Monitoring

The proposed project proponent shall submit a half-yearly compliance report in respect of stipulated Environmental Clearance terms and conditions to MoEF & CC Regional Office & SEIAA after grant of EC on 1st June and 1st December of each calendar year as per MoEF & CC Notification S.O. 5845 (E) Dated: 26.11.2018.

1.6 Generic Structure of EIA Document

The overall contents of the EIA report follow the list of contents prescribed in the EIA Notification 2006 and the "Environmental Impact Assessment Guidance Manual for Mining of Minerals" published by MoEF & CC.

1.7 Scope of the Study

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries and formulate the effective mitigation measures for each individual lease. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during **the summer season for March 2023 to May 2023** for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

Table 1.4: Environment Attributes

Sl.No.	Attributes	Parameters	Source and Frequency
1	Ambient Air Quality	PM_{10}, $PM_{2.5}$, SO_2, NO_2	Continuous 24-hourly samples twice a week for three months at 8 locations (2 Core & 6 Buffer)
2	Meteorology	Wind speed and direction, temperature, relative humidity and rainfall	Near project site continuous for three months with hourly recording and from secondary sources of IMD station
3	Water quality	Physical, Chemical and Bacteriological parameters	Grab samples were collected at 4 ground water and 2 surface water locations once during study period.
4	Ecology	Existing terrestrial and aquatic flora and fauna within 10 km radius circle.	Limited primary survey and secondary data was
5	Noise levels	Noise levels in dB(A)	8 locations – data monitored once for 24 hours during EIA study
6	Soil Characteristics	Physical and Chemical Parameters	Once at 6 locations during study period
7	Land use	Existing land use for different categories	Based on Survey of India topographical sheet and satellite imagery and primary survey.
8	Socio-Economic Aspects	Socio-economic and demographic characteristics, worker characteristics	Based on primary survey and secondary sources data like census of India 2011.
9	Hydrology	Drainage pattern of the area, nature of streams, aquifer characteristics, recharge and discharge areas	Based on data collected from secondary sources as well as hydro-geology study report prepared.
10	Risk assessment and Disaster Management Plan	Identify areas where disaster can occur by fires and explosions and release of toxic substances	Based on the findings of Risk analysis done for the risk associated with mining.

Source: Onsite Monitoring Data/Sampling by Laboratories

The data has been collected as per the requirement of the ToR issued by SEIAA – TN.

1.7.1 Regulatory Compliance & Applicable Laws/Regulations

- Application for Quarrying Lease as per Tamil Nadu Minor Mineral Concession Rules, 1959
- Obtained Precise Area Communication Letter as per Tamil Nadu Minor Mineral Concession Rules, 1959 for Preparation of Mining Plan and obtaining Environmental Clearance
- The Mining Plan of Granite quarry has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959

ToR vide Lr No.SEIAA-TN/F.No.8360/SEAC/ToR-13l5/2022 Dated: 21.12.2022 -P1
ToR vide Lr No. SEIAA-TN/F.No.9848/ToR- 1439/2023 Dated: 21.04.2023 -P2
ToR vide Lr No.SEIAA-TN/F.No.9855/ToR-1435/2023 Dated:24.04.2023 -P3

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2. PROJECT DESCRIPTION

2.0 General

Proposed Quarry in Devannagoundanur & Thangayur Village, Sankari and Edapadi Taluk, Salem District and Tamil Nadu State falls under Cluster Situation as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 21.07.0 ha consisting of three proposed and Existing quarries. 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.

2.1 Description of the Project

The Proposed project is located in Devannagoundanur & Thangayur Village, Sankari and Edappadi Taluk, Salem District and Tamil Nadu State. The quarry lease was granted in G.O. (3D) No.20, Industries (MMB.2) Department Dated 16.04.2015 for a period of twenty years. The mining plan was prepared in respect of Multi colour granite quarry and the same was approved by the State Geology and Mining Department, Guindy, Chennai vide letter No.11697/MM5/2012 dated 14.02.2014. The area over an extent of **2.00.2 Ha** in S.F. Nos 90/1(Part) & 90/2(Part), previously leased to ***P.Jayaraj,*** is an Individual is the sole proprietor, Lease period of 20 years.

The Project area is located extent of **2.31.5 Ha,** S.F. Nos 1/1(Part) and 1/2B(Part), Thangayur Village, Edappadi Taluk, Salem District, Tamil Nadu State. The quarry lease was granted vide G.O.(3D) No.15, Industries (MMB.2) Department Dated 18.03.2010 for a period of twenty years. The quarry lease deed was executed on 09.4.2010 and the lease period is valid up to 08.04.2030.The first scheme of quarrying prepared and submitted to the state department of geology and mining, Guindy, Chennai for the period of 2015-2016 to 2019-2020. The Second Scheme of Mining plan was approved by the Director of Geology and Mining, Chennai Vide Rc. No. 7862/MM4/2022, dated: 05.01.2023 for an approval scheme period of five years from 2020-21 to 2024 - 25. previously leased to **B. Venkatesh** is an Individual is the sole proprietor, Lease period of 20 years.

The Project area is located extent of **3.12.0 Ha,** S.F. Nos 1/2B(P)& 1/3B(P), Thangayur Village, Edappadi Taluk, Salem District, Tamil Nadu State. The quarry lease was granted vide G.O.(3D) No.18, Industries (MMB.2) Department Dated 08.02.2016 for a period of twenty years (Refer Annexure No. I). The quarry lease deed was executed on 03.03.2016 and the lease period is valid up to 02.03.2036. The mining plan is valid up to 02.03.2021. now, the first scheme of quarrying is prepared and submitted to obtain approval for the period of 2021-2022 to 2025-2026 (Five years). The mining plan was prepared in respect of Multi Colour granite quarry and the same was approved by the Commissioner, Department of Geology and Mining, Guindy, Chennai vide letter No. 5271/MM5/2014 dated 16.09.2014. previously leased to **B. Venkatesh** is an Individual is the sole proprietor, Lease period of 20 years.

Multicolour Granite quarry operation will be carried out by opencast mechanized method involving Eco-friendly Diamond Wire Saw Cutting, Heavy earth moving machineries like Excavators Trucks for Granite exploitation. Shot hole drilling with controlled blasting using slurry explosives for removal of overburden and Weathered portions during initial stage of quarry operation.

2.2 Location of the Project

- The area is located in ***of Devannagoundanur Village, Sankari Taluk & Thangayur Village, Edapadi Taluk, Salem District, Tamilnadu.***
- The entire quarry lease area falls in the Patta land, the area is situated in an elevated terrain.
- The Altitude of the area is ranges from **245m – 260m above from MSL**
- The area is mentioned in GSI Topo sheet No. **58-E/14**
- The Latitude between of **11°33'33.72"N to 11°33'51.96"N**
- The Longitude between of **77°50'41.23"E to 11°33'51.96"N** on WGS 1984 datum.

Table 2.1: Site Connectivity to the Project Area

Nearest Roadway	NH544– Salem – Coimbatore –7.6km-S SH221 – Edappadi – Eranapuram – 2.3km-NW
Nearest Village	470m-N
Nearest Town	Edappadi - 2.0km – NW
Nearest Railway Station	Sankari Railway Station- 10.0km - SE
Nearest Airport	Salem Airport - 34.0km - NE
Seaport	Nagapattinam 235km- North East

Source: PFR, Survey of India Toposheet

Table 2.2: Boundary Co-Ordinates of Proposed Project-P1

S.No	Latitude	Longitude
1	11°33'31.55" N	77°50'37.73"E
2	11°33'33.98" N	77°50'36.05"E
3	11°33'35.45" N	77°50'38.85"E
4	11°33'33.73" N	77°50'44.49"E
5	11°33'32.19" N	77°50'44.21"E
Datum: UTM-WGS84, Zone 43 North		

Table 2.3: Boundary Co-Ordinates of Proposed Project-P2

S.No	Latitude	Longitude
1	11°33'40.25" N	77°51'06.75"E
2	11°33'42.19" N	77°51'07.78"E
3	11°33'44.42" N	77°51'07.87"E
4	11°33'44.34" N	77°51'11.82"E
5	11°33'44.35" N	77°51'12.71"E
6	11°33'43.64" N	77°51'12.75"E
7	11°33'43.62" N	77°51'15.90"E
8	11°33'41.94" N	77°51'16.15"E
9	11°33'41.16" N	77°51'12.38"E
Datum: UTM-WGS84, Zone 43 North		

Table 2.4: Boundary Co-Ordinates of Proposed Project-P3

S.No	Latitude	Longitude
1	11°33'41.03" N	77°51'14.15"E
2	11°33'43.41" N	77°51'14.20"E
3	11°33'43.33" N	77°51'12.25"E
4	11°33'44.45" N	77°51'12.41"E
5	11°33'44.44" N	77°51'10.02"E
6	11°33'45.38" N	77°51'10.02"E
7	11°33'46.09" N	77°51'14.15"E
8	11°33'46.23" N	77°51'14.37"E
9	11°33'46.32" N	77°51'20.50"E
10	11°33'42.05" N	77°51'20.67"E
11	11°33'41.45" N	77°51'17.69"E
12	11°33'42.22" N	77°51'15.42"E
Datum: UTM-WGS84, Zone 43 North		

Figure 2.1: PHOTOGRAPHS OF THE PROJECT AREA -P1

Figure 2.2: PHOTOGRAPHS OF THE PROJECT AREA -P2

Figure 2.3: PHOTOGRAPHS OF THE PROJECT AREA -P3

Figure 2.4: Google Image Showing Project Area-P1

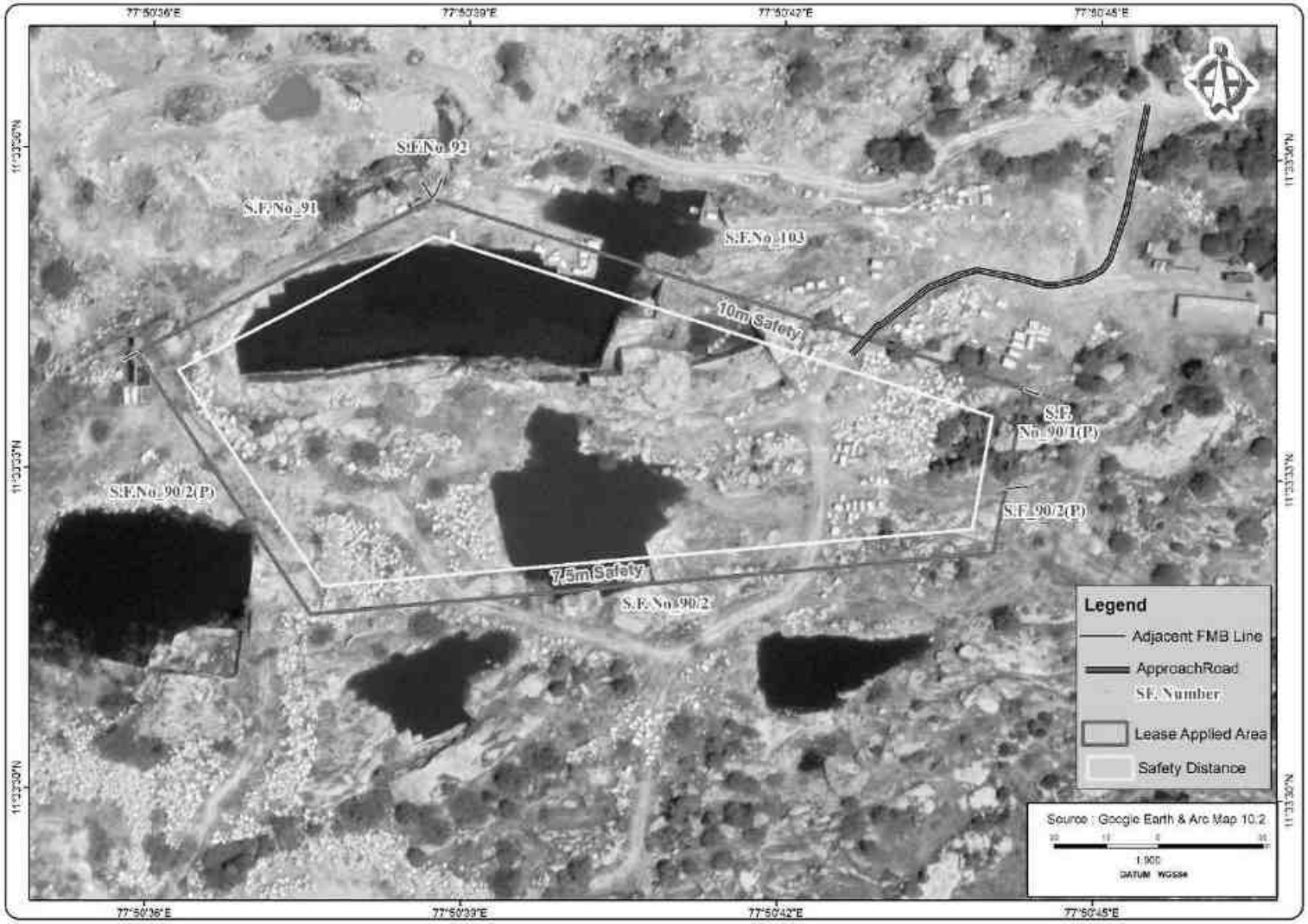


Figure 2.5: Google Image Showing Project Area-P2

Figure 2.6: Google Image Showing Project Area-P3

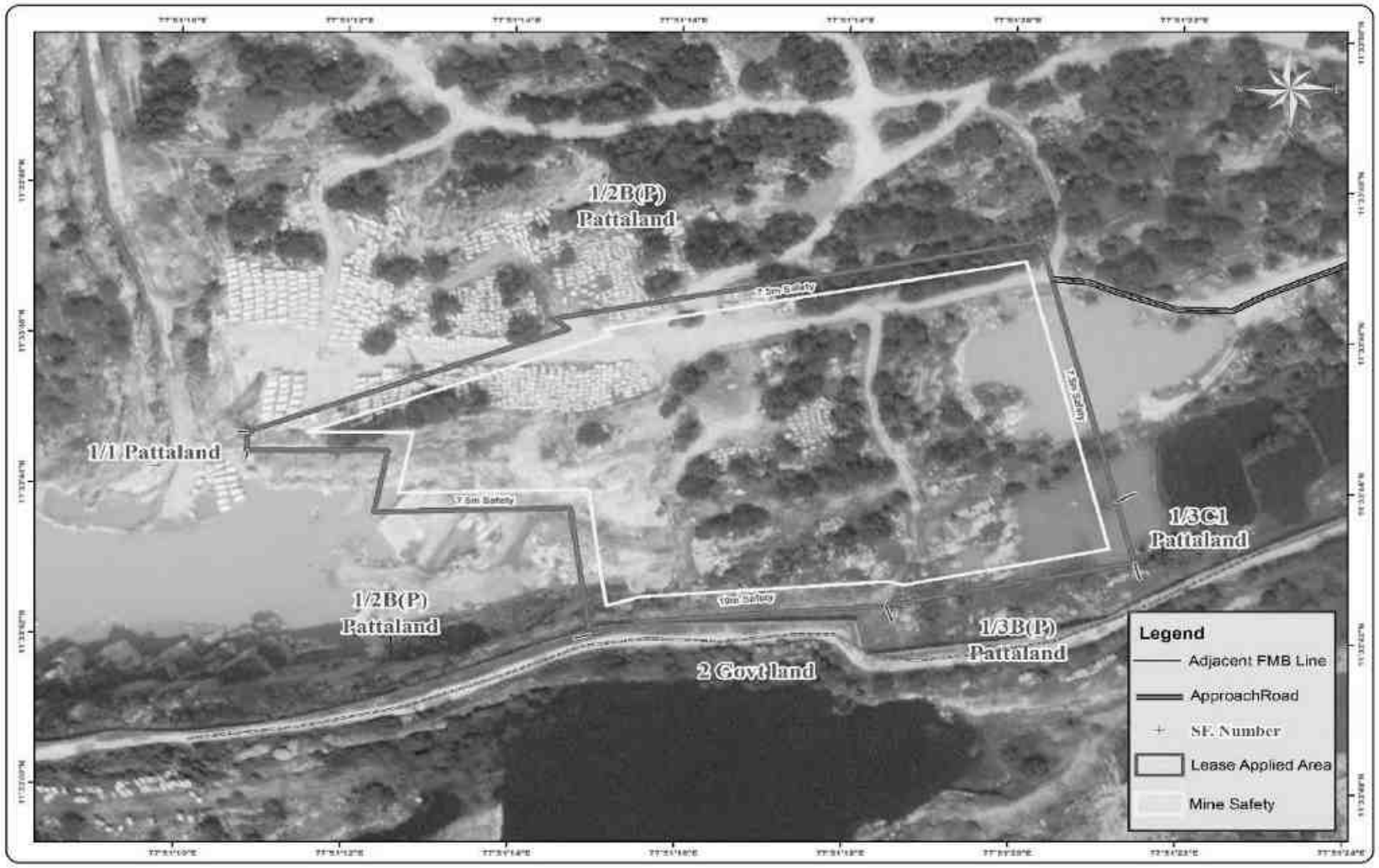


Figure 2.7: Quarry Lease Plan & Surface Plan-P1

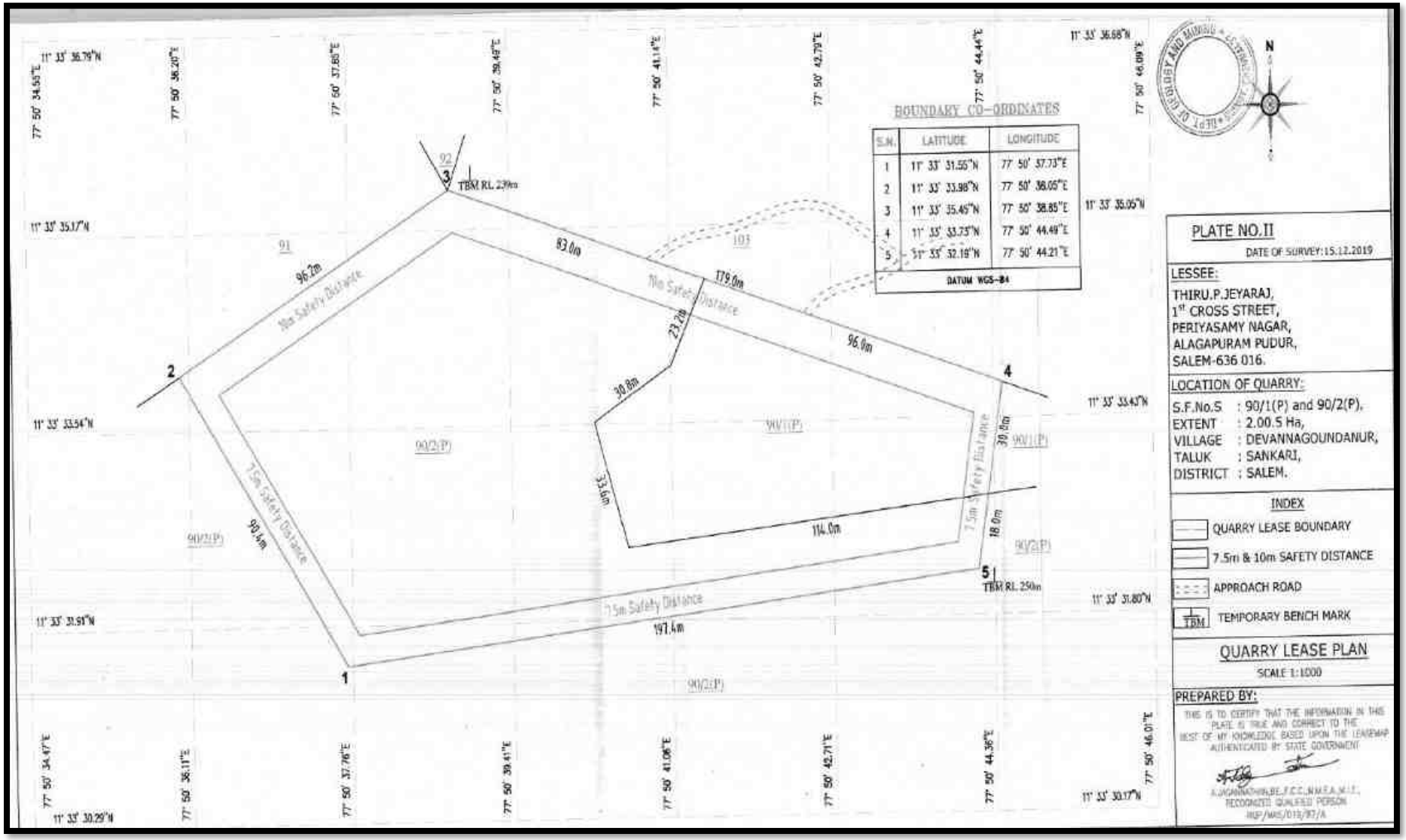


Figure 2.8: Quarry Lease Plan & Surface Plan-P2

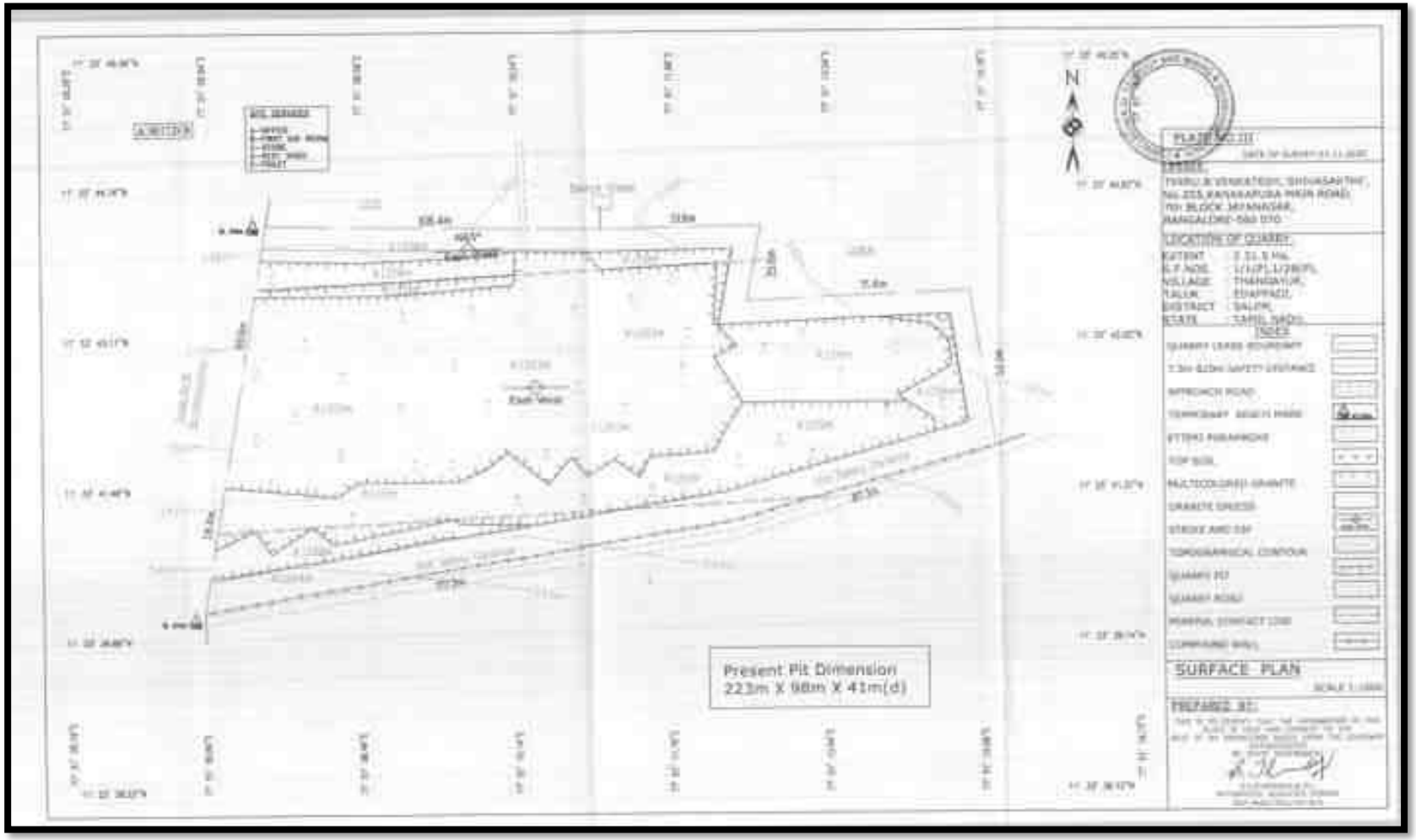


Figure 2.9: Quarry Lease Plan & Surface Plan-P3

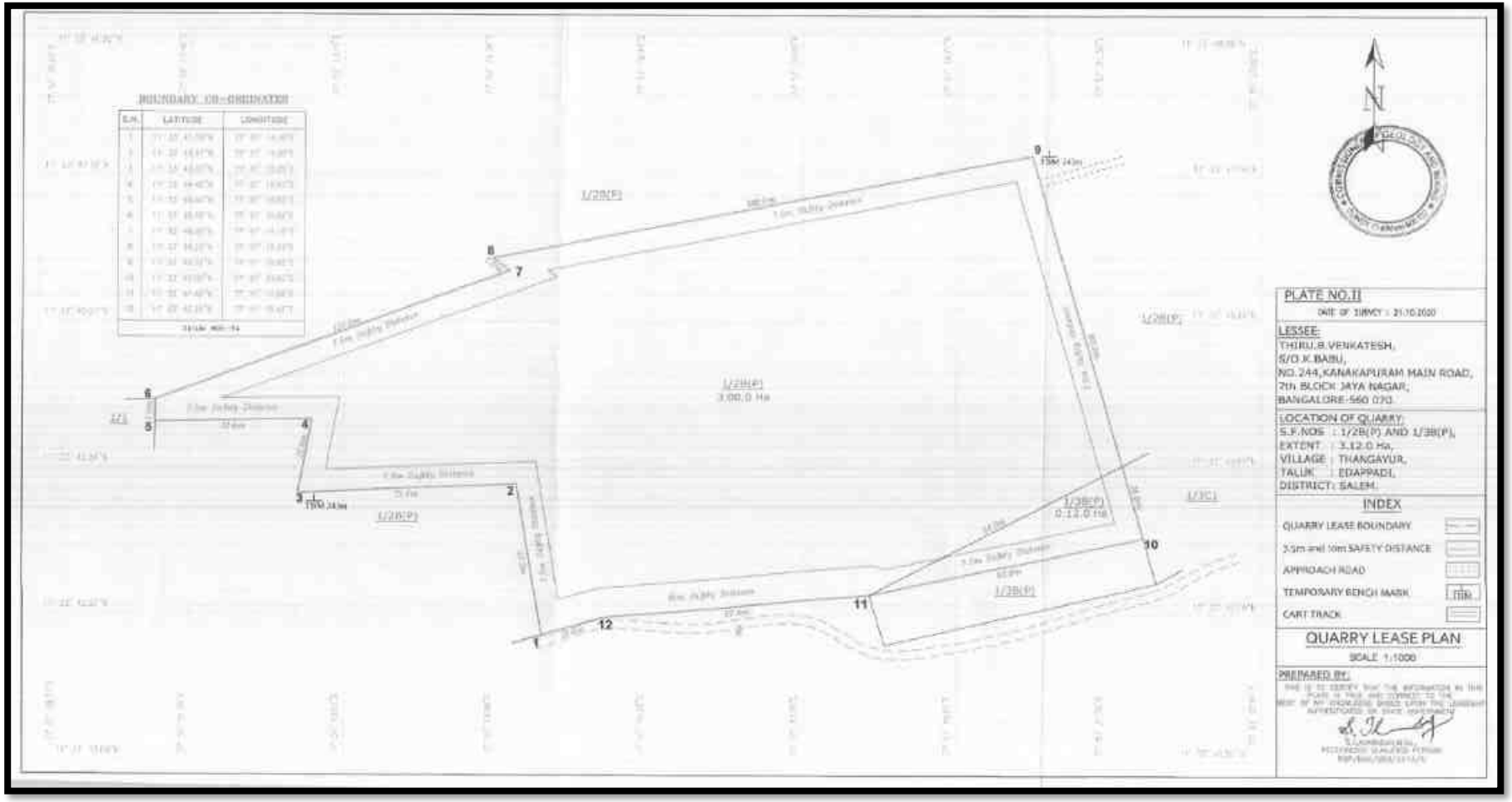


Figure 2.10: Image Showing Superimposed image Around 10 Km Radius

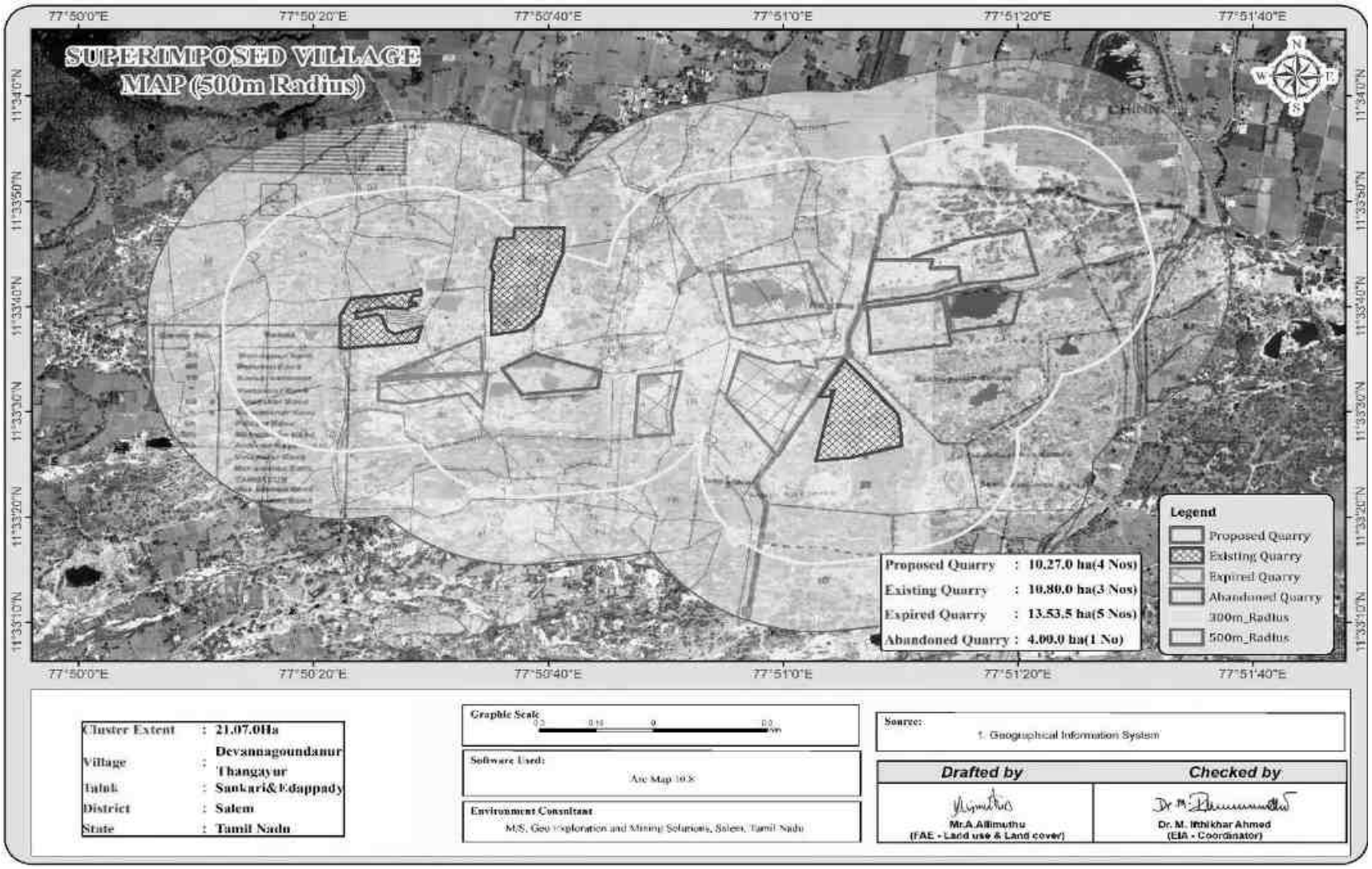


Figure 2.11: Image Showing Surface Features Around 10 Km Radius

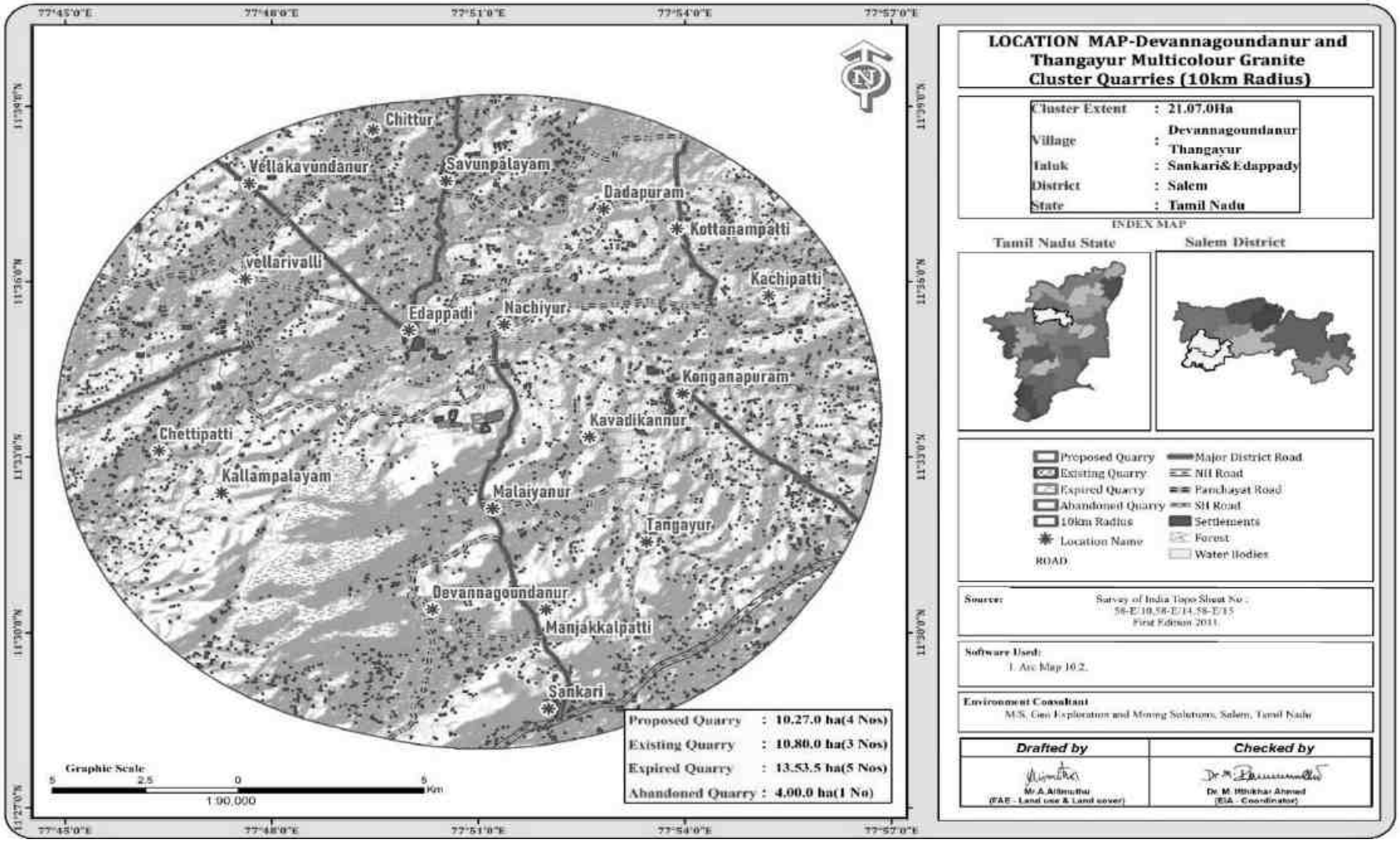


Figure 2.12: Image Showing Surface Features Around 5km Radius

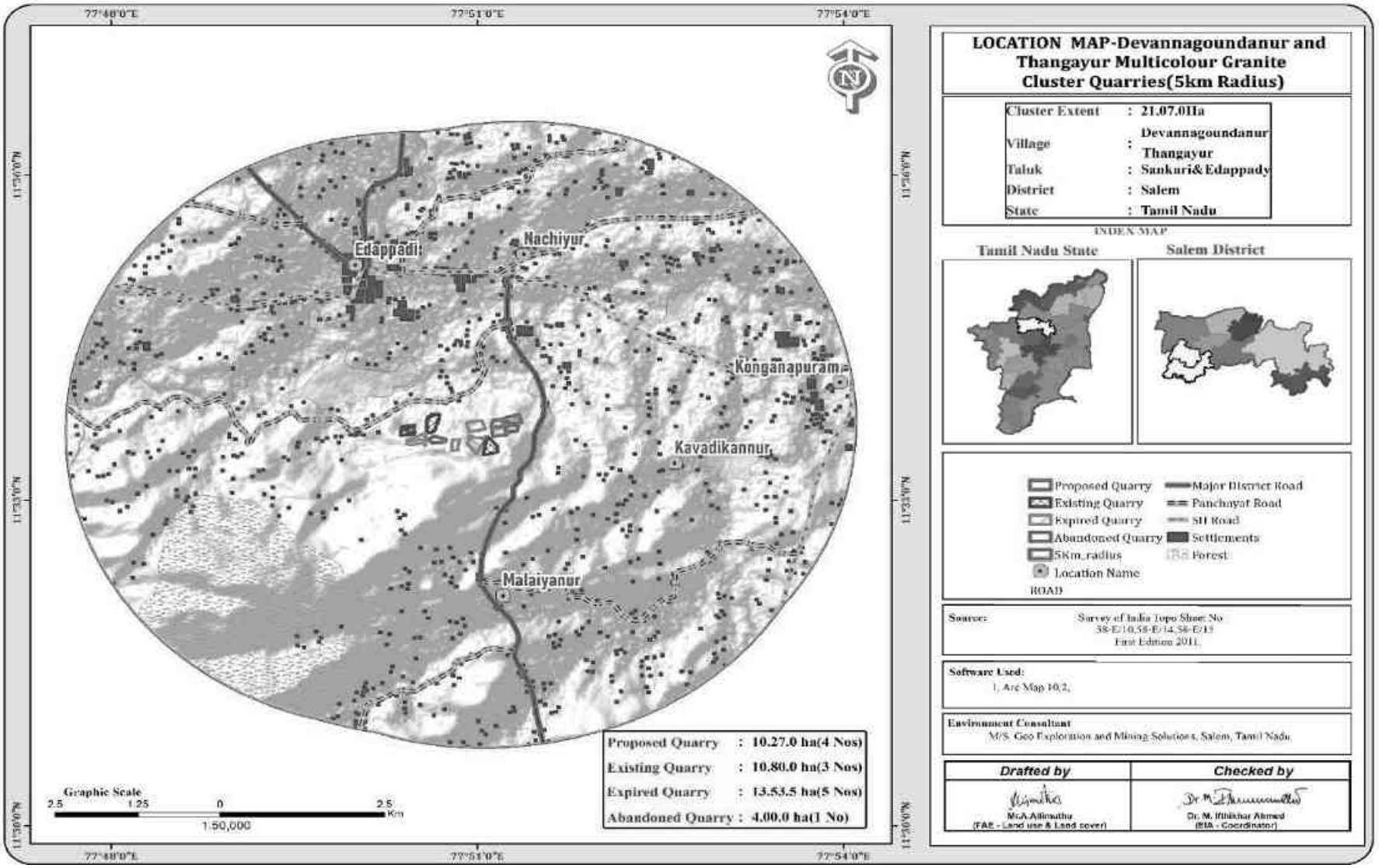
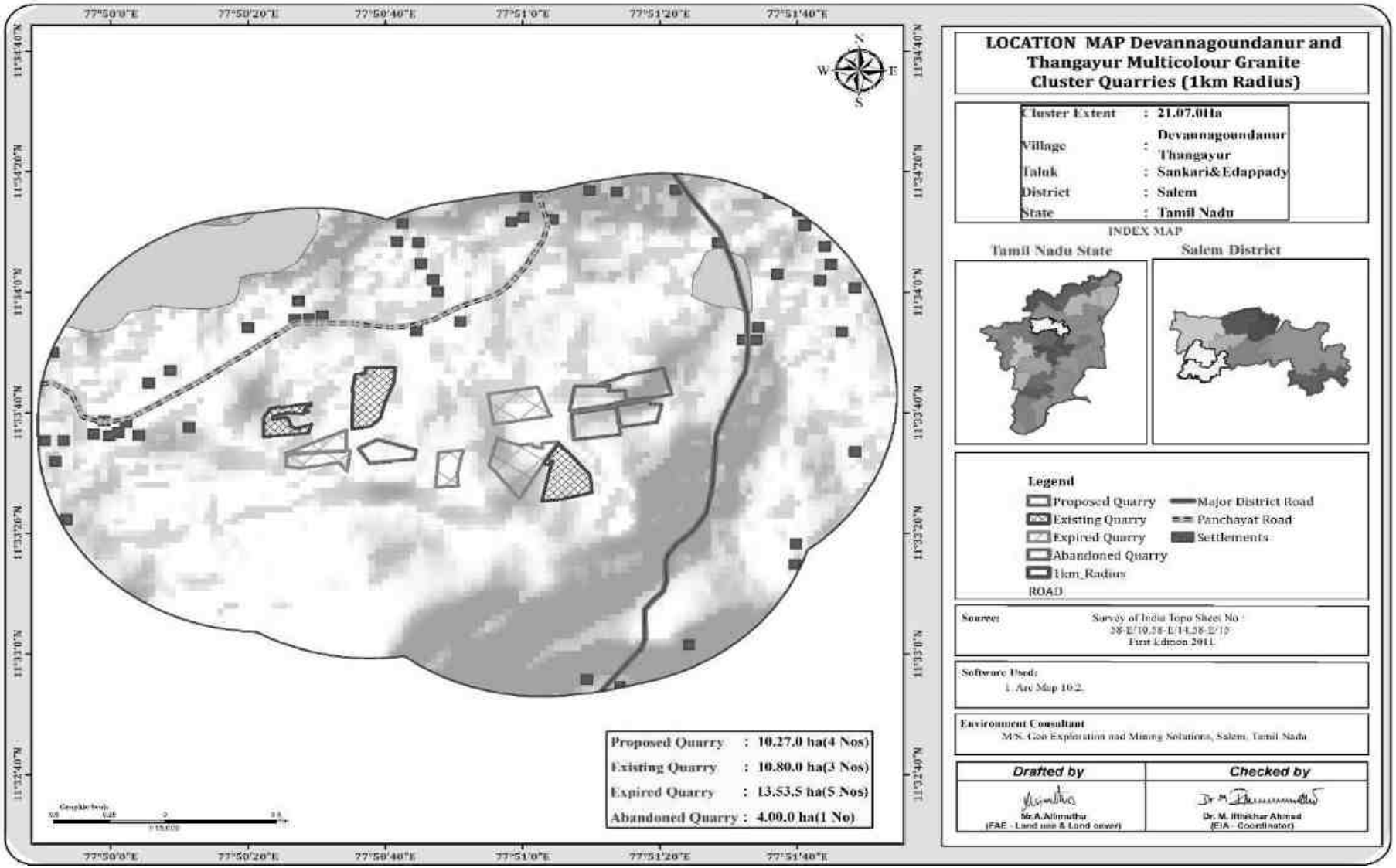


Figure 2.13: Image Showing Surface Features Around 1 Km Radius



2.2.1 Project Area

- The Topography of the Proposed Project is undulated topography, with Granite outcrops, which is site specific, Non – Captive use, opencast Mechanized quarry.
- There is No beneficiation or processing proposed inside the project area.
- Elevation is 240m-260m above from MSL, showing gentle gradient towards Northwest
- There is no forest land involved in the proposed project area and the area is devoid of major vegetation.

Table 2.5: Land Use Pattern of the Proposed Project -P1

Description	Present Area (Ha.)	Area utilized in %
Area under Quarry	0.69.0	34.4
Waste dump	0.08.6	4.2
Infrastructure	0.02.0	1.0
Roads	0.03.0	1.5
Green Belt	Nil	-
Stocking Blocks	1.17.9	58.9
Grand Total	**2.00.5**	**100**

Source: Approved Scheme of Mining Period

Table 2.6: Land Use Pattern of the Proposed Project -P2

Description	Present Area (Ha.)	Area required during this Scheme period(ha)	Area at the end of life of quarry (ha)
Area under Quarry	1.87.2	Nil	1.87.2
Waste dump	Nil	Nil	Nil
Infrastructure	*Nil	*Nil	*Nil
Roads	0.01.0	Nil	0.01.0
Green Belt	Nil	0.19.0	0.32.8
Stocking Blocks	0.43.3	0.24.3	0.10.5
Total	**2.31.5**	**0.43.3**	**2.31.5**

Table 2.7: Land Use Pattern of the Proposed Project -P3

Description	Present Area (Ha.)	Area utilized in %
Area under Quarry	0.52.2	16.8
Waste dump	0.13.8	4.4
Infrastructure	Nil	-
Roads	0.01.0	0.3
Green Belt	Nil	-
Stocking Blocks	2.45.0	78.5
Grand Total	**3.12.0**	**100**

2.2.2 Size or Magnitude of Operation

Table 2.8: Operational Details – P1

Description	P1
Geological Resources ROM	7,56,490
Granite Recovery (20 % in m^3)	1,51,298
Granite Waste (80 % in m^3)	6,05,192
Weathered rock(m^3)	-
Side Burden(m^3)	-
Top Soil in m^3	20,396
Mineable Reserves ROM	2,19,107
Granite Recovery (20 % in m^3)	43,821

Granite Waste (80 % in m^3)	1,75,286
Weathered rock (m^3)	-
Side Burden (m^3)	-
Top Soil in m^3	13,722
Proposed Production for five years plan period ROM	45,672
Granite Recovery (20% in m^3)	9,134
Granite Waste (80 % in m^3)	36,538
Weathered rock(m^3)	-
Top Soil in m^3	3,834
Number of Working Days	300
Production of ROM per day in five-year plan period	30
Production of Granite per day	6
Total Waste per day (Granite waste)	24

Source: Approved Scheme of Mining Period

Table 2.9: Operational Details – P2

Description	P2
Geological Resources ROM	5,84,140
Granite Recovery (60 % in m^3)	3,50,484
Granite Waste (40 % in m^3)	2,33,656
Weathered rock(m^3)	-
Side Burden(m^3)	2,57,550
Total waste (Granite waste + SB)	4,91,206
Top Soil in m^3	4,530
Mineable Reserves ROM	1,79,035
Granite Recovery (60 % in m^3)	1,07,421
Granite Waste (40 % in m^3)	71,614
Weathered rock (m^3)	-
Side Burden (m^3)	-
Top Soil in m^3	-
Proposed Production for five years plan period ROM	1,25,220
Granite Recovery (60% in m^3)	75,132
Granite Waste (40 % in m^3)	50,088
Weathered rock(m^3)	-
Top Soil in m^3	-
Number of Working Days	300
Production of ROM per day in five-year plan period	83
Production of Granite per day	47
Total Waste per day (Granite waste)	33

Table 2.9: Operational Details – P3

Description	P3
Geological Resources ROM	9,38,535
Granite Recovery (40 % in m^3)	3,75,414
Granite Waste (60 % in m^3)	5,63,121
Weathered rock(m^3)	41,538
Total waste (Granite waste + Weathered)	6,04,659
Top Soil in m^3	20,769
Mineable Reserves ROM	4,10,870
Granite Recovery (40% in m^3)	1,64,348
Granite Waste (60 % in m^3)	2,46,522

Weathered rock (m^3)	31,204
Total waste (Granite waste +Weathered)	2,77,726
Side Burden (m^3)	-
Top Soil in m^3	16,083
Proposed Production for five years plan period ROM	1,88,330
Granite Recovery (40% in m^3)	75,332
Granite Waste (60 % in m^3)	1,12,998
Weathered rock(m^3)	17,248
Total waste (Granite waste +Weathered)	1,30,246
Top Soil in m^3	9,041
Number of Working Days	300
Production of ROM per day in five-year plan period	126
Production of Granite per day	50
Total Waste per day (Granite waste +Weathered)	87

Approved Scheme of Mining Period

2.3 Geology

2.3.1 Regional Geology

The Multicolour Granite proposed to quarry is medium to coarse grained with feldspar and quartz is major constituents and garnet and other mafic minerals are accessories. The petrological settings of the area are simple and not a complicated phenomenon. There are no major minerals observed in the vicinity of the proposed quarry. A brief description of the regional Geology is discussed below.

This area forms a part of peninsular gneiss the widest spread group of rocks in many parts of Tamil Nadu. The southern domain of Tamilnadu is characterized by the khondalite group of rocks (with subordinate amounts of Charnockite) and marked by the absence of BMQ and dolerite dyke systems. The most common verities of granite are pink, grey and Multi-Coloured ones. In the granites feldspar forms about 50%, quartz a little less and the rest accounted for by amphiboles and pyroxenes. This type occurs in the form of large massive bodies (Batholiths, laccoliths) spreading over hundreds of square kilometers exhibiting variation in colour and texture. Other types occur as lenses and bands within the gneisses and other metamorphic rocks. In these cases, the molten magma of granite has been emplaced into the earlier rocks as narrow, small bodies and partly interacting.

Anorthosites, syenites, porphyries and like that generally considered along with the Multicolored granites. In these rocks quartz is nearly absent when hornblende or biotite abundant, the rock may be dark green or almost black. The northern part of Tamilnadu, north of Noyil – Cauvery River is characterized by the occurrences of a number of Dolerite dykes in contrast to the areas south of Noyil – Cauvery River where the dykes are absent. The dolerite dykes in general trending is in WNW- ESE and NNE – SSE directions and rarely in N-S and NNW – SSE directions. In central part of Tamilnadu, ENE – WNW to NE- SW trending dolerite dykes (Black granite) are seen transecting the Charnockite in Kalrayan & Kolli Hills. Palaeo magnetic studies of some of these dykes indicate Mid-Proterozoic age. Granites were formed from molten rock referred to as “Magma” formed at great depths within the crust of the earth. Such rocks that were formed at great depths during the Archaean age are now exposed at the surface of the earth as a result of the combined actions of wind, air, sun and water and weathering and denudation over the past several million years.

2.3.2. Geology of the lease applied area

This area forms a part of peninsular gneiss the most wide spread group of rocks in many parts of Tamil Nadu. The southern domain of Tamilnadu is characterized by the khondalite group of rocks (with subordinate amounts of Charnockite) and marked by the absence of BMQ and dolerite dyke systems. The rock formation is popularly known as Granite gneiss essentially made up of a supra crustal assemblages of quartz and Feldspar as major constituents, closely inter banded with calc - silicate rocks and dolomite, as well as Granite gneiss or schist, occurring within a vast area of biotite gneiss. The multi-coloured granite in this area comprises geologically as Granodiorite and popularly termed as "**Imperial white**".

The rock type is leucocratic euhedral, medium to fine grained, equigranular and well-developed gneissic banding of alternate layers of dark and light mineral is the specialty of this area which denotes the indicative of flow pattern of the rock mass in this East- West (i.e., the cutting direction of the Multi-coloured granite). Some slender pegmatite veins are intruded in a crisscross fashion which is likely to be reduced at deeper levels.

Mostly it is a concealed deposit under soil cover. The top soil is found to occur over the area with an average depth of 2m followed by fresh granite mass. Well-developed strike and dip joints observed at the surface level which is likely to decrease in deep seated condition. Taking in to consideration of the above geological factors, over burden, inter burden wastage during quarrying, other flaw and flower patches etc, the average recovery percentage has been computed as 20%.

It is inferred that the strike and dip joints are present on the surface layers which may not have a good recovery, these strike and dip joints may reduce in deep seated conditions, taking into consideration of these above factors, the average recovery percentage upto 47m (2m topsoil + 45m Multi coloured Granite) depth from the top of hill has been computed as 20%. This scheme of quarrying is discussed based on 20% recovery factor. If there is any considerable increase or decrease in the recovery factor a modified scheme of quarrying will be prepared and submitted to relevant authorities for subsequent clearance and approval.

The General Geological sequence of the rocks in the area is:-

Structural Settings of Devannagoundanur:

Order of super position:-

AGE		ROCK TYPE
Pleistocene to Recent	-	Topsoil
----------Unconformity----------		
Archaean to Proterozoic	-	Khondalite, Quartzite, Charnockite, Peninsular Gneissic Complex

Exploration studies

As far as Multicolour Granite deposits are concerned, the only practical method is the systematic geological mapping and delineation of commercial Multicolour Granite bodies within the field and careful evaluation of body luster, physical properties, engineering properties, commercial aspects etc.

Such an exploration study has already been conducted in this area during the course of quarrying operations. Based on the valuable geological information and by the field experience and the quarry already attained a maximum depth of 21m below from the existing ground profile, the estimation of geological resources and mineable reserves are arrived at considering to waste and market potential.

2.3.3 Hydrogeology

(i) Major Geological formations: Geology

The Salem district is underlain by Archaean crystalline, metamorphic complex. The geology of the district is very complicated owing to recurring tectonic and magmatic activities in the pre-cambrian period. The minerals like magnesite, bauxite, iron-ore, limestone and chromite are the major contribution made to the state by the district.

a) Gneisses The gneisses are perhaps the oldest rocks (fundamental gneisses) in about seven taluks. The general direction of foliation varies from E-W to ENE-WSW or S-E. The gneiss are highly weathered upto 30m at places, several ultramafic and basic rocks parallel to the foliation of the gneisses.\

b) Charnockites

The Charnockites, coarse grained and bluish dark to grey in colour, have the second largest coverages in the district. They are exposed in the Shevaroy hills, Pachamalai Kalrayan hills and in the western parts of Mettur taluk. Some of them are garnet ferous and are massive and less weathered than the gneisses. They show two to three distinct set of joints most of which are vertical with steep dip. These rocks occur in the kanjamalai, Godumalai, Chitteri and Olaipatti areas of the district. Kanjamalai are major iron ore deposits and are associated with Quartzfeldspathic gneisses, garnetiferous- quartz. These rocks are highly folded and jointed and less weathered.

Aquifer parameters

a) Hard rock

The thickness of aquifer in this district varies between 15 to 60m below ground level. The intergranular porosity is essentially dependent upon the intensity degree of weathering and fracture development in the hard rock. The deep weathering has developed in gneissic formation and moderate weathering in Charnockite formation.

The range of aquifer parameters in hard rock areas is given as follows:

Parameters	Range
Well yield in LPM	45-545 lpm
Transmissivity (T) m^2 /day	10.2-524.8 m^2 /day
Permeability (K) m/day	0.1-50 m/day

Figure 2.8: Regional Geology Map

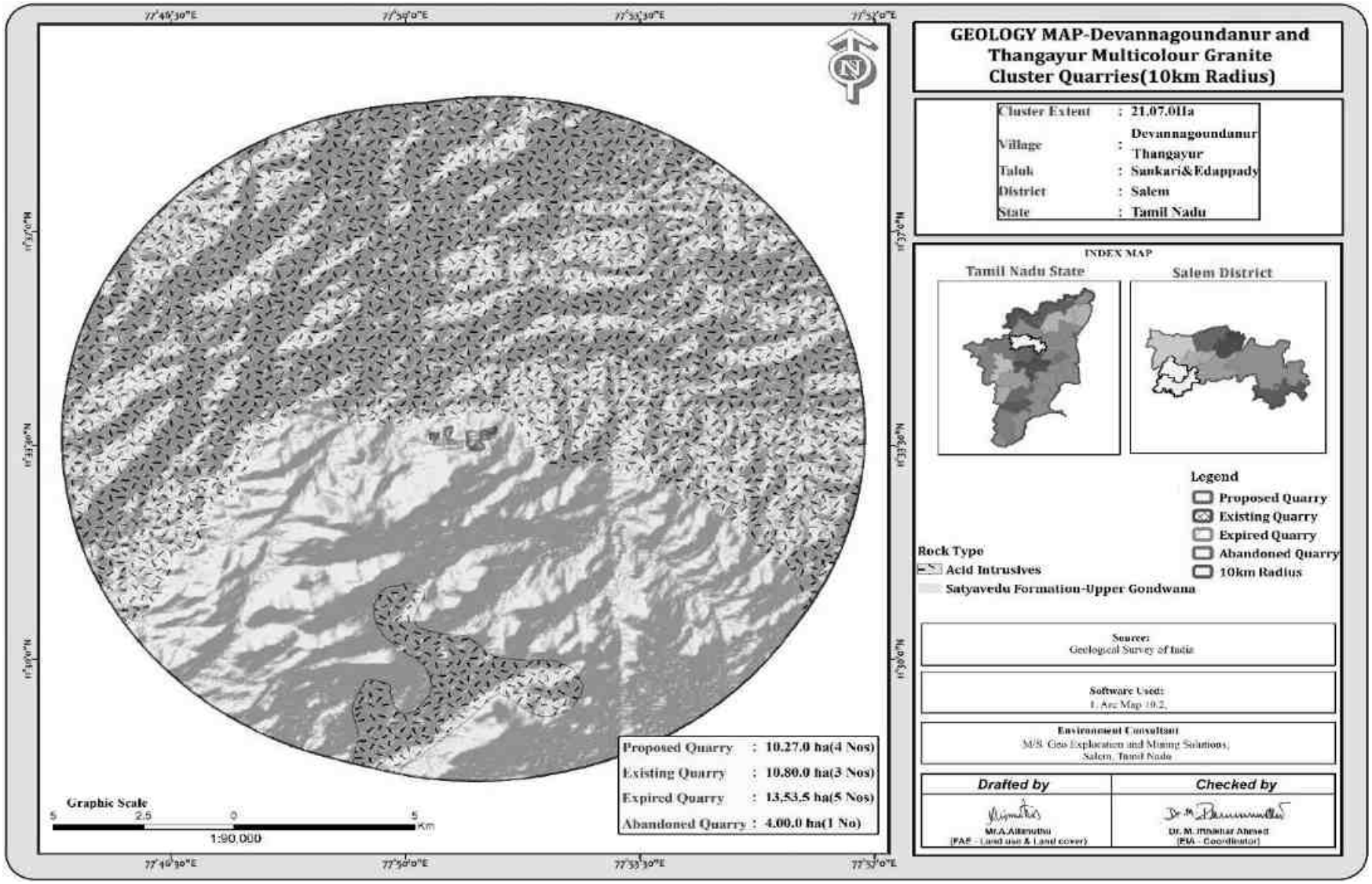


Figure 2.9: Geomorphology Map of The Study Area

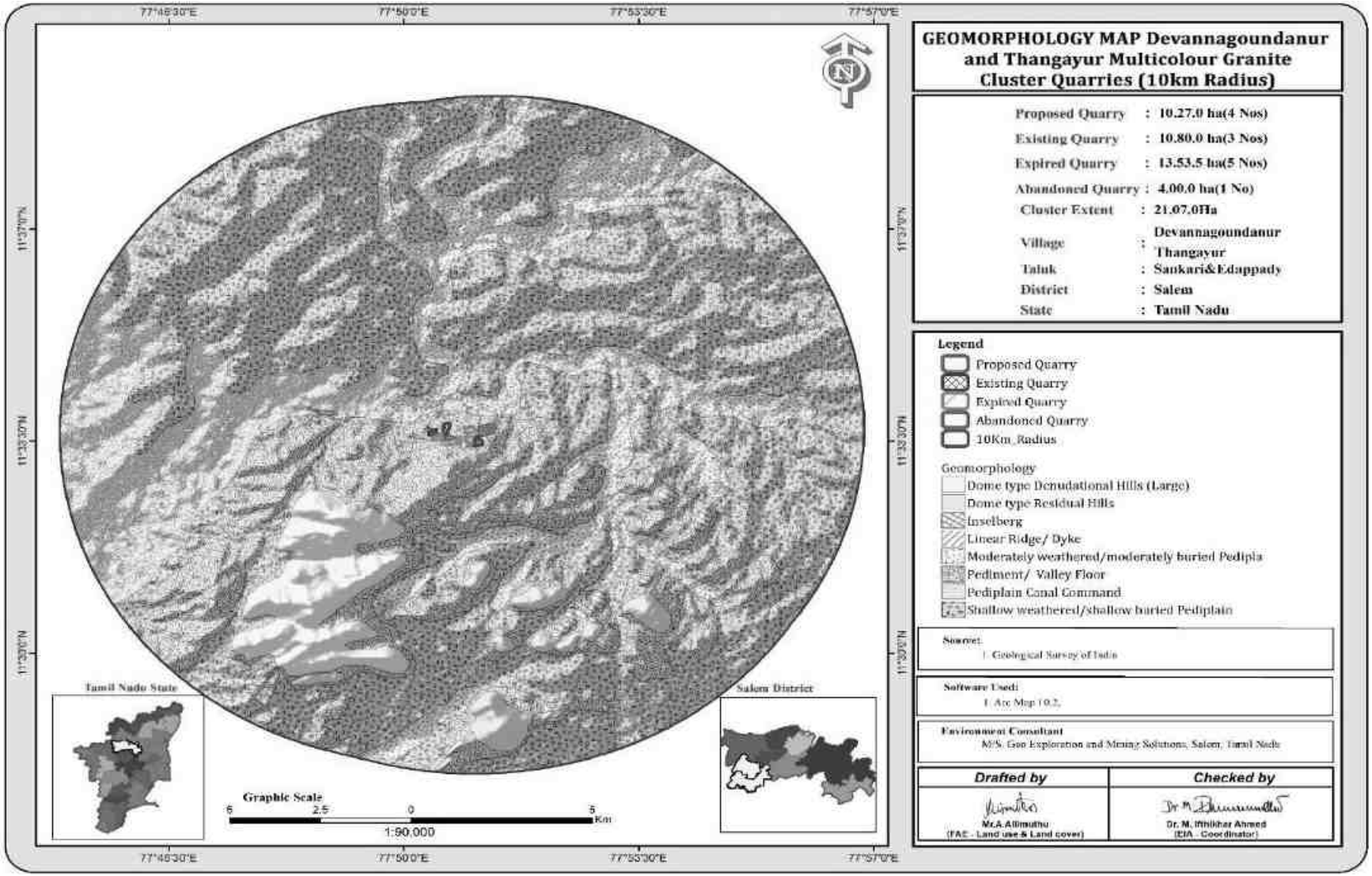
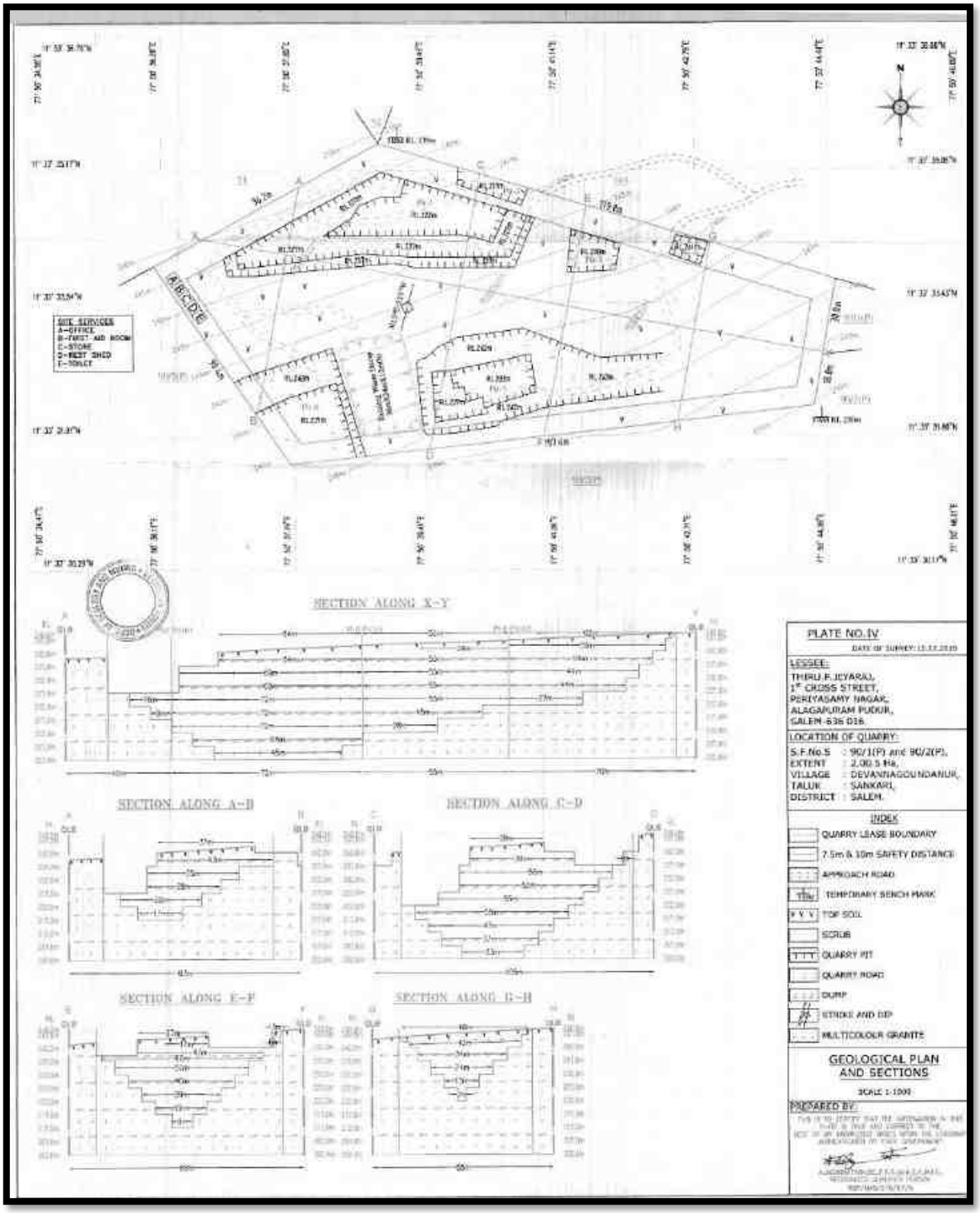
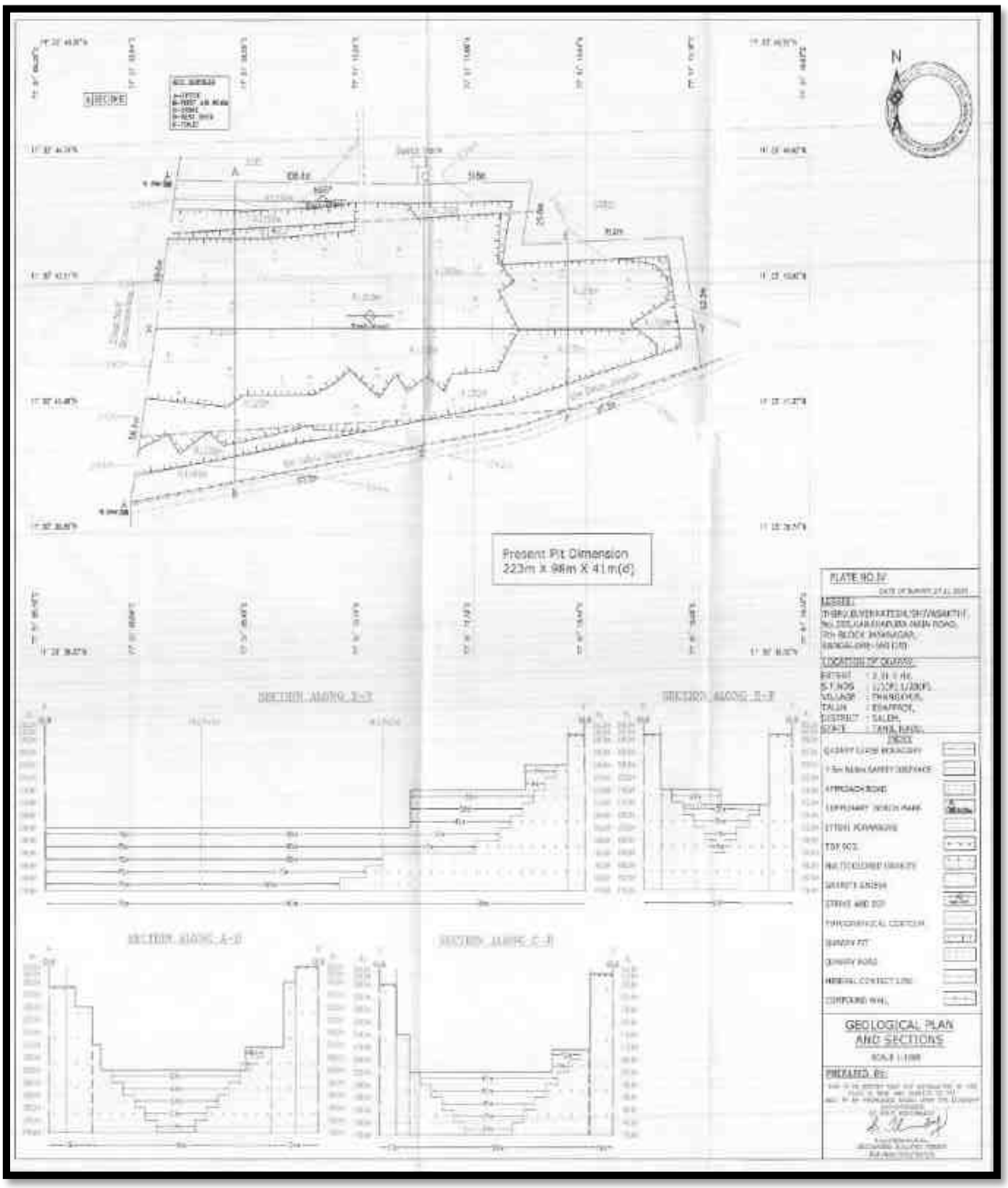


Figure 2.10: Geological Plan and Section -P1



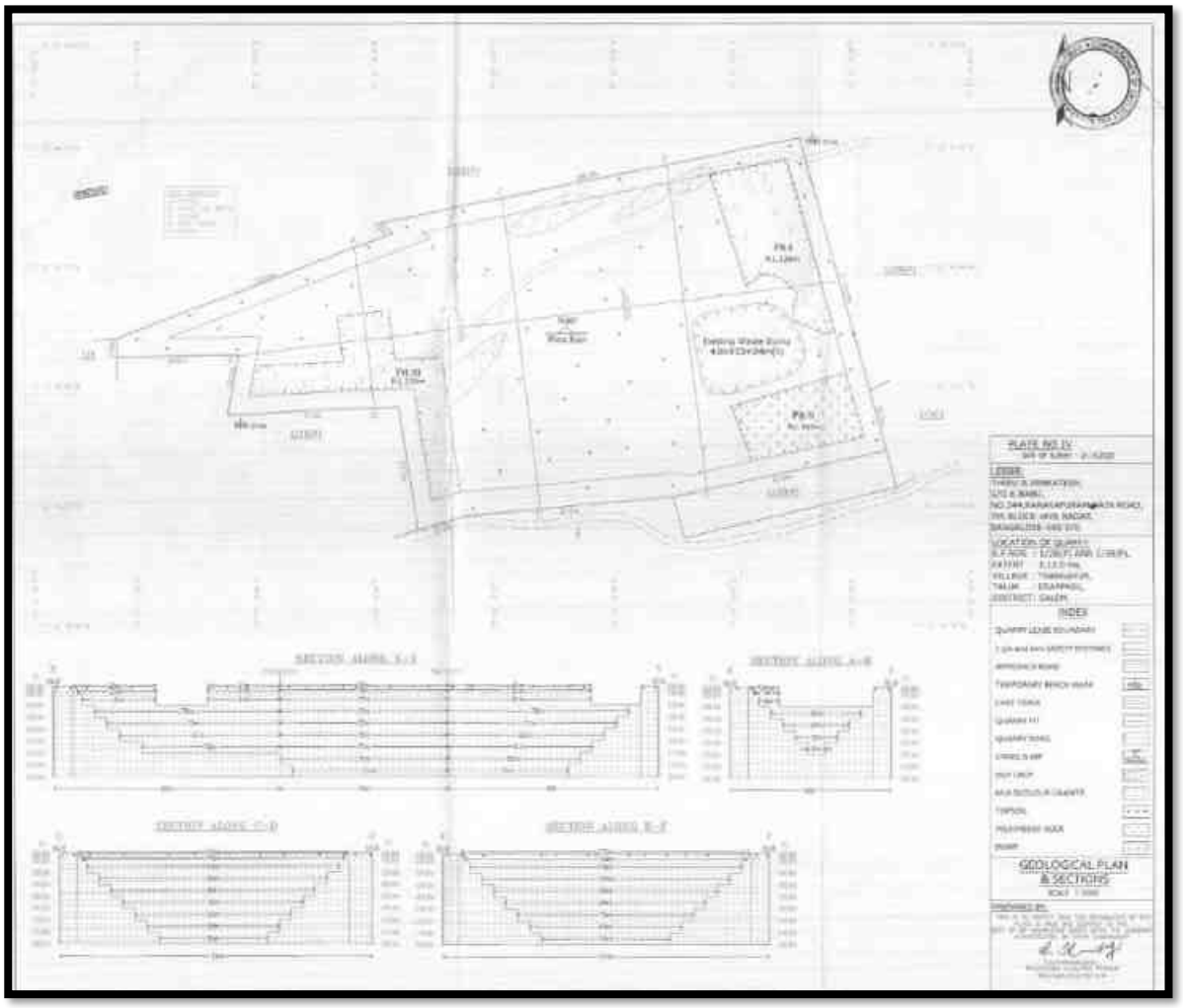
Source: Scheme of plan

Figure 2.11: Geological Plan and Section -P2



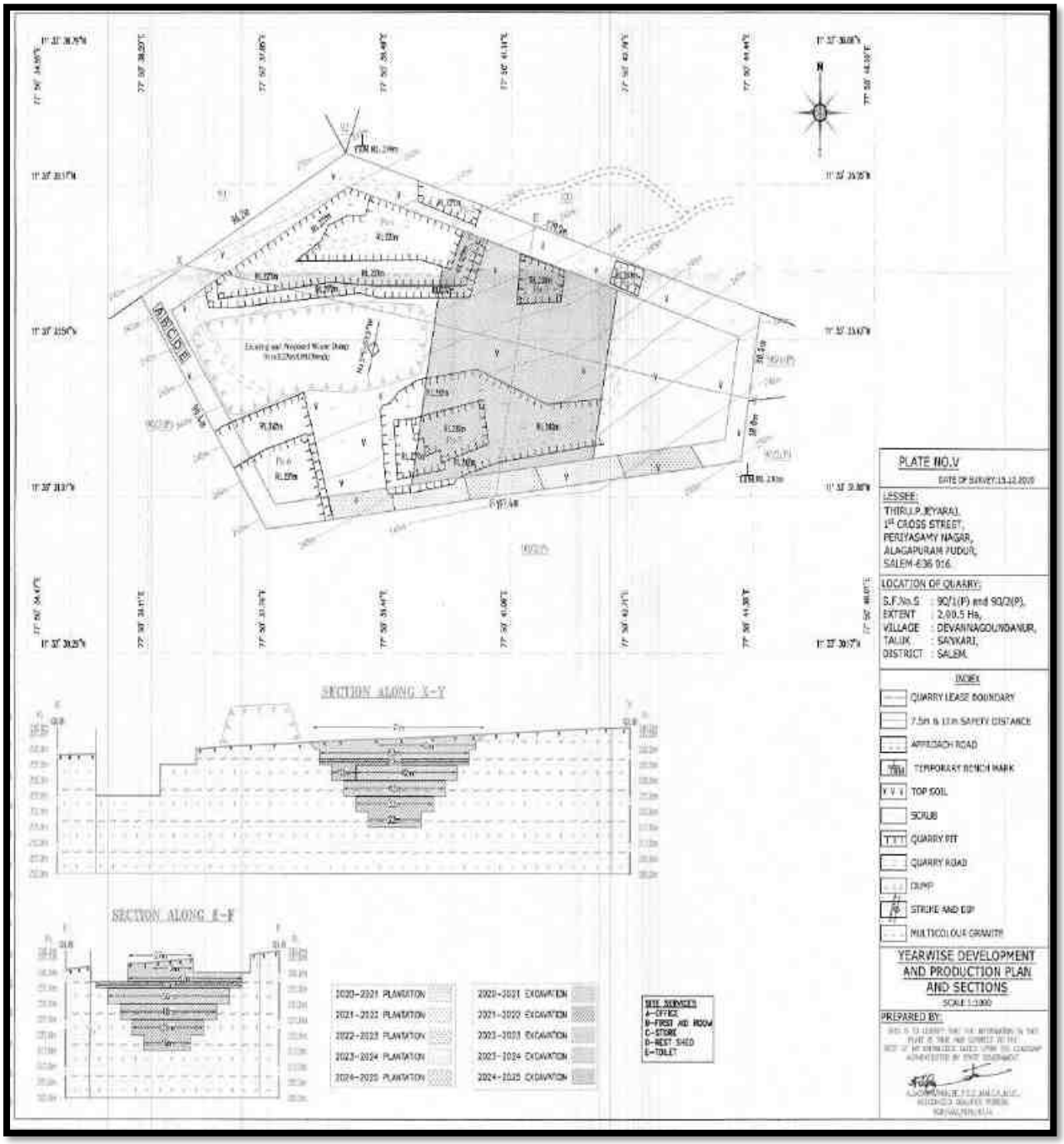
Source: Second Scheme of plan

Figure 2.11: Geological Plan and Section -P3



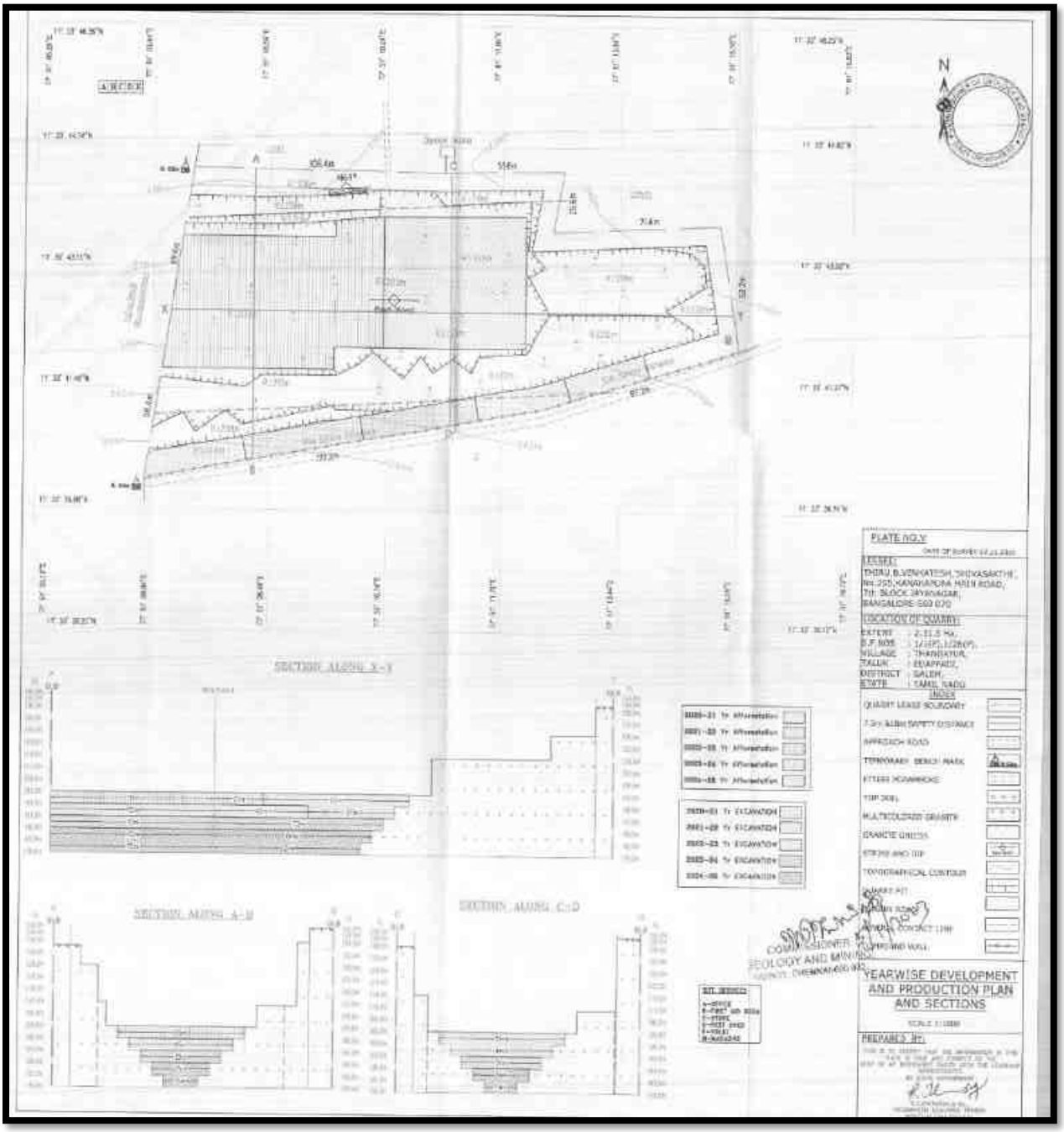
Source: Second Scheme of plan

Figure 2.12: Year-Wise Development Production Plan and Section -P1



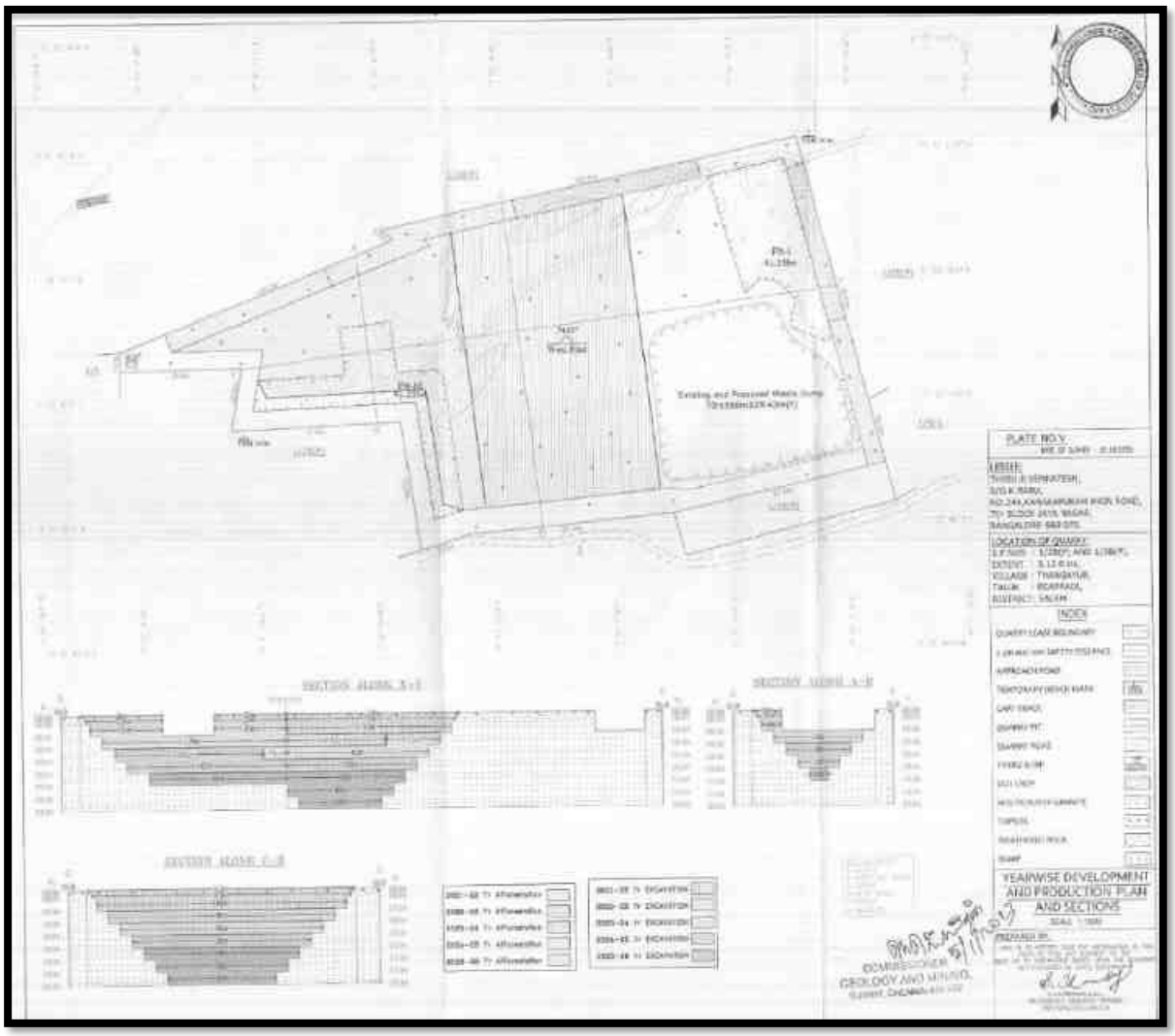
Source: Scheme of plan

Figure 2.13: Year-Wise Development Production Plan and Section -P2



Source: Second Scheme of plan

Figure 2.14: Year-Wise Development Production Plan and Section -P3



Source: Second Scheme of plan

2.4 Resources and Reserves

Multicolour Granite is occurring beneath the surface, Granite outcrops are visible in some places within the project area.

Table 2.5 Resources, Reserves -P1

Description	ROM in m^3	Granite recovery @20 % in m^3	Granite waste @80% recovery	Top Soil in m^3
Geological Resources	7,56,490	1,51,298	6,05,192	20,396
Mineable Reserves	2,19,107	43,821	1,75,286	13,722
Year wise Production of five years scheme of mining	45,672	9,134	36,538	3,834

Source: Approved Scheme of Period

Table 2.6 Year wise Production plan-P1

Year	ROM in m^3	Granite Recovery @ 20 % in m^3	Granite Waste @ 80 % in m^3	Topsoil in m^3
I	10102	2020	8082	3834
II	9940	1988	7952	-
III	10500	2100	8400	-
IV	8400	1680	6720	-
V	6730	1346	5384	-
Total	**45672**	**9134**	**36538**	**3834**

Source: Approved Scheme of Period

Table 2.7 Resources, Reserves -P2

Description	ROM in m^3	Granite recovery @60 % in m^3	Granite waste @40% recovery	Weathers Rock	Total waste	Side Burden in m^3	Top Soil in m^3
Geological Resources	5,84,140	3,50,484	2,33,656	-	-	2,57,550	4,530
Mineable Reserves	1,79,035	1,07,421	71,614	-	-	-	-
Year wise Production of five years scheme of mining	1,25,220	75,132	50,088	-	-	-	-

Source: Approved Scheme of Period

Table 2.8 Year wise Production plan-P2

Year	ROM in m^3	Granite Recovery @ 60 % in m^3	Granite Waste @ 40 % in m^3
I	24920	14952	9968
II	24880	14928	9952
III	24550	14730	9820
IV	24490	14694	9796
V	26380	15828	10552
Total	**125220**	**75132**	**50088**

Source: Approved Scheme of Period

Table 2.9 Resources, Reserves -P3

Description	ROM in m^3	Granite recovery @40 % in m^3	Granite waste @60% recovery	Weathers Rock	Total waste (Granite waste + Weathered)	Side Burden in m^3	Top Soil in m^3
Geological Resources	9,38,535	3,75,414	5,63,121	41,538	6,04,659	-	20,769
Mineable Reserves	4,10,870	1,64,348	2,46,522	31,204	2,77,726	-	16,083
Year wise Production	1,88,330	75,332	1,12,998	17.248			9,041

of five years schme of mining							

Source: Approved Scheme of Period

Table 2.10 Year wise Production plan-P3

Year	ROM in m^3	Granite Recovery @ 40% in m^3	Granite Waste @ 60 % in m^3	Weathers Rock in m^3	Topsoil in m^3
I	37100	14840	22260	15840	8249
II	37770	15108	22662	1408	792
III	38240	15296	22944	-	-
IV	35750	14300	21450	-	-
V	39470	15788	23682	-	-
Total	**188330**	**75332**	**112998**	**17248**	**9041**

Source: Approved Scheme of Period

Stacking of Granite Rejects and Disposal of Waste

The quantum of excavation is estimated to be 1,89,721 m^3 (ROM 1,59,598 m^3+ Top soil 12,875 m^3 +Weathered rock 17,248 m^3) up to depth of 66m during the entire lease period.

The generation of total waste is estimated about 1,99,624 m^3 (Granite waste + weathered Rock + Side Burden)

The excavated waste will be proposed to dump on the Southern eastern side of proposed quarries.

Conceptual Mining Plan/ Final Mine Closure Plan

Conceptual mining plan is prepared with an object of long-term systematic development of benches, lay outs, selection of permanent ultimate pit limit, depth of quarrying and ultimate pit, selection of sites for construction of infrastructure etc. The ultimate pit size is designed based on certain practical parameters such as economical depth of quarrying, safety zones, permissible area etc.,

Table 2.7 Ultimate Pit Dimension -P1 to P3

P1

Length in m	Width in m	Depth in m
213	89	47

Approved Scheme of Period

P2

Length in m	Width in m	Depth in m
233	98	66

Approved Scheme of Period

P3

Length in m	Width in m	Depth in m
233	121	38

Approved Scheme of Period

2.5 Method of Mining

- The method of mining is Opencast mechanized method
- Eco-friendly dimensional wire saw cutting for liberation and splitting up of blocks from parent sheet rocks
- Splitting of rock body of considerable volume from the parent rock formation by carefully avoiding visibly seen defects such as patches veins, etc., is done by adopting the method of “Diamond wire cutting” along the horizontal as well as two vertical sides on the front face of the formation.

- Jackhammer drilling with 32mm dia, this huge portion is further split into several blocks of required dimensions, only slurry explosives are used for secondary fragmentation and handling of waste.
- Hydraulic Excavator coupled with tippers is deployed for the formation of benches and loading
- There is no mineral processing or ore beneficiation proposed
- Proposed bench height is 5m and 5m width with 60^0slope
- The waste material generated during quarrying activity includes rock fragments of different sizes, and waste chips during dressing of the blocks. The waste materials are taken in tippers and proposed to be dumped in the respective approved places ear-marked for the purpose and the same will be utilized for backfilling in the northern side of the lease area during conceptual stage.

2.5.1 Drilling

Drilling will be carried out as per parameters given below: -

Spacing - 1m, Burden - 0.8m, Depth of hole - 1.5m

2.5.2 Blasting

Blasting will be done as per details below: -

Controlled blasting parameter: -

Spacing – 1m
Burden – 0.8 m
Depth of hole – 1.5 m
Charge per hole – 125 gms
Powder factor – 7.0 tonnes/kg
Dia of hole – 32 mm

Details of blasting design and parameters are discussed in approved mining plan.

2.5.3 Extent of Mechanization

Table 2.8: Machinery Details Proposed-P1

Drilling Equipment's					
Type	**No of Unit**	**Dia of Hole mm**	**Size capacity**	**Make**	**Motive Power**
Jack Hammer	1	32	1.2m to 6m	Atlas Copco	Compressed air
Compressor	4	-	140cfm/400psi	Atlas Copco	Diesel drive
Diamond Wire Saw	1	-	$20m^3$/day	Optima	Diesel Generator
Diesel Generator	2	-	125kva	Powerica	Diesel
Loading Equipment					
Type	**No of Unit**	**Capacity**	**Make**	**Motive Power**	
Crawler Crane	1	855	Tata P & H	Diesel Drive	
Excavator	1	300	Tata Hitachi	Diesel Drive	
Haulage within the Mine & Transport Equipment					
Type	No of Unit	Capacity	Make	Motive Power	
Tipper	2	20 tonnes	Tata	Diesel Drive	

Approved Scheme of Period

Table 2.9: Machinery Details Proposed-P2

Drilling Equipment's					
Type	**No of Unit**	**Dia of Hole mm**	**Size capacity**	**Make**	**Motive Power**
Jack Hammer	7	32	1.2m to 6m	Atlas Copco	Compressed air
Compressor	2	-	140cfm/400psi	Atlas Copco	Diesel drive
Diamond Wire Saw	3	-	$20m^3$/day	Optima	Diesel Generator
Diesel Generator	2	-	125kva	Powerica	Diesel
Wagon Drill	1	32	60 HP	Alimake	Diesel
Loading Equipment					
Type	**No of Unit**	**Capacity**	**Make**	**Motive Power**	
Derrick Crane	1	855	Tata P & H	Diesel Drive	
Excavator	2	300	Tata Hitachi	Diesel Drive	
Haulage within the Mine & Transport Equipment					
Type	No of Unit	Capacity	Make	Motive Power	

Tipper	2	20 tonnes	Tata	Diesel Drive

Approved Scheme of Period

Table 2.10: Machinery Details Proposed-P3

Drilling Equipment's					
Type	**No of Unit**	**Dia of Hole mm**	**Size capacity**	**Make**	**Motive Power**
Jack Hammer	7	32	1.2m to 6m	Atlas Copco	Compressed air
Compressor	2	-	140cfm/400psi	Atlas Copco	Diesel drive
Diamond Wire Saw	3	-	$20m^3$/day	Optima	Diesel Generator
Diesel Generator	2	-	125kva	Powerica	Diesel
Wagon Drill	1	32	60 HP	Alimake	Diesel
Loading Equipment					
Type	**No of Unit**	**Capacity**	**Make**	**Motive Power**	
Crawler Crane	1	855	Tata P & H	Diesel Drive	
Excavator	2	300	Tata Hitachi	Diesel Drive	
Haulage within the Mine & Transport Equipment					
Type	No of Unit	Capacity	Make	Motive Power	
Tippers	2	20 tonnes	Tata	Diesel Drive	

Approved Scheme of Period

2.6 General Features

2.6.1 Existing Infrastructures

Infrastructures like Mine office, Temporary Rest shelters for workers, Latrine and Urinal Facilities will be constructed as per the Mine Rule after the grant of quarry lease.

2.6.2 Drainage Pattern

There are no streams, canals or water bodies crossing within the project area, hence there is no requirement of stream or canals diversion.

2.6.3 Traffic Density

The traffic survey conducted based on the transportation route of material, the Granite will be transported mainly through the identify the traffic route.

Traffic density measurements were performed at Two locations

TS-1- Edappadi Road 3.2km -NE

TS-2- Edappadi to Sankari Road- 3.0km- SE.

Traffic density measurement were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., Heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station during each shift- one person on either direction for counting the traffic. At the end of each hour, fresh counting and recording was undertaken.

Figure. 2.12: Mineral Transportation Route Map

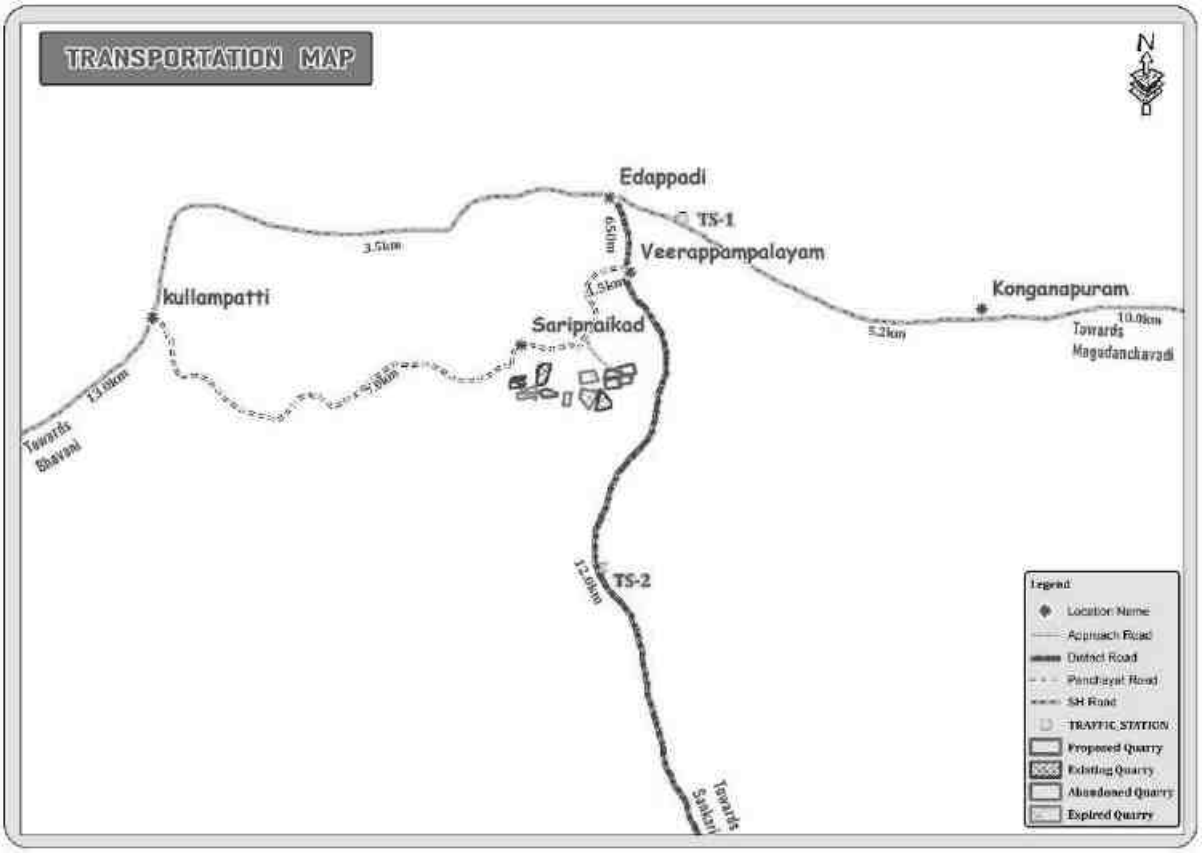


Table.2.9: Traffic Survey Locations

Station Code	Road Name	Distance and Direction	Type of Road
TS1	Edappadi Road	3.2 km NE	SH Road
TS2	Edappadi to Sankari	3.0km -SE	District Road

Source: On-site monitoring by GEMS FAE & TM

Table 2.10: Existing Traffic Volume

Station Code	HMV		LMV		2/3 Wheelers		Total PCU
	Number	PCU	Number	PCU	Number	PCU	
TS1	150	450	200	200	300	150	800
TS2	100	300	100	100	350	175	575

Source: On-site monitoring by GEMS FAE & TM

* PCU conversion factor: HMV (Trucks and Bus) = 3, LMV (Car, Jeep and Auto) = 1 and 2/3 Wheelers = 0.5

Table 2.11: Granite Hourly Transportation Requirement

Transportation of Granite per day		
Capacity of Trucks	**No of trips per day**	**Volume in PCU**
20Ts	9	27

Source: Data analysed from Approved Mining plan

Table 2.12: Summary of Traffic Volume

Route	Existing Traffic Volume in PCU	Incremental Traffic Due to the project in PCU	Total Traffic Volume in PCU	Hourly Capacity in PCU as per IRC - 1960
Edappadi Road	800	27	827	1500
Edappadi to Sankari	575	27	602	1500

Source: On-site monitoring analysis summary by GEMS FAE & TM

Due to this project the existing traffic volume will not exceed

As per the IRC 1960 this existing village road can handle 1,200 PCU in hour and Major district road can handle 1500 PCU in hour hence there will not be any conjunction due to this proposed transportation.

2.6.4 Mineral Beneficiation and Processing

There is no proposal for the mineral processing or ore beneficiation in this project

2.7 Project Requirement – P1 to P3

2.7.1 Water Source & Requirement

Detail of water requirements in KLD as given below:

Table 2.13 Water Requirement for the Projects

Sno	*Purpose*	*Quantity Required*			*Source*
		P1	**P2**	**P3**	
1	Domestic & Drinking purpose	1.0 KLD	0.5KLD	0.5KLD	From Existing, bore wells and drinking water will be sourced from Approved Water vendors.
2	Dust Suppression	1.5 KLD	0.8KLD	0.8KLD	From Existing bore wells from nearby area
3	Green Belt	0.8 KLD	0.7KLD	0.7KLD	From Existing bore wells from nearby area
Total		**3.3 KLD**	**2.0 KLD**	**2.0 KLD**	

Source: Prefeasibility report

* Drinking water will be sourced from Approved Water Vendors

2.7.2 Power and Other Infrastructure Requirement

The project does not require power supply for the mining operations. The quarrying activity is proposed during day time only (General Shift 8 AM – 5 PM, Lunch Break 1 PM – 2 PM). Electricity for use in office and other internal infrastructure will be obtained from TNEB.

The temporary infrastructures such as Mine Office, First Aid Room, Rest Shelter etc., will be constructed within the project area before commencing the quarry operation. No workshops are proposed inside the project area hence there will not be any process effluent generation from the proposed lease area. Domestic effluent from the mine office will be discharged to septic tank and soak pit. There is no toxic effluent expected to generate in the form of solid, liquid or gaseous form hence there is no requirement of waste treatment plant.

2.7.3 Fuel Requirement -P1 to P3

High speed Diesel (HSD) will be used for mining machineries. Diesel will be brought from nearby Fuel Stations.

High speed Diesel (HSD) will be used for mining machineries. Diesel will be brought from nearby Fuel Stations.

One Hydraulic Excavator will excavate and loading into the tippers about $20m^3$/Hour

Hydraulic Excavator will consume about 16 Ltrs per hour

P1

Per hour Excavator will consume	=	16 liters / hour
Per hour Excavator will excavate	=	$10m^3$
For45,672m3(for this Scheme period)	=	45,672/10
Diesel consume 4,567 working hours	=	4,567 hours x 16 liters
	=	73,072liters of HSD for five years scheme period

The HSD (High Speed Diesel) will be obtained from nearby fuel station near the vicinity of the project site and will be transported in Fuel Barrel specified for transport of HSD (High Speed Diesel).

P2

Per hour Excavator will consume	=	16 liters / hour
Per hour Excavator will excavate	=	$10m^3$
For 1,25,220m^3 (for this Scheme period)	=	1,25,220/10
Diesel consume 12,522 working hours	=	12,522 hours x 16 liters
	=	2,00,352 liters of HSD for scheme period of five years.

P3

Per hour Excavator will consume	=	16 liters / hour
Per hour Excavator will excavate	=	$10m^3$
For 1,88,330m^3 (for this Scheme period)	=	1,88,330/10
Diesel consume 18,833 working hours	=	18,833 hours x 16 liters
	=	3,01,328 liters of HSD for scheme period of five years

Source: Prefeasibility Report

2.8 Employment Requirement: P1 to P3

The skilled, competent qualified statutory persons will be engaged for quarrying operation, preference will be given to the local community.

Table 2.14: Employment Potential -P1 to P3

S.No	Description	Numbers		
		P1	P2	P3
1	Mines Manager	1	1	1
2	Mines Foreman	1	1	1
3	Machinery Operators	3	5	5
4	Skilled labour	4	6	6
5	Semi-skilled	8	21	21
6	Unskilled	5	7	7
	Total	**22**	**41**	**41**

Source: five years scheme period Plan

2.9 Project Implementation Schedule

The commercial operation will commence after the grant of Environmental Clearance. CTO will be obtained from the Tamil Nadu State Pollution Control Board. The conditions imposed during the Environmental Clearance will be compiled before the start of mining operation.

Table 2.15 Expected time Schedule

Sl.No	Particulars	Time Schedule (in month)					Remarks if any
		1st	2nd	3rd	4th	5th	
1	Environmental Clearance						
2	Consent to operate						Production Start Period
Time line may vary; subjected to rules and regulations /& other unforeseen circumstances							

Source: Anticipated based on Timelines framed in EIA Notification & CPCB Guidelines

Table 2.16 Capital Cost Estimation-P1-P3

S.No	Description	Cost Rs.		
		P1	P2	P3
1	Project Cost	Rs. 2,44,92,382/-	Rs. 3,60,67,000/-	Rs. 4,01,47,000/-
2	EMP Cost	Rs. 3,80,000/-	Rs. 3,80,000/-	Rs. 3,80,000/-
	Total	**Rs.24,872,382/-**	**Rs.3,64,47,000/-**	**Rs.4,05,27,000/-**

Source: five years scheme period Plan

3. DESCRIPTION OF ENVIRONMENT

3.0 General

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out covering March 2023-May 2023 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by EHS 360 Labs Private Limited, – An accredited by ISO/IEC 17025:2017 (NABL) Laboratory, for the below attributes-
for the below attributes –

- Land
- Water
- Air
- Noise
- Biological
- Socio-economic status

Study Area

An area of 10 km radius (aerial distance) from the periphery of the cluster is considered for EIA study. The data collection has been used to understand the existing environment scenario around the cluster against which the potential impacts of the project can be assessed. The study area has been divided into two zones viz core zone and buffer zone where core zone is considered as cluster quarries area and buffer zone taken as 10km radius from the periphery of the Cluster quarries. Both Core zone and Buffer zone is taken as the study area.

Study Period

The baseline study was conducted during the summer season i.e., March 2023-May 2023.

Study Methodology

- The boundary coordinates were superimposed on the satellite imagery to understand the relief of the area, besides Land use pattern of the area was studied through the Bhuvan (ISRO).
- Soil samples were collected and analysed for relevant physio-chemical characteristics, exchangeable Cations, nutrients & micro nutrients etc., in order to assess the impact due to mining activities and to recommend saplings for Greenbelt development.
- Ground water samples were collected during the study period from the existing bore wells, while surface water was collected from ponds in the buffer zone. The samples were analysed for parameters necessary to determine water quality (based on IS: 10500:2012 criteria) and those which are relevant from the point of view of environmental impact of the proposed mines.
- An onsite meteorological station was setup in project area, to collect data about wind speed, wind direction, temperature, relative humidity, rainfall and general weather conditions were recorded throughout the study period.
- In order to assess the Ambient Air Quality (AAQ), samples of ambient air were collected by installation of Respiratory Dust Samplers (RDS) for Fugitive dust, PM_{10} and SO_2, NO_X with gaseous attachments & Fine Dust Samplers (FDS) for $PM_{2.5}$ and other parameters as per NAAQ norms and analysed for primary air pollutants to work out the existing status of air quality.
- The Noise level measurements were also made at various locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.
- Baseline biological studies were carried out to assess the ecology of the study area to study the existing flora and fauna pattern of the area.
- Socio-Economic survey was conducted at village and household level in the study area to understand the present socio-economic conditions and assess the extent of impact due to the proposed mining project.

The sampling methodologies for the various environmental parameters required for the study, frequency of sampling, method of samples analysis, etc., are given below Table 3.1.

Table 3.1: Monitoring Attributes and Frequency of Monitoring

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 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	PM10 PM2.5 SO2 NOX Fugitive Dust	24 hourly twice a week (March to May 2023)	8 (1 core & 7 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 Quadrate & 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.

Source: On-site monitoring/sampling by EHS 360 Labs Private Limited, in association with GEMS
* All monitoring and testing are been carried out as per the Guidelines of CPCB and MoEF & CC.

3.1 Land Environment

The main objective of this section is to provide a baseline status of the study area covering 10km radius around the proposed mine site so that temporal changes due to the mining activities on the surroundings can be assessed in future.

3.1.1 LAND USE/ LAND COVER

To study the land use pattern of the core as well as a buffer zone, land use/land cover details have been identified/ maps have been prepared in accordance with the **Standard ToR point no. 4 & 10 Stating**:
Point No. 4 All comer coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ topo sheet. topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

Point No. 10. Lard 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 should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted.

Current vintage data of Indian Remote Sensing Satellite ResourceSat1 LISSIII (False Color Composite) has been used for Land Use / Land Cover study. Satellite image has been procured from National Remote Sensing Centre, Hyderabad.

3.1.2 OBJECTIVE

The objectives of the LULC study are as follow:

- To develop the Land use & Land cover map using land coordinates of the quarry area (Core Zone) and 10 km radius from the quarry site (Buffer area).
- To Identify and mark the important Land use and Land cover features using the primary and secondary data collected.
- To evaluate the impacts on existing land use/cover features of the buffer area by the Proposed Project activities.
- To identify the mitigative measures for the sustainable use of land and to protect the buffer zone from the adverse impacts.

Technical specification of Satellite imagery Data Used:

Current vintage data of Indian Remote Sensing Satellite RESOURCESAT1 (LISS-III) digital FCC (False Color Composite) has been used for preparation of Land use/ Land cover thematic map of study area. Satellite image has been procured from National Remote Sensing Centre, Hyderabad. Survey of India Toposheet as a reference map on 1:50,000 scale has been used for preparation of base layer data like road, rail network; village for geo-referencing of satellite image.

Satellite Image - Resourcesat1-LISSIII, 23.5m Resolution

Satellite Data Source - NRSC, Hyderabad

Satellite Vintage - 14st July 2020, Swath 141km wide.

SOI Toposheet No - 58 E/ 14

Software Used - ArcGIS 10.8

The satellite image (FCC colour 3,2,1) of the buffer zone is given in 3.1
The spatial resolution and the spectral bands in which the sensor collects the remotely sensed data are two important parameters for any land use survey. Resourcesat1-LISSIII, 23m Resolution of 23.5m and a 141 km wide swath of the earth in 23.5m resolution covering wide areas the data is collected in 4 visible bands namely band number and Resolution.

TABLE 3.2: Resourcesat1-LISSIII SENSOR characteristics

Band Number	Description	Wavelength	Resolution
Band 1	Green	0.52-0.59 µm	23.5 meters
Band 2	Red	0.62-0.68 µm	23.5meters
Band 3	NIR	0.77-0.86 µm	23.5meters
Band 4	SWIR	1.55-1.70 µm	70meters

Source: NRSC, Hyderabad

3.1.3 METHODOLOGY

The land use / land cover map is prepared by adopting the interpretation techniques of the Satellite image in combination with collateral data such as Survey of India topographical maps. Image classification is done by using visual interpretation techniques and digital classification using any of the image processing software. The various activities for preparation of LULC include pre-processing, rectification, image enhancements and classifying the satellite data for assessing the change in land use land cover due to proposed developmental activities.

- Preliminary/primary data collection of the study area
- Satellite data procurement from NRSC
- Secondary data collection from authorized bodies
- Survey of India Toposheet (SOI)
- Mine Layout
- Cadastral / Khasra map
- GPS Coordinates of Lease Boundary
- Processing of satellite data using ArcGIS 10.8 and preparing the Land Use & Land cover maps (e.g. Mine area, Existing Quarries, Settlements, Agriculture land, Non agriculture land, water bodies, etc.) by Digital Image Processing (DIP) technique.
- Geo-Referencing of the Survey of India Toposheet
- Geo-Referencing of satellite Imagery with the help of Geo-Referenced Toposheets
- Enhancement of the Satellite Imagery
- Base Map layer creation (Roads, Railway, Village Names, and other Secondary data, etc.)
- Data analysis and Classification using Digital interpretation techniques.
- Ground truth studies or field Verification.
- Error fixing / Reclassification
- Final Map Generation.

The land use/Land cover Map of the buffer zone is given in 3.4(b).

Land Use Pattern of the Buffer Zone (Study area)

Details of the same are given in Table - 3.3 and the map is shown in Figure - 3.2

TABLE: 3.3 LAND USE / LAND COVER DETAILS OF STUDY AREA

S.No	CLASSIFICATION	AREA_HA	AREA_%
	BUILTUP		
1	URBAN	437.44	1.28
2	RURAL	242.52	0.71
3	MINING	538.17	1.57
	AGRICULTURAL LAND		
4	CROP LAND	22583.56	66.05
5	PLANTATION	103.63	0.30
6	FALLOW LAND	5547.96	16.23
FOREST			
7	FOREST	1917.91	5.61
	BARREN/WASTE LANDS		
8	SCRUB LAND	2350.638739	6.87
	WETLANDS/ WATER BODIES		
9	WATER BODIES/LAKE	470.08	1.37
TOTAL		34191.91	100.00

Source: Bhuvan, NRSC.

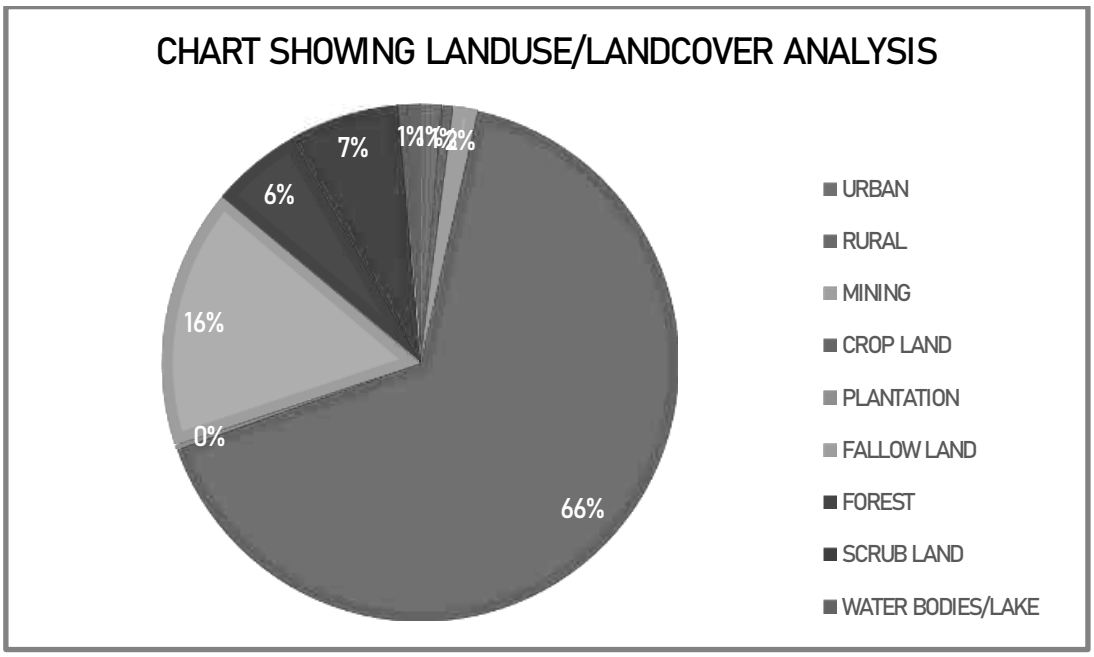


FIGURE 3.1: CHART SHOWING LANDUSE/LANDCOVER ANALYSIS USING LISS III Data

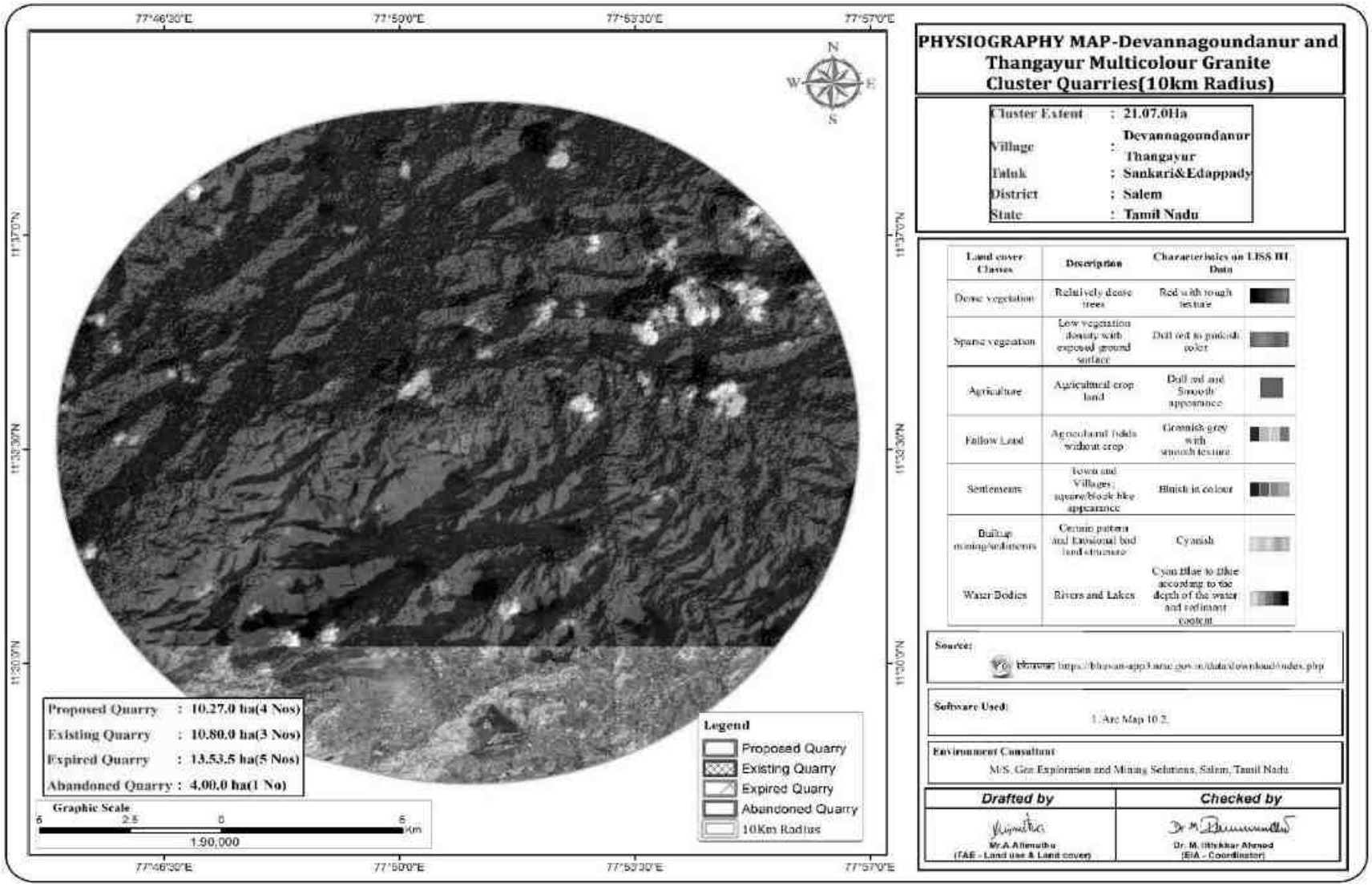
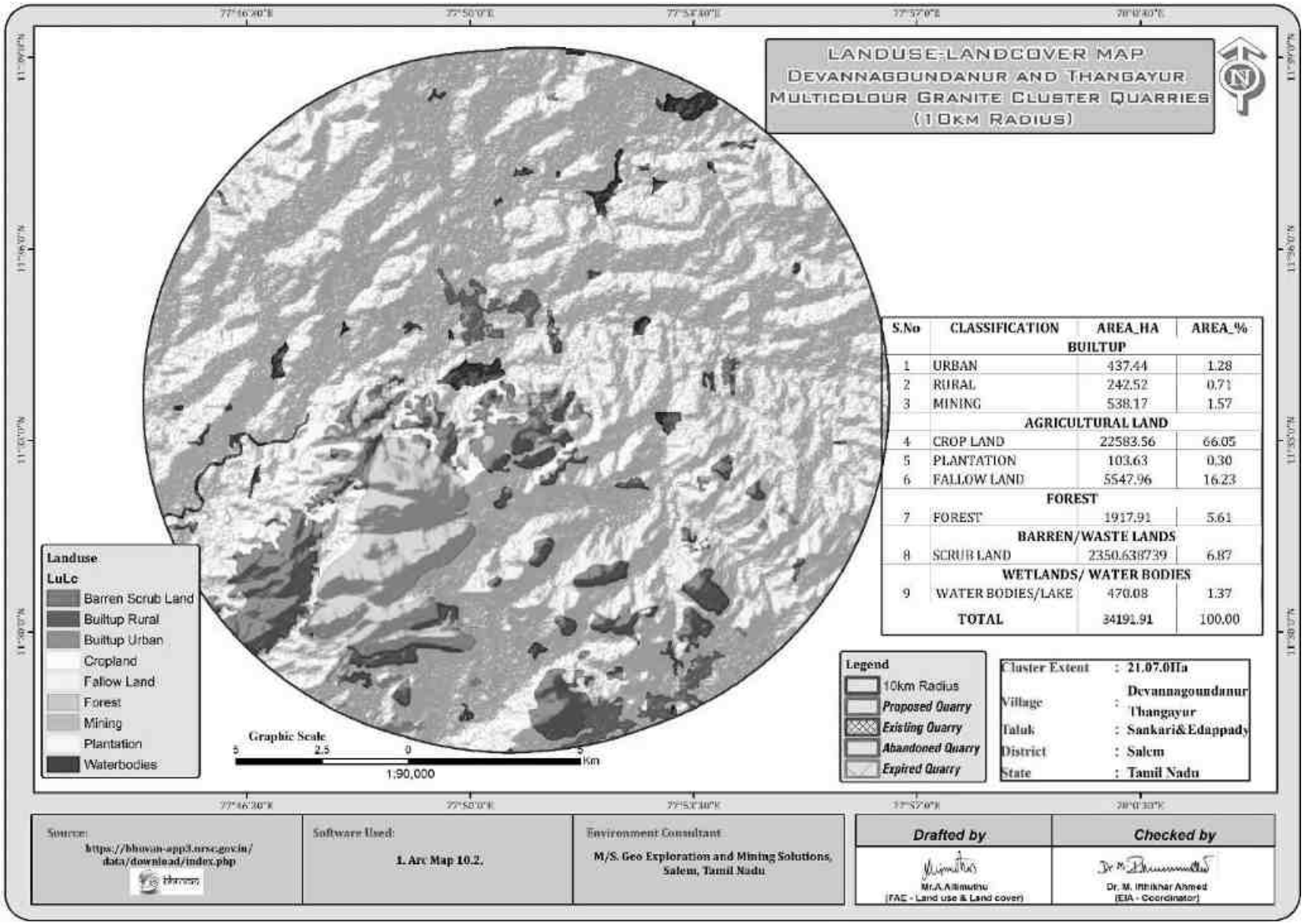


FIGURE 3.2: MAP SHOWING FALSE COLOR COMPOSITE (3,2,1) SATELLITE IMAGERY OF THE STUDY AREA



S.No	CLASSIFICATION	AREA_HA	AREA_%
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	AGRICULTURAL LAND		
4	CROP LAND	22583.56	66.05
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	FOREST		
7	FOREST	1917.91	5.61
	BARREN/WASTE LANDS		
8	SCRUB LAND	2350.638739	6.87
	WETLANDS/ WATER BODIES		
9	WATER BODIES/LAKE	470.08	1.37
	TOTAL	34191.91	100.00

FIGURE 3.3: LAND USE LAND COVER MAP 10KM RADIUS

3.1.4 Interpretation

- The 10 km radius study area mainly comprises of crop land & Agriculture Plantation land accounting of 66.05% & 0.30% of the total study area. The study area also consists of fallow land of 16.23%.
- Water Bodies such as ponds/ lakes comprises of 1.37% of the core and buffer area.
- The Scrub land accounts of 7%. As per the primary survey, it was observed the scrub land is mainly occupied by the stony waste and left-over domestic waste generated by the nearby areas.
- 1.57% of the total study area is occupied by the mine industries of captive mines. The area occupied by Mainly Multicoloue granite of the total buffer area. As also observed within the primary survey, the 10 km buffer area is also occupied by the medium scaled granite and marble and small Brick kiln industries also located in the study area.
- 2% of the area is covered under the human Settlement. The nearest village within the 2 km radius from the project site boundary is observed to be villages like Kartikad, Sarpraikad and Kunja etc.,

3.1.4.1Cropping Pattern of the Buffer Zone

Agriculture continues to be the most predominant sector of the district economy, as 30 percent of the population is engaged in Agriculture and allied activities for their livelihood. The district has as an area of 520530 Ha with net cultivated area of around 220138Ha. Salem District has all along been one of the districts in the state with a creditable performance in agricultural production with the farmers relatively more responsive and receptive to changing technologies and market forces.

In Salem District the major Horticulture Crops grown are mango, Banana, Tapioca, Tomato, Brinjal, Bhendi, Onion, Turmeric, pepper, Chillies, Coffee, Arecanut, Chrysanthaemum, Arali, Jasmine etc.., In total, about 78330 ha of area covered by various Horticulture crops in this district.

3.1.4.2 Interpretation and Conclusion

- Devannagoundanur and Thangayur Village in Multi colour granite quarries has proposed Project.
- Out of the total project area i.e.,34191 ha, 0.30% (i.e., 103.63 ha) will be developed under greenbelt development/ plantation.
- As new Proposed mine is coming in the area, percentage of human settlement will be increased in surrounding of project site and Infrastructure facilities also will be developed on the basis of requirement.
- The 10 km study area mostly covers of crop land 66.05%. As per current study 6.87% of the area is occupied by scrub land. Suriyamalai R.F area is about 5.61% in 10 km radius from the study area.
- The project site falls under the Multi colour Granite quarry region. Therefore, the area is appropriate for developing Road development and building etc., it shows that the region has good prospects in the future. Due to proposed Multi colour Granite quarry in this region, economic condition of locals is expected to be improved directly & indirectly. Hence project will prove to be the best economic proposal for the coming times.

3.1.5 TOPOGRAPHY

The lease applied area is exhibits flat terrain. The area has gentle sloping towards South western side from Salem district. The altitude of the area is 250-270m above Mean Sea level. Proposed and Existing quarry area.

3.1.5.1 Drainage Pattern of the Area

There are developed surface drainage channels in the study area. The drainage pattern of the area is dendritic it is inferred the rock-hard rock terrain.

The area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. The area is mostly dry in all seasons except rainy seasons.

During rainy season the surface runoff flows in NE to SW direction. The drainage pattern of the study area is given in Fig. 3.5. The quarrying activity will not hinder the natural flow of rainwater.

3.1.5.2 Seismic Sensitivity

The proposed project site falls in the seismic Zone II (Least active), low damage risk zone as per BMTPC, Vulnerability Atlas of Seismic zone of India IS: 1893 – 2002. The project area falls in the hard rock terrain on the peninsular shield of south India which is highly stable.

3.1.5.3 Environmental Features in the Study Area

Cauvery North Wildlife Sanctuary is situated 1.5Km South. There are no other Wildlife Sanctuaries, National Park and Archaeological monuments within cluster area. No Protected and Reserved Forest area is involved in the cluster area. Therefore, there will be no need to acquisition/diversion of forest land. The details related to the environment sensitivity around the cluster area i.e., 10km radius, are given in the below Table 3.3.s

Table 3.4: Details of Environment Sensitivity around the Cluster

No	Sensitive Ecological Features	Name	Arial Distance in km from Cluster
1	National Park / Wild life Sanctuaries	Cauvery North wild life sanctuary	Nil within 10KM Radius
2	Reserve Forest	Suriyamalai R.F.	2.5 Km -SouthWest
3	Lake Reservoir	Periya Eri	635m-NW
		Kullampatti Lake	6.5km-NW
		Channel	5.6km-W
4	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	None	Nil within 10KM Radius
5	Critically Polluted Areas	None	Nil within 10 km Radius
6	Mangroves	None	Nil within 10 km Radius
7	Mountains/Hills	None	Nil within 10 km Radius
8	Notified Archaeological Sites	None	Nil within 10 km Radius
9	Industries/ Thermal Power Plants	None	Nil within 10 km Radius
10	Defence Installation	None	Nil within 10 km Radius

Source: Survey of India Toposheet

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3.1.6 Soil Environment

Soil quality of the study area is one of the important components of the land environment. The composite soil samples were collected from the study area and analysed for different parameters. The locations of the monitoring sites are detailed in Table 3.4 and Figure 3.3.

Table 3.5: Soil Sampling Locations

S. No	Location Code	Monitoring Locations	Distance (km) and Direction	Coordinates
1	S1	Core Zone	Project Area	11°33'32.26"N 77°50'42.63"E
2	S2	Near Proposed Quarry	900m NE	11°33'45.19"N 77°51'12.73"E
3	S3	Kavadikanur	3.4km SE	11°34'28.48"N 77°50'16.49"E
4	S4	Kallampalayam	6.4km SW	11°32'19.61"N 77°47'22.54"E
5	S5	Manjakalpatti	6km South	11°30'23.86"N 77°51'49.60"E
6	S6	Vellarivalli	6.8km NW	11°35'59.31"N 77°47'38.71"E

Source: On-site monitoring/sampling by EHS 360 Labs Private Limited in association with GEMS.

FIGURE 3.6: Collection of Soil Sample

The objective of the soil sampling is -

- To determine the baseline soil characteristics of the study area;
- To determine the impact of proposed activity on soil characteristics and;
- To determine the impact on soil more importantly agriculture production point of view

Methodology –

For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the project site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. Six (6) locations were selected for soil sampling on the basis of soil types, vegetative cover, industrial & residential activities including infrastructure facilities, which would accord an overall idea of the soil characteristics. The samples were analysed for physical and chemical characteristics. The samples were sent to laboratory for analysis. The samples were filled in Polythene bags, coded and sent to laboratory for analysis and the details of methodology in respect are given in below Table 3.5.

Table 3.6: Methodology of Sampling Collection

Particulars	Details
Frequency	One grab sample from each station-once during the study period
Methodology	Composite grab samples of the topsoil were collected from 3 depths, and mixed to provide a representative sample for analysis. They were stored in airtight Polythene bags and analysed at the laboratory.

Source: On-site monitoring/sampling by EHS 360 Labs Private Limited in association with GEMS

Soil Testing Result –

The samples were analysed as per the standard methods prescribed in "Soil Chemical Analysis (M.L. Jackson, 1967) & Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India".

Figure 3.7: Soil Sampling Locations Around 10 Km Radius

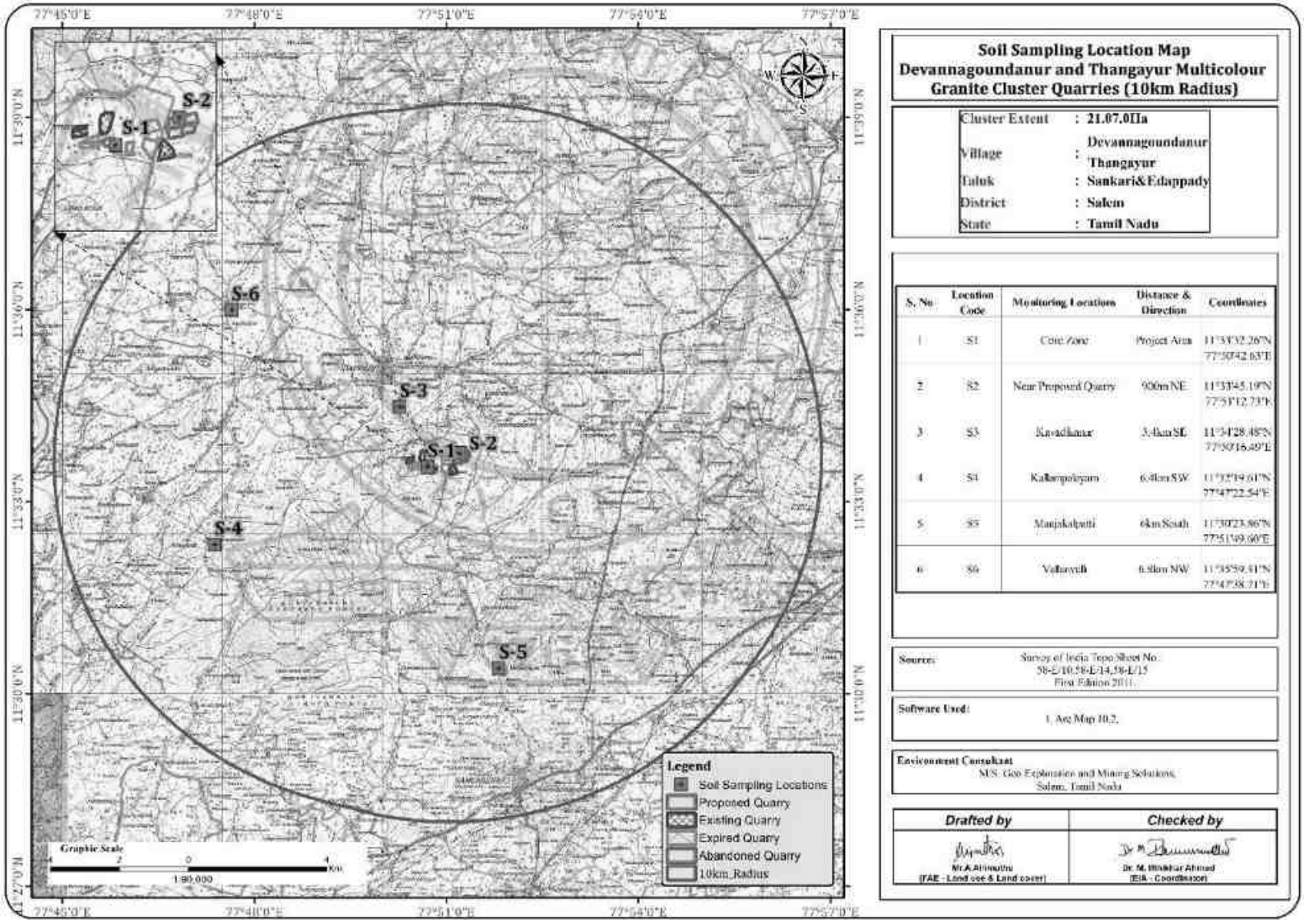


Figure 3.8: Soil Map

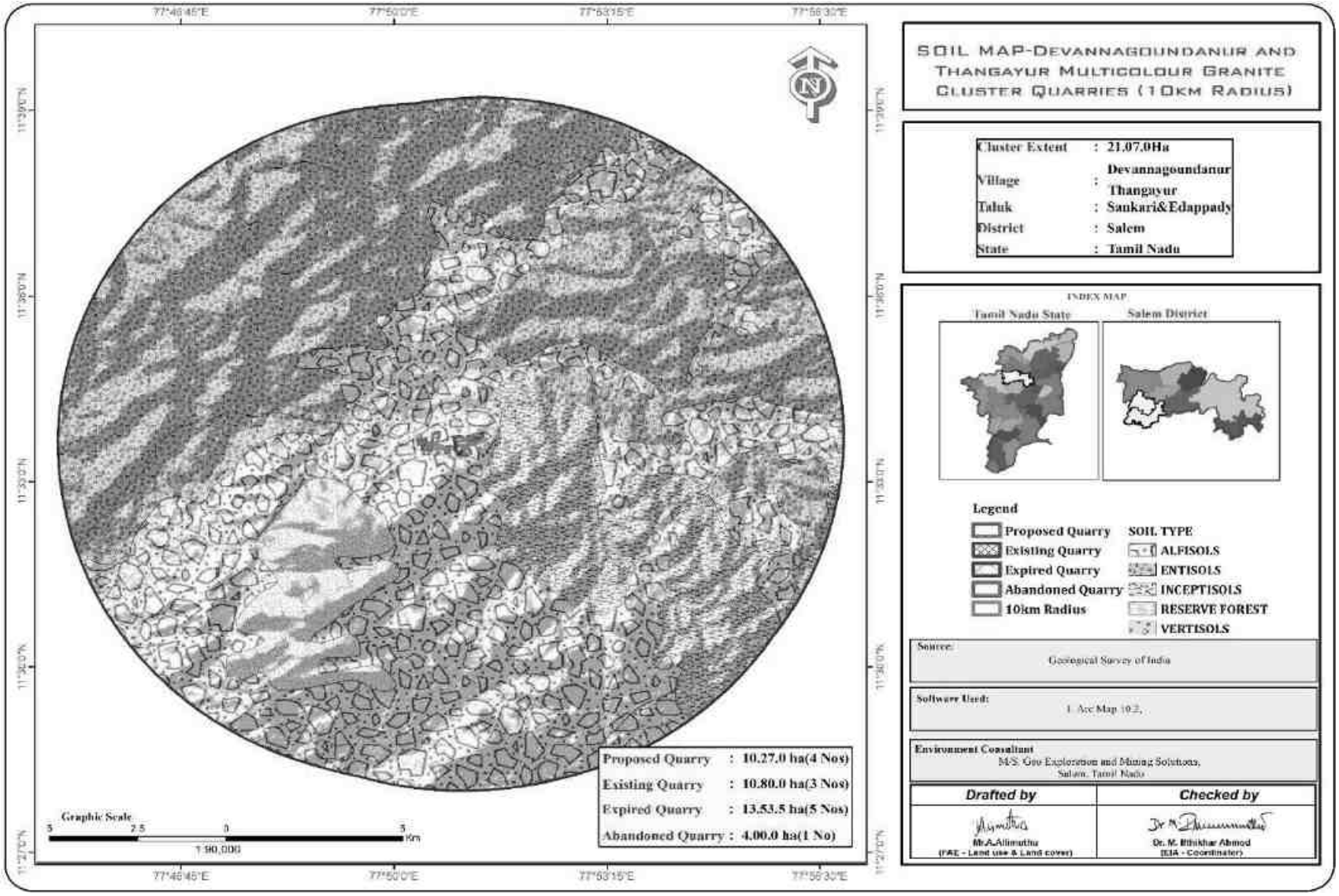


Table 3.7: Soil Quality of the Study Area

S.No	Test Parameters	Protocols	S1	S2	S3	S4	S5	S6
1	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.72	8.25	7.98	8.15	7.87	7.94
2	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	525 µmhos/cm	615 µmhos/cm	543 µmhos/cm	356 µmhos/cm	445 µmhos/cm	451 µmhos/cm
3	Water Holding Capacity	By Gravimetric Method	46.3 %	46.5 %	51.2 %	44.1. %	45.3 %	46.8 %
4	Bulk Density	By Cylindrical Method	1.08 g/cm^3	1.14 g/cm^3	1.02 g/cm^3	1.04 g/cm^3	1.09 g/cm^3	1.12 g/cm^3
5	Porosity	By Gravimetric Method	42.9 %	43.9 %	40.8 %	42 %	41.5 %	40.3 %
6	Calcium as Ca	Food and Agriculture organization of the united Nation Rome 2007 : 2018	125 mg/kg	116.2 mg/kg	103.5 mg/kg	154 mg/kg	131 mg/kg	139 mg/kg
7	Magnesium as Mg		64.8 mg/kg	65.3 mg/kg	78.1mg/kg	78.3 mg/kg	80.4 mg/kg	81.4 mg/kg
8	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	123 mg/kg	114 mg/kg	124mg/kg	89.8 mg/kg	115 mg/kg	106 mg/kg
9	Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.015 %	0.0007 %	0.014 %	0.0068 %	0.0041 %	0.0028 %
10	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	1.7 mg/kg	1.03 mg/kg	2.5 mg/kg	3.2 mg/kg	2.72 mg/kg	2.46 mg/kg
11	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	365 mg/kg	295 mg/kg	516 mg/kg	385 mg/kg	363 mg/kg	301 mg/kg
12	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.93 %	1.26%	2.6%	1.75 %	2.22 %	2.01 %
13	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.12 %	0.74 %	1.53 %	1.02 %	1.30 %	1.18 %
14	Texture :							
	Clay	Gravimetric Method	34.8 %	33.5 %	36.1 %	31.2 %	30.5 %	31.4 %
	Sand		33.6 %	34.0 %	34.8 %	29.8 %	34.1 %	33.9 %
	Silt		31.6 %	32.5 %	29.1 %	39.0 %	35.4 %	34.7 %
15	Manganese as Mn	USEPA 3050 B – 1996 &	19.6 mg/kg	27.8 mg/kg	30.3 mg/kg	25 mg/kg	19.5 mg/kg	18.2 mg/kg
16	Zinc as Zn	USEPA 6010 C - 2000	0.95 mg/kg	2.2 mg/kg	2.41 mg/kg	1.19 mg/kg	1.19 mg/kg	1.20 mg/kg
17	Boron as B		1.81 mg/kg	1.41 mg/kg	1.60 mg/kg	1.48 mg/kg	1.28 mg/kg	1.31 mg/kg
18	Potassium as K		29.5 mg/kg	19 mg/kg	37.4 mg/kg	40.3 mg/kg	30.1 mg/kg	28.3 mg/kg
19	Cadmium as Cd		BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
20	Total Chromium as Cr		BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
21	Copper as Cu		BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
22	Lead as Pb		1.02 mg/kg	0.5mg/kg	0.85 mg/kg	0.95 mg/kg	1.0 mg/kg	1.15mg/kg
23	Iron as Fe		2.43 mg/kg	2.46 mg/kg	2.61 mg/kg	1.89 mg/kg	2.27 mg/kg	1.98mg/kg
24	Cation Exchange Capacity	USEPA 9080 – 1986	34.7 meq/100g of soil	32.9 meq/100g of soil	37.3 meq/100g of soil	39.8 meq/100g of soil	40.5 meq/100g of soil	37.3 meq/100g of soil

Source: Sampling Results by EHS 360 Labs Private Limited,

Interpretation & Conclusion

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 30.5% to 36.1% and Bulk Density of Soils in the study area varied between 1.02– 1.14 g/cc. The Water Holding Capacity and Porosity of the soil samples is found to be medium i.e. ranging from 44.1 – 51.2 %. & 40.3-43.9%.

- The nature of soil is slightly alkaline to strongly alkaline with pH range 7.87 to 8.72
- The available Nitrogen content range between 295 to 516 kg/ha
- The available Phosphorus content range between 1.03 to 3.2kg/ha
- The available Potassium range between 19 to 40.3 mg/kg
- Whereas, the micronutrient as zinc (Zn) and iron (Fe) were found in the range of 0.95to 2.41 mg/kg; 1.89 to 2.61 mg/kg.

3.2 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.

3.2.1 Surface Water Resources:

The study area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. 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 freshwater for couple of months after rainy season.

Table 3.8: Water Bodies in the Buffer Zone

P1			
S.No	**LABEL**	**DISTANCE & DIRECTION**	**Habitation**
1	Periya Eri	880m NW	600m NW
2	Odai	1km NE	
3	Odai	1km SW	
4	Sarabanga River	1.2km SW	
5	Chetti Eri	1.4km NE	
6	Achampalli Eri	4km East	
7	Canal	5km SW	
8	Kondayampalayam Eri	5.8km NE	
9	Eri	9.5km NE	

P2			
S.No	**LABEL**	**DISTANCE & DIRECTION**	**Habitation**
1	Odai	500m North	660m NW
2	Chetti Eri	580m NE	
3	Periya Eri	1.4km NW	
4	Sarabanga River	1.5km NW	
5	Odai	2km SW	
6	Achampalli Eri	3km SE	
7	Kondayampalayam Eri	5.3km NE	
8	Canal	6km SW	
9	Eri	8.5km NE	

P3			
S.No	**LABEL**	**DISTANCE & DIRECTION**	**Habitation**
1	Chetti Eri	410m NE	660m NW
2	Odai	470m North	
3	Periya Eri	1.5km NW	
4	Sarabanga River	1.5km NW	
5	Odai	2km SW	
6	Achampalli Eri	2.8km SE	
7	Kondayampalayam Eri	5.2km NE	
8	Canal	6.2km SW	
9	Eri	8.5km NE	

Source: Survey of India Toposheet

3.2.3 Methodology

Reconnaissance survey was undertaken and monitoring locations were finalized based on;

- Drainage pattern;
- Location of Residential areas representing different activities/likely impact areas; and
- Likely areas, which can represent baseline conditions

Two (2) surface water and four (4) ground water samples were collected from the study area and were analysed for physio-chemical, heavy metals and bacteriological parameters in order to assess the effect of mining and other activities on surface and ground water. The samples were analysed as per the procedures specified by CPCB, IS-10500:2012 and 'Standard methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). The water sampling locations are given in Table 3.8 and shown as Figure 3.5.

Table 3.9: Water Sampling Locations

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	SW1	Periya Eri	2km NW	11°33'52.95"N 77°49'29.60"E
2	SW2	Achampalli Eri	4km SE	11°33'24.75"N 77°52'56.30"E
3	WW-1	Near Project Area	420m NE	11°33'46.64"N 77°50'48.36"E
4	WW-2	Manjakalpatti	6km South	11°30'23.21"N 77°51'55.78"E
5	BW-1	Kavadikanur	3.4km SE	11°34'27.05"N 77°50'18.44"E
6	BW-2	Vellarivalli	6.8km NW	11°35'57.68"N 77°47'36.44"E

Source: On-site monitoring/sampling by EHS 360 Labs Private Limited in association with GEMS.

Figure 3.9: Collection of Water Sample

Table 3.10: Ground Water Sampling Results

S.NO	Parameter	Unit	WW1	WW2	BW1	BW2
1	Color	Hazen	< 5	< 5	5	5
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable
3	pH@ 25ºC	-	7.15	7.27	7.68	7.45
4	Electrical Conductivity	µs/cm	775 µmhos/cm	769 µmhos/cm	988 µmhos/cm	904 µmhos/cm
5	Turbidity	NTU	1.0 NTU	1.0 NTU	2.5 NTU	1.56 NTU
6	Total Dissolved Solids	mg /l	498 mg/l	474 mg/l	628 mg/l	569 mg/l
7	Total Hardness as $CaCO_3$	mg/l	112.4 mg/l	135.7 mg/l	155.7 mg/l	149.8 mg/l
8	Calcium as Ca	mg/l	22.7 mg/l	26.6 mg/l	34.6 mg/l	29.6mg/l
9	Magnesium as Mg	mg/l	13.5 mg/l	16.8 mg/l	21.4 mg/l	18.4 mg/l
10	Total Alkalinity	mg/l	118.2 mg/l	124.6 mg/l	128 mg/l	134.5 mg/l
11	Chloride as Cl^-	mg/l	94.6 mg/l	92.0 mg/l	108.4 mg/l	86.6 mg/l
12	Sulphate as SO_4^-	mg/l	21.8 mg/l	30.6 mg/l	32.8 mg/l	28.4 mg/l
13	Iron as Fe	mg/l	0.12 mg/l	0.15 mg/l	0.24 mg/l	0.20 mg/l
14	Free Residual Chlorine	mg/l	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)
15	Fluoride as F	mg/l	0.19 mg/l	0.20 mg/l	0.35 mg/l	0.20 mg/l
16	Nitrates as NO_3	mg/l	6.4 mg/l	6.8 mg/l	4.8mg/l	5.2 mg/l
17	Copper as Cu	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
18	Manganese as Mn	mg/l	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
19	Mercury as Hg	mg/l	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
20	Cadmium as Cd	mg/l	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)
21	Selenium as Se	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
22	Aluminium as Al	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
23	Lead as Pb	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
24	Zinc as Zn	mg/l	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
25	Total Chromium	mg/l	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)
26	Boron as B	mg/l	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
27	Mineral Oil	mg/l	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)
28	Phenolic Compunds	mg/l	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
29	Anionic Detergents	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
30	Cynaide as CN	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
31	Total Coliform	Per 100ml	110 MPN/100ml	130 MPN/100ml	140 MPN/100ml	140 MPN/100ml
32	E-Coli	Per 100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml
33	Barium as Ba	mg/l	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)
34	Ammonia (as Total	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
35	Sulphide as H_2S	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
36	Molybdenum as Mo	mg/l	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
37	Total Arsenic as	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
38	Total Suspended Solids	mg/l	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)

Source: Sampling Results by EHS 360 Labs Private Limited,

Table 3.11: Surface Water Sampling Results

S.NO	Parameter	UNIT	SW1	SW2
1	Color	Hazen	10 Hazen	5 Hazen
2	Odour	-	Agreeable	Agreeable
3	pH@ 25ºC	-	7.02	7.39
4	Electrical Conductivity @ 25ºC	µs/cm	1160 µmhos/cm	1041 µmhos/cm
5	Turbidity	NTU	2.5 NTU	3.8 NTU
6	Total Dissolved Solids	mg /l	712 mg/l	596 mg/l
7	Total Hardness as $CaCO_3$	mg/l	199.5 mg/l	192.7 mg/l
8	Calcium as Ca	mg/l	34.8 mg/l	33.4 mg/l
9	Magnesium as Mg	mg/l	27.3 mg/l	26.5mg/l
10	Total Alkalinity as $CaCO_3$	mg/l	242 mg/l	215 mg/l
11	Chloride as Cl^-	mg/l	103 mg/l	112 mg/l
12	Sulphate as SO_4^-	mg/l	51..6 mg/l	47.8 mg/l
13	Iron as Fe	mg/l	0.11 mg/l	0.16 mg/l
14	Free Residual Chlorine	mg/l	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)
15	Fluoride as F	mg/l	0.25 mg/l	0.35 mg/l
16	Nitrates as NO_3	mg/l	6.8mg/l	12.8 mg/l
17	Copper as Cu	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
18	Manganese as Mn	mg/l	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
19	Mercury as Hg	mg/l	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
20	Cadmium as Cd	mg/l	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)
21	Selenium as Se	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
22	Aluminium as Al	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
23	Lead as Pb	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
24	Zinc as Zn	mg/l	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
25	Total Chromium	mg/l	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)
26	Boron as B	mg/l	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
27	Mineral Oil	mg/l	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)
28	Phenolic Compunds as	mg/l	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
29	Anionic Detergents as	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
30	Cynaide as CN	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
31	Biological Oxygen	mg/l	5.8 mg/l	8.9 mg/l
32	Chemical Oxygen	mg/l	38 mg/l	37 mg/l
33	Dissolved Oxygen	mg/l	4.7 mg/l	5.8 mg/l
34	Total Coliform	Per 100ml	653 MPN/100ml	510 MPN/100ml
35	E-Coli	Per 100ml	65 MPN/100ml	94 MPN/100ml
36	Barium as Ba	mg/l	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)
37	Ammonia-n (as Total	mg/l	1.5 mg/l	1.46 mg/l
38	Sulphide as H_2S	mg/l	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
39	Molybdenum as Mo	mg/l	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
40	Total Arsenic as As	mg/l	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
41	Total Suspended Solids	mg/l	9.8 mg/l	11.6 mg/l

3.2.4 Interpretation & Conclusion

Surface Water

Ph:

The pH varied from 7.02 to 7.39 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 596 to 712 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

Chloride varied between 103mg/l and 112 mg/l. Nitrates varied from 6.8 to 12.8 mg/l, while sulphates varied from 47.8 to 51.6 mg/l.

Ground Water

The pH of the water samples collected ranged from 7.15 to 7.68 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. Total Dissolved Solids were found in the range of 474-628 mg/l in all samples. Total hardness varied between 112.4-155.7mg/l. 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.

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by hard rock formation fissured and fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-80 Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth above 38m. The maximum depth proposed out of proposed projects is 47 m BGL for the entire period. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area. There is no necessity of stream, channel diversion due to these proposed projects.

During the rainy season there is a possibility of collection of seepage water from the subsurface levels this is due to the high intensity of fracture and weathered portion up to a depth of 40m thus the collected seepage water will be stored in the mine sump pits and will be used for dust suppression and greenbelt development and during the end of the life of the mine this collected water will act as a temporary reservoir.

3.2.6 Ground Water Resources:

Salem district is underlain entirely by Archaean Crystalline formations with Recent alluvial deposits occurring along the river and streams courses and colluvium of valley-fills. The important aquifer systems in the district are constituted by weathered, fissured and fractured crystalline rocks and the recent alluvial deposits. Ground water occurs under phreatic conditions. The maximum saturated thickness of these aquifers is upto 5 m depending upon the topographic conditions. The study area falls in the Devanagoundanur which is categorized as Safe (< 70%) as per G.O (MS) No 113 dated 09.06.2016.

There are Eight open wells and Nine Bore wells within the radius of 1km Most of the wells are almost in dry conditions: - The details of the well and depth in monsoon and non-monsoon is described below:

Table 3.12: Details of Borewell & Water Level In 1km Radius

S.No	Name	LONGITUDE	LATITUDE	Mar-23	Apr-23	May-23
1	BW1	77° 50' 47.63"E	11° 33' 43.88"N	58.5	59.1	59.7
2	BW2	77° 50' 53.03"E	11° 34' 02.10"N	58.8	59.4	60
3	BW3	77° 51' 08.61"E	11° 34' 16.26"N	59	59.6	60.2
4	BW4	77° 51' 35.44"E	11° 33' 45.52"N	59.5	60.1	60.7
5	BW5	77° 51' 43.70"E	11° 33' 14.87"N	58	58.6	59.2
6	BW6	77° 51' 01.99"E	11° 33' 09.30"N	59.2	59.8	60.4
7	BW7	77° 51' 12.67"E	11° 32' 52.09"N	59.4	60	60.6
8	BW8	77° 49' 58.59"E	11° 33' 37.27"N	58.6	59.2	59.8
9	BW9	77° 49' 51.09"E	11° 33' 42.19"N	58.2	58.8	59.4

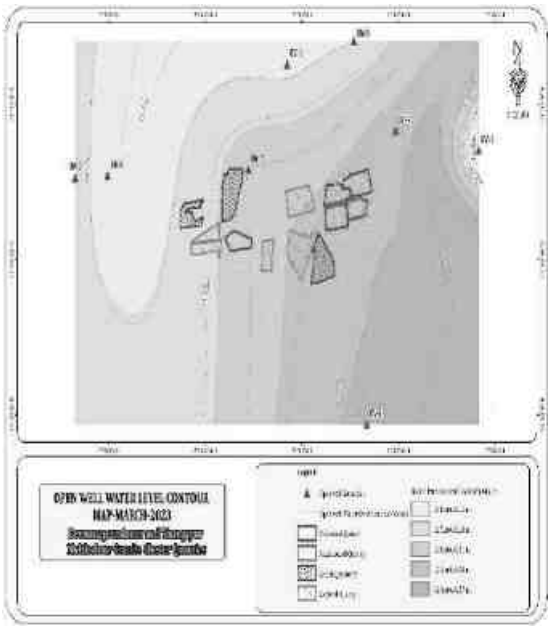
Source: Data obtained by the FAE & Team Members

Table 3.13: Details of Open well & Water Level in 1km Radius

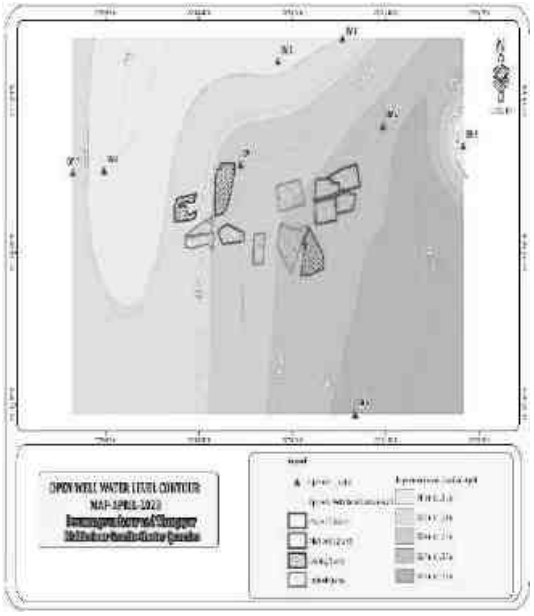
S.No	LABEL	LONGITUDE	LATITUDE	Mar-23	Apr-23	May-23
1	OW1	77° 50' 43.32"E	11° 33' 47.34"N	12	12.6	13.2
2	OW2	77° 50' 55.36"E	11° 34' 07.74"N	11.5	12.1	12.7
3	OW3	77° 51' 16.12"E	11° 34' 12.22"N	11.6	12.2	12.8
4	OW4	77° 51' 29.07"E	11° 33' 54.92"N	12.3	12.9	13.5
5	OW5	77° 51' 54.86"E	11° 33' 51.05"N	11	11.6	12.2
6	OW6	77° 51' 20.12"E	11° 32' 58.16"N	12.5	13.1	13.7
7	OW7	77° 49' 49.54"E	11° 33' 45.75"N	11.8	12.4	13
8	OW8	77° 49' 59.54"E	11° 33' 46.17"N	11.4	12	12.6

Figure 3.10: Post Monsoon Water Level of Open Well 1 Km Radius

MARCH– 2023



APRIL -2023



MAY- 2023

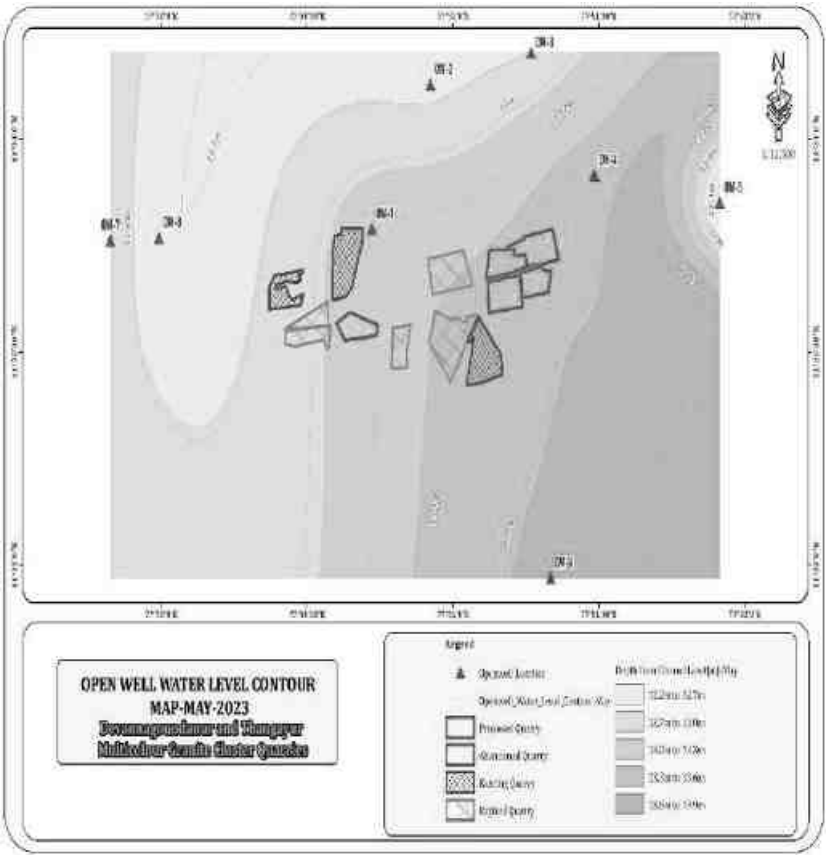
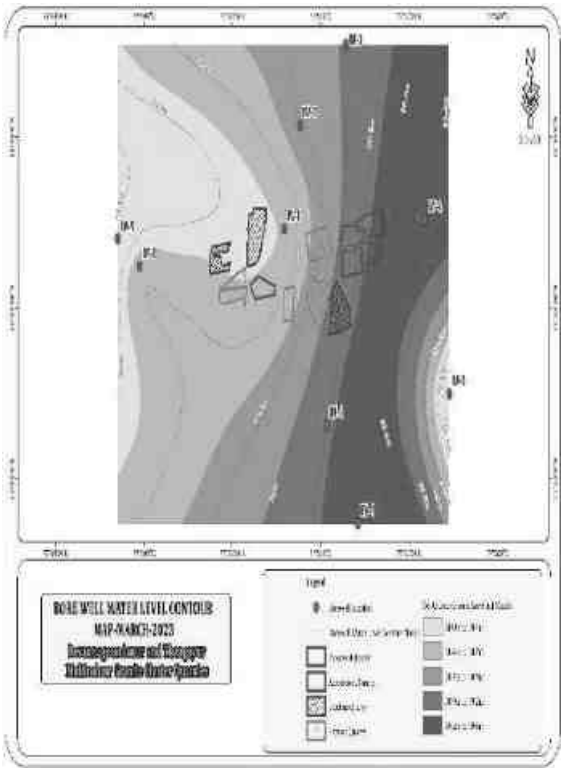
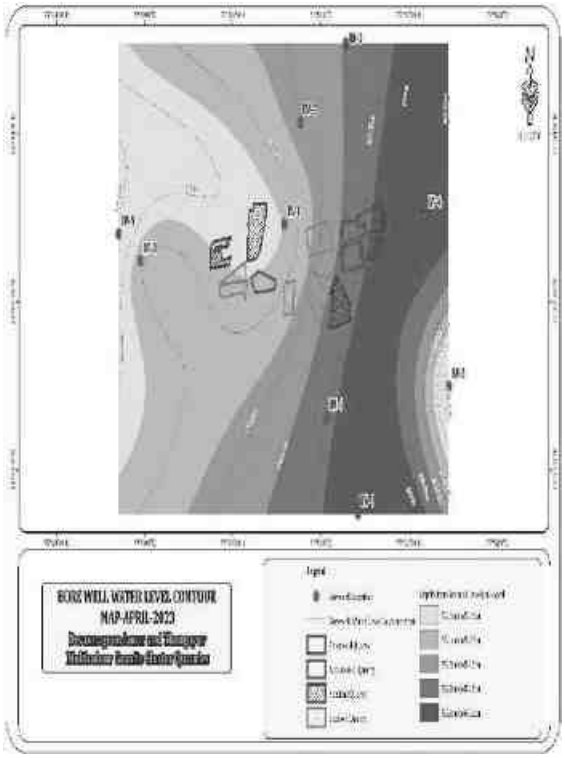


Figure 3.11: Post Monsoon Water Level of Bore Well 1 Km Radius

MARCH– 2023



APRIL- 2023



MAY 2023

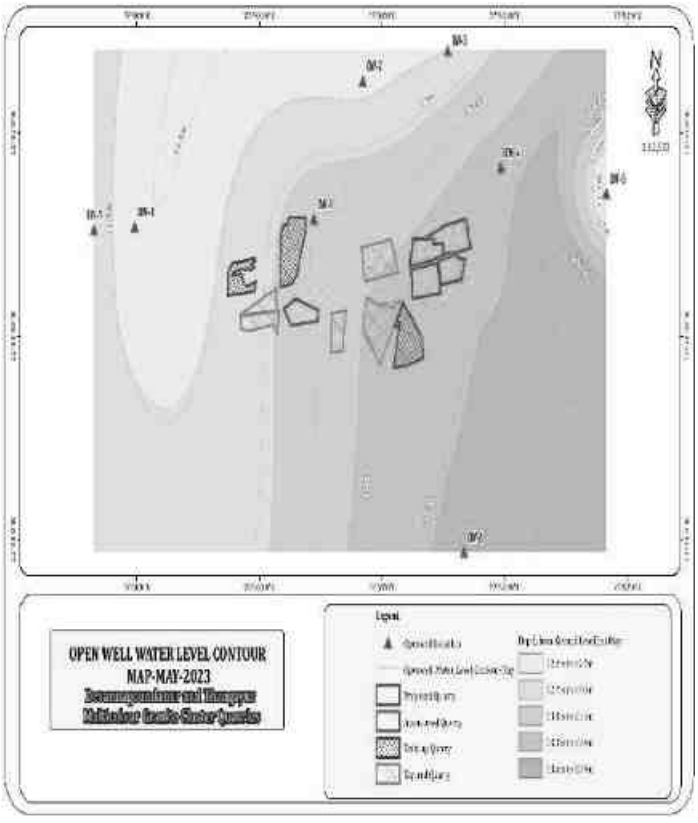


Figure 3.12: Drainage Map Around 10 Km Radius from Project Site

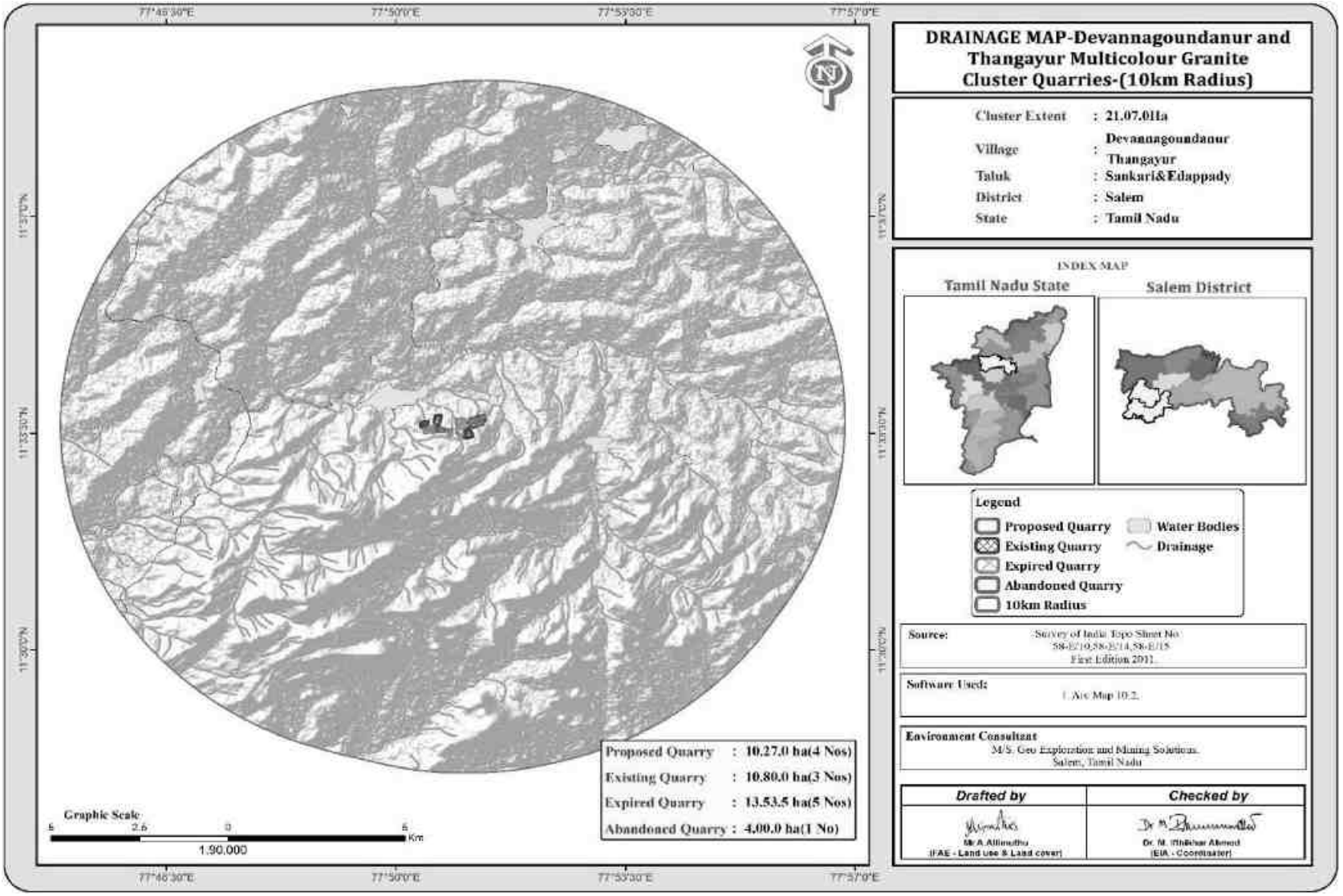
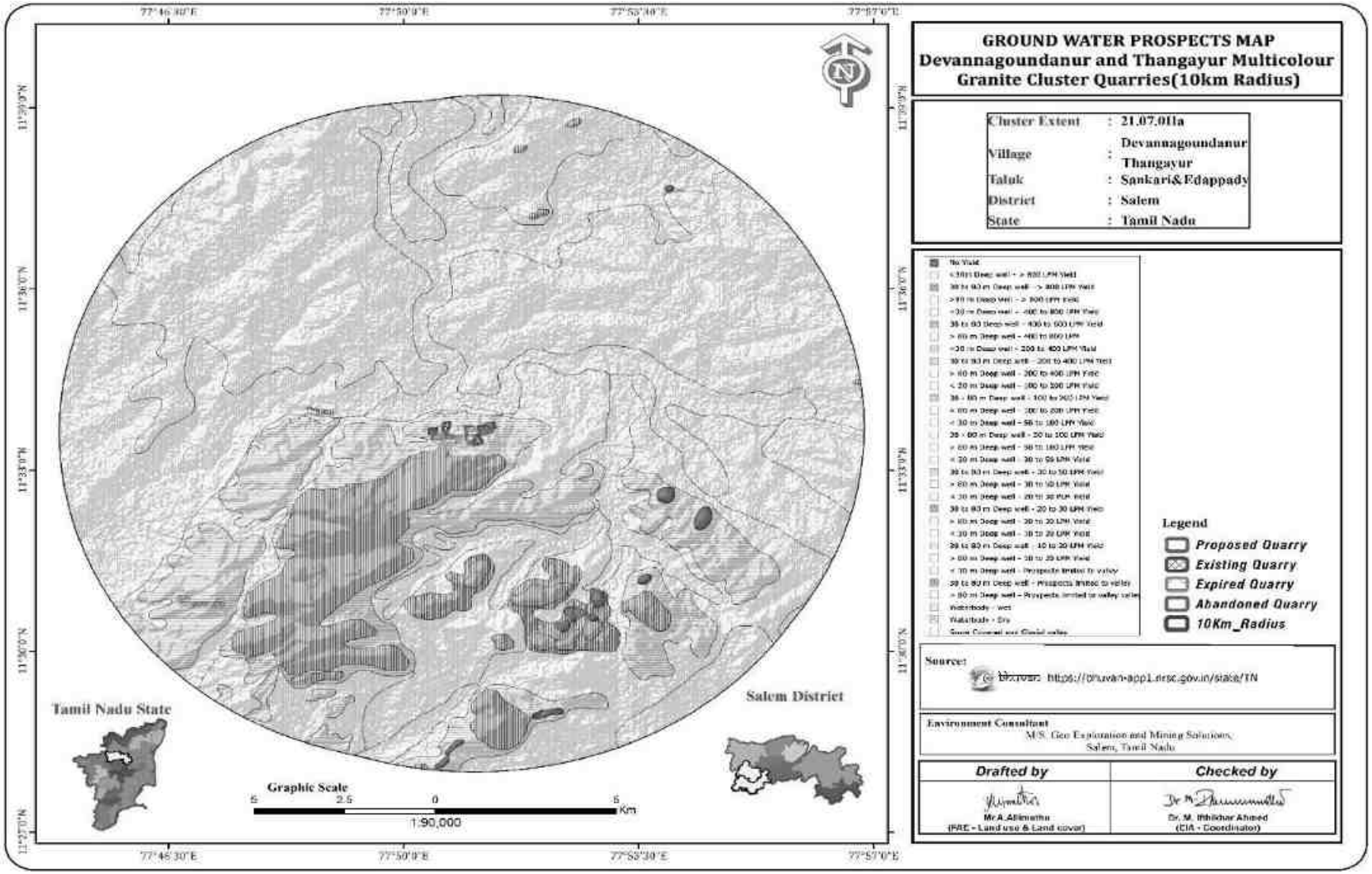


Figure 3.13: Ground Water Prospect Map



3.3 Air Environment

The existing ambient air quality of the area is important for evaluating the impact of mining activities on the ambient air quality. The baseline studies on air environment include identification of specific air 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. The sources of air pollution in the region are mostly due to vehicular traffic, dust arising from unpaved village road and domestic & agricultural activities. The prime objective of the baseline air quality study was to establish the existing ambient air quality of the study area. These will also be useful for assessing the conformity to standards of the ambient air quality during the operation of proposed projects in cluster.

This section describes the identification of sampling locations, methodology adopted during the monitoring period and sampling frequency.

3.3.1 Meteorology & Climate

Meteorology is the key to understand the Air quality. The essential relationship between meteorological condition and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

A temporary meteorological station was installed at project site by covering cluster quarries. The station was installed at a height of 3 m above the ground level in such a way that there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature are recorded on hourly basis.

Climate –

- The climate here is tropical. The summers here have a good deal of rainfall, while the winters have very little. According to the Köppen-Geiger classification, the prevailing climate in this region is categorized as Aw. The average temperature in Salem is 26.6 °C | 79.9 °F. About 968 mm | 38.1 inch of precipitation falls annually.
- The Salem is located close to the equator, making the summers difficult to define. The most popular time to visit is January, February, March, June, July, August, September, October, November, December.
- The driest month is January, with 8 mm | 0.3 inch of rain. Most of the precipitation here falls in October, averaging 182 mm | 7.2 inch.
- April is the warmest month of the year. The temperature in April averages 30.0 °C | 86.1 °F. December is the coldest month, with temperatures averaging 23.6 °C | 74.5 °F.
  https://en.climate-data.org/asia/india/tamil-nadu/salem

Rainfall

Table 3.14: Rainfall Data

Actual Rainfall in mm					Normal Rainfall in mm
2017	2018	2019	2020	2021	
1006.5	712.7	927.5	967.9	1167.6	954.8

Source: https://www.twadboard.tn.gov.in/content/salem

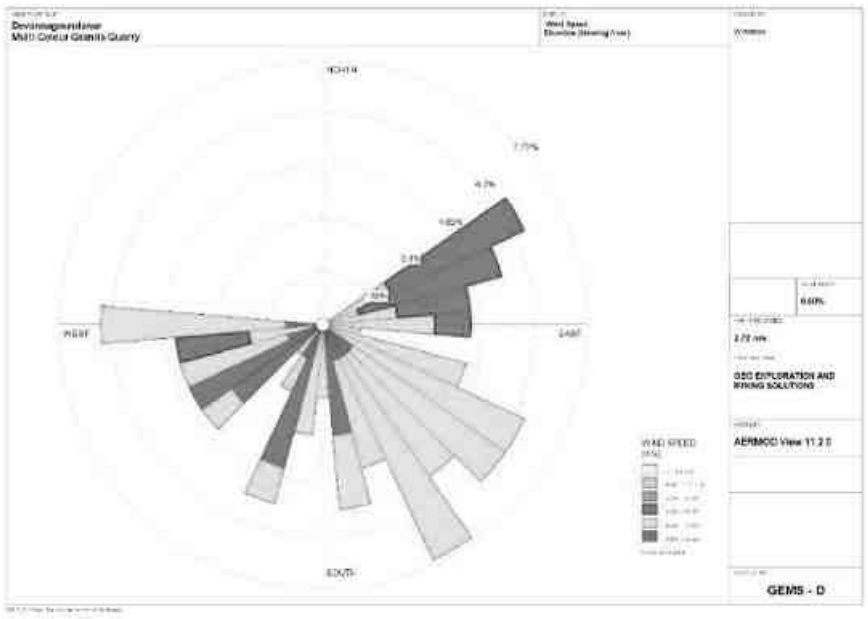
Table 3.15: Meteorological Data Recorded at Site

S.No	Parameters		Mar–2023	Apr–2023	May–2023
1	Temperature (^{0}C)	Max	31.3	34.05	30.19
		Min	25.2	29.04	25.32
		Avg	28.25	31.54	27.75
2	Relative Humidity (%)	Avg	56.65	48.78	81.12
3	Wind Speed (m/s)	Max	4.45	3.97	4.36
		Min	1.65	1.72	1.25
		Avg	3.05	2.84	2.80
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		ENE,SE	SE,ESE	W,WSW

Correlation between Secondary and Primary Data

The meteorological data collected at the site is almost similar to that of secondary data collected from IMD station. A comparison of site data generated during the three months with that of IMD,
Wind rose diagram of the study site is depicted in Figure. 3.8. Predominant downwind direction of the area during study season is North - East to South West.

Figure 3.14: Windrose Diagram



Source: Wind Rose plot view, Lake Environmental Software

In the abstract of collected data wind rose were drawn on presented in figure No.3.8 during the monitoring period in the study area

- Predominant winds were from ENE, SE, SE, ESE, W, WSW
- Wind velocity readings were recorded between 0.50 to 5.70 m/s
- Temperature readings ranging from 25.2 to 34.05 °C
- Relative humidity ranging from 48.78 to 81.12 %

3.3.2 Methodology and Objective

The prime objective of the ambient air quality study is to assess the existing air quality of study area and its conformity to NAAQS. The observed sources of air pollution in the study area are industrial, traffic and domestic activities. The baseline status of the ambient air quality has been established through a scientifically designed ambient air quality monitoring network considering the followings:

- Meteorological condition on synoptic scale;
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status;
- Location of residential areas representing different activities;
- Accessibility and power availability; etc.,

3.3.3 Sampling and Analytical Techniques

Parameter	Method	Instrument
$PM_{2.5}$	Gravimetric Method Beta attenuation Method	Fine Particulate Sampler Make – Thermo Environmental Instruments – TEI 121
PM_{10}	Gravimetric Method Beta attenuation Method	Respirable Dust Sampler Make –Thermo Environmental Instruments – TEI 108
SO_2	IS-5182 Part II (Improved West & Gaeke method)	Respirable Dust Sampler with gaseous attachment

NO_x	IS-5182 Part II (Jacob & Hochheiser modified method)	Respirable Dust Sampler with gaseous attachment
Free Silica	NIOSH – 7601	Visible Spectrophotometry

Source: Sampling Methodology followed by Omegaa Laboratories & CPCB Notification

Table 3.16: National Ambient Air Quality Standards

Sl. No.	Pollutant	Time Weighted Average	Concentration in ambient air	
			Industrial, Residential, Rural & other areas	Ecologically Sensitive area (Notified by Central Govt.)
1	Sulphur Dioxide ($\mu g/m^3$)	Annual Avg.* 24 hours**	50.0 80.0	20.0 80.0
2	Nitrogen Dioxide ($\mu g/m^3$)	Annual Avg. 24 hours	40.0 80.0	30.0 80.0
3	Particulate matter (size less than 10µm) PM_{10} ($\mu g/m^3$)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
4	Particulate matter (size less than 2.5 µm $PM_{2.5}$ ($\mu g/m^3$)	Annual Avg. 24 hours	40.0 60.0	40.0 60.0

Source: NAAQS CPCB Notification No. B-29016/20/90/PCI-I Dated: 18th Nov 2009

*Annual Arithmetic mean of minimum 104 measurements in a year taken twice a Week 24 hourly at uniform interval
** 24 hourly / 8 hourly or 1 hourly monitored value as applicable shall be complied with 98 % of the time in a year. However, 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

3.3.4 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at seven (8) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period March to May 2023. The baseline data of ambient air has been generated for $PM_{10,}$ $PM_{2.5}$, Sulphur Dioxide (SO_2) & Nitrogen Dioxide (NO_2) Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications.

It was ensured that the equipment was placed preferably at a height of at least 3 ± 0.5m above the ground level at each monitoring station, for negating the effects of wind-blown ground dust. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results.

3.3.5 Ambient Air Quality Monitoring Stations

Eight (8) monitoring stations were set up in the study area as depicted in Figure 3.15 for assessment of the existing ambient air quality. Details of the sampling locations are as per given below.

Table 3.17: Ambient Air Quality (AAQ) Monitoring Locations

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ1	Core Zone	Project Area	11°33'32.61"N 77°50'42.69"E
2	AAQ2	Near Proposed Quarry	770m NE	11°33'43.58"N 77°51'8.01"E
3	AAQ3	Edappadi	1.7km NW	11°34'28.82"N 77°50'16.31"E
4	AAQ4	Kavadikanur	3.4km SE	11°33'20.34"N 77°52'36.20"E
5	AAQ5	Konganapuram	5.6km NE	11°34'18.74"N 77°53'44.15"E
6	AAQ6	Kallampalayam	6.4km SW	11°32'22.65"N 77°47'16.67"E
7	AAQ7	Manjakalpatti	6km South	11°30'23.66"N 77°51'52.59"E
8	AAQ8	Vellarivalli	6.8km NW	11°36'0.02"N 77°47'38.52"E

Source: On-site monitoring/sampling by EHS Laboratories in association with GEMS

Figure 3.15: Site Photographs of Ambient Air Quality Monitoring

Source: Field Photos

Figure 3.16: Ambient Air Quality Locations Around 10 Km Radius

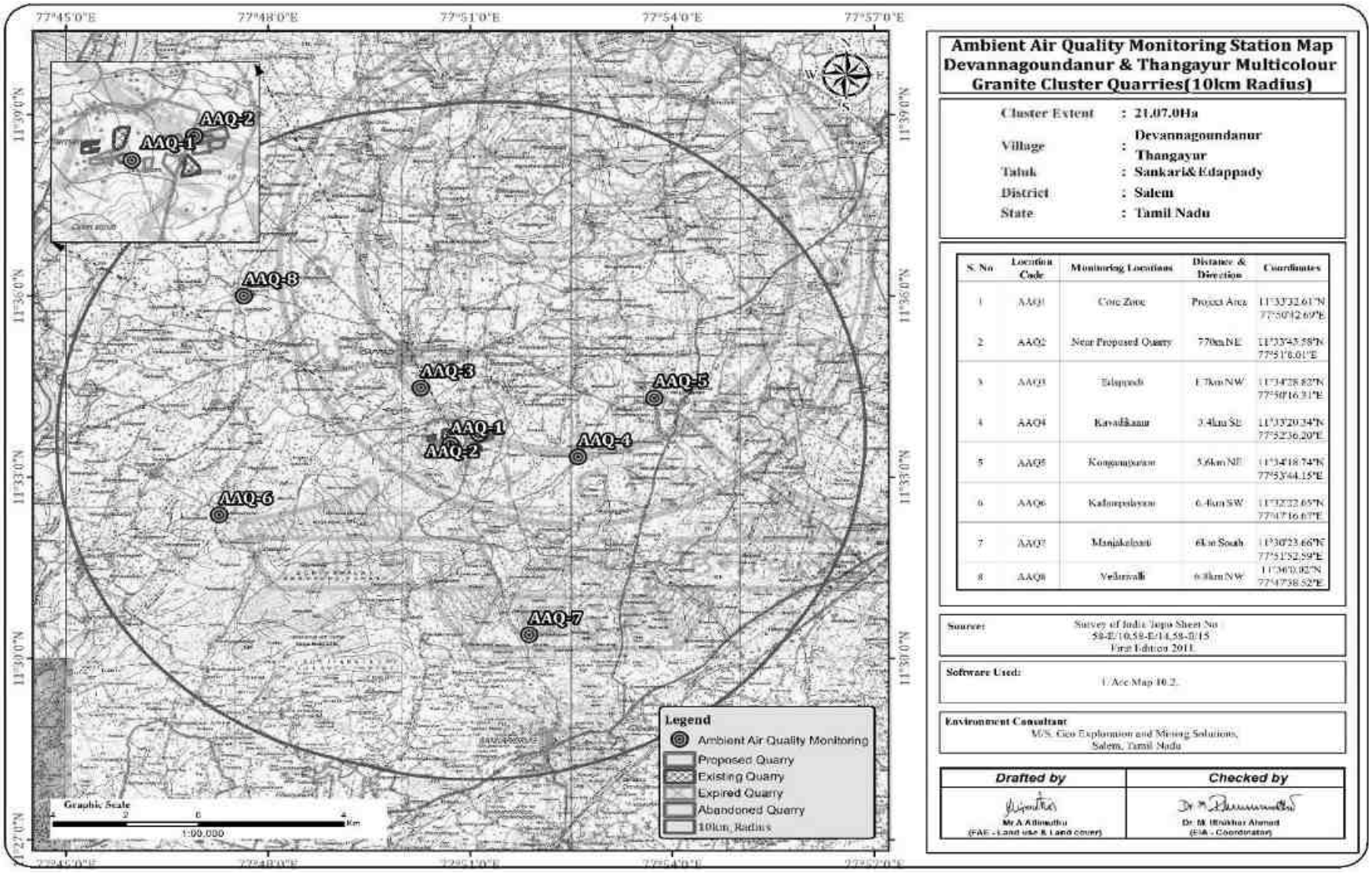


Table 3.18: AAQ1 – Core Zone

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	56.3	23.2	43.2	6.2	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	57.2	21.2	42.1	5.0	20.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	58.1	22.3	44.5	7.3	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	59.4	23.5	45.3	8.1	22.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	60.2	24.1	46.1	6.2	23.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	55.0	25.3	47.2	5.3	21.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	56.2	23.5	43.5	6.1	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	57.4	22.4	44.2	5.3	23.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	58.3	24.1	42.0	6.1	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	59.2	25.6	45.6	5.8	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	60.2	24.1	46.3	6.0	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	58.0	25.3	47.2	5.0	22.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	56.3	22.0	45.0	6.3	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	54.2	22.3	44.2	7.0	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	56.0	23.4	46.0	6.0	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	55.8	22.3	44.1	7.2	23.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	57.0	24.6	43.2	5.4	20.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	58.3	25.4	47.0	6.2	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	60.0	22.1	44.5	7.2	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	58.0	23.2	45.6	5.5	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	59.2	22.0	43.0	6.3	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	57.2	22.3	47.2	7.2	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	56.3	23.1	42.3	8.2	23.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	55.1	24.6	44.5	6.3	21.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	57.8	22.3	45.6	8.4	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	58.3	25.0	46.5	5.2	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.19: AAQ2 – Near Proposed quarry

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	62.5	25.2	46.2	6.2	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	63.1	26.3	45.0	5.8	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	60.1	27.1	47.2	7.3	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	64.2	26.2	48.0	8.2	23.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	65.3	27.3	49.3	5.2	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	65.0	25.0	46.0	6.3	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	62.3	26.3	47.2	7.1	23.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	64.1	27.2	48.3	8.2	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	63.5	25.2	49.0	6.0	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	62.5	26.3	46.3	5.3	23.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	60.0	27.1	47.2	7.2	23.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	61.2	25.3	45.0	8.3	22.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	62.5	26.0	46.2	7.0	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	63.8	27.1	47.0	8.2	23.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	64.8	26.8	46.0	6.3	21.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	65.2	27.1	48.3	7.4	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	63.2	25.3	49.2	8.2	23.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	64.3	26.2	45.1	7.0	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	65.8	27.1	46.2	6.3	22.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	64.0	25.3	48.3	7.2	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	62.3	26.1	49.1	8.5	21.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	61.5	25.0	46.2	5.5	22.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	63.0	26.3	47.3	6.3	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	64.5	27.0	48.2	5.4	20.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	65.8	27.0	47.0	7.3	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	63.0	25.4	45.0	8.2	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.20: AAQ3 – Edappadi

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	62.3	23.2	43.2	6.3	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	63.1	25.4	46.2	5.0	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	64.0	24.1	44.2	7.0	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	63.2	25.3	45.3	6.2	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	62.3	24.0	46.0	5.0	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	63.4	25.6	47.2	7.3	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	64.2	23.1	48.3	6.4	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	62.0	24.0	46.0	7.4	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	61.2	25.3	47.2	5.0	20.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	63.5	27.3	48.1	6.3	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	64.6	25.0	46.3	7.0	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	63.0	24.1	45.2	5.2	19.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	62.5	23.5	46.3	6.0	21.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	61.3	25.6	47.0	7.2	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	63.8	26.0	48.2	5.3	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	64.2	25.3	44.2	6.1	21.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	63.0	24.1	43.0	7.2	20.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	62.1	27.8	45.6	6.4	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	64.8	23.8	46.2	7.3	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	64.0	24.6	44.0	5.8	20.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	61.2	25.1	45.8	6.2	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	62.3	27.0	46.2	7.2	19.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	63.5	23.2	47.0	6.4	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	62.0	26.1	46.0	7.8	21.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	61.0	25.3	45.2	5.1	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	62.4	27.2	44.2	6.9	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.21: AAQ4 – Kavadikanur

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	64.2	23.2	43.2	5.2	20.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	62.1	24.1	42.0	6.3	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	61.0	25.1	44.3	5.1	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	64.3	23.0	45.2	7.3	20.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	66.5	25.4	46.0	6.0	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	65.0	23.1	44.2	5.2	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	64.1	24.1	43.1	6.3	19.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	65.0	25.6	46.2	7.1	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	64.2	24.0	45.1	5.0	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	66.0	25.1	47.3	6.2	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	64.2	23.5	48.2	7.2	20.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	66.3	24.1	46.2	7.3	19.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	67.0	25.2	45.2	6.0	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	66.4	24.0	43.1	5.1	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	67.5	25.3	47.2	7.4	19.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	64.2	24.6	48.3	5.3	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	65.3	25.1	47.0	6.1	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	66.4	24.8	45.3	7.3	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	67.2	25.3	46.0	6.4	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	65.0	25.8	44.0	5.0	22.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	66.3	24.6	43.2	7.0	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	64.5	25.3	44.8	6.2	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	66.8	24.1	43.5	5.4	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	67.0	26.5	46.2	7.8	20.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	65.3	24.7	47.8	6.2	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	64.2	25.1	48.2	5.4	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.22: AAQ5 – Konganapuram

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	64.2	23.1	45.2	6.2	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	63.0	22.0	44.1	7.3	18.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	62.3	23.1	46.3	8.4	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	65.1	24.1	47.2	7.0	20.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	64.2	23.6	43.2	6.8	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	66.2	24.0	44.1	8.3	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	63.5	23.5	45.6	6.4	18.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	64.2	22.1	46.2	7.3	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	65.1	20.0	47.1	6.8	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	63.0	23.6	44.0	7.0	21.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	62.5	24.3	45.3	8.5	22.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	64.3	20.1	46.2	6.0	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	62.0	21.1	43.0	7.3	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	66.0	24.3	44.2	8.0	22.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	65.1	22.0	45.0	6.3	18.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	63.4	23.4	46.2	7.1	19.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	64.0	20.0	44.3	6.0	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	62.3	21.4	45.1	7.4	22.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	63.4	20.3	44.0	6.5	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	62.5	24.3	44.1	7.0	22.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	63.5	20.5	45.2	6.3	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	65.0	23.6	46.3	7.1	19.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	64.2	24.5	47.2	8.4	20.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	63.8	25.2	44.5	6.2	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	64.0	22.5	46.3	7.3	21.7	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	62.5	23.4	45.2	6.5	22.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.23: AAQ6 – Kallampalayam

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	61.5	23.4	45.3	7.2	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	60.2	22.1	46.2	6.2	17.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	63.2	23.0	44.2	7.1	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	62.5	24.1	44.0	6.3	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	64.3	25.3	46.3	7.0	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	65.0	26.1	45.2	6.4	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	63.5	24.0	44.0	7.2	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	62.0	23.5	45.3	6.3	19.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	61.5	26.1	46.0	6.0	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	64.3	25.1	44.2	7.4	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	62.5	25.0	45.0	6.5	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	64.8	22.3	46.3	7.2	18.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	65.2	24.1	44.0	6.1	19.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	63.1	25.6	45.2	6.5	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	62.4	26.1	46.1	7.3	18.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	65.2	23.1	44.3	6.4	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	63.8	24.5	45.2	7.1	20.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	64.2	25.6	46.1	6.3	18.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	66.0	22.0	44.3	7.2	19.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	65.0	23.4	45.2	6.4	17.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	61.0	24.5	46.1	7.8	18.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	65.1	23.0	44.2	6.2	20.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	64.2	25.1	45.1	7.3	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	63.8	26.0	46.3	6.2	19.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	62.5	24.0	45.2	7.0	20.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	61.2	25.3	44.1	6.5	18.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.24: AAQ7 – Manjakalpatti

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	63.2	22.1	44.5	7.1	18.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	62.1	23.1	44.2	6.2	16.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	64.0	25.3	46.1	7.3	17.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	65.2	26.4	47.3	6.0	20.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	66.3	28.1	43.0	7.4	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	67.2	27.0	44.2	7.0	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	66.0	29.3	45.3	7.3	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	64.2	23.4	44.0	6.2	17.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	63.1	24.6	45.2	7.4	16.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	62.0	25.1	46.3	6.0	17.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	63.4	23.0	47.1	7.5	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	64.0	24.0	45.0	6.4	19.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	65.2	25.8	43.5	7.2	16.2	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	66.0	26.0	46.0	6.8	17.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	67.2	27.4	43.1	7.1	18.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	64.0	29.2	45.0	6.5	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	63.1	24.0	46.3	7.4	22.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	66.0	27.3	44.0	6.0	23.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	64.2	25.2	45.1	7.3	22.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	66.0	27.0	46.8	7.4	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	62.8	25.3	45.0	6.2	18.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	63.0	26.8	46.3	7.1	20.8	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	64.2	28.1	44.5	7.5	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	65.2	29.2	42.0	6.1	23.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	66.8	26.4	46.1	7.3	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	67.2	27.2	44.2	6.4	22.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.25: AAQ8 – Vellarivalli

Monitoring			Particulates, µg/m³		Gaseous Pollutants, µg/m³					Other Pollutants (Particulate Phase) , µg/m³				
Date	Period, hrs.	SPM	$PM_{2.5}$	PM_{10}	SO_2	NO_2	NH_3	O_3 (8-hly Avg.)	CO (8-hly Avg.)	Pb, µg/m³	As, ng/m³	Ni, ng/m³	C_6H_6, ng/m³	BaP, ng/m³
NAAQ Norms*		(24 hrs.)	60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2.0 (8hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)
06.03.2023	7:00-7:00	65.3	24.2	43.2	6.2	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
07.03.2023	7:15-7:15	64.2	23.0	44.0	5.0	21.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
13.03.2023	7:00-7:00	62.3	25.1	45.1	7.2	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
14.03.2023	7:15-7:15	63.8	26.3	46.0	8.0	24.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
20.03.2023	7:00-7:00	64.2	28.0	44.0	7.0	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
21.03.2023	7:15-7:15	65.3	27.3	43.2	6.3	22.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
27.03.2023	7:00-7:00	66.0	26.0	45.2	7.1	23.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
28.03.2023	7:15-7:15	67.2	24.2	42.3	8.2	21.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
03.04.2023	7:00-7:00	68.3	25.3	44.5	7.0	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
04.04.2023	7:15-7:15	66.0	26.4	45.1	6.8	24.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
10.04.2023	7:00-7:00	67.2	27.0	46.2	5.3	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
11.04.2023	7:15-7:15	65.0	28.0	45.0	6.4	22.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
17.04.2023	7:00-7:00	66.0	27.8	44.3	7.5	21.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
18.04.2023	7:15-7:15	64.3	25.3	45.0	8.0	23.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
24.04.2023	7:00-7:00	65.1	26.4	46.1	6.2	22.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
25.04.2023	7:15-7:15	68.3	24.3	44.0	7.0	23.4	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
01.05.2023	7:00-7:00	67.0	25.3	42.3	8.3	24.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
02.05.2023	7:15-7:15	64.0	27.2	45.1	5.2	22.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
08.05.2023	7:00-7:00	65.1	28.0	43.1	6.4	24.0	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
09.05.2023	7:15-7:15	63.2	26.0	45.3	7.3	23.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
15.05.2023	7:00-7:00	67.5	25.4	46.1	8.2	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
16.05.2023	7:15-7:15	66.8	26.1	44.2	7.3	22.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
22.05.2023	7:00-7:00	68.0	27.3	45.3	8.4	20.3	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
23.05.2023	7:15-7:15	65.2	28.3	43.1	6.2	21.5	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
29.05.2023	7:00-7:00	64.0	26.4	45.0	7.3	23.6	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5
30.05.2023	7:15-7:15	65.2	27.5	46.2	8.4	24.1	<5	<5	<1.0	<0.01	<5	<3	<1.0	<0.5

Table 3.26: Abstract of Ambient Air Quality Data

1	**Parameter**	**PM2.5**	**PM10**	**SO_2**	**NO_2**
2	No. of Observations	260	260	260	260
3	10^{th} Percentile Value	22.3	43.2	5.3	18.3
4	20^{th} Percentile Value	23.2	44.1	6.0	19.3
5	30^{th} Percentile Value	24.0	44.4	6.2	20.2
6	40^{th} Percentile Value	24.3	45.1	6.3	20.5
7	50^{th} Percentile Value	25.1	45.3	6.5	21.2
8	60^{th} Percentile Value	25.3	46.0	7.0	21.4
9	70^{th} Percentile Value	25.8	46.2	7.2	22.3
10	80^{th} Percentile Value	26.4	46.3	7.3	22.5
11	90^{th} Percentile Value	27.2	47.3	8.0	23.5
12	95^{th} Percentile Value	28.0	48.3	8.3	23.6
13	98^{th} Percentile Value	29.2	49.1	8.4	24.1
14	Arithmetic Mean	25.5	45.9	7.0	21.5
15	Geometric Mean	25.4	45.9	6.9	21.5
16	Standard Deviation	2.1	1.8	1.0	1.9
17	Minimum	22.3	43.2	5.3	18.3
18	Maximum	29.2	49.1	8.4	24.1
19	**NAAQ Norms***	**100.0**	**60.0**	**80.0**	**80.0**
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

Legend: $PM_{2.5}$-Particulate Matter size less than 2.5 µm; PM_{10}-Respirable Particulate Matter size less than 10 µm; SO_2-Sulphur dioxide; NO_2-Nitrogen Dioxide; CO-Carbon monoxide; O_3-Ozone; NH_3-Ammonia; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; C_6H_6-Benzene & BaP- Benzo (a) pyrene in particulate phase levels were monitored below their respective detectable limits.

* NAAQ Norms-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Area.

Table 3.27: Summary of Ambient Air Quality Data (AAQ1-AAQ8)

PM2.5	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	23.4	26.2	25.0	24.6	22.7	22.7	26.0	26.2
Minimum	21.2	25.0	23.1	23.0	20.0	22.0	22.1	23.0
Maximum	25.6	27.3	27.8	26.5	25.2	26.1	29.3	28.3
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	44.8	47.1	45.9	45.4	22.7	24.3	45.0	44.6
Minimum	42.0	45.0	43.0	42.0	43.0	44.0	42.0	42.3
Maximum	47.2	49.3	48.3	48.3	47.2	46.3	47.3	46.2
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
NO2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	22.2	22.3	20.4	20.5	20.6	19.0	19.9	22.6
Minimum	20.0	20.4	19.0	19.0	18.0	17.0	16.2	20.3
Maximum	23.6	23.6	21.6	22.6	22.6	20.5	23.5	24.5
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

SO2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	6.3	6.9	6.3	6.2	7.1	6.7	6.9	7.0
Minimum	5.0	5.2	5.0	5.0	6.0	6.0	6.0	5.0
Maximum	8.4	8.5	7.8	7.8	8.5	7.8	7.5	8.4
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

FIGURE 3.17: BAR DIAGRAM OF SUMMARY OF AIR QUALITY MODEL(AAQ1-AAQ8)

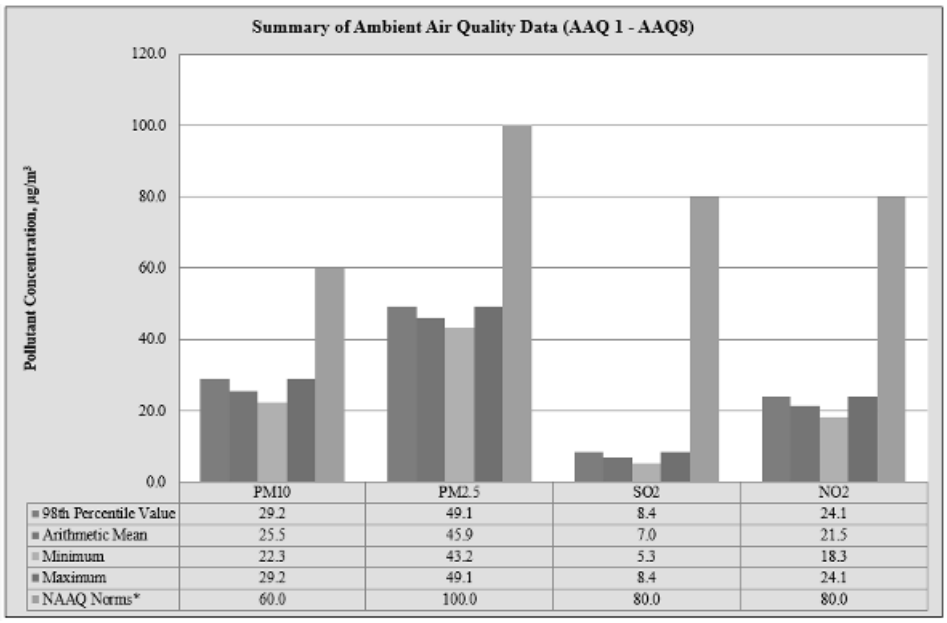


FIGURE 3.17-A : BAR DIAGRAM OF PARTICULATE MATTER (PM2.5)

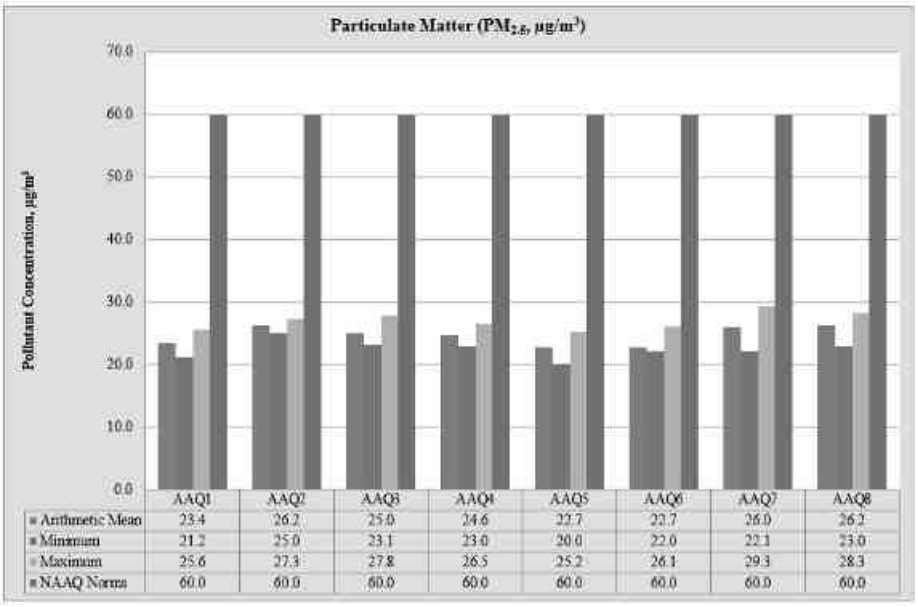
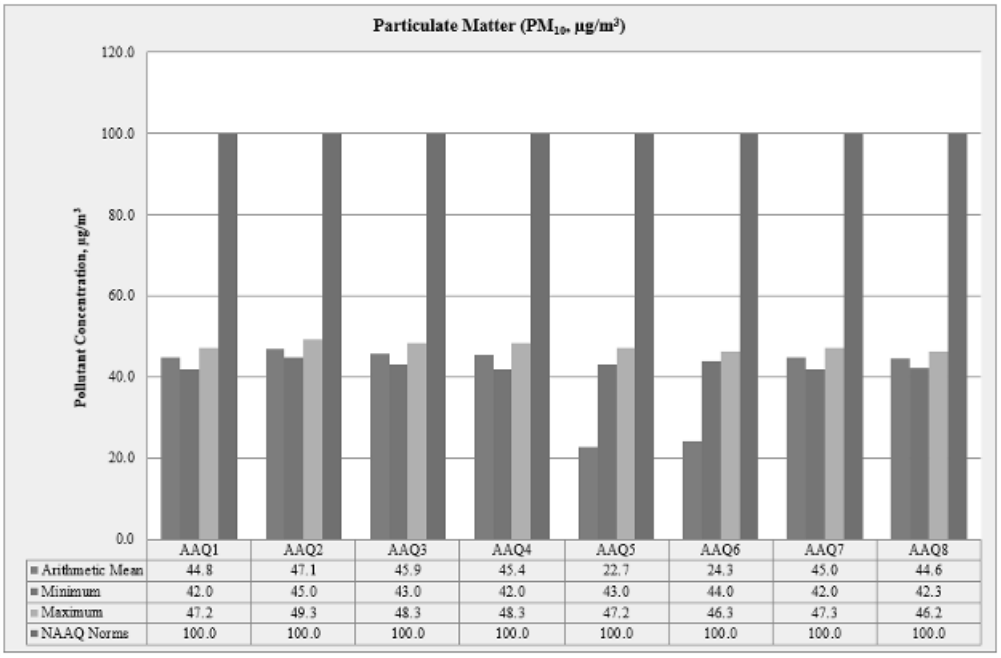
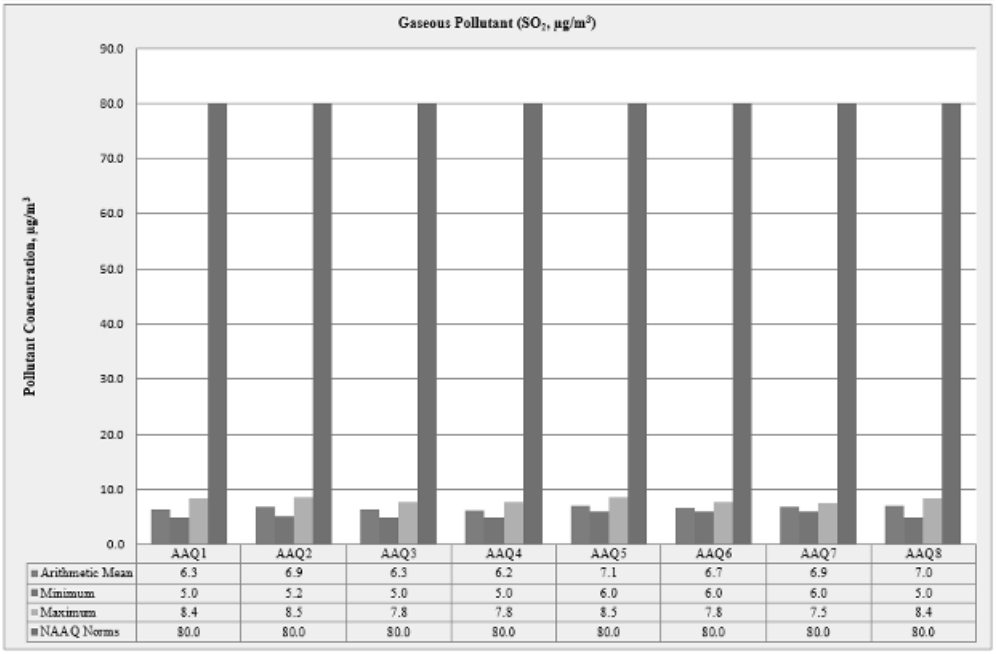


FIGURE 3.17-B: BAR DIAGRAM OF PARTICULATE MATTER (PM_{10})



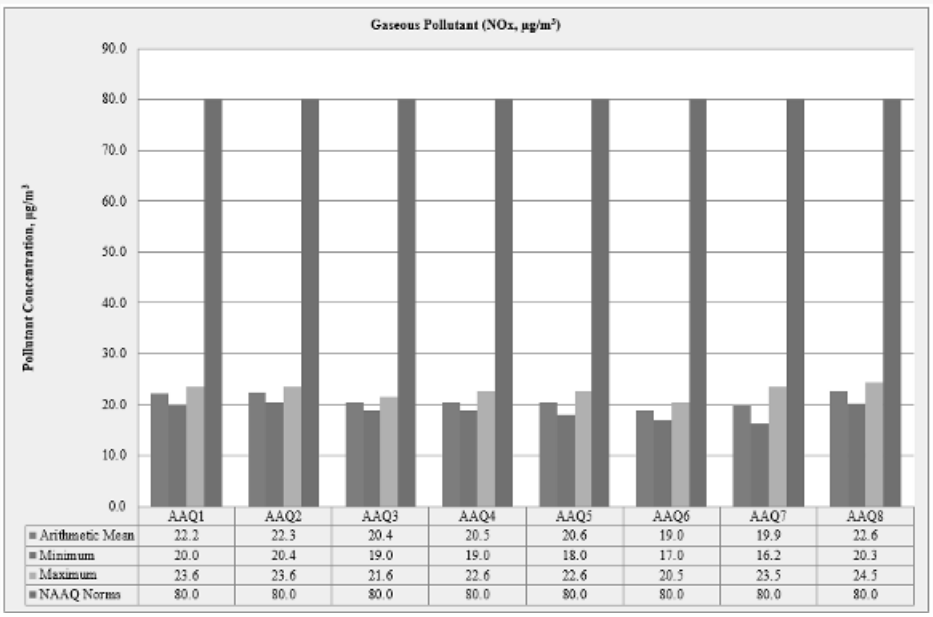
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	44.8	47.1	45.9	45.4	22.7	24.3	45.0	44.6
Minimum	42.0	45.0	43.0	42.0	43.0	44.0	42.0	42.3
Maximum	47.2	49.3	48.3	48.3	47.2	46.3	47.3	46.2
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FIGURE 3.18-A: BAR DIAGRAM OF PARTICULATE MATTER (SO_2)



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Arithmetic Mean	6.3	6.9	6.3	6.2	7.1	6.7	6.9	7.0
Minimum	5.0	5.2	5.0	5.0	6.0	6.0	6.0	5.0
Maximum	8.4	8.5	7.8	7.8	8.5	7.8	7.5	8.4
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

FIGURE 3.18-B: BAR DIAGRAM OF PARTICULATE MATTER (SO_2)



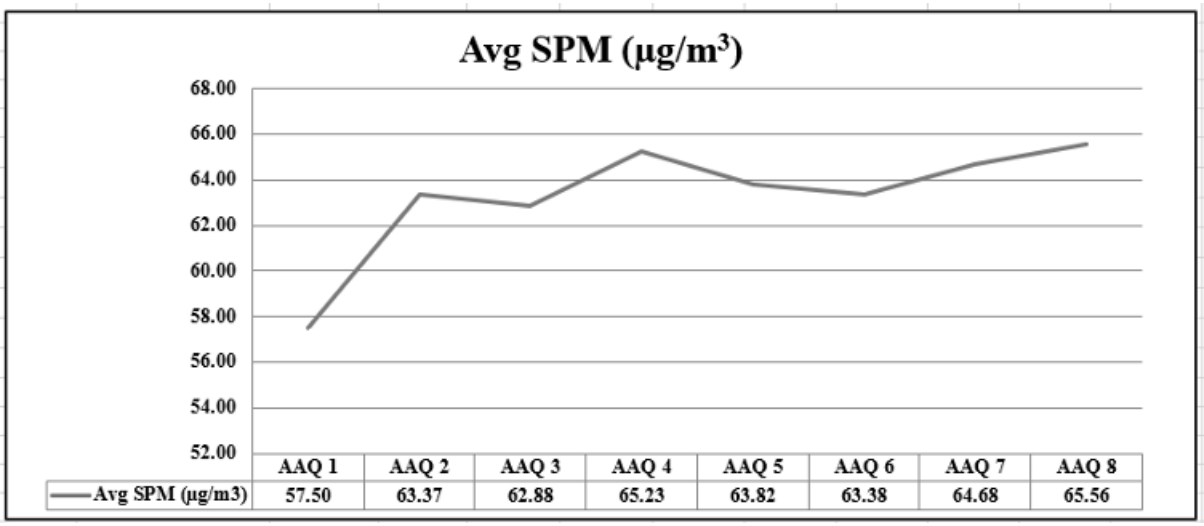
3.3.7 FUGITIVE DUST EMISSION –

Fugitive dust was recorded at 8 AAQ monitoring stations for 30 days average during the study period.

Table 3.28: Average Fugitive Dust Sample Values In mg/m³

AAQ Locations	Avg SPM (µg/m³)
AAQ 1	57.50
AAQ 2	63.37
AAQ 3	62.88
AAQ 4	65.23
AAQ 5	63.82
AAQ 6	63.38
AAQ 7	64.68
AAQ8	65.56

Source: Onsite monitoring/ sampling by EHS360 Labs Private Limited

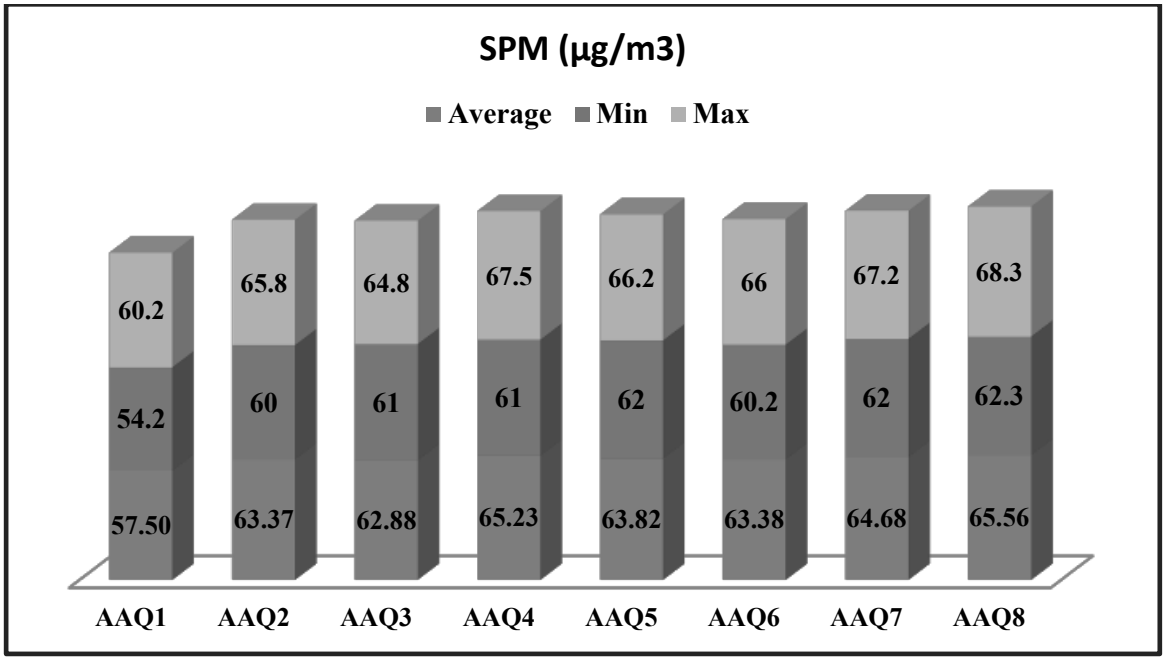


Source: Line Diagram of Table 3.25

Table 3.29 : Fugitive Dust sample values in µg/m³ –

SPM (µg/m3)	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Average	57.50	63.37	62.88	65.23	63.82	63.38	64.68	65.56
Min	54.2	60	61	61	62	60.2	62	62.3
Max	60.2	65.8	64.8	67.5	66.2	66	67.2	68.3

Source: Field Data's



Source: Bar Diagram of table 3.26

3.3.6 Interpretations & Conclusion

From the above data's, the concentration of main criteria pollutants has been observed that maximum concentration of PM10 is 49.3 µg/m^3 recorded at Near Proposed area and minimum is 42.0 µg/m^3 recorded at Kavadikanur Village. The concentration of PM2.5 varies from 20.0 µg/m^3 Minimum concentration was recorded at Konganapuram Village and Maximum concentration of $PM_{2.5}$ recorded at 29.3 µg/m^3 Manjakalpatti Village. SO2 concentration level ranged from 7.5 – 5.0 µg/m^3 and NO^2 concentration ranged from 24.5– 20.5µg/m^3 in the study area. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

Toxic Metals (Lead, Nickel & Arsenic): Representative samples from all sampling stations were collected and analysed for Toxic Metals i.e. Lead, Arsenic & Nickel. The concentrations of Toxic Metals were below detectable limit at all sampling stations.

Overall Ambient Air Quality of proposed project area and its buffer zone is good during monitoring period and there are no any abnormal values recorded. The maximum concentration in the core zone is due to the quarrying activity of the cluster of quarries situated within 500m radius. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

The ambient air quality of different locations has been compared with the respective NAAQS. The air quality has been categorized into four broad categories based on an Exceedance Factor (the ratio of average concentration of a pollutant with that of a respective standard).

The four air quality categories are:

i. Critical pollution (C): when EF is > 1.5

ii. High pollution (H): when the EF is between 1.0 < 1.5

iii. Moderate pollution (M): when the EF between 0.5 < 1.0

iv. Low pollution (L): when the EF is < 0.5

The Exceedance Factor (EF) is calculated for major pollutants as follows:

3.4 Noise Environment

The vehicular movement on road and mining activities is the major sources of noise in study area, the environmental assessment of noise from the mining activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

The main objective of noise monitoring in the study area is to establish the baseline noise level and assess the impact of the total noise expected to be generated during the project operations around the project site.

3.4.1 Identification of Sampling Locations

In order to assess the ambient noise levels within the study area, noise monitoring was carried out at Eight (8) locations. The noise level monitoring locations were carried out by covering commercial, residential, rural areas within the radius of 10 km. A noise monitoring methodology was chosen such that it best suited the purpose and objectives of the study.

Table 3.30: Details of Noise Monitoring Locations

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	N1	Core Zone	Project Area	11°33'33.07"N 77°50'42.72"E
2	N2	Near Proposed Quarry	770m NE	11°33'44.30"N 77°51'10.19"E
3	N3	Edappadi	1.7km NW	11°34'28.70"N 77°50'16.40"E
4	N4	Kavadikanur	3.4km SE	11°33'20.17"N 77°52'36.85"E
5	N5	Konganapuram	5.6km NE	11°34'18.77"N 77°53'43.98"E
6	N6	Kallampalayam	6.4km SW	11°32'22.50"N 77°47'16.95"E
7	N7	Manjakalpatti	6km South	11°30'23.87"N 77°51'52.67"E
8	N8	Vellarivalli	6.8km NW	11°35'59.68"N 77°47'38.69"E

Source: On-site monitoring/sampling by EHS360 Labs Private Limited in association with GEMS

FIGURE 3.19. Collection of Noise Sample

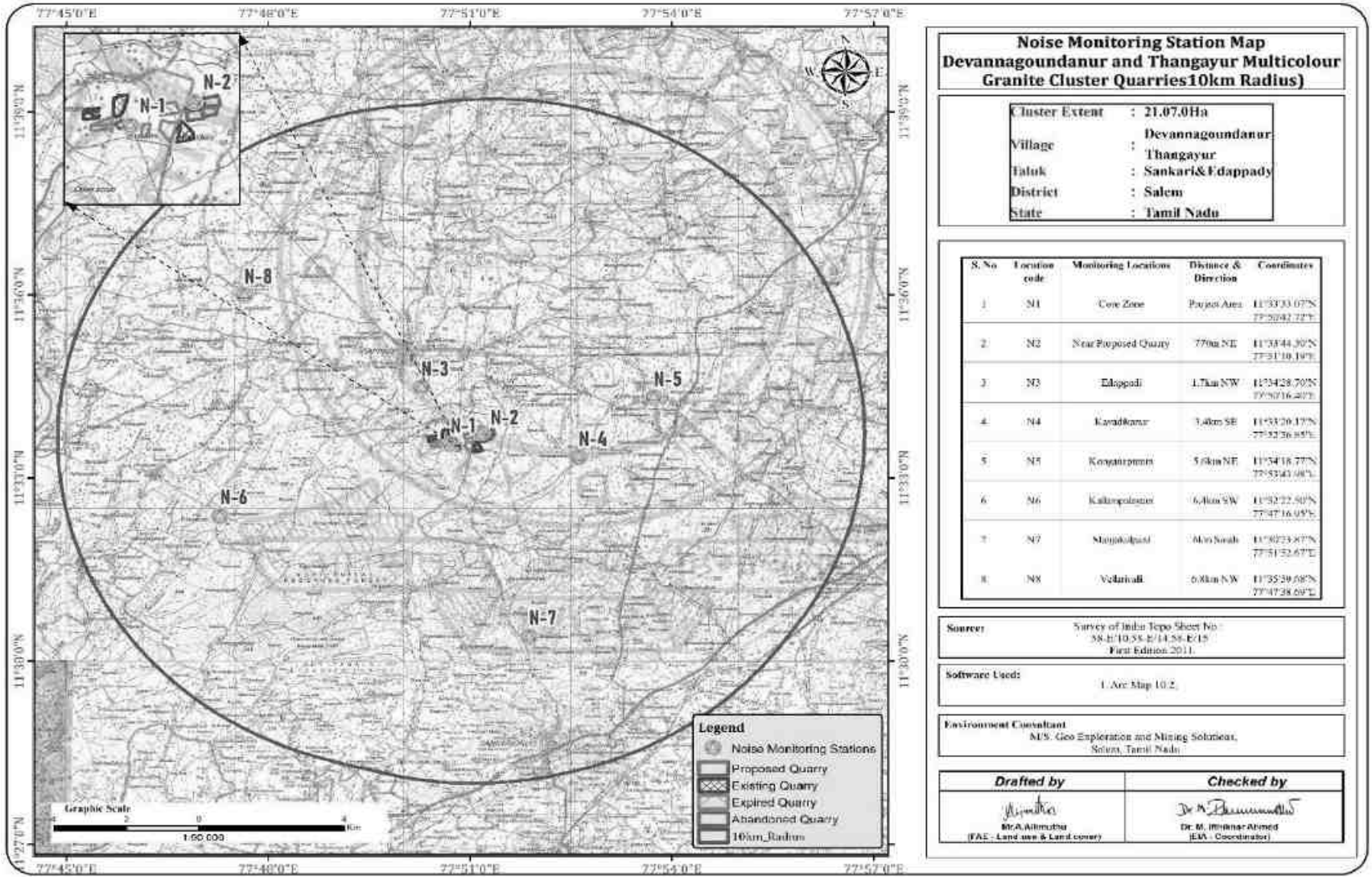
3.4.2 Method of Monitoring

Digital Sound Level Meter was used for the study. All reading was taken on the 'A-Weighting' frequency network, at a height of 1.5 meters from ground level. The sound level meter does not give a steady and consistent reading and it is quite difficult to assess the actual sound level over the entire monitoring period. To mitigate this shortcoming, the Continuous Equivalent Sound level, indicated by Leq, is used. Equivalent sound level, 'Leq', can be obtained from variable sound pressure level, 'L', over a time period by using following equation.

Measured noise levels, displayed as a function of time, is useful for describing the acoustical climate of the community. Noise levels recorded at each station with a time interval of about 60 minutes are computed for equivalent noise levels. Equivalent noise level is a single number descriptor for describing time varying noise levels.

Leq = 10 Log L / TΣ (10Ln/10)
Where L = Sound pressure level at function of time dB (A)
T = Time interval of observation

Figure 3.20: Noise Monitoring Stations Around 10 Km Radius



3.4.3 Analysis of Ambient Noise Level in the Study Area

The Digital Sound pressure level have been measured by a sound level meter (Model: HTC SL-1352) An analysis of the different Leq data obtained during the study period has been made. Variation was noted during the day-time as well as night-time. The results are presented in below Table 3.6

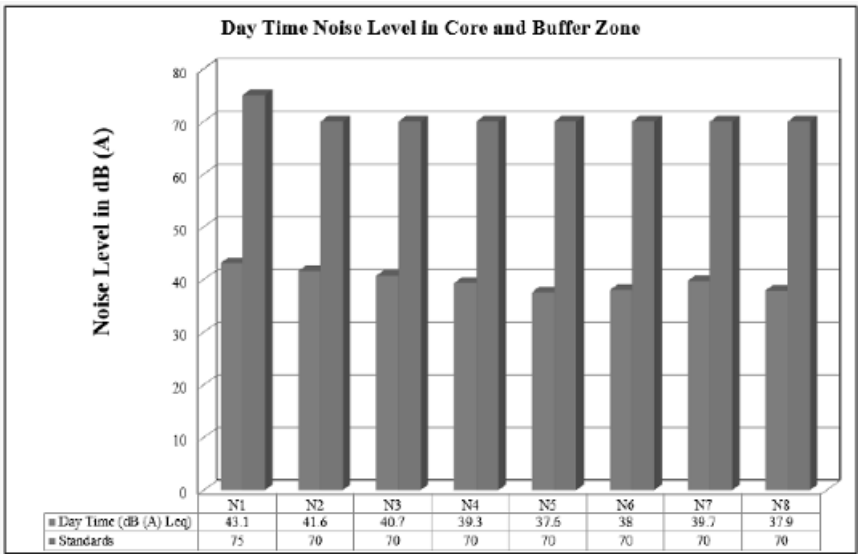
Day time: 6:00 hours to 22.00 hours.
Night time: 22:00 hours to 6.00 hours.

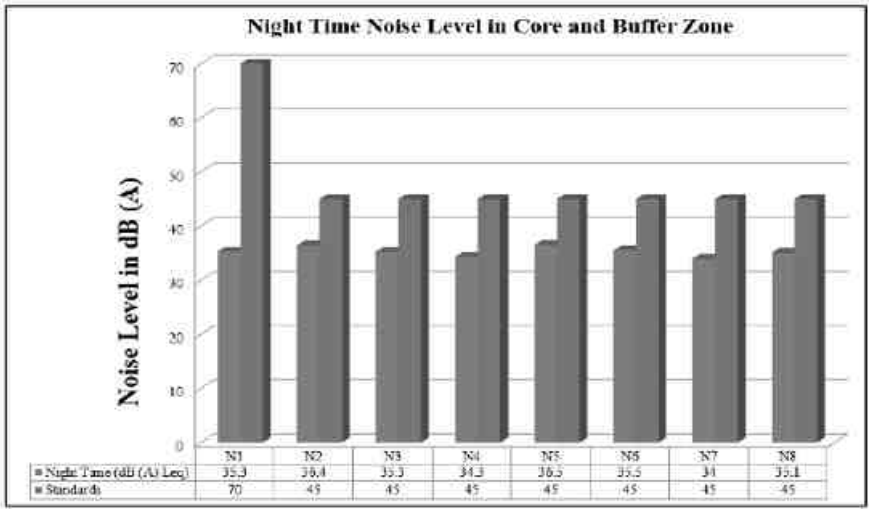
Table 3.31: Ambient Noise Quality Result

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Core Zone	42.2	37.0	**Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)**
2	Near Proposed Quarry	41.9	36.9	
3	Edappadi	40.9	37.3	
4	Kavadikanur	38.1	36.2	**Residential Day Time– 55 dB (A) Night Time- 45 dB (A)**
5	Konganapuram	38.1	35.5	
6	Kallampalayam	37.0	36.3	
7	Manjakalpatti	36.1	34.6	
8	Vellarivalli	36.5	34.9	

Source: On-site monitoring/sampling by EHS360 Labs Private Limited in association with GEMS

Figure 3.21: Day and Night Time Noise Levels in Core and Buffer





3.4.4 Interpretation & Conclusion:

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 41.9 – 42.2dB (A) Leq and during night time were from 36.9 – 37.0 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 36.1– 40.9 dB (A) Leq and during night time were from 34.6 – 37.3 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. Noise monitoring results reveal that the maximum & minimum noise levels at day time were recorded in the range of 47.5 dB(A) Leq in core zone and 34.5 dB(A) Leq in minimum core zone area and 39.6 dB(A) in Kavadikaranur Village & 30.2 dB(A) in Konganapuram and Kallampalayam Village at night time. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.5 Ecological Environment

3.5.0 Introduction

Ecology is a branch of science that deals with the relationship and interactions between organisms and their environment. An ecological survey of the study area was performed, particularly with reference to the listing of species and assessment of the existing baselineecological conditions in the study area. The main objective of the biological study is to collectthe baseline data regarding flora and fauna in the study area. Data has been collected through extensive surveys of the area with reference to flora and fauna. Information is also collected from different sources i.e. government departments such as the District Forest Office, Government of Tamil Nadu.

3.5.1 Forestry in Salem District Circle

At present the jurisdiction of Salem Forest circle is over Salem and Namakkal districts. It consists of three territorial divisions namely Salem Forest Division, Attur Forest Division, and Namakkal Forest Division, and two special Divisions Mettur Soil Conservation Scheme (MSCS) and Interface Forestry Division (IFF). The total forest area of Salem forest is 161723.08 ha. The Salem Forest circle comprises the hill ranges namely Shervaroys, Kalrayans, Pachamalai, and the Kolli hills.

The main challenges with respect to forest protection in Salem circle is with poaching, illicit arrack distillation, encroachments, and felling of sandalwood trees. The circle is known for the sandalwood reserve and the forest is classified into the following types (As per Champion and Seth's classification).

- ✓ Type 5A/C3 - Southern Tropical dry mixed deciduous forests
- ✓ Type 5/2S1 - Secondary dry deciduous forests
- ✓ Type 5/DS1 - Dry deciduous scrub forests
- ✓ Type 5/DS2 - Dry Savannah forests
- ✓ Type 5/DS3 - Dry Euphorbia scrub forests
- ✓ Type 5A/1S1 - Southern Dry Tropical Riverain forests
- ✓ Type 8A/C1 - Southern sub-tropical broad leaved hill forests.

(Source: ENVIS Centre Department of Environment Government of Tamil Nadu).

3.5.2 Scope of Work

The scope of work for this study includes the identification of ecologically sensitive receptors, based on a literature survey, field investigations, and their mitigation with conservation action plan. The study was carried out in the core as well as buffer zone of the proposed multi-colour granite quarry of Thiru .P Jayaraj (ML Area: 2.00.5 Ha). The study was carried out systematically and scientifically using primary and secondary data in order to bring out factual information on the ecological conditions of the mine site i.e. mine and 10 km radius area from the mine, i.e. Study Area.

The study involved the assessment of general habitat type, vegetation pattern, preparation of inventory of flora and fauna of terrestrial ecosystem within 10 km radius from the boundary of proposed mine. Biological assessment of the site was done to identify ecologically sensitive areas and whether there are any rare, endangered,

endemic or threatened (REET) species of flora & fauna in the core area as well its buffer zone to be impacted. The study also designed to suggest suitable mitigation measures if necessary for protection of wildlife habitats and conservation of REET species if any.

3.5.3. Ecology - Study Area

The core area extent of 2.00.5 Ha of multi-colour granite quarry has an impact on the diversity of flora and fauna of surrounding area but present work was carried out on the detailed study of the impacts of multi-colour granite quarry on ecology and biodiversityof core lease area with the proper mitigation and sustainable management plan. The mine lease applied area is exhibits elevated topography whereas in buffer zone some places agricultural land is dominated. The following methods were applied during the baseline study of flora, fauna, and diversity assessment.

3.5.3.1 Objectives of Biological Studies

a) To study the likely impact of the proposed mining project on the local biodiversity andto suggest mitigation measure, if required, for vulnerable biota.
b) To assess the nature and distribution of vegetation Terrestrial in and around the miningactivity.
c) Detail of flora and fauna, Endemic, Rare, Endangered, and Threatened (RET Species) separately for core and buffer area based on such primary field survey and clearly indicating the Schedule of fauna present. In case of any schedule - I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department, and details furnished.
d) Devise management & conservation measures for biodiversity.

3.5.3.2 Methodology of Sampling

1. Field survey was conducted by visual encounter survey for flora present within the 10 km radius study area of proposed mine.
2. After surveying the core and buffer areas, a detailed floral inventory has been compiled. List of all plants of the study area was prepared and their habitats were recorded.
3. Verification of Rare, Endangered and Threatened Flora species from IUCN Red Data Book.

A methodology of Sampling Flora and fauna studies were carried out during the winter season to assess the list of terrestrial plant and animal species that occur in the core area and the buffer area up to 10 km radius from the project site. No damage is created to flora and fauna during the sampling.

In order to provide representative ecological status for the study area, the 10-km buffer zone has been divided into four quartiles for biodiversity sampling, i.e., NE (Quartile- 1), NW (Quartile-2) SW (Quartile-3) and SE (Quartile-4). Each of the quartiles have been examined for representative flora on randomly sampled quadrats for trees (10x10-m), shrubs (5x5-m), and herbs (1x1-m) depending upon prevailing geographical conditions and bio- diversity aspects of study area.

3.6 Quadrats method

Quadrats of 10 × 10-m were laid down randomly within core and 5-km buffer area; each quadrat was laid to assess the trees (>5 cm GBH) and one, 5×5-m sub-quadrat nested within the quadrat for shrubs. The quadrats were laid randomly to cover the area to maximize the sampling efforts and minimize the species homogeneity, such as small stream area, trees in agricultural bunds, tank bunds, farm forestry plantations, wildlife areas, natural forest area, avenue plantations, house backyards, etc. In each quadrat individuals belonging to tree (10 × 10-m) and shrub (5×5-m) were recorded separately and have been identified on the field.

3.7 Flora

The quadrat sampling technique was used for sampling vegetation. Sampling quadrats of the regular shape of dimensions 10 × 10 m, 5 × 5 m, and 1 × 1 m, were nested within each other and were defined as the units for sampling the area and measuring the diversity of trees, Shrubs, and herbs respectively.

3.7.1 Flora Composition in the Core Zone

Taxonomically a total of 33 species belonging to 19 families have been recorded from the core zone mining lease area. The area is situated on an elevated topography. The gradient towards the Northwest side. Based on the habitat classification of the enumerated plants the majority of species were Trees 11, followed by Herbs 10, Shrubs 5, Grass 3, Creeper 2, and Cactus 2. Details of flora with the scientific name were mentioned in Table No. 3.1. The result of the core zone of flora studies shows that Fabaceae and Poaceae, Asteraceae are the main dominating species in the study area mentioned in Table No.3.1. No species were found as threatened category.

Table No: 3.32 Flora in the Core zone of Devannagoundanur Village, Multi colour Granite quarry

SI. No	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Mesquite	Mullu maram	*Prosopis juliflora*	Fabaceae
2.	Asian Palmyra palm	Panai maram	*Borassus flabellifer*	Arecaceae
3.	White Bark Acacia	Vela maram	*Vachellia leucophloea*	Fabaceae
4.	Pala indigo	Pala maram	*Wrightia tinctoria*	Apocynaeceae
5.	Banyan tree	Alamaram	*Ficus benghalensis*	Moraceae
6.	Neem	Vembu	*Azadirachta indica*	Meliaceae
7.	Madras thorn	Kudukapuli	*Pithecellobium dulce*	Fabaceae
8.	Malayan Cherry	Ten Pazham	*Muntingia calabura*	Muntingiaceae
9.	Suger apple	Seethapalamaram	*Annona squamosa*	Annonaceae
10.	Millettia pinnata	Pongam oiltree	*Pongamia pinnata*	Fabaceae
11.	Bitter Albizia	Arappu Tree	*Albizia amara*	Fabaceae
Shrubs				
1.	Milk Weed	Erukku	*Calotropis gigantea*	Apocynaceae
2.	Castor oil plant	Amanakku	*Ricinus communis*	Euphorbiaceae
3.	Lantana	Unni chedi	*Lantana camara*	Verbenaceae
4.	Tanner's cassia	Avaram	*Senna auriculata*	Fabaceae
5.	Night shade plan	Sundaika	*Solanum torvum*	Solanaceae
Herbs				
1.	Common leucas	Thumbai	*Leucas aspera*	Lamiaceae
2.	Fish poison	Kolinchi	*Tephrosia purpurea*	Fabaceae
3.	Mexican mint	Karpuravalli	*Coleus amboinicus*	Lamiaceae
4.	Asthma-plant	Amman pacharisi	*Euphorbia hirta*	Euphorbiaceae
5.	Indian doab	Arugampul	*Cynodon dactylon*	Poaceae
6.	Carrot grass	Parttiniyam	*Parthenium hysterophorus*	Asteraceae
7.	Coat buttons	Thatha poo	*Tridax procumbens*	Asteraceae
8.	Bitter bush	-	*Chromolaena odorata*	Asteraceae
9.	Bindii	Nerunji mullu	*Tribulus terrestris*	Zygophyllaceae
10.	Prickly chaff flower	Nayuruv	*Achyranthes aspera*	Amaranthaceae
Creeper /Climbers				

1.	Stemmed vine	Perandai	*Cissus quadrangularis*	Vitaceae
2.	Stinking passionflower	Poonai puduku chedi	*Passiflora foetida L*	Passifloraceae
Grass				
1.	Eragrostis	Pullu	*Eragrostis ferruginea*	Poaceae
2.	Great brome	Thodappam	*Bromus diandrus*	Poaceae
3.	Nut grass	Korai	*Cyperus rotandus*	Poaceae
Cactus				
1.	Prickly pear	Nagathali	*Opuntia dillenii*	Cactaceae
2.	Triangular spruge	Chaturakalli	*Euphorbia antiquorum*	Euphorbiaceae

(**Sources**: Species observation in the field study)

a. Azadirachta indica

b. Ricinus communis

c.Senna auriculata

d.Pongamia pinnata

e. Ficus benghalensis

f. Opuntia dillenii

g. Pithecellobium dulce

h. Albizia amara

i. Euphorbia antiquorum

j. Muntingia calabura

k. Cissus quadrangularis

l. Borassus flabellifer

m. Tephrosia purpurea

n. Coleus amboinicus

o.Annona squamosal

p.Vachellia leucophloea

q.Prosopis juliflora

r.Solanum torvum

Fig No: 3.1. Flora species observation in the Core zone area

Table No: 3.33 Flora in Buffer Zone of Devannagoundanur Village, Multi colour Granite quarry

S.No.	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Bitter Albizia	Arappu Tree	*Albizia amara*	Fabaceae
2.	White Bark Acacia	Vela maram	*Vachellia leucophloea*	Fabaceae
3.	Wild Date Palm	Icham	*Phoenix sylvestris*	Arecaceae
4.	Blue gum	Thayala maram	*Eucalyptus*	Myrtaceae
5.	Indian ash tree	Odiya maram	*Lannea coromandelica*	Anacardiaceae
6.	Mango	Manga	*Mangifera indica*	Anacardiaceae
7.	Neem	Vembu	*Azadirachta indica*	Meliaceae
8.	Tamarind	Puliyamaram	*Tamarindus indica*	Legumes
9.	Jackfruit	Palamaram	*Artocarpus heterophyllus*	Moraceae
10.	Mesquite	Mullu maram	*Prosopis juliflora*	Fabaceae
11.	Coral Tree	Kalyana murungai	*Erythrina variegata*	Papilionoide
12.	Asian Palmyra palm	Panai maram	*Borassus flabellifer*	Arecaceae
13.	Indian ash tree	Odiya maram	***Lannea coromandelica***	Anacardiaceae
14.	Custard apple	Seethapazham	*Annona reticulata*	Annonaceae
15.	Banana tree	Vazhaimaram	*Musa acuminata*	Musaceae
16.	Curry leaves	Karuveppali	*Murraya koenigii*	Rutaceae
17.	Lemon	Ezhumuchaipalam	*Citrus lemon*	Rutaceae
18.	Bidi leaf tree	Thiruvathi Plant	*Bauhinia racemosa*	Fabaceae
19.	Rusty Acacia	Parambai	*Acacia ferruginea*	Mimosaceae

20.	Indian almond	Padam maram	*Terminalia catappa*	Combretaceae
21.	Peepal	Arasanmaram	*Ficus religiosa*	Moraceae
22.	Yellow flame tree	Perunkondrai	*Peltophorum pterocarpum*	Fabaceae
23.	Jamun Fruit Plant	Naval maram	*Syzygium cumini*	Myrtaceae
24.	Flamboyant	Cemmayir-konrai	*Delonix regia*	Fabaceae
25.	Chinaberry	Malai vembu	*Melia azedarach L.*	Meliaceae
26.	Monkey pod tree	Thungumoonchi	*Samanea saman*	Fabaceae
27.	Yellow Flame	Iyalvagai	*Peltophorumpterocarpum*	Fabaceae
28.	Teak	Thekku	*Tectona grandis*	Verbenaceae
29.	Indian gooseberry	Nelli	*Emblica officinalis*	Phyllanthaceae
30.	Henna	Marudaani	*Lawsonia inermis*	Lythraceae
31.	Black Siris	Karuvagai	*Albizia odoratissima*	Mimosaceae
32.	Madras thorn	Kudukapuli	*Pithecellobium dulce*	Fabaceae
33.	Malayan Cherry	Ten Pazham	*Muntingia calabura*	Muntingiaceae
34.	Pomegranate	Mathulai	*Punica granatum*	Lythraceae
35.	Banyan tree	Alamaram	*Ficus benghalensis*	Moraceae
36.	Peepal	Asoka maram	*Ficus religiosa*	legume
37.	Chinese chaste tree	Nochi	*Vitex negundo*	Verbenaceae
38.	Ceylon satinwood	Porasu	*Chloroxylon swietenia*	Rutaceae
39.	Indian Jujube	Ilanthai	*Ziziphus jujuba*	Rhamnaceae
40.	Millettia pinnata	Pongam oiltree	*Pongamia pinnata*	Fabaceae
41.	Coconut	Thennai maram	*Cocos nucifera*	Arecaceae

42.	Guava	Koyya	*Psidium guajava*	Myrtaceae
43.	Notched Leaf Soapnut	Poovankottai	*Sapindus emarginata*	Sapindaceae
44.	Butter Tree	Kattu illupai	*Madhuca indica*	Sapotaceae
45.	Conkerberry	Sirukilaa	*Carissa spinarum*	Apocynaceae
46.	Pala indigo	Pala maram	*Wrightia tinctoria*	Apocynaeceae
47.	River tamarind	Savundal maram	*leucaena leucocephala*	Fabaceae
48.	Portia tree	Poovarasan	*Thespesia populnea*	Malvaceae
49.	Drumstick tree	Murunga maram	*Moringa oleifera*	Moringaceae
50.	Sacred Tree	Porasu	*Butea monosperma*	Fabaceae
51.	Mesquite	Mullu maram	*Prosopis juliflora*	Fabaceae
52.	Papaya	Pappali maram	*Carica papaya L*	Caricaceae
53.	Bamboo	Moonghil	*Bambusa bambo*	Poaceae
Shrubs				
1.	Tanner's cassia	Avaram	*Senna auriculata*	Fabaceae
2.	Milk Weed	Erukku	*Calotropis gigantea*	Apocynaceae
3.	Lantana	Unni chedi	*Lantana camara*	Verbenaceae
4.	Triangular spruge	Chaturakalli	*Euphorbia antiquorum*	Euphorbiaceae
5.	Night shade plan	Sundaika	*Solanum torvum*	Solanaceae
6.	Broom creeper	Kattukodi	*Cocculus hirsutus*	Menispermaceae
7.	Solanum pubescens	Malaisundai	*Solanum pubescens Willd*	Solanaceae
8.	Orange Jasmine	Mock Orange	*Murraya paniculata*	Rutaceae
9.	Asian Bush beech	Sirukumalaan	*Gmelina asiatica*	Verbenaceae
10.	Wild jasmine	Kattumalli	*Jasminum trichotomum*	Oleaceae

11.	Rough cocklebur	Marlumuttu	*Xanthium indicum*	Asteraceae
12.	Mexican prickly poppy	Bramathndu	*Argemone mexicana*	Papaveraceae
13.	Puriging nut	Kattamanakku	*Jatropha curcas*	Euphorbiaceae
14.	Indian Oleander	Arali	*Nerium indicum*	Apocynaceae
15.	Clustered Morning Glory	Onan kodi	*Ipomoea staphylina*	Convolvulaceae
16.	Shoe flower	Chemparuthi	*Hibiscu rosa-sinensis*	Malvaceae
17.	Dwarf Heliotrope	Theelkoduku	*Heliotropium supinum*	Boraginaceae
18.	Jackal jujube	Suraimullu	*Ziziphus oenoplia*	Rhamnaceae
19.	Touch-me-not	Thottalchinungi	*Mimosa pudica*	Mimosaceae
20.	Chinese chaste tree	Nalla nochi	*Vitex negundo L*	Verbinaceae
21.	Thorn apple	Oomathai	*Datura stramonium*	Solanaceae
22.	Malabar catmint	Pei veratti	*Anisomeles malabarica*	Lamiaceae
23.	Indian mallow	Thuthi	*Abutilon indicum*	Meliaceae
24.	Bush Morning Glory	Neiveli Kattamani	*Ipomoea carnea*	Convolvulaceae
25.	Carray Cheddle	Kaarai	*Canthiumparviflorum*	Rubiaceae
26.	Castor oil plant	Amanakku	*Ricinus communis*	Euphorbiaceae
27.	Flame of the Woods	Idlipoo	*Xoracoc cinea*	Rubiaceae
Herbs				
1.	Eggplant	Kathrikkai	*Solanum melongena*	Solanaceae
2.	Aloe barbadensis	Katrazhai	*Aloe vera*	Asphodelaceae
3.	Bara Gokhru	Yanainerunjil	*Pedalium murex*	Pedaliaceae
4.	Commelina benghalensis	Kanavazha	*Commelina benghalensis*	Commelinaceae
5.	Coat buttons	Thatha poo	*Tridax procumbens*	Asteraceae

6.	-	Impoora chakkalathi	*Oldenlandia dichotoma*	Rubiaceae
7.	Indian doab	Arugampul	*Cynodon dactylon*	Poaceae
8.	Chilli	Milakai	*Capsicum annuum*	Solanaceae
9.	Indian Copperleaf	Kuppaimeni	*Acalypha indica*	Euphorbiaceae
10.	Asthma-plant	Amman pacharisi	*Euphorbia hirta*	Euphorbiaceae
11.	Tomato	Thakkali	*Solanum lycopersicum*	Solanaceae
12.	White dammar	Mookutipoondu	*Vicoa indica*	Asteraceae
13.	Cleome viscosa	Nai kadugu	*Celome viscosa*	Capparidaceae
14.	Bindii	Nerunji mullu	*Tribulus terrestris*	Zygophyllaceae
15.	Prickly chaff flower	Nayuruv	*Achyranthes aspera*	Amaranthaceae
16.	Field beans	Avarai	*Hyacinth Beans*	Fabaceae
17.	Common leucas	Thumbai	*Leucas aspera*	Lamiaceae
18.	Spiny amaranth	Mullu keerai	*Amaranthus spinosus*	Amaranthaceae
19.	Holy basil	Thulasi	*Ocimum tenuiflorum*	Lamiaceae
20.	Ban Tulsi	Melakai poondu	*Croton bonplandianus*	Euphorbiaceae
21.	Gale of the wind	Keelaneeli	*Phyllanthus niruri*	Phyllanthaceae
22.	Europeanblack nightshade	Manathakkali	*Solanumnigrum*	Solanaceae
23.	Ladies' fingers	Vendakkai	*Abelmoschus esculentus*	Malvaceae
24.	Majjigeberru gida	Purpannai	*Aerva monsoniae*	Amaranthaceae
25.	Vigna mungo	Ulunthu	*Vigna mungo*	Fabaceae
26.	Water hyssop	Nilappachai	*Bacopa monnieri*	Scrophulariaceae
27.	Century plant	Agave	*Agave america*	Agavaceae
28.	Sand Herbage	Manal keerai	*Gisekia pharnaceoides*	

29.	Fish poison	Kollukaivelai	*Tephrosia purpureae*	Papilionaceae
30.	chicken weed	Sirupasalai	*Portulaca quadrifida L*	Portulacaceae
31.	Bright eyes	Nithiyakalyani	*Catharanthus roseus*	Apocynaceae
32.	Carrot grass	Parttiniyam	*Parthenium hysterophorus*	Asteraceae
33.	Indian mint	Karpura valli	*Coleus amboinicus*	Lamiaceae
Climber				
1.	Stemmed vine	Perandai	*Cissus quadrangularis*	Vitaceae
2.	Ivy gourd	Kovai	*Coccinia grandis*	Cucurbitaceae
3.	Balloon plant	Mudakrttan	*Cardiospermum halicacabum*	Sapindaceae
4.	Bitter apple	Peikkumatti	*Citrullus colocynthis*	Cucurbitaceae
5.	Butterfly pea	Sangu poo	*Clitoria ternatea*	Fabaceae
6.	Wild jasmine	Malli	*Jasminum augustifolium*	Oleaceae
7.	Betel	Vetrilai	*Piper betle*	Piperaceae
8.	Pointed gourd	Kovakkai	*Trichosanthes dioica*	Cucurbitaceae
9.	Wild bitter	Pavarkai	*Momordica charantia*	Cucurbitaceae
10.	Bottle Guard	Sorakkai	*Lagenaria siceraria*	Cucurbitaceae
11.	White pumpkin	Poosanaikkaai	*Cucurbitaceae*	Cucurbitaceae
12.	Rosary Pea	Gundumani	*Abrus precatorius*	Fabaceae
Creeper				
1.	Nut grass	Korai	*Cyperus rotandus*	Poaceae
2.	Cucumis maderaspatanus	Musumusukkai	*Mukia maderaspatana*	Cucurbitaceae
Grass				

1.	Eragrostis	Pullu	*Eragrostis ferruginea*	Poaceae
2.	Windmill grass	Chevvarakupul	*Chloris barbata*	Amaranthaceae
3.	Great brome	Thodappam	*Bromus diandrus*	Poaceae
Cactus				
1.	Prickly pear	Nagathali	*Opuntia dillenii*	Cactaceae
2.	Triangular spruge	Chaturakalli	*Euphorbia antiquorum*	Euphorbiaceae

*E- Economical, M- Medicinal, EM- Both Economical and Medicinal, NE- Not evaluated.

(Sources: Species observation in the field study)

3.7.2. Flora Composition in the Buffer Zone

Similar habitats may be found in the buffer area as well, although there is a wider variety of plants there than in the core zone area. The buffer zone has some forests located away from the proposed project site and there are 132 species in the buffer zone study area in total, based on records. The floral (132) varieties among them Trees 53, herbs 33, shrubs 27, Climbers 12, Grasses 3, Creepers 2, and Cactus 2 were identified. The result of the buffer zone of flora studies shows that Fabaceae and Cucurbitaceous, Euphorbiaceae is the main dominating species in the study area mentioned in Table No.3.2. There are no impacts due to this mining activity. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. Apart from the proposed project area, there is agricultural land. Horticulture and agricultural land are untouched. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. A list of floral species has been prepared based on a primary survey (site observations) and discussion with local people (Secondary data). The total number of different plant life forms under trees, shrubs, herbs, and climbers is shown in Table 3.3 and their % distribution is shown in Figure 3.2.

Table 3.34 Number of floral life forms in the Study Area

S. No	Plant Life Form	Number of Species
1	Trees	53
2	Shrubs	27
3	Herbs	33
4	Climber	12
5	Creepers	2
6	Grass	3
7	Cactus	2
Total No. of Species		**132**

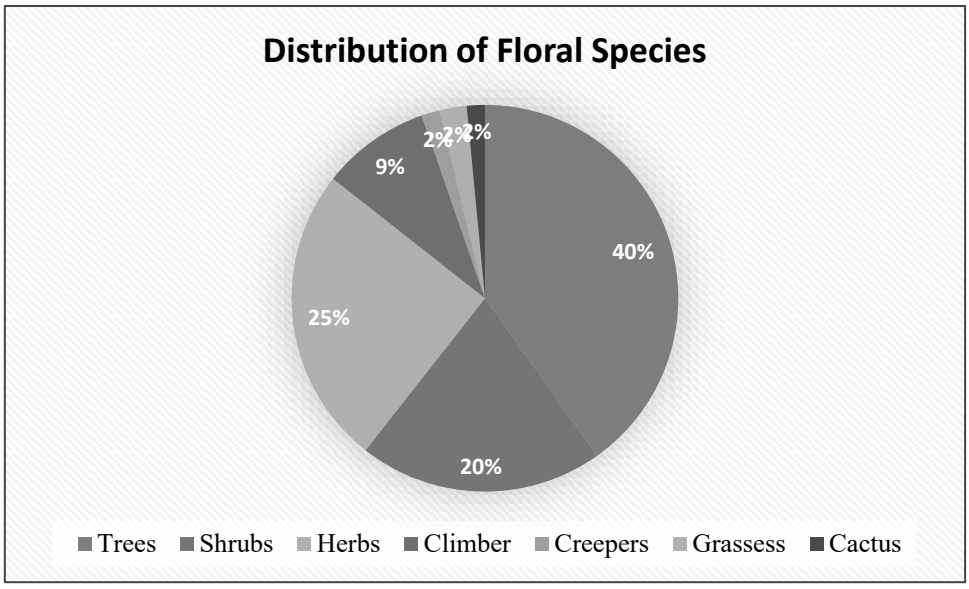


Fig No. 3.2: pie diagram showing % distribution of floral life forms

Table No: 3.35 List of medicinal plants recorded from the nearby forest area (Suriyamalai Reserve Forest)

S.No	Botanical Name	Family	Local name(s)	Habit	Part(s) used	Uses
1.	Abrus precatorius L.	Fabaceae	Kundumani	***CL***	Leaves, Seeds	Skin diseases, Eye disease and tooth ache.
2.	Acacia catechu (L.f.) Willd	Mimosaceae	Karungaali	T	Wood	Skin diseases, mouth ulcer, dysentery and Leprosy.
3.	Acacia nilotica (L.) Willd. ex Del. subsp. indica (Benth) Brenan	Mimosaceae	Karuvelam	T	Bark, heartwood, Leaves, Seeds and gum	Urino-genital diseases, wounds, haemorrhage, ulcers, cough and tooth ache.
4.	Acalypha indica L	Euphorbiaceae	Kuppaimeni	H	Whole plant	Eczema, skin diseases, cough and bronchitis, Wounds and ulcer
5.	Erythrina variegata	Papilionoide	Kalyana murungai	T	Whole plant	Laxative, diuretic, anthelmintic, galactagogue and emmenagogue, venereal buboes.
6.	Achyranthes aspera L	Amaranthaceae	Nayurivi	H	Whole plant	Diuretic, astringent, skin diseases and piles
7.	Albizia lebbeck (L.) Willd	Mimosaceae	Vaagai	T	Seeds, Leaves, Bark, Flowers and Pod	Eczema,Ulcer, rheumatism, leprosy
8.	Aloe vera (L.) Burm.f.	Asphodelaceae	Chotthukathazhai	H	Leaf juice	Dysentry, leucorrhoea, amenorrhoea, menstrual problems, intestinal worms and skin tonics
9.	Azadirachta indica A. Juss	Meliaceae	Vaembu	T	Bark, Leaves, Flower, Seeds and Oil	Antiviral, anthelmintic, insecticide, antiseptic, skin diseases, small pox and clean teeth.
10.	Cissus quadrangularis L.	Vitaceae	Pirandai	CL	Stem	Rheumatoid arthritis, appetizer, bone fracture and nervine tonic.
11.	Ormocarpum cochinchinense (Lour.) Merr.	Fabaceae	Elumbotti	S	Bark	Fever, rheumatism and bone setting.
12.	Phyllanthus urinaria L	Euphorbiaceae	Malai Kizhanelli	H	Whole plant	Jaundice, gonorrhea, urinary diseases, indigestion, bleeding piles and menstrual problems.

H-Herb; S-Shrub; CL- Climber; T-Tree

3.7.3 The vegetation in the RF / PF areas, ecologically sensitive areas etc.

There are no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar sites, Tiger/Elephant Reserves/(existing as well as proposed) within 10 km of the mine lease area. There are few reserve forests located in the study area, Suriyamalai R.F has located about 2.5km on the west side, There are no impacts due to this mining activity. The reserve forest is away from the proposed project site. There are no protected forests within the project area, Hence submission of clearance from the National Board of Wildlife does not arise. No Wildlife Sanctuary in the study area around 10km radius. In addition, No Biosphere Reserves, Wildlife corridors, or, Tiger / Elephant reserves within 10 km of the project area. No protected (PF) forests either in the mine lease area or in the buffer zone. Thus, no forest land is involved in any manner.

There are no protected or ecologically sensitive areas such as National parks or Important Bird Areas (IBAs), or Wetlands or migratory routes of fauna or water bodies or human settlements within the proposed mine lease area. There are no Biosphere reserves or wildlife sanctuaries or National parks or Important Bird Areas (IBAs), or migratory routes of fauna. Thus, the area under study (Mine lease area and the 10 Km buffer zone) is not ecologically sensitive.

Thus, no forest land is involved in any manner. There are no impacts due to this mining activity. There are neither forests nor forest dwellers nor forest-dependent communities in the mine lease area. There shall be no forest-impacted families (PF) or people (PP). Thus, the rights of Traditional Forest Dwellers will not be compromised on account of the project.

3.8 FAUNA

The faunal survey has been carried out as per the methodology cited and listed out Mammals, birds, Reptiles, Amphibians, and Butterflies. All the listed species were compared with Red Data Book and Indian Wildlife Protection Act, 1972. There are no rare, endangered, threatened (RET) and endemic species present in the core area.

3.8.1. Fauna Composition in the Core Zone

A total of 24 varieties of species were observed in the Core zone of Devannagoundanur Village, Multi colour granite quarry (Table No.3.4) among them numbers of Insects 7, Reptiles 4, Mammals 2, and Avian 11. A total of 24 species have been recorded from the core mining lease area. None of these species are threatened or endemic in the study area and surroundings. There is no Schedule I species and 11 species are under Schedule IV according to the Indian Wildlife Act 1972. A total of 11 species of bird were sighted in the mining lease area. There are no critically endangered, endangered, vulnerable, and endemic species were observed. Details of fauna in the core zone with the scientific name were mentioned in Table No. 3.5.

Table No: 3.36 Fauna in the Core zone of Devannagoundanur Village, Multi colour granite quarry, Salem District, Tamil Nadu

SI. No	Common name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
Insects					
1.	Common Tiger	Nymphalidae	*Danaus genutia*	NL	NL
2.	Grey pansy	Nymphalidae	*Junonia atlites*	Schedule IV	LC
3.	Common Tiger	Nymphalidae	*Danaus genutia*	Schedule IV	LC
4.	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
5.	Striped tiger	Nymphalidae	*Danaus plexippus*	Schedule IV	LC
6.	Termite	Blattodea	*Hamitermes silvestri*	NE	LC

7.	Red-veined darter	Libellulidae	*Sympetrum fonscolombii*	NL	LC
Reptiles					
1.	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
2.	Common skink	Scincidae	*Mabuya carinatus*	NL	LC
3.	Rat snake	Colubridae	*Ptyas mucosa*	Sch II (Part II)	LC
4.	Green vine snake	Colubridae	*Ahaetulla nasuta*	Schedule IV	NL
Mammals					
1.	Indian Field Mouse	Muridae	*Mus booduga*	Schedule IV	NL
2.	Common rat	Muridae	*Rattus rattus*	Schedule IV	LC
Aves					
1.	Koel	Cucalidae	*Eudynamys*	Schedule IV	LC
2.	Black drongo	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
3.	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
4.	House crow	Corvidae	*Corvussplendens*	NL	LC
5.	Sunbird	Nectariniidae	*Cinnyrisasiaticus*	Schedule IV	LC
6.	Shikra	Laniidae	*Laniusexcubitor*	Schedule IV	LC
7.	Rose-ringed parkeet	Psittaculidae	*Psittacula krameri*	NL	LC
8.	Common quail	Phasianidae	*Coturnix coturnix*	Schedule IV	LC
9.	Cattle egret	Ardeidae	*Bubulcus ibis*	NE	LC
10.	Rock pigeon	Columba livi	*Columbidae*	Schedule IV	LC
11.	Indian Robin	Turdinae	*Saxicoloides fulicata*	Schedule IV	LC

*NL- Not listed, LC- Least Concern

3.8.2 Fauna Composition in the Buffer Zone

Taxonomically a total of 67 species have been recorded from the buffer zone area. Based on habitat classification the majority of species were Birds 25 and the list of bird species recorded during the field survey and literature from the study area is given in Table 3.6, followed by Insects 21, Reptiles 10, Mammals 5(*directly sighted animals & Secondary data), and amphibians 6. There are six Schedule II species and 43 species are under Schedule IV according to the Indian Wildlife Act 1972. A total of 25 species of bird were sighted in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed. There are no impacts on nearby fauna species. It is apparent from the list that none of the species either spotted or reported is included in Schedule I of the Wildlife Protection Act. Similarly, none of them comes under the REET category.

Dominant species are mostly birds and insects, and six amphibian was observed during the extensive field visit is mentioned in table 3.6. The result of core & Buffer zone of fauna studies shows that Nymphalidae, Colubridae, and Scincidae are the main dominating species in the study area; it is mentioned in Table No.3.6. There is no schedule I Species in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

Table No: 3.37 Faunal Diversity in Buffer Zone

SI. No	Common Name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
Insects					
1.	Chocolate pansy	Nymphalidae	*Junonia iphita*	NL	LC
2.	Indian honey bee	Apidae	*Apis cerana*	Schedule IV	LC
3.	Grey pansy	Nymphalidae	*Junonia atlites*	Schedule IV	LC
4.	Common Tiger	Nymphalidae	*Danaus genutia*	Schedule IV	LC
5.	Lemon pansy	Nymphalidae	*Junonia lemonias*	Schedule IV	LC
6.	Common Pierrot	Lycaenidae	*Castalius rosimon*	NL	LC
7.	Common Leopard	Nymphalidae	*Phalanta phalantha*	Schedule IV	LC
8.	Plain Tiger	Nymphalidae	*Danaus chrysippus*	Schedule IV	LC
9.	Milkweed butterfly	Nymphalidae	*Danainae*	NL	LC
10.	Termite	Blattodea	*Hamitermes silvestri*	NE	LC
11.	Common emigrant	Pieridae	*Catopsilia pomona*	Schedule IV	LC
12.	Common grass yellow	Pieridae	*Eurema hecabe*	Schedule IV	LC
13.	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
14.	Red-veined darter	Libellulidae	*Sympetrum fonscolombii*	NL	LC
15.	Ant	Formicidae	*Camponotus Vicinus*	NL	NL
16.	Tawny coster	Nymphalidae	*Danaus chrysippus*	Schedule IV	LC
17.	Dragonfly	Gomphidae	*Ceratogomphus pictus*	Schedule IV	LC
18.	Common Indian crow	Nymphalidae	*Euploea core*	Schedule IV	LC
19.	Grass yellow	Pieridae	*Eurema hecabe*	NL	LC
20.	Lesser grass blue	Lycaenidae	*Zizina Otis indica*	Schedule IV	LC

21.	Striped tiger	Nymphalidae	*Danaus plexippus*	Schedule IV	LC
Reptiles					
1.	Rat snake	Colubridae	*Ptyas mucosa*	Sch II (Part II)	LC
2.	Chameleon	Chamaelenidae	*Chameleon zeylanicus*	Sch II (Part II)	LC
3.	Fan-Throated Lizard	Agamidae	*Sitanaponticeriana*	NL	LC
4.	Indian wall lizard	Gekkonidae	*Hemidactylus flaviviridis*	Schedule IV	NL
5.	Green vine snake	Colubridae	*Ahaetulla nasuta*	Schedule IV	NL
6.	Indian cobra	Elapid snakes	*Naja naja*	Sch II (Part II)	LC
7.	Common krait	Elapid snakes	*Bungarus caeruleus*	Schedule IV	NL
8.					
9.	Striped basilisk	Corytophanidae	*Basiliscus vittatus*	Schedule IV	NL
10.	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
11.	Russell's viper	Viperidae	*Vipera russseli*	Sch II (Part II)	LC
Mammals					
1	Indian palm squirrel	Sciuridae	*Funambulus palmarum*	Schedule IV	LC
2	Asian Small Mongoose	Herpestidae	*Herpestes javanicus*	Schedule (Part II)	LC
3	Indian Field Mouse	Muridae	*Mus booduga*	Schedule IV	LC
4	Brown rat	Muridae	*Rattus norwegicus*	Schedule IV	LC
5	Indian hare	Leporidae	*Lepus nigricollis*	Schedule (Part II)	LC
Aves					
1.	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
2.	Koel	Cucalidae	*Eudynamys*	Schedule IV	LC
3.	Black-headed Munia	Estrildidae	*Lonchuramalacca*	Schedule IV	LC
4.	Cattle egret	Ardeidae	*Bubulcus ibis*	NL	LC

5.	Indian Roller	Coraciidae	*Coracias benghalensis*	Schedule IV	LC
6.	Indian Robin	Turdinae	*Saxicoloides fulicata*	Schedule IV	LC
7.	Pond-Heron	Ardeidae	*Ardeo labacchus*	Schedule IV	LC
8.	Small blue Kingfisher	Alcedinidae	*Alcedo atthis*	Schedule IV	LC
9.	House crow	Corvidae	*Corvussplendens*	NL	LC
10.	Cattle Egret	Ardeidae	*Bubulcus ibis*	-	-
11.	Sunbird	Nectariniidae	*Nectariniidae*	NL	LC
12.	Indian blue robin	Larvivorabrunnea	*Muscicapidae*	Schedule IV	LC
13.	Asian green bee-eater	Meropidae	*Meropsorientalis*	NL	LC
14.	Hoopoe	Upupidae	*Upupaepops*	Schedule IV	LC
15.	Rock pigeon	Columba livi	*Columbidae*	Schedule IV	LC
16.	Rose-ringed parkeet	Psittaculidae	*Psittacula krameri*	NL	LC
17.	White Breasted king fisher	Alcedinidae	*Halcyon smyrnensis*	Schedule IV	LC
18.	Red-vented Bulbul	Pycnonotidae	*Pycnonotus cafer*	Schedule IV	LC
19.	Common quail	Phasianidae	*Coturnix coturnix*	Schedule IV	LC
20.	Cuckoo	Cuculidae	*Cuculuscanorus*	Schedule IV	LC
21.	Black drongo	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
22.	Woodpecker bird	Picidae	*Picidae*	Schedule IV	LC
23.	Two-tailed Sparrow	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
24.	Grey Francolin	Phasianidae	*Francolinus pondicerianus*	Schedule IV	LC
25.	House Sparrow	Passerinae	*Passer domesticus*	Schedule IV	LC
Amphibians					
1.	Indian Burrowing frog	Dicroglossidae	*Sphaerotheca breviceps*	Schedule IV	LC
2.	Indian Skipper Frog	Dicroglossidae	*Euphlyctis cyanophlyctis*	Schedule IV	LC
3.	Indian Pond Frog	Dicroglossidae	*Euphlyctis hexadactylus*	Schedule IV	LC

4.	Indian Toad	Dicroglossidae	*Bufomelanostictus*	Schedule IV	LC
5.	Paddyfield / Cricket Frog	Dicroglossidae	*Limnonectes limnocharis*	Schedule IV	LC
6.	Ornate Narrow-mouthed Frog	Dicroglossidae	*Microhyla ornata*	Schedule IV	LC

*Status assigned by the IUCN, where – CR – Critically Endangered; EN – Endangered; LC – Least Concern; NT – Near Threatened; VU – Vulnerable, DA – Data Deficient, NE – Not Evaluated

a.Euploea core

b. Calotes versicolor

c.Danaus chrysippus

d. Basiliscus vittatus

E.Catopsilia pomona

f.Junonia iphita

i.Eurema hecabe

j.Ceratogomphus pictus

k. Acridotheres tristis

l. Alcedo atthis

*(Species observation during the field visit)

Fig No: 3.3. Fauna species observation in the Core and buffer zone area

3.9 Aquatic Vegetation

The study area has a few seasonal water bodies away from the proposed project site. Periya Eri is located about 1.5km on the west side and Saranga Nathi Revi is located about 5.5 km on the west side. But no major drainage system can be found within the study area. No Aquatic diversity is noticed in the core zone area. Aquatic weeds are found to be growing everywhere in 10 km radius area, in every water bog, pond, etc. *Typha angustata* can be found growing all along the drains of villages, small water-logged depressions, and agricultural fields lacking water but containing enough moisture to support its growth. And where water is present, *Eichhornia crassipes* has taken its roots and covers the entire water surface by its sprawl and invasion. All the aquatic plant species are listed in Table 3.7.

3.9.1 Objectives of Aquatic Studies

- ✓ Generating data through actual field collection in these locations over the study period.
- ✓ Consulted with locals to obtain knowledge about aquatic flora and animals.

3.8.2. Macrophytes

The macrophytes observed within the study area are tabulated in Table 3.7.

Table No: 3.38 List of aquatic plants observed in the study area

S.No	Scientific Name	Common Name	Type
1.	*Typha angustifolia*	Lesser Bulrush	Emergent hydrophytes

2.	*Ipomea aquatica*	Water Morning Glory	Marshy amphibious hydrophytes
3.	*Hydrilla verticillata*	Hydrilla	Submerged hydrophytes
4.	*Pistia stratiotes*	Water lettuce	Free floating hydrophytes
5.	*Cyperus articulates*	Jointed flatsedge	Emergent Hydrophytes
6.	*Eichhornia crassipes*	Common water hyacinth	Free floating hydrophytes

***LC- Least Concern, NA-Not yet assessed**

3.9. 2Findings/Results

The assessment was carried out during the summer season. The inspection day was quite all right with respectable weather. The details of the flora and fauna observed are given below.

Records of threatened species in the area

No threatened species were observed

Endangered Species as per Wildlife (Protection) Act

No Endangered fauna was recorded in the project area**.**

Endemic Species of the Project areas

No endemic species were observed in the project area.

Migratory species of the Project areas

No migratory fauna observed in project area.

Migratory corridors and Flight paths

No migratory corridors and Flight paths were observed in project area.

Breeding and spawning grounds

No breeding and spawning grounds were earmarked for the wildlife fauna in project area.

There are no critically endangered, endangered, vulnerable, and endemic species were observed. As the rainfall in the area is scanty and as no toxic wastes are produced or discharged on account of mining, the proposed mining activity is not going to have any additional and adverse impacts on these RET species. There are no ecologically sensitive areas or protected areas within the 10 Km radius. Hence no specific conservation for conservation of any RET species or Wildlife is envisaged.

There are few reserve forests located in the study area, Suriyamalai R.F has located about 2.5km on the west side, There are no impacts due to this mining activity. The reserve forest is away from the proposed project site. There are no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar sites, Tiger/Elephant Reserves/(existing as well as proposed) within 10 km of the mine lease area. There are no protected forests within the project area. Hence submission of clearance from the National Board of Wildlife does not arise.

There are no endangered, endemic, and RET Species. There is no Schedule I species in study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] The proposed project is not going to have any direct or indirect adverse impact on the species mentioned above.

3.10. Conclusion

The observations and assessment of the overall ecological scenario involve details such as classification of Biogeographic zone, eco-region, habitat types, and land cover, distances from natural habitats, vegetation/forest types, and sensitive ecological habitats such as Wetlands sites, Important Bird areas, migration corridors of important wildlife etc. Such baseline information provides better understanding of the situation and overall ecological importance of the area. This baseline information viewed against proposed project activities help in predicting their impacts on the wildlife and their habitats in the region. Data collected and information gathered from secondary literature on flora, fauna, protected area, natural habitats, and wildlife species etc., and consulted

and discussed with local people, from the villages, herders and farmers who inhabit close to the proposed project area.

3.8 Socio Economic Environment for Devannagoundanur and Thangayur Village

There is no habitation/ village within the radius of 1km from the project area. Socio-economic study is an essential part of environmental study. It includes demographic structure of the area, provision of basic amenities viz., housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as 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.

It is expected that the Socio-Economic Status of the area will slightly improve because of this proposed project. As the proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area and, thus, improve their standard of living.

3.8.1 Objectives of the Study

The objectives of the socio-economic study are as follows:

- To study the socio-economic status of the people living in the study area of the proposed mining project.
- To assess the impact of the project on Quality of life of the people in the study area.
- To recommend Community Development measures needs to be taken up in the study Area.

3.8.2 Scope of Work

- To study the Socio-economic Environment of the area from the secondary sources;
- Data Collection & Analysis
- Prediction of project impact
- Mitigation Measures

3.8.3 Administrative Setup of Salem District

Salem district includes 4 Revenue Divisions, 14 Taluks, 44 Revenue firkas, 31 Town Panchayats, 1 Municipal corporation. There are 640 Revenue Villages, in this district. In 2011, Salem district had population of 51,51,549 with a sex-ratio of 1004 females for every 1,000 males. Source: https://salem.nic.in/census/

3.8.4 Study area - Devannagoundanur Village

As per the Population Census 2011, there are total 2417 families residing in the village Devannagoundanur Village. The total population of Devannagoundanur is 8925 out of which 4613 are males and 4312 are females thus the Average Sex Ratio of Devannagoundanur is 935.

3.8.5 Study area - Thangayur Village

As per the Population Census 2011, there are total 1586 families residing in the village Thangayur Village. The total population of Thangayur is 5245 out of which 2767 are males and 2478 are females thus the Average Sex Ratio of Thangayur is 896

Table 3.39: Population Characteristics Devannagoundanur Village

Village	No. of Households	Total Population	Population Male	Population female	Sex Ratio	Total Literates	Total Illiterates
Devannagoundanur	2417	8925	4613	4312	935	5288	3637

The total geographical area of village is 4536.93 hectares. Devannagoundanur has a total population of 8,925 peoples, out of which male population is 4,613 while female population is 4,312. Literacy rate of Devannagoundanur village is 59.25% out of which 65.84% males and 52.20% females are literate. There are about 2,417 houses in Devannagoundanur village.

Table 3.40: Occupational Characteristics Devannagoundanur Village

Particulars	Total	Male	Female
Total No. of Houses	**2,417**	-	-
Population	**8,925**	4,613	4,312
Child (0-6)	**774**	433	341

Particulars	Total	Male	Female
Schedule Caste	**2,206**	1,152	1,054
Schedule Tribe	**0**	0	0
Literacy	**64.88 %**	72.66 %	56.69 %
Total Workers	**5,365**	3,005	2,360
Main Worker	**4,819**	-	-
Marginal Worker	**546**	307	239

Source: Census 2011, Tamil Nadu, https://www.census2011.co.in/data/village/633924-Devannagoundanur-tamil-nadu.html

Caste Factor

Schedule Caste (SC) constitutes 24.72 % of total population in Devannagoundanur village. The village Devannagoundanur currently doesn't have any Schedule Tribe (ST) population.

Work Profile

In Devannagoundanur village out of total population, 5365 were engaged in work activities. 89.82 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 10.18 % were involved in Marginal activity providing livelihood for less than 6 months. Of 5365 workers engaged in Main Work, 1443 were cultivators (owner or co-owner) while 1900 were Agricultural labourer.

Table 3.41: Population Characteristics Thangayur Village

Village	No. of Households	Total Population	Population Male	Population female	Sex Ratio	Total Literates	Total Illiterates
Thangayur	1586	5245	2767	2478	896	3152	2093

The total geographical area of village is 1969.09 hectares. Thangayur has a total population of 5,245 peoples, out of which male population is 2,767 while female population is 2,478. Literacy rate of Thangayur village is 60.10% out of which 70.91% males and 48.02% females are literate. There are about 1,586 houses in Thangayur village.

Table 3.42: Population Characteristics Around 10km Radius

Total No of Villages	No. of Households	Total Population	Population Male	Population female	SC Population Male	SC Population female	Total Literates Male	Total Literates Female	Total Illiterates Male	Total Illiterates Female
16	87367	316820	165413	151407	23076	21547	105603	69620	59810	81787

Table 3.43: Occupational Characteristics Around 10km Radius

Total Worker Population Male	Total Worker Population Female	Main Working Population Male	Main Working Population Female	Main Cultivator Population Male	Main Cultivator Population Female	Main Agricultural Labourers Population Male	Main Agricultural Labourers Population Female	Non-Working Population Male	Non-Working Population Female
106495	79456	169592	99919	18326	14443	73166	34935	58918	71951

Source: Census 2011, Tamil Nadu

3.8.5 Basic Amenities

A better network of physical infrastructure facilities (well-built roads, rail links, irrigation, power and telecommunication, information technology, market-network and social infrastructure support, viz. health and education, water and sanitation, veterinary services and co-operative) is essential for development of the rural economy.

A review of infrastructure facilities available in the area has been given on the basis of field survey. In this study the villages which fall within 10 km radius around the site has been covered. Infrastructure facilities available in the area are presented below.

All basic amenities Education (higher education, colleges, universities, medical college, Transport facilities, Railway station, Bus station area available in the district headquarters Salem at a distance of 35km – North East).

3.8.6 Conclusion

To evaluate the impacts of proposed quarry project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the locality of the site. Hence it can be concluded that the present environment status of the study area will not be affected by the project as **Devannagoundanur & Thangayur Multi Colour Granite** Quarry will adopt adequate control measures to protect the surrounding environment and will contribute in development of the study areas.

The proposed project will aim to provide preferential employment to the local people there by improving the employment opportunity in the area and in turn the social standards will improve.

Table 3.44: Population Characteristics Around 10km Radius

Sno	Name	TRU	No_HH	TOT_P	TOT_M	TOT_F	P_06	M_06	F_06	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST	P_LIT	M_LIT	F_LIT	P_ILL	M_ILL	F_ILL
1	**Sankari**	**Rural**	**23542**	**84036**	**43154**	**40882**	**7238**	**3832**	**3406**	**18813**	**9737**	**9076**	**11**	**6**	**5**	**49924**	**29111**	**20813**	**34112**	**14043**	**20069**
2	Olakkachinnanur	Rural	372	1391	716	675	126	74	52	310	157	153	0	0	0	862	497	365	529	219	310
3	Devannagoundanur	Rural	2417	8925	4613	4312	774	433	341	2206	1152	1054	0	0	0	5288	3037	2251	3637	1576	2061
4	Kaveripatti	Rural	1568	5842	3087	2755	543	304	239	308	158	150	0	0	0	2908	1824	1084	2934	1263	1671
5	Manjakalpatti	Rural	862	3161	1662	1499	312	180	132	704	370	334	0	0	0	1922	1125	797	1239	537	702
6	Vettukkadupatti	Rural	79	303	154	149	24	15	9	53	29	24	0	0	0	198	114	84	105	40	65
7	**Idappady**	**Total**	**22515**	**82291**	**43222**	**39069**	**8085**	**4277**	**3808**	**7248**	**3703**	**3545**	**61**	**0**	**61**	**42794**	**26241**	**16553**	**39497**	**16981**	**22516**
8	Vembaneri	Rural	952	3542	1928	1614	334	166	168	165	87	78	0	0	0	1696	1094	602	1846	834	1012
9	Avaniperur(East)	Rural	2344	8724	4583	4141	911	479	432	663	348	315	0	0	0	5059	3017	2042	3665	1566	2099
10	Chettimankurichi	Rural	2245	8740	4667	4073	895	466	429	267	144	123	0	0	0	4263	2707	1556	4477	1960	2517
11	Chittur	Rural	4059	14466	7476	6990	1379	741	638	1155	562	593	61	0	61	7215	4319	2896	7251	3157	4094
12	Vellarivalli	Rural	3394	12093	6295	5798	1037	531	506	2434	1255	1179	0	0	0	6464	3950	2514	5629	2345	3284
13	**Konganapuram**	**Rural**	**18529**	**67879**	**35848**	**32031**	**6950**	**3746**	**3204**	**6129**	**3155**	**2974**	**6**	**0**	**6**	**36968**	**22831**	**14137**	**30911**	**13017**	**17894**
14	Thangaiyur	Rural	1586	5245	2767	2478	445	258	187	1091	583	508	0	0	0	3152	1962	1190	2093	805	1288
15	Chinnakavundanur	Rural	1993	6819	3497	3322	543	276	267	1801	958	843	0	0	0	4133	2411	1722	2686	1086	1600
16	Aiveli	Rural	910	3363	1744	1619	332	172	160	1276	678	598	0	0	0	2377	1363	1014	986	381	605
	Total		**87367**	**316820**	**165413**	**151407**	**29928**	**15950**	**13978**	**44623**	**23076**	**21547**	**139**	**6**	**133**	**175223**	**105603**	**69620**	**141597**	**59810**	**81787**

Source: Census 201, Tamil Nadu

Table 3.45: Occupational Characteristics Around 10km Radius

Sno	Name	TOT_WORK_P	TOT_WORK_M	TOT_WORK_F	MAIN WORK_P	MAINWORK_M	MAIN WORK_F	MAIN_CL_P	MAIN_CL_M	MAIN_CL_F	MAIN_AL_P	MAIN_HH_P	MAIN_OT_P	MARG WORK_P	NON_WORK_P
1	**Sankari**	**48626**	**28193**	**20433**	**42989**	**25864**	**17125**	**8630**	**5009**	**3621**	**16852**	**1494**	**16013**	**5637**	**35410**
2	Olakkachinnanur	755	443	312	414	369	45	107	99	8	106	9	192	341	636
3	Devannagoundanur	5365	3005	2360	4819	2698	2121	1443	807	636	1900	207	1269	546	3560
4	Kaveripatti	3503	2005	1498	3249	1848	1401	500	303	197	2103	49	597	254	2339
5	Manjakalpatti	1511	1031	480	1438	993	445	217	168	49	498	73	650	73	1650
6	Vettukkadupatti	220	110	110	64	55	9	0	0	0	0	0	64	156	83
7	**Idappady**	**49703**	**27871**	**21832**	**45820**	**26339**	**19481**	**8204**	**4442**	**3762**	**21331**	**3551**	**12734**	**3883**	**32588**
8	Vembaneri	2280	1245	1035	2252	1233	1019	349	220	129	1241	172	490	28	1262
9	Avaniperur(East)	4743	2840	1903	4406	2690	1716	550	288	262	481	557	2818	337	3981
10	Chettimankurichi	5375	2996	2379	4971	2829	2142	753	387	366	2738	282	1198	404	3365
11	Chittur	9305	4953	4352	9034	4856	4178	2631	1319	1312	4524	366	1513	271	5161
12	Vellarivalli	7484	4146	3338	6693	3762	2931	954	498	456	3892	206	1641	791	4609
13	**Konganapuram**	**38216**	**22430**	**15786**	**36016**	**21718**	**14298**	**6398**	**3677**	**2721**	**15003**	**2722**	**11893**	**2200**	**29663**
14	Thangaiyur	3184	1822	1362	2969	1727	1242	980	526	454	1080	50	859	215	2061
15	Chinnakavundanur	3982	2335	1647	3133	2042	1091	771	424	347	1023	34	1305	849	2837
16	Aiveli	1699	1070	629	1325	896	429	282	159	123	394	36	613	374	1664
	Total	**185951**	**106495**	**79456**	**169592**	**99919**	**69673**	**32769**	**18326**	**14443**	**73166**	**9808**	**53849**	**16359**	**130869**

Source: Census 2011, Tamil Nadu

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 General

Environmental impacts both direct and indirect on various environmental attributes due to proposed mining activity will be created in the surrounding environment, during the operational and post–operational phases. The occurrence of mineral deposits, being site specific, their exploitation, often, does not allow for any choice except adoption of eco-friendly operation. The methods are required to be selected in such a manner, so as to maintain environmental equilibrium ensuring sustainable development.
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.

The following parameters are of significance in the Environmental Impact Assessment and are being discussed in detail

- Land environment
- Soil environment
- Water Environment
- Air Environment
- Noise Environment
- Socio economic environment
- Biological Environment

Based on the baseline environmental status at the project site, the environmental factors that are likely to be affected (Impacts) are identified, quantified and assessed.

4.1 Land Environment

4.1.1 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 area applied for quarry lease is 10.27.0 Ha, the total extent of the cluster is 21.07.0 Ha (Cluster area is calculated as per MoEF & CC Notification – S.O. 2269 (E) Dated: 01.07.2016) including existing and proposed quarries. The proposed project area is proponent own patta land, No forest land involved in this lease applied area. The ultimate depth of the proposed project is quarrying is varying from 38m below the ground level and will not intersect the ground water table. The project is site specific.

4.1.2 Mitigation measures

Due to the quarrying activities in the project the land use pattern will be altered. In order to minimize the adverse effects, the following control measures will be implemented:

- In the Opencast Method of Mining the degradation of land is insignificant, after completion of the quarrying operation the land, the land will be partially backfilled with dumped material and part of the area will be allowed to collect rainwater which will act as temporary reservoir, this Granite waste, overburden not produce any toxic effluents in the form of solid, liquid or gas
- Top Soil will be removed and utilized for greenbelt development in the safety barrier
- The periphery of the mining lease area will be converted to a greenbelt to prevent Noise and sound propagation to the nearby lands
- Construction of garland drains all around the quarry pit and construction of check dam at strategic location in lower elevations to prevent soil erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area
- Barbed wire fencing will be re constructed at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.1.1.2 Soil Environment

4.1.1.3 Impact on Soil Environment

Erosion and Sedimentation (Removal of protective vegetation cover; Exposure of underlying soil horizons that may be less pervious, or more erodible than the surface layers; Reduced capacity of soils to absorb rainfall; Increased energy in storm-water runoff due to concentration and velocity; and Exposure of subsurface materials which are unsuitable for vegetation establishment).

4.1.1.4 Mitigation measures for Soil Conservation

- The top soil will be preserved in the safety barrier and kept in moisture condition. The preserved top soil will be utilized for greenbelt development in the safety barrier and utilized for plantation on the top bench
- Garland drains will be constructed around the project area to arrest any soil from the quarry area being carried away by the rainwater. This will also avoid the soil erosion and siltation in the mining pits and maintaining the stability of the benches.

4.1.1.5 Waste Dump Management

4.1.1.6 Anticipated Impact

Solid waste is in the form of Granite waste which does not produce any toxic effluent during dumping. Garland drains will be constructed around the waste dump to prevent the rainwater entering into the quarrying pit besides this garland drain will also help in facilitating the rainwater to the natural gradient.

There is generation of topsoil is aims to cumulative produce about 12,875m^3 during this five-year scheme of period. The top soil will be preserved all along the safety barrier and utilized for construction of bund and afforestation purpose. The total waste to be cumulatively produced during this Scheme of period is around 1,99,624m^3 (Granite waste 60%) the same will be temporarily dump on the North western side with Dimensions of 177m(L) x 127m (W) x 41m (D). As and when there is accumulation of waste, the same is loaded into the tipper by loading machines and dumped in the respective places ear-marked for the purpose.

4.1.1.7 Mitigation measures

- Retaining wall with weep hole, Garland drain will be provided around the dump areas
- Proper angle of repose to be maintained
- Grasses to be done over the dump areas for stability.
- Soil erosion may also be accelerated on areas where the overburden from the ore excavation operation will be dumped. As there is neither a toxic effluent nor solid waste from the mine, quality of soil is not expected to be adversely affected.

4.2 Water Environment (Impact & Mitigation Measures)

4.2.1 Anticipated Impact on Surface and ground water

The impact due to mining on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. For the quarrying activity water will be utilized for wire saw cutting (which will be recycled), water sprinkling on haul roads and greenbelt development. The quarrying activity will not intersect ground water table as ultimate depth of the quarry from 38 to 47m and water table is found at a depth of 69m summer and 64m rainy season BGL.

4.2.2 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 area. 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 area.

There is no proposal Granite processing or workshop within the project area thus there is no effluent anticipated in the mine.

Detail of water requirements in KLD as given below:

Table 4.1 Water Requirement for the Project

Sno	*Purpose*	*Quantity Required*			*Source*
		P1	**P2**	**P3**	
1	Domestic & Drinking purpose	1.0 KLD	0.5KLD	0.5KLD	From Existing, bore wells and drinking water will be sourced from Approved Water vendors.
2	Dust Suppression	1.5 KLD	0.8KLD	0.8KLD	From Existing bore wells from nearby area
3	Green Belt	0.8 KLD	0.7KLD	0.7KLD	From Existing bore wells from nearby area
Total		**3.3 KLD**	**2.0 KLD**	**2.0 KLD**	

Source: Prefeasibility report

- 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 judicially 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 (Impact & Mitigation Measures)

The air borne particulate matter is the main air pollutant in this opencast mining. The mining operation will be carried out by Diamond wire saw cutting, jackhammer drilling (35mm dia) and Hydraulic Excavators will be utilized for handling of Granite waste.

4.3.1. Anticipated Impact

The air borne particulate matter generated by quarrying operation, and transportation. The emissions of Sulphur dioxide (SO_2), Oxides of Nitrogen (NOx) due to excavation/loading equipment and vehicles plying on haul roads are marginal. Loading - unloading and transportation of Granite 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 (PM_{10}) affecting Ambient Air of the area. Prediction of impacts on air environment has been carried out taking into consideration three proposed quarry aims to Cumulatively production about 3,59,222m^3 (ROM) on air environment and net increase in emissions by Open pit source modelling in AERMOD Software.

4.3.2 AERMOD Frame work of Computation & details

By using the above-mentioned inputs, ground level concentrations due to the quarrying activities have been estimated to know the incremental concentration in ambient air quality and impact in the study area. The effect of air pollutants upon receptors are influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modelling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by quarrying activities. PM_{10} was the major pollutant occurred during quarrying activities. The prediction included the impact of Excavation, Drilling, Blasting

(Occasionally), loading and movement of vehicles during transportation and meteorological parameters such as wind speed, wind direction, temperature, rainfall, humidity and Cloud cover.

Impact was predicted over the distance of 10 km around the source to assess the impact at each receptor separately at the various locations and maximum incremental GLC value at the project site. Maximum impact of PM_{10} was observed close to the source due to low to moderate wind speeds. Incremental value of PM_{10} was superimposed on the base line data monitored at the proposed site to predict total GLC of PM_{10} due to combined impacts.

4.3.2.1 Emission Rate

An emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.
The general equation for emissions estimation is:

$$E = A \times EF \times (1-ER/100)$$

Where:
E = Emissions;
A = Activity rate;
EF = Emission factor, and
ER = Overall emission reduction efficiency, %

The proposed mining activity includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 4-2.

Table 4.2: Estimated Emission Rate for -P1

Activity	Source type	Value	Unit
Drilling	Point Source	0.052549789	g/s
Blasting	Point Source	0.000096932	g/s
Mineral Loading	Point Source	0.036548800	g/s
Haul Road	Line Source	0.002484384	g/s/m
Overall Mine	Area Source	0.050636531	g/s
SO2	Point Source	0.00014964	g/s
Nox	Area Source	0.000006686	g/s

Table 4.3: Estimated Emission Rate for -P2

Activity	Source type	Value	Unit
Drilling	Point Source	0.069278205	g/s
Blasting	Point Source	0.000386009	g/s
Mineral Loading	Point Source	0.038847571	g/s
Haul Road	Line Source	0.002486253	g/s/m
Overall Mine	Area Source	0.054092080	g/s
SO2	Point Source	0.000293704	g/s
Nox	Area Source	0.000015033	g/s

Table 4.4: Estimated Emission Rate for -P3

Activity	Source type	Value	Unit
Drilling	Point Source	0.078179759	g/s
Blasting	Point Source	0.000706458	g/s
Mineral Loading	Point Source	0.041219766	g/s
Haul Road	Line Source	0.002489565	g/s/m
Overall Mine	Area Source	0.061688070	g/s
SO2	Point Source	0.000524325	g/s
Nox	Area Source	0.000035382	g/s

4.3.2 Frame work of Computation & Model details

By using the above-mentioned inputs, ground level concentrations due to the quarrying activities have been estimated to know the incremental concentration in ambient air quality and impact in the study area. The effect of air pollutants upon receptors are influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modelling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by quarrying activities. PM_{10} was the major pollutant occurred during quarrying activities. The prediction included the impact of Excavation, Drilling, Blasting, loading and movement of vehicles during transportation and meteorological parameters such as wind speed, wind direction, temperature, rainfall, humidity and Cloud cover.

Impact was predicted over the distance of 10 km around the source to assess the impact at each receptor separately at the various locations and maximum incremental GLC value at the project site. Maximum impact of PM_{10} was observed close to the source due to low to moderate wind speeds. Incremental value of PM_{10} was superimposed on the base line data monitored at the proposed site to predict total GLC of PM_{10} due to combined impacts.

Figure 4.1: AERMOD Terrain Map

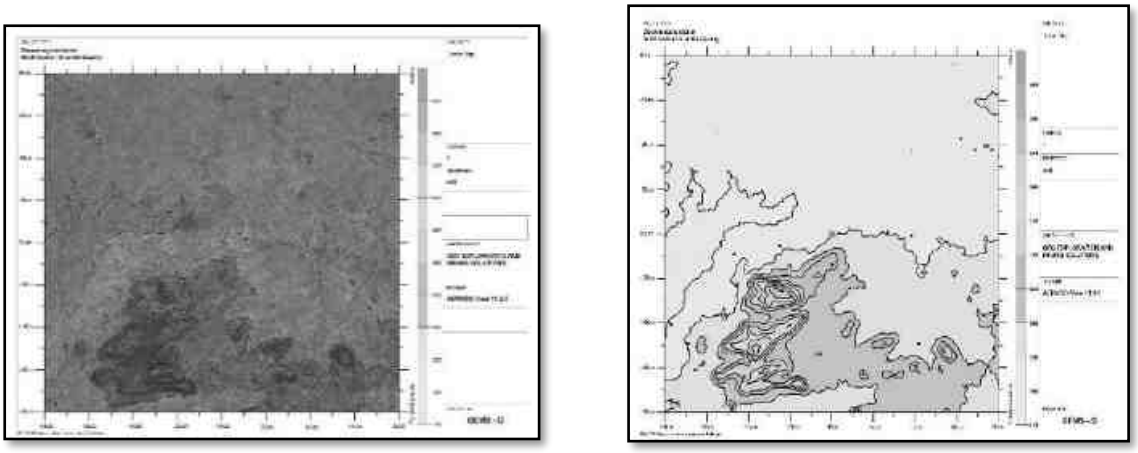


Figure 4.2: Predicted Incremental Concentration of Fugitive Dust

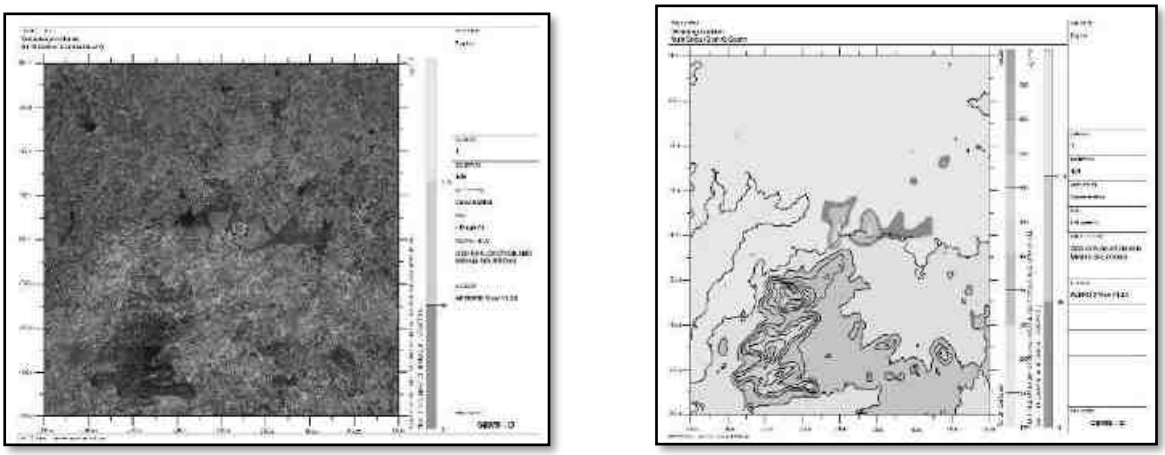


Figure 4.3: Predicted Incremental Concentration of PM_{10}

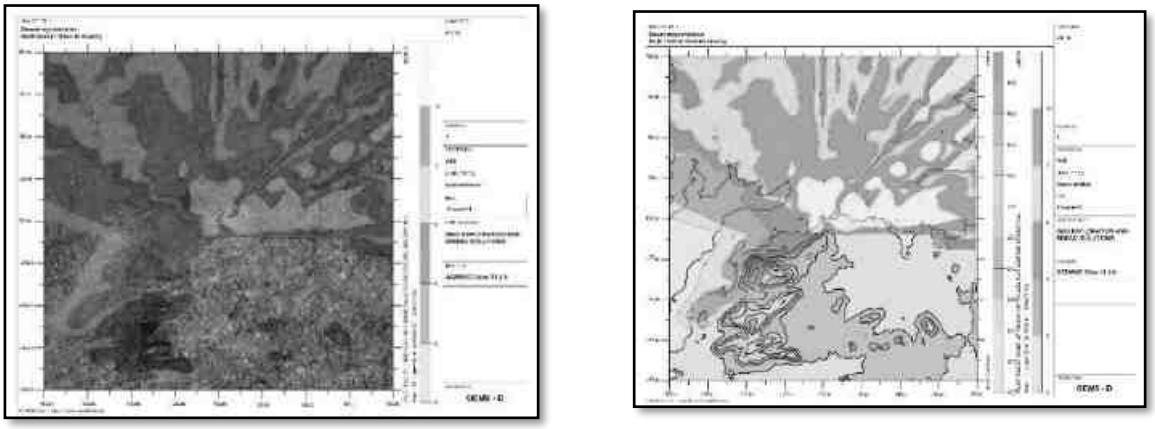


Figure No 4.4: Predicted Incremental Concentration of $PM_{2.5}$

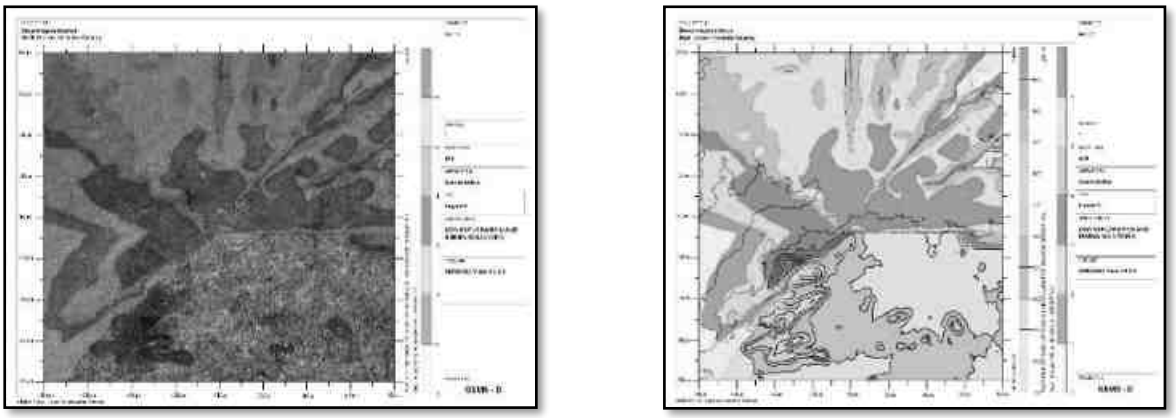


Figure No 4.5: Predicted Incremental Concentration Of So_2

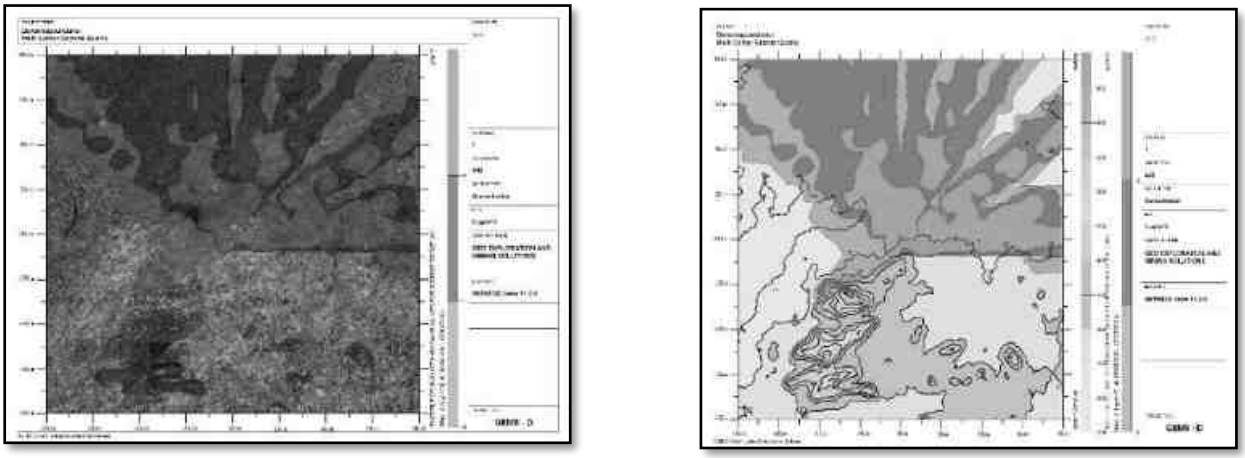
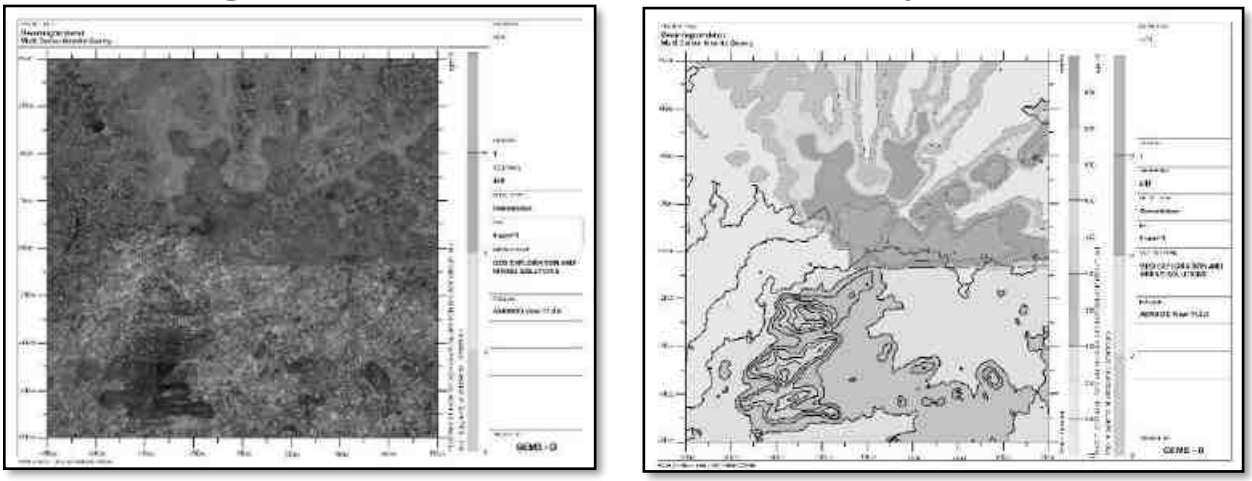


Figure No 4.6: Predicted Incremental Concentration of No_x



4.3.2.1 Model Results

The post project Resultant Concentrations of Fugitive Dust emission, PM_{10}, $PM_{2.5}$, SO_2 & NO_X (GLC) is given in Table below:

Table 4.5: Incremental & Resultant GLC of Fugitive Dust

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Fugitive ($\mu g/m^3$)	Incremental value of Fugitive due to mining ($\mu g/m^3$)	Total Fugitive ($\mu g/m^3$) (5+6)
AAQ1	11°33'32.61"N 77°50'42.69"E	76	-21	57.50	119	176.5
AAQ2	11°33'43.58"N 77°51'8.01"E	854	318	63.37	0	63.4
AAQ3	11°34'28.82"N 77°50'16.31"E	-735	1722	62.88	0	62.9
AAQ4	11°33'6.08"N 77°53'46.46"E	5701	-847	65.23	0	65.2
AAQ5	11°35'33.42"N 77°52'48.48"E	3928	3725	63.82	0	63.8
AAQ6	11°32'22.65"N 77°47'16.67"E	-6235	-2194	63.38	0	63.4
AAQ7	11°30'23.66"N 77°51'52.59"E	2218	-5890	64.68	0	64.7
AAQ8	11°36'0.02"N 77°47'38.52"E	-5561	4555	65.56	0	65.6

Table 4.6: Incremental & Resultant GLC OF PM_{10}

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM_{10} ($\mu g/m^3$)	Incremental value of PM_{10} due to mining ($\mu g/m^3$)	Total PM_{10} ($\mu g/m^3$) (5+6)
AAQ1	11°33'32.61"N 77°50'42.69"E	76	-21	44.8	14.89	59.7
AAQ2	11°33'43.58"N 77°51'8.01"E	854	318	47.1	13.00	60.1
AAQ3	11°34'28.82"N 77°50'16.31"E	-735	1722	45.9	14.23	60.1
AAQ4	11°33'6.08"N 77°53'46.46"E	5701	-847	45.4	3.98	49.4
AAQ5	11°35'33.42"N 77°52'48.48"E	3928	3725	22.7	6.97	29.7
AAQ6	11°32'22.65"N 77°47'16.67"E	-6235	-2194	24.3	0.61	24.9
AAQ7	11°30'23.66"N 77°51'52.59"E	2218	-5890	45.0	0	45.0
AAQ8	11°36'0.02"N 77°47'38.52"E	-5561	4555	44.6	10.00	54.6

Table 4.7: Incremental & Resultant GLC OF $PM_{2.5}$

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline $PM_{2.5}$ ($\mu g/m^3$)	Incremental value of $PM_{2.5}$ due to mining ($\mu g/m^3$)	Total $PM_{2.5}$ ($\mu g/m^3$) (5+6)
AAQ1	11°33'32.61"N 77°50'42.69"E	76	-21	23.4	6.86	30.3
AAQ2	11°33'43.58"N 77°51'8.01"E	854	318	26.2	5.76	32.0
AAQ3	11°34'28.82"N 77°50'16.31"E	-735	1722	25.0	6.11	31.1
AAQ4	11°33'6.08"N 77°53'46.46"E	5701	-847	24.6	2.79	27.4
AAQ5	11°35'33.42"N 77°52'48.48"E	3928	3725	22.7	3.50	26.2
AAQ6	11°32'22.65"N 77°47'16.67"E	-6235	-2194	22.7	1.45	24.1
AAQ7	11°30'23.66"N 77°51'52.59"E	2218	-5890	26.0	0	26.0
AAQ8	11°36'0.02"N 77°47'38.52"E	-5561	4555	26.2	4.63	30.9

Table 4.8: Incremental & Resultant GLC OF SO_2

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline So_2 ($\mu g/m^3$)	Incremental value of So_2 due to mining ($\mu g/m^3$)	Total So_2 ($\mu g/m^3$) (5+6)
AAQ1	11°33'32.61"N 77°50'42.69"E	76	-21	6.3	2.47	8.8
AAQ2	11°33'43.58"N 77°51'8.01"E	854	318	6.9	1.79	8.7
AAQ3	11°34'28.82"N 77°50'16.31"E	-735	1722	6.3	2.23	8.6
AAQ4	11°33'6.08"N 77°53'46.46"E	5701	-847	6.2	0	6.2
AAQ5	11°35'33.42"N 77°52'48.48"E	3928	3725	7.1	0.24	7.3
AAQ6	11°32'22.65"N 77°47'16.67"E	-6235	-2194	6.7	0	6.7
AAQ7	11°30'23.66"N 77°51'52.59"E	2218	-5890	6.9	0	6.9
AAQ8	11°36'0.02"N 77°47'38.52"E	-5561	4555	7.0	0.69	7.7

Table 4.9: Incremental & Resultant GLC OF NO_X

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Nox ($\mu g/m^3$)	Incremental value of Nox due to mining ($\mu g/m^3$)	Total Nox ($\mu g/m^3$) (5+6)
AAQ1	11°33'32.61"N 77°50'42.69"E	76	-21	22.2	9.80	32.0
AAQ2	11°33'43.58"N 77°51'8.01"E	854	318	22.3	8.67	31.0
AAQ3	11°34'28.82"N 77°50'16.31"E	-735	1722	20.4	9.00	29.4
AAQ4	11°33'6.08"N 77°53'46.46"E	5701	-847	20.5	0	20.5
AAQ5	11°35'33.42"N 77°52'48.48"E	3928	3725	20.6	0	20.6
AAQ6	11°32'22.65"N 77°47'16.67"E	-6235	-2194	19.0	0	19.0
AAQ7	11°30'23.66"N 77°51'52.59"E	2218	-5890	19.9	0	19.9
AAQ8	11°36'0.02"N 77°47'38.52"E	-5561	4555	22.6	0	22.6

From the resultant of cumulative concentration i.e., Background + Incremental Concentration of pollutant in all the receptor locations without effective mitigation measures are still within the prescribed NAAQ limits of 100, 60, 80 & 80 µg/m^3 for PM_{10}, $PM_{2.5,}$ SO_2 & NO_X respectively. By adopting suitable mitigation measures, the pollutant levels in the atmosphere can be further being controlled.

4.3.3. 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 –

- Blasting will be carried out only to remove the overburden and weathered portion
- Establish time of blasting to suit the local conditions and water sprinkling on blasting face
- Controlled blasting includes 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

Haul Road & Transportation –

- Water will be sprinkled on haul roads, Loading Points 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 taurpaulin
- The speed of tippers plying on the haul road will be limited below 20 km/hr to avoid generation of dust.
- Main source of gaseous pollution will be from vehicle used for transportation of mineral; therefore, weekly maintenance of 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 road 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 area

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 months once to assess effectiveness of mitigation measures proposed

4.4 Noise Environment

Noise pollution is mainly due to operation like drilling & blasting (Occasionally) and plying of trucks & HEMM. These activities will not cause any problem to the inhabitants of this area because there is no human settlement in close proximity to the project area. Noise modelling has been carried out considering blasting and compressor operation (drilling) and transportation activities.

Predictions have been carried out to compute the noise level at various distances around the working pit due to these major noise-generating sources.

Noise at a point generates spherical waves, which are propagated outwards from the source through the air at a speed of 1,100 ft/sec, with the first wave making an ever-increasing sphere with time. As the wave spreads the intensity of noise diminishes as the fixed amount of energy is spread over an increasing surface area of the sphere. The assumption of the model is based on point source relationship i.e., for every doubling of the distance the noise levels are decreased by 6 dB (A).

For hemispherical sound wave propagation through homogeneous loss free medium, one can estimate noise levels at various locations at different sources using model based on first principle.

$$Lp_2 = Lp_1 - 20 \log (r_2/r_1) - Ae_{1,2}$$

Where:

Lp_1 & Lp_2 are sound levels at points located at distances r_1 & r_2 from the source.

$Ae_{1,2}$ is the excess attenuation due to environmental conditions. Combined effect of all sources can be determined at various locations by logarithmic addition.

$$Lp_{total} = 10 \log \{10^{(Lp1/10)} + 10^{(Lp2/10)} + 10^{(Lp3/10)} + \ldots\ldots\}$$

4.4.1 Anticipated Impact

Attenuation due to Green Belt has been taken to be 4.9 dB (A). The inputs required for the model are:

- Source data
- Receptor data
- Attenuation factor

Source data has been computed considering of all the machinery and activities used in the mining process. Same has been listed in Table 4-8.

The total noise to be produced by mining activity is calculated to be 95.8 dB (A). Generally, most mining operations produce noise between 100-109 dB (A). We have considered equipment and operation noise levels (max) to be approx. 109 dB (A) for nose prediction modelling.

Table 4.10: Predicted Noise Incremental Values

Location ID	N1	N2	N3	N4	N5	N6	N7	N8
Maximum Monitored Value (Day) dB(A)	47.5	45.3	46.3	42.3	42.1	42.1	39.20	41.30
Incremental Value dB(A)	60.1	42.37	35.49	29.47	25.13	23.97	24.54	23.45
Total Predicted Noise level dB(A)	60.33	47.09	46.65	42.52	42.19	42.17	39.35	41.37
NAAQ Standards	Industrial Day Time- 75 dB (A) & Night Time- 70 dB (A) Residential Day Time– 55 dB (A) & Night Time- 45 dB (A)							

The incremental noise level is found within the range of 60.1 dB (A) in Core Zone and 23.97 to 42.37 dB (A) in Buffer zone. The noise level at different receptors in buffer zone is lower due to the distance 33.3 involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A) the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations are within permissible limits of Industrial area (core zone) & Residential area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (The Principal Rules were published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.).

4.4.2 Mitigation measures for Control of Noise

The following noise mitigation measures are proposed for control of Noise

- Usage of sharp drill bits while drilling which will help in reducing noise;
- Secondary blasting will be totally avoided and hydraulic rock breaker are utilized for breaking boulders;
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will reduce noise;
- 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 will be developed around the project areas 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 though training and awareness.
- Regular medical check–up and proper training to personnel to create awareness about adverse noise level effects.

4.4.3 Ground Vibrations

Ground vibrations due to mining activities in the project area are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc. However, the major source of ground vibration from the proposed mine is moving of Heavy Earth Moving Machineries vibration due to blasting is very minimal since the blasting will not carried out frequently in this type of Granite quarry operation. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements.

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining lease area and may cause injury to persons or damage to the structures. Nearest habitation from the project area is located 350 m South East. The ground vibrations due to the blasting in proposed mine are calculated using the empirical equation.

The empirical equation for assessment of peak particle velocity (PPV) is:

$$V = K\,[R/Q_{0.5}]^{-B}$$

Where –

V = peak particle velocity (mm/s)

K = site and rock factor constant

Q = maximum instantaneous charge (kg)

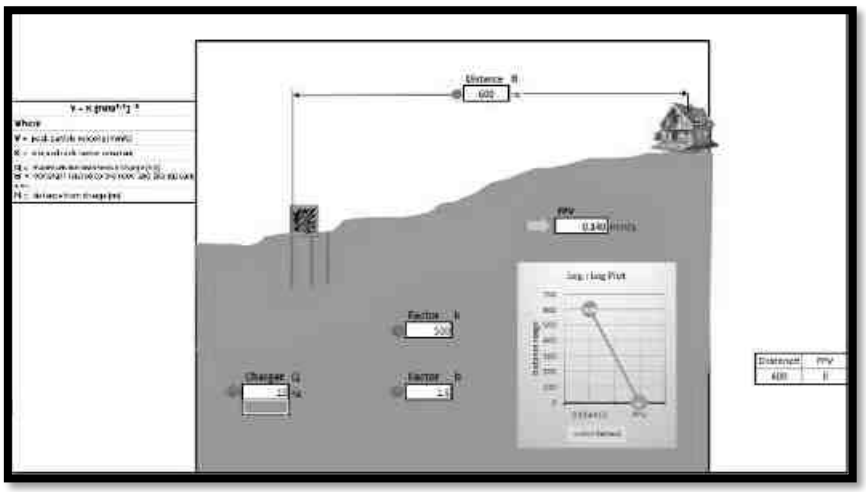
B = constant related to the rock and site (usually 1.6)

R = distance from charge (m)

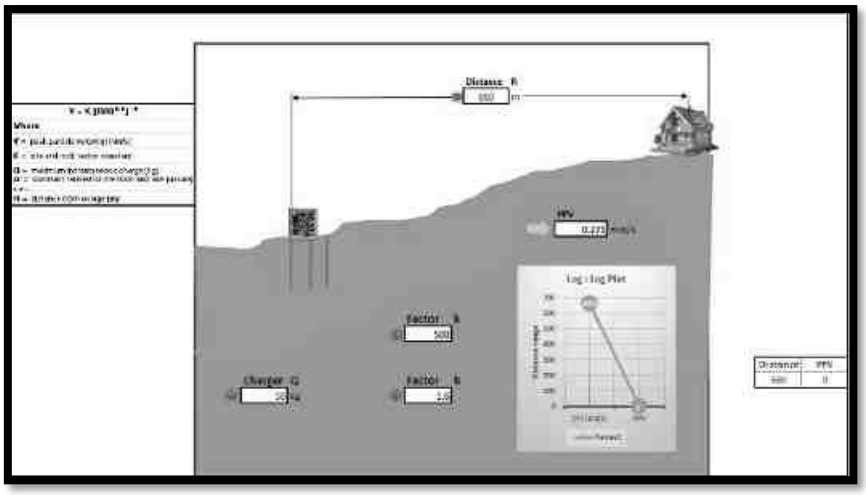
TABLE 4.11: PREDICTED PPV VALUES DUE TO BLASTING P1 to P3

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	13	600	0.140
P2	36	660	0.271
P3	54	660	0.375

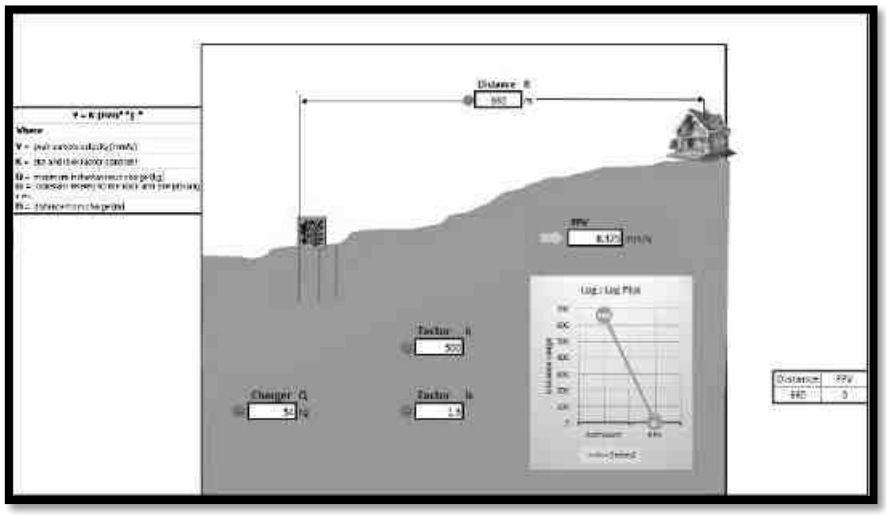
Figure No 4.7: Ground Vibration Prediction -P1



P2



P3



From the above graph, the charge per blast of 13,36,54 kg is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997. It should be ensured that the explosives used for blasting at one blast should not exceed more than 100kg at any point of time. However, as per statutory requirement control measures will be adopted to avoid the impacts due to ground vibrations and fly rocks due to blasting.

4.4.3.1 Mitigation measures for Control of Vibration

- The blasting operations in the mine are proposed to be carried out by jackhammer drilling and blasting using delay detonators, which reduces the ground vibrations;
- Proper quantity of explosive, suitable stemming materials and appropriate delay system should be adopted to avoid overcharging and for safe blasting;
- Adequate safe distance from blasting should be maintained as per DGMS guidelines;
- Blasting shelter will be provided as per DGMS guidelines;
- Blasting operations will be carried out only during day time;
- The charge per delay will be minimized and preferably a greater number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity shall be temporarily stopped;
- Drilling parameters like depth, diameter and spacing will be properly designed to give proper blast;
- A fully trained explosives blast man (Mining Mate, Mines Foreman, 2_{nd} Class Mines Manager/ 1st Class Mines Manager) will be appointed.

4.5 Ecology and Biodiversity

4.5.1. Anticipated Impact on Flora

- 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.

4.5.2 Mitigation Measures

4.5.2.1. Green Belt Development

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.

4.5.2.2 Species Recommendation for Plantation granted in the District.

Following points have been considered while recommending the species for plantation:

- The natural growth of existing species and the survival rate of various species.
- Suitability of a particular plant species for a particular type of area.
- Creating biodiversity.
- Fast-growing, thick canopy copy, perennial and evergreen large leaf area.
- Efficient in absorbing pollutants without major effects on natural growth.
- The following species may be considered primary for plantations best suited for the prevailing climate condition in the area.

Table No 4.5.2.1 List of plant species proposed for Greenbelt development

S. No	Name of the plant (Botanical)	Family Name	Common Name	Habit
1	Borassus flabellifer	Arecaceae	Panai	T
2	Morinda pubescens	Rubiaceae	Nuna	T
3	Pongamia pinnata	Fabaceae	Pungam	T
4	Thespesia Populnea	Malvaceae	Puvarasu	T
5	Syrygium cumini	Myrtaceae	Naval	T
6	Saraca asoca	Fabaceae	Asoca	T
7	Limonia acidissima	Rutaceae	Odhiam	T
8	Lannea coromandelica	Anacardiaceae	Vila maram	T
9	Cassia roxburghii	Fabaceae	Sengondrai	T
10	Pterocarpus marsupium	Fabaceae	Vengai	T

(*Source: Guidance for Developing Green belts Manual, CPCB 2000)

4.5.3 Anticipated Impact on Fauna

- No rare, endemic & endangered species are reported in the buffer zone. However, during the course of mining, the management will practice the scientific method of mining with a proper Environmental Management Plan including pollution control measures especially for air and noise, to avoid any adverse impact on the surrounding wildlife.
- Fencing around the mine lease area to restrict the entry of stray animals.
- Green belt development will be carried out which will help in minimizing adverse impact on the flora found in the area.

4.5.3.1. Mitigation Measures

- A suitable plan for the conservation of Schedule-I Species have been prepared and the necessary fund for implementation for the same will be made.
- All the preventive measures will be taken for the growth & development of fauna.
- Creating and developing awareness for nature and wildlife in the adjoining villages.
- The workers shall be trained to not harm any wildlife, should it come near the project site. No work shall be carried out after 6.00 pm.

4.5.3.2 Afforestation

More number of trees has been observed along the approach road to the lease area, the trees will be maintained in good condition. The 7.5m and 10m Safety distance along the boundary has been identified to be utilized for subsequent Afforestation. However, the afforestation should always be carried out in a systematic and scientific manner. Regional trees like Neem, Pongamia, Pinnata, Casuarina will be planted along the Lease boundary and avenues as well as over non-active dumps at a rate of 50 trees per annum with interval 3m in between. A retaining wall will be constructed around the dumping yard. The rate of survival expected to be 80% in this area. Afforestation Plan is given in Table No.4.11 and preparation of green belt details are given in Table No.4.11.

Table 4.11: Greenbelt development plan-P1

Year	No. of tress proposed to be planted	Area to be covered in m^2	Name of the species to be plant	Survival rate expected in %
1st	1200	7.5m Safety Distance, Panchayat road etc..	Neem, Casuarina, Pongamia pinnata, etc., trees	80

Nearly proposed for afforestation by planting 1200 Nos. of trees during every year and expected growth is around at a survival rate of 80%.

Table 4.12: Preparation of green belt details -P1

ACTIVITY	YEAR					RATE	AMOUNT (Rs.)
	1st						
Plantation (In Nos.)	1200					@100 Rs Per sapling	1,20,000 /-
Plantation and Maintenance Cost							
Barbed wire fencing (In Mtrs) 540 Mtrs	1,62,000	-	-	-	-	@300 Rs Per Meter	1,62,000/-
Garland drain (In Mtrs) 500 Mtrs	1,50,000	-	-	-	-	@300 Rs Per Meter	1,50,000/-
TOTAL							**4,32,000/-**

Table 4.13: Greenbelt development plan-P2

Year	No. of tress proposed to be planted	Area to be covered in m^2	Name of the species to be plant	Survival rate expected in %
1st	1400	7.5m Safety Distance, Panchayat road etc..	Neem, Casuarina, Pongamia pinnata, etc., trees	80

Nearly proposed for afforestation by planting 1400 Nos. of tree saplings during this scheme period .

Table 4.14: Preparation of green belt details -P2

ACTIVITY	YEAR					RATE	AMOUNT (Rs.)
	1st						
Plantation (In Nos.)	1400					@100 Rs Per sapling	1,40,000/-
Plantation (Safety zone) Cost							
Compound Wall (In Mtrs) 260 Mtrs	-	-	-	-	-	@300 Rs Per Meter	78,000/
Barbed wire fencing (In Mtrs) 300 Mtrs	90,000	-	-	-	-	@300 Rs Per Meter	90,000/
Garland drain (In Mtrs) 450 Mtrs	1,35,000	-	-	-	-	@300 Rs Per Meter	1,35,000/-
TOTAL							**4,43,000/-**

Table 4.15: Greenbelt development plan-P3

Year	No. of tress proposed to be planted	Area to be covered in m^2	Name of the species to be plant	Survival rate expected in %
1st	1900	7.5m Safety Distance, Panchayat road etc..	Neem, Casuarina, Pongamia pinnata, etc., trees	80

Nearly proposed for afforestation by planting 1900 Nos. of tree saplings during this scheme period

Table 4.16: Preparation of green belt details -P3

ACTIVITY	YEAR					RATE	AMOUNT (Rs.)
	1st						
Plantation (In Nos.)	1900					@100 Rs Per sapling	1,90,000/-
Plantation (Safety zone) Cost							
Barbed wire fencing (In Mtrs) 850 Mtrs	2,55,000	-	-	-	-	@300 Rs Per Meter	2,55,000/
Garland drain (In Mtrs) 950 Mtrs	2,85,000	-	-	-	-	@300 Rs Per Meter	2,85,000/-
TOTAL							**7,30,000/-**

4.5.3.2.1. Species Recommendation for Plantation granted in the district

Following points have been considered while recommending the species for plantation:

- Natural growth of existing species and survival rate of various species.
- Suitability of a particular plant species for a particular type of area.
- Creating of biodiversity.
- Fast growing, thick canopy copy, perennial and evergreen large leaf area.
- Efficient in absorbing pollutants without major effects of natural growth.
- The following species may be considering primary for plantation best suited for the prevailing climate condition in the area.

Table 4.13: Recommended Species to Plant in the Greenbelt

S. No	Name of the plant (Botanical)	Family Name	Common Name	Habit
1	Borassus flabellifer	Arecaceae	Panai	T
2	Morinda pubescens	Rubiaceae	Nuna	T
3	Pongamia pinnata	Fabaceae	Pungam	T
4	Thespesia Populnea	Malvaceae	Puvarasu	T
5	Syrygium cumini	Myrtaceae	Naval	T
6	Saraca asoca	Fabaceae	Asoca	T
7	Limonia acidissima	Rutaceae	Odhiam	T
8	Lannea coromandelica	Anacardiaceae	Vila maram	T
9	Cassia roxburghii	Fabaceae	Sengondrai	T
10	Pterocarpus marsupium	Fabaceae	Vengai	T

4.5.3.2.2 Impact on Aquatic Biodiversity

Mining activities will not disturb the aquatic ecology as there is no effluent discharge proposed from the Multi-Colour Granite quarry. There is no natural perennial surface water body within the mine lease area, like wetlands, rivers streams, lakes, and farmer sites. There is no impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. Kindly refer the Chapter 3, clause No 3.7.3**.** Aquatic biodiversity is observed in the study area.

4.5.4 Impact Assessment on Biological Environment

This chapter highlights the various impacts on ecology and biodiversity due to mining activity. The major adverse impacts due to pre-mining and mining phases are loss of habitat, biodiversity, rare flora and fauna, fisheries and other aquatic life, migration of wildlife, and overall disruption of the ecology of the area. During the post-mining phase after land restoration, ecology may effectively improve. A detail of impact and assessments was mentioned in Table No.4.14

Table No: 4.14 Anticipated impact of Ecology and Biodiversity

S. No	Aspect Description	Likely Impacts on Ecology and Biodiversity (EB)	Impact Consequence Probability Description Justification	Significance	Mitigation Measures
Pre-mining phase					
1	Uprooting of vegetation of lease area	Site specific loss of common floral diversity (Direct impact)	The site possesses Common floral (not tree) species. Clearance of these species will not result in loss of flora.	Less severe	No immediate action is required. However, a Greenbelt /plantation will be developed on the project site and on the periphery of the project boundary, which will improve the floral and faunal diversity of the project area.
		Site specific loss of associated faunal diversity (Partial impact)	The site supports only common species, which use a wide variety of habitats of the buffer zone reserve forest area. So, there is no threat of Faunal diversity		
		Loss of Habitat (Direct impact)	Site does not for unique / critical habitat structure for unique flora or fauna.		
Mining phase					
2	Excavation of mineral using machine and labours, transportation Activities will Generate noise.	Site-specific disturbance to normal faunal movements at the site due to noise. (Partial impact)	Site does not form unique / critical habitat structure for unique flora or fauna.	Less severe	-Mining activity should not be operated after 5PM. - Excavation of dump and transportation work should stop before 7PM.

3	Vehicular movement for transportation of materials will result in the generation of dust (Particulate matter) due to haul roads and emission of Sulphur Dioxide, Nitrogen Dioxide, Carbon monoxide, etc.	Impact on Surrounding agriculture and associated fauna due to deposition of dust and emission of CO. (Indirect impact)	Impact is less as the agricultural land is far from the core area.	Less severe	All vehicles will be certified for appropriate Emission levels. More plantations have been suggested Upgrade the vehicles with alternative fuels such biodiesel, methanol, and biofuel around the mining area.

Table 4.15: Ecological Impact Assessments

S.No	Attributes	Assessment
1	Impact of mining activity on agricultural land nearby the proposed project site.	Agricultural land is located away from the proposed project site. There are no impacts on the agricultural land & Horticulture. Kindly refer to the conclusion.
2	Activities of the project affect the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in the mining lease site. The fauna sighted mostly migrated from the buffer area.
3	Located near an area populated by rare or endangered species	No Endangered, Critically Endangered, or vulnerable species were sighted in the core mining lease area.
4	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/ coastline/estuary/sea	Panai R.F has located about 1.5km on the south followed by Anchetty R.F located about 2km on the South side and Noganoor R.F is located about 4km on the East side, Jowlagiri RF is located about 5.8km on the west side. There is no Eco Sensitive zone/ Critically polluted area/ HACA/CRZ located within 10 km radius of the area.
5	The proposed project restricts access to waterholes for wildlife	'No '
6	Proposed mining project impact surface water quality that also provides water to wildlife	'No 'scheduled or threatened wildlife animals are sighted regularly core in the core area.
7	Proposed mining project increase siltation that would affect nearby biodiversity areas.	Surface runoff management such as drains is constructed properly so there will be no siltation effect in the nearby mining area.
8	Risk of fall/slip or cause death to wild animals due to project activities.	'No'
9	The project release effluents into a water body that also supplies water to a wildlife.	No water body near to core zone so the chances of water becoming polluted is low.
10	Mining projects affect the forest-based livelihood/ any specific forest product on which local livelihood depended.	'No'
11	The project likely to affect migration routes.	'No 'migration route observed during the monitoring period.
12	The project is likely to affect the flora of an area, which have medicinal value	'No'
13	Forestland is to be diverted, has carbon high sequestration.	'No 'There was no forest land diverted.
14	The project is likely to affect wetlands, Fish breeding grounds, and marine ecology.	'No'. Wetland was not present in the near core Mining lease area. No breeding and nesting ground is present in the core mining area.

(Format Source: EIA Guidance Manual-Mining and Minerals, 2010)

4.6 Socio Economic

The socio-economic impacts of mining are many. Impacts of a mine project may be positive or Negative. The adverse impacts attribute to physical displacement due to land acquisition, which is followed by loss of livelihood, mental agony, changes in social structure, and risk to food security etc., People are also directly affected due to pollution. Social Impact Assessment (SIA) is a process of analysis, monitoring and managing the social consequences of a project. Study on Socio-economic status has already been carried out using primary socio-economic survey for generating the baseline data of Socio-economic status.

4.6.1 Anticipated Impact

From the primary Socio-economic survey & through secondary data available from established literature and census data 2011, it is found that there would be positive impact on Socio-economic condition of the nearby area. There is no habitation within 600m of the proposed mining lease area. Therefore, no major impact is anticipated on the nearby habitation during the entire life of the mine.

4.6.2 Mitigation Measures

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

4.7 Occupational Health and Safety

Occupational health and safety hazards will occur during the operational phase of mining and primarily include the following:

- Respiratory hazards
- Noise
- Physical hazards
- Explosive storage and handling

4.7.1 Respiratory Hazards

Long-term exposure to silica dust may cause silicosis the following measures are proposed:

- Cabins of excavators and tippers will be enclosed with AC and sound proof
- Use of personal dust masks will be made compulsory

4.7.2 Noise

Workers are likely to get exposed to excessive noise levels during mining activities. The following measures are proposed for implementation

- The use of hearing protection will be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110 dB(A)
- No employee will be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection
- Ear muffs provided will be capable of reducing sound levels at the ear to at least 85 dB(A)
- Periodic medical hearing checks will be performed on workers exposed to high noise levels

4.7.3 Physical Hazards

The following measures are proposed for control of physical hazards

- Specific personnel training on work-site safety management will be taken up;
- Work site assessment will be done by rock scaling of each surface exposed to workers to prevent accidental rock falling and / or landslide, especially after blasting activities;
- Natural barriers, temporary railing, or specific danger signals will be provided along rock benches or other pit areas where work is performed at heights more than 2m from ground level;
- Maintenance of yards, roads and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be taken up

4.7.4 Occupational Health Survey

All the persons will undergo pre-employment and periodic medical examination. Employees will be monitored for occupational diseases by conducting the following tests

- General physical tests
- Audiometric tests, Full chest, X-ray, Lung function tests, Spirometric tests
- Periodic medical examination – yearly, Lung function/ Silicosis test – yearly, those who are exposed to dust
- Eye test

Essential medicines will be provided at the site. The medicines and other test facilities will be provided at free of cost. The first aid box will be made available at the mine for immediate treatment. First aid training will be imparted to the selected employees regularly. The lists of first aid trained members shall be displayed at strategic places.

4.7.5 Post COVID Health Management Plan for Workers

The following Health Management plan will be strictly implemented in the Mines, Mine officials like Mines Manager and Foreman will be Act as a Controller of Health Management of the workers.

- Temperature will be checked to all the workers while arriving to work on each day
- If any persons/employees have fever of 100.4 or higher, chills, shortness of breath will be sent to Hospital and the persons will be employed after fourteen days
- All the persons inside the mine area instructed to wear fabric or disposable pleated masks covering Nose and Mouth
- Social distancing of 6 feet will be maintained all the time
- Temporary Hand washing points will be installed near the working places, workers will be initiated to Wash hands frequently with soap and water for a minimum of 20 seconds and advised to avoid touching face. This is an essential contagion-control mechanism

4.7.6 Plastic Waste Management

As per the Tamil Nadu Government Order (Ms) No. 84 Environment and Forest (EC.2) Department Dated 25.06.2018 following kind of plastics will not be used in the mines area.

- Use and throw away plastics such as carry bags, plastic bags, plastic sheets used for food wrapping, spreading, plastic plates, plastic coated tea cups and plastic tumblers will not be used in the mines

Action Plan:

Action Plan	Responsibility
All the employees will be checked for plastics before entering the quarry.	Watchman
Every week or month a meeting of workers under the chairmanship of the mine manager will be held to explain the disadvantages of plastic use.	Mine Foreman & Mining Mate
They will be advised not to bring plastic materials into the mines and those who are involved in such activities will not be allowed to work on the day of the snow.	Mines Manager
The miners will be provided with areca nut plates and mugs to help reduce the use of plastics.	Mines owner

4.8 Mine Closure

Mine closure plan is the most important environmental requirement in mineral mining projects. The mine closure plan should cover technical, environmental, social, legal and financial aspects dealing with progressive and post closure activities. The closure operation is a continuous series of activities starting from the decommissioning of the project.

Objective of Mine closure

- To create a productive and sustainable after-use for the site, acceptable to mine owners, regulatory agencies, and the public
- To protect public health and safety of the surrounding habitation
- To minimize environmental damage
- To conserve valuable attributes and aesthetics
- To overcome adverse socio-economic impacts.

4.8.1 Mine Closure criteria

The criteria involved in mine closure are discussed below:

4.8.1.1 Physical Stability

All anthropogenic structures, which include mine workings, buildings, rest shelters etc., remaining after mine decommissioning should be physically stable. They should present no hazard to public health and safety as a result of failure or physical deterioration and they should continue to perform the functions for which they were designed. The design periods and factors of safety proposed should take full account of extreme events such as floods, hurricane, winds or earthquakes, etc. and other natural perpetual forces like erosion, etc.,

4.8.1.2 Chemical Stability

The solid wastes on the mine site should be chemically stable. This means that the consequences of chemical changes or conditions leading to leaching of metals, salts or organic compounds should not endanger public health and safety nor result in the deterioration of environmental attributes. If the pollutant discharge likely to cause adverse impacts is predicted in advance, appropriate mitigation measures like settling of suspended solids or passive treatment to improve water quality as well as quantity, etc. could be planned. Monitoring should demonstrate that there is no adverse effect of pollutant concentrations exceeding the statutory limits for the water, soil and air qualities in the area around the closed mine.

4.8.1.3 Biological Stability

The stability of the surrounding environment is primarily dependent upon the physical and chemical characteristics of the site, whereas the biological stability of the mine site itself is closely related to rehabilitation and final land use. Nevertheless, biological stability can significantly influence physical or chemical stability by stabilizing soil cover, prevention of erosion/wash off, leaching, etc.,

A vegetation cover over the disturbed site is usually one of the main objectives of the rehabilitation programme, as vegetation cover is the best long-term method of stabilizing the site. When the major earthwork components of the rehabilitation programme have been completed, the process of establishing a stable vegetation community begins. For re-vegetation, management of soil nutrient levels is an important consideration. Additions of nutrients are useful under three situations.

- Where the nutrient level of spread topsoil is lower than material in-situ e.g. for development of social forestry
- Where it is intended to grow plants with a higher nutrient requirement than those occurring naturally e.g. planning for agriculture
- Where it is desirable to get a quick growth response from the native flora during those times when moisture is not a limiting factor e.g. development of green barriers

The Mine closure plan should be as per the approved mine plan. The mine closure is a part of approved mine plan and activities of closure shall be carried out as per the process described in mine closure plan

(Annexure I)

5. ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 Introduction

Consideration of alternatives to a project proposal is a requirement of EIA process. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives helps to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost-effective options.

The quarrying operation like drilling, blasting, excavation, loading & transportation are being carried out. The site has been selected based on geological investigation and exploration as below:

- Transportation facility for materials & manpower
- Overall impact on environment and mitigation feasibility
- Socio – economic background.

Enough infrastructures exists and lesser resources are required to be deployed. Since, any further construction for infrastructure is not required and hence does not affect the environment considerably. The mineral deposits are site specific in nature; hence question of seeking alternate site does not arise for this project.

6. ENVIRONMENTAL MONITORING PROGRAMME

6.0 General

The monitoring and evaluation of environmental parameters indicates potential changes occurring in the environment, which paves way for implementation of rectifying measures wherever required to maintain the status of the natural environment. Evaluation is also a very effective tool to judge the effectiveness or deficiency of the measures adopted and provides insight for future corrections.

The main objective of environmental monitoring is to ensure that the obtained results in respect of environmental attributes and prevailing conditions during operation stage are in conformity with the prediction during the planning stage. In case of substantial deviation from the earlier prediction of results, this forms as base data to identify the cause and suggest remedial measures. Environmental monitoring is mandatory to meet compliance of statutory provisions under the Environment (Protection) Act, 1986, relevant conditions regarding monitoring covered under EC orders issued by the SEIAA as well as the conditions set forth under the order issued by Tamil Nadu Pollution Control Board while granting CTO.

6.1 Methodology of Monitoring Mechanism

Implementation of EMP and periodic monitoring will be carried out by Project Proponent. A comprehensive monitoring mechanism has been devised for monitoring of impacts due to proposed project; Environmental protection measures like dust suppression, control of noise and blast vibrations, maintenance of machinery and vehicles, housekeeping in the mine premises, plantation, implementation of Environmental Management Plan and environmental clearance conditions will be monitored by the Mine Management. On the other hand, implementation of area level protection measures like green belt development, environmental quality monitoring etc., are taken up by a senior executive who reports Mine Management.

An Environment monitoring cell (EMC) will be constituted to monitor the implementation of EMP and other environmental protection measures.
The responsibilities of this cell will be:

- Implementation of pollution control measures
- Monitoring programme implementation
- Post-plantation care
- To check the efficiency of pollution control measures taken
- Any other activity as may be related to environment
- Seeking expert's advice when needed

The environmental monitoring cell will co-ordinate all monitoring programs at site and data thus generated will be regularly furnished to the State regulatory agencies as compliance status reports.
The sampling and analysis report of the monitored environmental attributes will be submitted to the Tamil Nadu Pollution Control Board (TNPCB) at a frequency of half-yearly and yearly. The half-yearly reports are submitted to Ministry of Environment and Forest, Regional Office and SEIAA as well.

The sampling and analysis of the environmental attributes will be as per the guidelines of Central Pollution Control Board (CPCB)/Ministry of Environment, Forest and Climate Change (MoEF & CC).

6.2 Implementation Schedule of Mitigation Measures

The mitigation measures proposed in Chapter-4 will be implemented so as to reduce the impact on the environment due to the operations of the proposed project. Implementation schedule of mitigation measures is given in Table 6.1.

Table 6.1: Implementation Schedule

S.No.	Recommendations	Time Period	Schedule
1	Land Environment Control Measures	Before commissioning of the project	Immediate
2	Soil Quality Control Measures	Before commissioning of the project	Immediate
3	Water Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediate and as project progress
4	Air Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediate and as project progress
5	Noise Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediate and as project progress
6	Ecological Environment	Phase wise implementation every year along with mine operations	Immediate and as project progress

6.3 Monitoring Schedule and Frequency

Monitoring shall confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges, emissions and wastes, for measurement against statutory standards. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints.

The environmental monitoring will be conducted in the mine operations as follows:

- Air quality;
- Water and wastewater quality;
- Noise levels;
- Soil Quality; and
- Greenbelt Development

The details of monitoring is detailed in Table 6.2

Table 6.2: Monitoring Schedule for the Project Area

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, 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	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	–	During blasting Operation	Peak Particle Velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

Source: Guidance of manual for mining of minerals, February 2010

6.4 Budgetary Provision for EMP

The cost in respect of monitoring of environmental attributes, parameter to be monitored, sampling/monitoring locations with frequency and cost provision against each proposal is shown in Table 6.3. Monitoring work will be outsourced to external laboratory approved by NABL / MoEF.

The proposed capital cost for Environmental Monitoring Programme is Rs 76,000/- and the recurring cost is Rs 76,000/- per annum.

Table 6.3: Environmental Monitoring Budget for P1,P2&P3

Sl.No.	Parameter	Capital Cost	Recurring Cost per annum
1	Air Quality	Rs. 76,000/-	Rs. 76,000/-
2	Meteorology		
3	Water Quality		
4	Hydrology		
5	Soil Quality		
6	Noise Quality		
7	Vibration Study		
Total		**Rs 76,000/-**	**Rs 76,000/-**

6.5 Reporting Schedules of Monitored Data

The monitored data on air quality, water quality, noise levels and other environmental attributes will be periodically examined by the Mine Management level and Head of Organization for taking necessary corrective measures. The monitoring data will be submitted to Tamil Nadu State Pollution Control Board in the Compliance to CTO Conditions & environmental audit statements every year to MoEF & CC and Half-Yearly Compliance Monitoring Reports to MoEF & CC Regional Office and SEIAA.

Periodical reports to be submitted to: -

- MoEF & CC – Half yearly status report
- TNPCB - Half yearly status report
- Department of Geology and Mining: quarterly, half yearly annual reports

Besides the Mines Manager/Agent will submit the periodical reports to

- Director of mines safety,
- Labour enforcement officer,
- Controller of explosives as per the norms stipulated by the department.

CHAPTER – 7: ADDITIONAL STUDIES

7.0 General

The following Additional Studies were done as per items identified by project proponent and items identified by regulatory authority. And items identified by public and other stakeholders are incorporated after Public Hearing.

- Public Consultation
- Risk Assessment
- Disaster Management Plan

7.1 Public Consultation:

Application to The Member Secretary of the Tamil Nadu Pollution Control Board (TNPCB) to conduct Public Hearing in a systematic, time bound and transparent manner ensuring widest possible public participation at the project site or in its close proximity in the district is submitted along with this Draft EIA / EMP Report and the outcome of public hearing proceedings will be detailed in the Final EIA/EMP Report.

7.2 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. Risk Assessment is all about prevention of accidents and to take necessary steps to prevent it from happening.

Factors of risks involved due to human induced activities in connection with mining & allied activities with detailed analysis of causes and control measures for the mine is given in below Table 7.4.

Table 7.4 Risk Assessment

S. No	Risk factors	Causes of risk	Control measures
1	Accidents due to explosives and heavy mining machineries	Improper handling and unsafe working practice	▪ All safety precautions and provisions of Mine Act, 1952, Metalliferous Mines Regulation, 1961 and Mines Rules, 1955 will be strictly followed during all mining operations; ▪ Entry of unauthorized persons will be prohibited; ▪ Firefighting and first-aid provisions in the mine office complex and mining area; ▪ Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use ▪ Working of quarry, as per approved plans and regularly updating the mine plans; ▪ Cleaning of mine faces shall be daily done in order to avoid any overhang or undercut; ▪ Handling of explosives, charging and firing shall be carried out by competent persons only under the supervision of a Mine Manager; ▪ Maintenance and testing of all mining equipment as per manufacturer guidelines.
2	OB / Waste Dump	Sliding of benches Height and slope of the benches	▪ Dumps benches are maintained with proper 3 m height and 37° slope to prevent slope failure and terraced.

		Drainage facilities	▪ Dumping in the waste dump in layers and dozing daily. ▪ Vegetation of the top and slopes of the dump to prevent erosion and providing water drainage channels ▪ Providing proper drainage facilities in mine and dump area. ▪ Construction of retaining wall around dump area to stop sliding of material. ▪ Garland drain to be made around OB dump area
3	Drilling& Wire Saw Cutting	Due to improper and unsafe practices Due to high pressure of compressed air, hoses may burst Drill Rod may break	▪ Safe operating procedure established for drilling (SOP) will be strictly followed. ▪ Only trained operators will be deployed. ▪ No drilling shall be commenced in an area where shots have been fired until the blaster/blasting foreman has made a thorough Examination of all places, ▪ Drill& Wire saw operator shall examine the drilling and wire saw equipment and satisfy himself ▪ Drilling & cutting operations shall not be carried on simultaneously on the benches at places directly one above the other. ▪ Periodical preventive maintenance and replacement of worn-out accessories in the compressor and drill equipment and wire saw equipment as per operator manual. ▪ All drills and wire saw unit shall be provided with wet drilling and cutting arrangement and it shall be maintained in efficient working in condition. ▪ Operator shall regularly use all the personal protective equipment.
4	Blasting	Fly rock, ground vibration, Noise and dust. Improper charging, stemming & Blasting/ fining of blast holes Vibration due to movement of vehicles	▪ The maximum charge per delay and by optimum blast hole pattern, vibrations will be controlled within the permissible limit and blast can be conducted safely. ▪ SOP for Charging, Stemming & Blasting/Firing of Blast Holes will be followed by blasting crew during initial stage of operation ▪ Shots are fired during daytime only. ▪ All holes charged on any one day shall be fired on the same day. ▪ The danger zone is and will be distinctly demarcated (by means of red flags)
5	Transportation	Potential hazards and unsafe workings contributing to accident and injuries Overloading of material While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	▪ Before commencing work, drivers personally check the dumper/truck/tipper for oil(s), fuel and water levels, tyre inflation, general cleanliness and inspect the brakes, steering system, warning devices including automatically operated audio-visual reversing alarm, rear view mirrors, side indicator lights etc., are in good condition. ▪ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. ▪ Concave mirrors should be kept at all corners

			▪ All vehicles should be fitted with reverse horn with one spotter at every tipping point ▪ Loading according to the vehicle capacity ▪ Periodical maintenance of vehicles as per operator manual
6	Natural calamities	Unexpected happenings	▪ Escape Routes will be provided to prevent inundation of storm water ▪ Garland drains will be provided at the toe of dump ▪ Fire Extinguishers & Sand Buckets
7	Failure of Mine Benches and Pit Slope	Slope geometry, Geological structure	Ultimate or over all pit slope shall be below 60° and each bench height shall be 5m height.

7.3 Disaster Management Plan

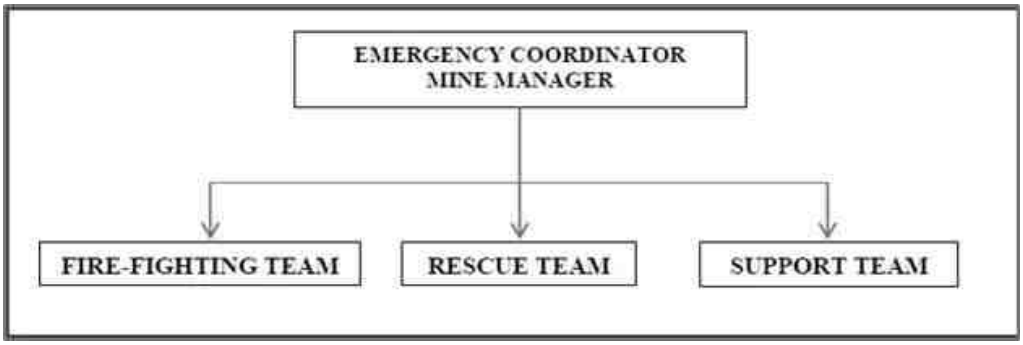
The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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:

- Effect the 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

It is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy. To tackle the consequences of a major emergency inside the mines or immediate vicinity of the mines, a Disaster Management Plan must be formulated, and this planned emergency document is called “Disaster Management Plan”.

In case a disaster takes place, despite preventive actions, disaster management will have to be done in line with the descriptions below. There is an organization proposed for dealing with the emergency situations and the coordination among key personnel and their team has been shown below –



The emergency organization shall be headed by emergency coordinator who will be qualified competent mine manager. In his absence senior most people available at the mine shall be emergency coordinator till arrival of mine manager. There would be three teams for taking care of emergency situations – Fire-Fighting Team, Rescue Team and Support Team. The proposed composition of the teams is given in Table 7.5.

Table 7.5: Proposed Teams to Deal with Emergency Situation

Designation	Qualification
Fire-Fighting Team	
Team Leader	Mines Manager
Team Member	Mines Foreman
Team Member	Mining Mate
Rescue Team	
Team Leader	Mines Manager
Team Member	Environment Officer
Team Member	Mining Foreman
Support Team	
Team Leader	Mines Manager
Assistant Team Leader	Environment Officer
Team Member	Mining Mate
Security Team	Mines Foreman

Once the mine becomes operational, the above table along with names of personnel will be prepared and made easily available to workers. A mobile communication network and wireless shall connect Mine Emergency Control Room (MECR) to control various departments of the mine, fire station and neighbouring industrial units/mines.

Roles and responsibilities of emergency team –

(a) Emergency coordinator (EC)

The emergency coordinator shall assume absolute control of site and shall be located at MECR.

(b) Incident controller (IC)

Incident controller shall be a person who shall go to the scene of emergency and supervise the action plan to overcome or contain the emergency. Shift supervisor or Environmental Officer shall assume the charge of IC.

(c) Communication and advisory team

The advisory and communication team shall consist of heads of Mining Departments i.e., Mines Manager

(d) Roll call coordinator

The Mine Foreman shall be Rollcall Coordinator. The roll call coordinator will conduct the roll call and will evacuate the mine personnel to assembly point. His prime function shall be to account for all personnel on duty.

(e) Search and rescue team

There shall be a group of people trained and equipped to carryout rescue operation of trapped personnel. The people trained in first aid and fire-fighting shall be included in search and rescue team.

(f) Emergency security controller

Emergency Security Controller shall be senior most security person located at main gate office and directing the outside agencies e.g., fire brigade, police, doctor and media men etc.,

Emergency control procedure –

The onset of emergency, will in all probability, commence with a major fire or explosion or collapse of wall along excavation and shall be detected by various safety devices and also by members of operational staff on duty. If located by a staff member on duty, he (as per site emergency procedure of which he is adequately briefed) will go to nearest alarm call point, break glass and trigger off the alarms. He will also try his best to inform about location and nature of accident to the emergency control room. In accordance with work emergency procedure the following key activities will immediately take place to interpret and take control of emergency.

- On site fire crew led by a fireman will arrive at the site of incident with fire foam tenders and necessary equipment.
- Emergency security controller will commence his role from main gate office
- Incident controller shall rush to the site of emergency and with the help of rescue team and will start handling the emergency.
- Site main controller will arrive at MECR with members of his advisory and communication team and will assume absolute control of the site.

- He will receive information continuously from incident controller and give decisions and directions to:
  - Incident controller
  - Mine control rooms
  - Emergency security controller

Proposed fire extinguishers at different locations –

The following type of fire extinguishers has been proposed at strategic locations within the mine.

Table 7.6: Proposed Type of Fire Extinguishers

Location	Type of Fire Extinguishers
Electrical Equipment‟s	CO_2 type, foam type, dry chemical powder type
Fuel Storage Area	CO_2 type, foam type, dry chemical powder type, Sand bucket
Office Area	Dry chemical type, foam type
Location	Type of Fire Extinguishers

Alarm system to be followed during disaster –

On receiving the message of disaster from Site Controller, fire-fighting team, the mine control room attendant will sound siren wailing for 5 minutes. Incident controller will arrange to broadcast disaster message through public address system.

On receiving the message of "Emergency Over" from Incident Controller the emergency control room attendant will give "All Clear Signal", by sounding alarm straight for 2 minutes.

The features of alarm system will be explained to one and all to avoid panic or misunderstanding during disaster.

In order to prevent or take care of hazard / disasters if any the following control measures have been adopted.

- All safety precautions and provisions of Metalliferous Mines Regulations (MMR), 1961 is strictly followed during all mining operations.
- Observance of all safety precautions for blasting and storage of explosives as per MMR 1961.
- Entry of unauthorized persons into mine & allied areas is completely prohibited.
- Firefighting and first-aid provisions in the mines office complex and mining area are provided.
- Provisions of all the safety appliances such as safety boot, helmets, goggles, dust masks, ear plugs and ear muffs etc. are made available to the employees and the use of same is strictly adhered to through regular monitoring.
- Training and refresher courses for all the employees working in hazardous premises.
- Working of mine, as per approved plans and regularly updating the mine plans.
- Cleaning of mine faces is regularly done.
- Handling of explosives, charging and blasting are carried out only by qualified persons following SOP.
- Checking and regular maintenance of garland drains and earthen bunds to avoid any inflow of surface water in the mine pit.
- Provision of high-capacity standby pumps with generator sets with enough quantity of diesel for emergency pumping especially during monsoon.
- A blasting SIREN is used at the time of blasting for audio signal.
- Before blasting and after blasting, red and green flags are displayed as visual signals.
- Checking of blasting area for any un-blasted hole or material.
- Warning notice boards indicating the time of blasting and NOT TO TRESPASS are displayed at prominent places.
- Regular maintenance and testing of all mining equipment were carried out as per manufacturer’s guidelines.

7.4 Cumulative Impact Study

There are 4 Proposed and 3 existing quarries, 5 Expired quarries, 1Abandoned Quarry within a radius of 500 meters from the proposed project area. The list of quarries is as below

Table 7.7: List of Quarries within 500 Meter Radius from this Proposal

PROPOSED QUARRIES				
CODE	**Name of the Owner**	**S.F.Nos & Village**	**Extent**	**Status**
P1	Thiru. P.Jayaraj, No.252, 1st Cross Street Periyasamy Nagar, Alagapuram Pudur, Salem – 636 016.,	90/1(Part) & 90/2(Part), of Devannagoundanur Village, Sankari Taluk	2.00.5	Lr No. SEIAA-TN/F.No.t360/SEAC /ToR- 1315/2022 Dated: 21.12.2022
P2	Thiru. B. Venkatesh, No.255, Kanakapura Main Road, 7th Block, Jayanagar, Bengaluru, Karnataka – 560 070,	1/1(Part) and 1/2B(Part) Thangayur Village, Edappadi Taluk	2.31.5	Lr No. SEIAA-TN/F.No.9848/ToR-1439/2023 Dated: 21.04.2023
`P3	Thiru. B. Venkatesh, No.255, Kanakapura Main Road, 7th Block, Jayanagar, Bengaluru, Karnataka – 560 070,	1/2B(P) and 1/3B(P) Thangayur Village, Edappadi Taluk	3.12.0	Lr No. SEIAA-TN/F.No.9855/ToR-1435/2023 Dated:24.04.2023
P4	M/s. Classic Mines, No.2/140E, Mankuttaikadu, Morur Post, Tiruchengode Taluk, Namakkal District.	2/2A1B2, 2/2A2, 2/2B (P), 2/2A1C (P), Thangayur Village, Edappadi Taluk	2.83.0	Application under process
TOTAL			**10.27.0 Ha**	
EXISTING QUARRIES				
CODE	**Name of the Owner**	**S.F. Nos & Village**	**Extent**	**Status**
E-1	KMB Granite P Ltd, 4/59, Bharathi street, Swarnapuri Salem- 636004	76/2B, 76/7 Devannagoundanur Village, Sankari Taluk	2.10.5	17/03/2006 To 16/03/2026
E-2	M/s.Gem granites 58, Cathedral Road, Chennai -86	74/1B,74 /2B, 91/1	4.37.0	04.12.2008 to 3.12.2028
E-3	R.Navinladdha, S/o. (Late) Sri Rameshwarladha, 31/1 Chandramuki Pattalama Temple street, South end Circle, Basavanagudi, Bengaluru-560004.	9/1A1, 9/2A2, 9/2A3, 9/2B	4.32.5	22.12.2016-21.12.2036
Total			**10.80.0 Ha**	
EXPIRED QUARRIES				
Ex-1	B. Venkatesh S/o.Babu, Sivasakthi, 255, Kanakapura Main Road, 7th Block, Jaya Nagar Bangalore-70	100/2A & 2B Devannagoundanur Village, Sankari Taluk	3.74.5	01/03/2001 To 28/02/2021
Ex-2	M/s.Gem granites, 58, Cathedral Road, Chennai -86	104, Devannagoundanur Village, Sankari Taluk	1.77.0	30.9.1998 to 29.9.2018
Ex-3	M/s.Gem granites, 58, Cathedral Road, Chennai -86	106/1 Devannagoundanur Village, Sankari Taluk	4.87.0	30.9.1998 to 29.9.2018
Ex-4	KMB Granite P Ltd, 4/59, Bharathi street, Swarnapuri Salem- 636004	88/1P, Devannagoundanur Village, Sankari Taluk	1.75.5	19.8.1998 to 18.8.2018
Ex-5	Syhims Granites, No.4/59, Bharathi street, Swarnapuri, Five roads, Salem-4	89/3, Devannagoundanur Village, Sankari Taluk	1.39.3	08.9.1995 to 07.9.2005
TOTAL			**13.53.3 Ha**	
ABANDONED QUARRY				
A1	Atlas Granite	2/2B, Thangayur Village, Edappadi Taluk	4.00.0	25.4.1994 to 24.4.2004
	Total		**4.00.0 Ha**	
TOTAL CLUSTER EXTENT			**21.07.0 Ha**	

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

Table 7.8 A: Salient Features of Proposed Projects "P1"

Name of the Quarry		**Thiru. P.Jayaraj,**
Lease period		20 years
Mining Lease area		2.00.5 Ha
Location		90/1(Part) & 90/2(Part), of Devannagoundanur Village, Sankari Taluk, Salem District
First Scheme of Period		5 Years (2020-2025)
Life of the Mine		20 years
Existing Depth (As per Pit letter)		1) Pit 1 = 85m x 32m x21m 2) pit 2 = 26mx 06m x 05m 3) Pit 3 = 18m x l6m x 05m 4) Pit 4 = 12m x 08m x 04m 5) Pit 5 = 93 m x36m x l6m 6) Pit 6 = 40m x 37m x l0m
Previous lease particulars		It is a patta land registered in the name of Applicant (Thiru.P.Jayaraj) vide patta nos.1157 & 815
Proposed Depth for five years plan period		47m
Ultimate Depth		213m(L) x 89m (W) x 47m (D) (2m Topsoil + 45m Multicolored Granite)
Toposheet No		58 E/14
Latitude between		11°33'31.55"N to 11°33'35.45"N
Longitude between		77°50'36.05"E to 77°50'44.49"E
Topography		The area is exhibits in elevated topography and the gradient towards Northwest side. The altitude of the area is ranges from 239m - 250m above from MSL.
Machinery proposed	Jackhammer	4
	Compressor	1
	Hydraulic drilling machine	-
	Hydraulic/Crawler crane	1
	Mobile crane	-
	Excavator	1
	Tipper	2
	Diesel Generator	2
	Diamond wire saw	1
	Water pump	-
	Water tanker	-
Proposed manpower deployment		22
A. Project cost		Rs. 2,44,92,382
B.EMP Cost		Rs. 3,80,800/-
C.CER cost		Rs. 5,00,000/-
Total Project cost		Rs.2,53,69,882/-

Table 7.8 B: Salient features of proposal "P2"

Name of the Quarry	**Thiru. B. Venkatesh**
Lease period	20 years
Mining Lease area	2.31.5 Ha
Location	1/1(Part) and 1/2B(Part) Thangayur Village, Edappadi Taluk
Second Scheme of Mining Period	5 Years (2020-2025)
Life of the Mine	20 years
Existing Depth (As per Pit letter)	223m(L) x 98m (W) x 41m (D)
Previous lease particulars	It is a Own patta land
Proposed Depth for five years plan period	66m (1m topsoil + 65m Multi Colour granite)
Ultimate Depth	233m(L) x 98m (W) x 66m (D) ((8m AGL + 58m BGL)
Toposheet No	58 E/14
Latitude between	$11^0$33'40.25'' N to $11^0$33'44.42''N
Longitude between	77°51'06.75''E to 77°51'15.15''E

Topography		The area exhibits slightly elevated topography. The gradient is gentle towards Northwest and altitude of the area is ranges from 236m to 244m above from MSL
Machinery proposed	Jackhammer	7
	Compressor	2
	Wagon drilling machine	1
	Derric crane	1
	Mobile crane	-
	Excavator	2
	Tipper	2
	Diesel Generator	2
	Diamond wire saw	3
	Water pump	-
	Water tanker	-
Proposed manpower deployment		41
A. Project cost		Rs. 3,60,67,000/-
B.EMP Cost		Rs. 3,80,000/-
C.CER cost		Rs. 5,00,000/-
Total Project cost		Rs.3,64,47,000/-

Table 7.8 C: Salient features of proposal "P3"

Name of the Quarry		**Thiru. B. Venkatesh**
Lease period		20 years
Mining Lease area		3.12.0 Ha
Location		1/2B(P) & 1/3B(P) Thangayur Village, Edappadi Taluk
First Scheme of Mining Period		5 Years (2021-2026)
Life of the Mine		20 years
Existing Depth (As per Pit letter)		1) Pit 1 = 30m x 76m x 8m 2) pit 2 = 50m x 27m x 01m 3) Pit 3 = 80m x 84m x 08m
Previous lease particulars		It is an Own patta land
Proposed Depth for five years plan period		38m
Ultimate Pit Dimension		233m(L) x 121m (W) x 38m (D)
Toposheet No		58 E/14
Latitude between		11°33'41.03'' N to 11°33'46.32''N
Longitude between		77°51'10.02''E to 77°51'20.75''E
Topography		The area exhibits flat topography. The gradient is gentle towards North and altitude of the area is 243m above from MSL.
Machinery proposed	Jackhammer	7
	Compressor	2
	Wagon drilling machine	1
	Derric crane	1
	Crawl crane	1
	Excavator	2
	Tipper	2
	Diesel Generator	2
	Diamond wire saw	3
	Water pump	-
	Water tanker	-
Proposed manpower deployment		41
A. Project cost		Rs. 4,01,47,000
B.EMP Cost		Rs. 3,80,000/-
C.CER cost		Rs. 5,00,000/-
Total Project cost		Rs.4,05,27,000/-

Table 7.8 E: Salient Features of Existing Quarry "E1"

SALIENT FEATURES OF PROPOSAL "E1"		
Name of the Mine	Multi-coloured Granite quarry belongs to M/s.KMB Granite	
Survey Nos	76/2B, 76/7	
Land Type	Patta land.	
Extent	2.10.5 Ha	
Depth of Mining	37 m	
Mining Plan Period / Lease Period	20 years	
Toposheet No	58 E/14	
Latitude between	11°33'41.60"N to ~11°33'36.00"N	
Longitude between	77°50'29.16"E to 77°50'22.20"E	
Highest Elevation	225-235m ASML	
Machinery Proposed	Jack Hammer	5
	Compressor	2
	Hydraulic Excavator	1
	Tippers	2
	Crawler crane	1
	Wire saw	1
	Diesel generator	1
Proposed Blasting Method	Deep hole drill blasting	
Manpower Proposed	30	
Nearest Habitation	350m-NE	

Table 7.7 F: Salient features of existing quarry "E2"

SALIENT FEATURES OF PROPOSAL "E2"						
Name of the Mine	Multi-coloured Granite quarry belongs to M/s.Gem granites					
Survey Nos	74/1B,74 /2B, 91/1					
Land Type	Patta land.					
Extent	4.37.0 Ha					
Depth of Mining	41 m					
Mining Plan Period / Lease Period	20 years					
Geological Reserves	**ROM m^3**	**Total Recoverable Reserve m^3@8%**	**Granite Waste m^3@ 92%**	**Weathered Rock m^3**	**Side Burden m^3**	**Top soil m^3**
	12,08,100	96,648	11,11,452	80,028	10,00,386	25,423
Mineable Reserves	2,91,890	25,352	2,68,538	33,306	50,725	10,988
Year wise production next five years	1,50,865	12,070	1,38,795	22,536	150	7,448
Existing Pit Dimesion (Maximum)	PIT I- 100 L(m) 72W (m) 11 D (m) PIT II- 25 L (m) 10 W (m) 2 D (m) PIT III- 45 L (m) 20 W (m) 3 D (m) PIT III- 50 L (m) 40 W (m) 2 D (m)					
Ultimate Pit Dimension	177 L(m) 127 W (m) 41 D (m)					
Toposheet No	58 E/14					
Latitude between	11º33'37.12'N to 11º33'47.47'N					
Longitude between	77º50'35.10''E to 77º50'41.39''E					
Highest Elevation	223-230m ASML					

Machinery Proposed	Jack Hammer	6
	Compressor	2
	Hydraulic Excavator	2
	Tippers	2
	Crawler crane	1
	Wire saw	1
	Diesel generator	1
Proposed Blasting Method	Deep hole drill blasting	
Manpower Proposed	35	
Nearest Habitation	200m-NW	

Table 7.7 G: Salient features of existing quarry "E3"

SALIENT FEATURES OF PROPOSAL "E3"						
Name of the Mine	Multi-Colour Granite belongs to R.Navinladdha					
Survey Nos	9/1A1, 9/2A2, 9/2A3, 9/2B					
Land Type	Own Patta land.					
Extent	4.32.5 Ha					
Depth of Mining	31 m					
Mining Plan Period / Lease Period	20 years					
Mining Plan Approval details	2016-2021 (Vide letter no SEIAA-TN/F.NO 5824/1 (a)/EC:3862/2016, dated 14.11.2016					
First Scheme of Mining Plan Approval details	22.12.2021 to 21.12.2026					
Geological Reserves	**ROM m^3**	**Total Recoverable Reserve m^3@60%**	**Granite Waste m^3@ 40%**	**Weathered Rock m^3**	**Total waste (Granite waste) m^3**	**Top soil m^3**
	12,01,410	5,01,746	7,20,846	-	4,80,564	12,403
Mineable Reserves	7,61,050	4,65,215	2,95,835	-	2,95,835	14,108.5
First Scheme of Mining year wise production for five years	50,517	30,310	20,207	-	20,207	2016
Existing Pit Dimension (Maximum)	PIT I- 111 L(m) 79 W (m) 10.5 D (m)					
Ultimate Pit Dimension	232 L(m) 182W (m) 30.5 D (m)					
Toposheet No	58 E/14					
Latitude between	11º33'25.23'N to 11º33'34.85'N					
Longitude between	77º51'02.76''E to 77º51'10.08''E					
Highest Elevation	262 m ASML					
Machinery Proposed	Jack Hammer			8		
	Compressor			2		
	Hydraulic Excavator			1		
	Tippers			2		
	Crawler crane			1		
	Wire saw			1		
	Diesel generator			1		
Proposed Blasting Method	Deep hole drill blasting					
Manpower Proposed	34					
Total Project Cost	Rs.2,75,87,000/-					
EMP cost	Rs. 3,80,000/-					

CER Cost	Rs. 5,00,000/-
Nearest Habitation	906m-NE

Approved Scheme of Period

The Cumulative Impact is mainly anticipated due to drilling & blasting and excavation and transportation activities in all the quarries (proposed and existing) within the cluster and major impact anticipated is on Air & Noise Environment Movement of HEMM and operating of machineries in the cluster.

Air Environment –

Calculating the Cumulative Load of Mining within the cluster is as shown in table 7.10.

Table 7.8: Cumulative Production Load of Granite

Quarry	Mineable Reserves ROM in m^3	Mineable Reserves of Granite in m^3	Proposed production of ROM for five-year period in m^3	Production of ROM Per Day in m^3	Production of Granite Per day in m^3	Number of Lorry loads of Granite per day
P1	2,19,107	43,821	45,672	30	6	1
P2	1,79,035	1,07,421	1,25,220	83	50	8
P3	4,10,870	1,64,348	1,88,330	126	50	8
E1	186202	37240	23052	15	3	1
E2	2,91,890	25,532	1,50,865	101	8	1
E3	7,61,050	4,65,215	50,517	34	20	3
Total	**20,48,154**	**8,43,577**	**5,83,656**	**389**	**137**	**22**

Source: Approved Mining plan of Respective mines

On a cumulative basis considering all the 6 quarries (3 Existing and 3 Proposed) it can be seen that the overall production of Granite ROM per day is 389 m^3 and overall production of Granite is 137m^3 per day (recovery percentage is vary from one quarry to another), No of Lorry loads per day is 22.

Based on the above production quantities the emissions due to various activities in all the 3 mines includes various activities like ground preparation, excavation, handling and transport of ore. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.9

Table 7.9: Emission Estimation from Quarries within 500 Meter Radius P1-P3

Estimated Emission Rate for -P1

Activity	Source type	Value	Unit
Drilling	Point Source	0.052549789	g/s
Blasting	Point Source	0.000096932	g/s
Mineral Loading	Point Source	0.036548800	g/s
Haul Road	Line Source	0.002484384	g/s/m
Overall Mine	Area Source	0.050636531	g/s
SO2	Point Source	0.00014964	g/s
Nox	Area Source	0.000006686	g/s

Estimated Emission Rate for -P2

Activity	Source type	Value	Unit
Drilling	Point Source	0.069278205	g/s
Blasting	Point Source	0.000386009	g/s
Mineral Loading	Point Source	0.038847571	g/s
Haul Road	Line Source	0.002486253	g/s/m
Overall Mine	Area Source	0.054092080	g/s
SO2	Point Source	0.000293704	g/s
Nox	Area Source	0.000015033	g/s

Estimated Emission Rate for -P3

Activity	Source type	Value	Unit
Drilling	Point Source	0.078179759	g/s
Blasting	Point Source	0.000706458	g/s
Mineral Loading	Point Source	0.041219766	g/s
Haul Road	Line Source	0.002489565	g/s/m
Overall Mine	Area Source	0.061688070	g/s
SO2	Point Source	0.000524325	g/s
Nox	Area Source	0.000035382	g/s

Estimated Emission Rate for -E1

Activity	Source type	Value	Unit
Drilling	Point Source	0.006250025	g/s
Blasting	Point Source	0.000096325	g/s
Mineral Loading	Point Source	0.036548212	g/s
Haul Road	Line Source	0.002482205	g/s/m
Overall Mine	Area Source	0.061256531	g/s
SO2	Point Source	0.00022964	g/s
Nox	Area Source	0.000001212	g/s

Estimated Emission Rate for -E2

Activity	Source type	Value	Unit
Drilling	Point Source	0.073168863	g/s
Blasting	Point Source	0.000507278	g/s
Mineral Loading	Point Source	0.040270365	g/s
Haul Road	Line Source	0.002488026	g/s/m
Overall Mine	Area Source	0.070180817	g/s
SO2	Point Source	0.000432103	g/s
Nox	Area Source	0.000039339	g/s

Estimated Emission Rate for -E3

Activity	Source type	Value	Unit
Drilling	Point Source	0.052204831	g/s
Blasting	Point Source	0.000093792	g/s
Mineral Loading	Point Source	0.035787148	g/s
Haul Road	Line Source	0.002483961	g/s/m
Overall Mine	Area Source	0.068813551	g/s
SO2	Point Source	0.000135258	g/s
Nox	Area Source	0.000012077	g/s

Source: Emission Calculations

Table 7.10: Incremental & Resultant GLC within Cluster

PM_{10} in $\mu g/m^3$	
Location	CORE
Background	44.8
Highest Incremental	14.89
Resultant	59.7
NAAQ standard	100 $\mu g/m^3$
$PM_{2.5}$ in $\mu g/m^3$	
Location	CORE
Background	23.4
Highest Incremental	6.86
Resultant	30.3
NAAQ standard	60 $\mu g/m^3$
SO_2 in $\mu g/m^3$	
Location	CORE
Background	6.3
Highest Incremental	2.47
Resultant	8.8
NAAQ standard	80 $\mu g/m^3$
NOx in $\mu g/m^3$	
Location	CORE
Background	22.2
Incremental	9.8
Resultant	32.0

NAAQ standard	80 µg/m^3

Noise Environment –

Noise pollution is mainly due to operation like drilling & blasting and plying of trucks & HEMM. Cumulative Noise modelling has been carried out considering blasting and compressor operation (drilling) and transportation activities. Predictions have been carried out to compute the noise level at various distances around the different quarries within the 500 m radius.

For hemispherical sound wave propagation through homogeneous loss free medium, one can estimate noise levels at various locations at different sources using model based on first principle.

$$Lp_2 = Lp_1 - 20 \log (r_2/r_1) - Ae_{1,2}$$

Where:

Lp_1 & Lp_2 are sound levels at points located at distances r_1 & r_2 from the source.

$Ae_{1,2}$ is the excess attenuation due to environmental conditions. Combined effect of all sources can be determined at various locations by logarithmic addition.

$$Lp_{total} = 10 \log \{10^{(Lp1/10)} + 10^{(Lp2/10)} + 10^{(Lp3/10)} + \ldots\ldots\}$$

Attenuation due to Green Belt has been taken to be 4.9 dB (A). The inputs required for the model are:
Source data has been computed considering of all the machinery and activities used in the mining process.

Table 7.11: 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	47.5	44.5	49.3	55
Habitation Near P2	44.2	42.4	46.4	
Habitation Near P3	43.2	42.4	45.8	
Habitation Near E1	45.3	49.2	50.7	
Habitation Near E2	42.6	54.1	54.4	
Habitation Near E3	46.5	41.0	47.6	

The incremental noise level is found within the range of 41.0 – 49.2 dB (A) in Core Zone. The noise level at different receptors in buffer zone is lower due to the distance involved and other topographical features adding to the noise attenuation. The resultant Noise level due to monitored values and calculated values at the receptors are based on the mathematical formula considering attenuation due to Green Belt as 4.9 dB (A) the barrier effect. From the above table, it can be seen that the ambient noise levels at all the locations near habitations are within permissible limits of Residential Area (buffer zone) as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (The Principal Rules were published in the Gazette of India, vide S.O. 123€, dated 14.2.2000 and subsequently amended vide S.O. 1046€, dated 22.11.2000, S.O. 1088€, dated 11.10.2002, S.O. 1569 €, dated 19.09.2006 and S.O. 50 € dated 11.01.2010 under the Environment (Protection) Act, 1986.).

Ground Vibrations

Ground vibrations due to mining activities in the all the 6 Mines within cluster are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc. However, the major source of ground vibration from the all the 6 mines is blasting. The major impact of the ground vibrations is observed on the domestic houses located in the villages nearby the mine lease area. The kuchha houses are more prone to cracks and damage due to the vibrations induced by blasting whereas RCC framed structures can withstand more ground vibrations. Apart from this, the ground vibrations may develop a fear factor in the nearby settlements.

Another impact due to blasting activities is fly rocks. These may fall on the houses or agricultural fields nearby the mining areas and may cause injury to persons or damage to the structures.

Nearest Habitations from 6 mines respectively are as in below Table 7.12.

TABLE 7.12: NEAREST HABITATION FROM EACH MINE

Location ID	Distance & Direction
Habitation Near P1	600m NW
Habitation Near P2	660m NW
Habitation Near P3	660m NW
Habitation Near E1	350m NE
Habitation Near E2	225m NW
Habitation Near E3	930m NE

The ground vibrations due to the blasting in all the mines are calculated using the empirical equation for assessment of peak particle velocity (PPV) is:

$$V = K\,[R/Q^{0.5}]^{-B}$$

Where –
V = peak particle velocity (mm/s)
K = site and rock factor constant
Q = maximum instantaneous charge (kg)
B = constant related to the rock and site (usually 1.6)
R = distance from charge (m)

TABLE 7.13: GROUND VIBRATIONS AT 6 Quarries

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	13	600 NW	0.140
P2	36	660 NW	0.271
P3	54	660 NW	0.375
E1	64	350m NE	0.215
E2	44	225m West	1.779
E3	15	930m NE	0.078

Source: Blasting Calculations

From the above table, the charge per blast is considered as maximum in each mine and the resultant PPV is well below the Peak Particle Velocity of 8 mm/s as per Directorate General of Mines Safety for safe level criteria through Circular No. 7 dated 29/8/1997.

Socio Economic Environment –

The 3 mines shall create employment to 100 peoples and revenue will be created to government

Table 7.14: Socio Economic Benefits from 6 Quarries

Location code	Employment	Project Cost	CER
P1	22	Rs. 2,44,92,382	Rs.5,00,000/-
P2	41	Rs. 3,60,67,000/-	Rs.5,00,000/-
P3	41	Rs. 4,01,47,000	Rs.5,00,000/-
Total	104	Rs. 10,07,06,382	Rs.15,00,000/-

As per para 6 (II) of the office memorandum, all the mines being a green field project & Capital Investment is ≤ 100 crores, they shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC.

- Proposed Projects shall fund towards CER – **Rs 15,00,000/-**

A total of 104 people getting and will get employment from these cluster quarries. Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III, Dated: 01.05.2018 by all the mines

As per para 6 (II) of the office memorandum, all the mines being a green field project & Capital Investment is ≤ 100 crores, they shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC and the total CER amount from the 3 mines is Rs 15,00,000/-

TABLE 7.15: EMPLOYMENT BENEFITS FROM 11 MINES

Description	Employment
P1	**22**
P2	41
P3	41
Total	**104**
E1	30
E2	35
E3	34
Total	**99**
Grand Total	**203**

A total of 104 people will get employment due to 3 proposed mines in cluster and 69 people are already employed at 3 existing mines.

TABLE 7.16: GREENBELT DEVELOPMENT

Code	No of Trees proposed to be planted	Survival %	Area to be covered	Name of the Species
P1	1200	80 %	Safety barrier & panchayat road	Neem, Casuarina, Pongamia pinnata,
P2	1400	80 %		Neem, Casuarina, Pongamia pinnata,
P3	1900	80 %		Neem, Casuarina, Pongamia pinnata,
Total	**4500**	**80 %**		Neem, Casuarina, Pongamia pinnata,
E1	150	80 %		Neem, Casuarina, Pongamia pinnata,
E2	250	80 %		Neem, Casuarina, Pongamia pinnata,
E3	170	80 %		Neem, Casuarina, Pongamia pinnata,
Total	**570**	80 %		Neem, Casuarina, Pongamia pinnata,
Grand Total	**5070**	80 %		

Source: Scheme of Mining Period

Based on the Proposed Mining Plan it's anticipated that there shall growth of native species of Neem, Casuarina, Pongamia pinnata etc., in the Cluster at a rate of 5070 Trees Planted over a period of 5 Years with Survival Rate of 80%.

7.5 PLASTIC WASTE MANAGEMENT PLAN

The Project Proponent shall comply with Tamil Nadu Government Order (Ms) No. 84 Environment and Forest (EC.2) Department Dated: 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986.

Objective

- To investigate the actual supply chain network of plastic waste.
- To identify and propose a sustainable plastic waste management by installing bins for collection of recyclables with all the plastic waste
- Preparation of a system design layout, and necessary modalities for implementation and monitoring.

TABLE 7.28: ACTION PLAN TO MANAGE PLASTIC WASTE

Sl.No.	Activity	Responsibility
1	Framing of Layout Design by incorporating provision of the Rules, user fee to be charged from waste generators for plastic waste management, penalties/fines for littering, burning plastic waste or committing any other acts of public nuisance	Mines Manager
2	Enforcing waste generators to practice segregation of bio-degradable, recyclable and domestic hazardous waste	Mines Manager
3	Collection of plastic waste	Mines Foreman
4	Setting up of Material Recovery Facilities	Mines Manager
5	Segregation of Recyclable and Non-Recyclable plastic waste at Material Recovery Facilities	Mines Foreman
6	Channelization of Recyclable Plastic Waste to registered recyclers	Mines Foreman
7	Channelization of Non-Recyclable Plastic Waste for use either in Cement kilns, in Road Construction	Mines Foreman
8	Creating awareness among all the stakeholders about their responsibility	Mines Manager
9	Surprise checking's of littering, open burning of plastic waste or committing any other acts of public nuisance	Mine Owner

Source: Proposed by FAE's and EC

CHAPTER – 8: PROJECT BENEFITS

8.0 General

Multi colour Granite quarry of Devannagoundanur and Thangayur Village aims to Production of cumulatively is about 3,59,222m^3 of ROM and 1,59,598 Granite recovery (for the entire period) for Life of Mine of 20 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
- To meet out the demand supply gap of Granite and enhance the foreign exports

8.1 Employment Potential

It is proposed to provide employment to about 104 persons for carrying out mining operations and give preference to the local people in providing employment. In addition, there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc., the economic status of the local people will be enhanced due to mining project.

8.2 Socio-Economic Welfare Measures Proposed

The impact of mining activity in the area will be more positive than negative on the socio-economic environment in the immediate project impact area. The employment opportunities both direct and indirect will contribute to enhanced money incomes to job seekers with minimal skill sets especially among the local communities.

8.3 Improvement in Physical Infrastructure

The proposed mine is located Devannagoundanur and Thangayur Multi Colour Granite Quarry, Sankari and Edappadi Taluk, Salem District of Tamil Nadu and the area have communications, roads and other facilities already well established. The following physical infrastructure facilities will further improve due to proposed mine.

- Road Transport facilities
- Communications
- Medical, Educational and social benefits will be made available to the nearby civilian population in addition to the workmen employed in the mine.

8.4 Improvement in Social Infrastructure

Employment is expected during civil construction period, in trade, garbage lifting, sanitation and other ancillary services, Employment in these sectors will be primarily temporary or contractual and involvement of unskilled labour will be more. A major part of the labour force will be mainly from local villagers who are expected to engage themselves both in agriculture and mining activities. This will enhance their income and lead to overall economic growth of the area.

8.5 Other Tangible Benefits

The proposed mine is likely to have other tangible benefits as given below.

- Indirect employment opportunities to local people in contractual works like construction of infrastructural facilities, transportation, sanitation, for supply of goods and services to the mine and other community services.
- Additional housing demand for rental accommodation will increase
- Cultural, recreation and aesthetic facilities will also improve
- Improvement in communication, transport, education, community development and medical facilities and overall change in employment and income opportunity

- The State Government will also benefit directly from the proposed mine, through increased revenue from royalties, cess, DMF, GST etc.,

8.5.1 Corporate Social Responsibility

The project proponent Devannagoundanur and Thangayur Multi Colour Granite Quarry, Sankari and Edappadi Taluk, Salem District of Tamil Nadu will take responsibility to develop awareness among all levels of their staff about CSR activities and the integration of social processes with business processes. Those involved with the undertaking of CSR activities will be provided with adequate training and re-orientation.

Under this programme, the project proponent will take-up following programmes for social and economic development of villages within 10 km of the project site. For this purpose, separate budget will be provided every year. For finalization of these schemes, proponent will interact with LSG. The schemes will be selected from the following broad areas –

- Health Services
- Social Development
- Infrastructure Development
- Education & Sports
- Self-Employment

8.5.2 CSR Cost Estimation

CSR activities will be taken up in the Devannagoundanur and Thangayur village mainly contributing to education, health, training of women self-help groups and contribution to infrastructure etc., CSR budget is allocated as 2.5% of the profit.

8.5.3 Corporate Environment Responsibility–

Allocation for Corporate Environment Responsibility (CER) shall be made as per Government of India, MoEF & CC Office Memorandum F.No.22-65/2017-IA.III, Dated: 01.05.2018.

As per para 6 (II) of the office memorandum, being a green field project & Capital Investment is ≤ 100 crores, Devannagoundanur and Thangayur Multi Colour Granite Quarry shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC.

Table 8.1: CER – Action Plan for P1,P2,P3

Activity	Beneficiaries	Total in Rs
Water Management – Construction of rainwater harvesting structures	Devannagoundanur and Thangayur village	5,00,000
Sanitation – Maintenance & repairs of toilets in nearby schools	One school in Devannagoundanur and Thangayur village	
Solar Power – Installation of Solar Street Lamps	Devannagoundanur and Thangayur village roads	
Total		**5,00,000**

Source: Field survey conducted by FAE, consultation with project proponent

CHAPTER – 9: ENVIRONMENTAL COST BENEFIT ANALYSIS

Not Applicable, Since Environmental Cost Benefit Analysis not recommended at the Scoping stage.

CHAPTER - 10: ENVIRONMENTAL MANAGEMENT PLAN -P1

10.0 General

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 Environmental Policy

The Project Proponent committed to conduct all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will **– P.Jayaraj**

- Allocate necessary resources to ensure the implementation of the environmental policy
- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

10.1.1 Description of the Administration and Technical Setup –

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 the proposed quarry.

The said team will be responsible for:

- Analysis of the water and air samples collected through external laboratory
- Monitoring of the water/ waste water quality, air quality and solid waste generated
- 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.

10.2 Land Environment Management –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir and the remaining part of the area (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation will be developed under greenbelt development programme.

Table 10.1: Proposed Controls for Land Environment

Control	Responsibility
Designing vehicle wash-down system so that all washed water is captured and passed through grease and oil separators.	Mines Manager
Refueling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
No external dumping i.e., outside the project area	Mine Foreman
Greenbelt on dumps and its maintenance	Environment Officer
Garland drains with catch pits to be provided all around the project area to prevent run off affecting the surrounding lands.	Environment Officer
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager
Thick plantation using native flora spices will be carried out on the backfilled area.	Mines Manager
There will be formation of a small surface water body in the mined-out area, which can be used for watering the greenbelt at the conceptual stages.	Environment Officer

10.3 Soil Management

10.3.1 Top Soil Management –

It is anticipated to remove 13,722 m^3 of topsoil and preserve it to facilitate greenbelt development on the backfilled area during mine closure.

10.3.2 Overburden / Waste and Side Burden Management –

It is anticipating to remove 1,75,286m^3 of waste (Granite waste@ 80%) which will temporarily store at predetermined places as per mining plan and will be backfilled during mine closure.

Table 10.2: Proposed Controls for Soil Management

Control	Responsibility
backfilling process during mine closure as per mining plan	Mines Manager
The dump slopes will be planted with deep rooting shrubs, grasses and creepers for stabilizing them	Environment Officer
Garland drains are to be paved around the dump area to arrest possible wash off in the rainy seasons	Mines Manager
Surface run-off from the surface dumps via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
The backfilled area shall be covered with the soil for green belt development	Environment Officer
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Environment Officer
keeping records of mitigation of erosion events, to improve on management techniques	Environment Officer
The overall slope of the dump is maintained at angle of repose not exceeding 37° from horizontal	Mines Manager
The retaining wall has to be made to arrest the waste dump spills	Mines Manager
A monitoring map with information including their GPS coordinates, erosion type, intensity, and the extent of the affected area, as well as existing control measures and assessment of their performance	Environment Officer
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Environment Officer
Test soils for pH, EC, chloride, exchangeable cations, particle size and water holding capacity	Mines Manager

10.4 Water Management

Water is a key component in mining projects as it is required for, and affected by, mining activities. Effective water management is important for a variety of reasons including: uninterrupted operation of the mine, compliance with operational permissions and applicable legislation, and minimization of effects on the receiving environment.

This section focuses on actions for avoidance, mitigation, and control, as well as a water management monitoring program –

- To protect water-related resources, and avoid harmful impacts;
- To supply and retain water for mine operations;
- to Define water-related environmental control structures; and
- To manage water to ensure that any discharges are following the applicable water quality levels and guidelines.

Table 10.3: Proposed Controls for Water Environment

Control	Responsibility
To maximize the reuse of pit water for water supply	Mines Manager
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Environment Officer
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations Safety distance of 50m will be always maintained from the odai and oorani	Mines Manager
Mine pit water is used for dust suppression and greenbelt development utilization of mine pit water is optimal and effective ways	Environment Officer
Ensure there is no process effluent generation or discharge from the project area into water bodies	Environment Officer
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Manager
Fast growing grasses, small plants and bushes will be grown on the overburden dumps to control soil erosion and siltation	Mines Manager
Retention walls and garland drains will be constructed around toe of waste dumps to arrest silt wash off from dumps during monsoon	Environment Officer
Rainwater harvesting measures will be adopted in the project area and in nearby villages to maintain and enhance the ground water table of the area	Environment Officer
Regularly assess and modify Water Management Plan to adapt to changing work plans and site conditions	Environment Officer
Familiarize all site personnel with the purpose and content of the Water Management Plan, and their responsibilities in its implementation	Environment Officer
Water management and sediment control structures and facilities will be regularly inspected and maintained according to the monitoring schedules	Environment Officer
Monthly or after rainfall, inspection for performance of water management structures and systems	Environment Officer
Conduct ground water and surface water monitoring for parameters specified by State Pollution Control Board (SPCB)	Mines Manager

Source: Proposed by FAE‟s & EIA Coordinator

10.5 Air Quality Management

The proposed mining activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements.

Table 10.4: Proposed Controls for Air Environment

Control	Responsibility
Generation of dust during excavation is minimized by water sprinkling on working face	Mines Manager
Develop thick Greenbelt with tall growing trees and thick foliage cover all along the boundary of the project (7.5 Meter Buffer Zone) to arrest dust spreading outside the project area and to be maintained. This plantation cover will also act as an acoustic barrier	Environment Officer
Daily maintenance of haul roads and daily water sprinkling to minimize the generation of fugitive dust due to movement of heavy earth moving machineries on it	Mines Manager
Handle the waste from the mine pit to respective dumps and backfilling during closure process, fugitive dust is anticipated. this fugitive emission can be controlled by well-maintained machineries, well maintained haul roads water sprinkling on haul roads twice a day. Besides it is also advised not to handle the waste during high windy periods	Mines Manager & Environment Officer
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself to be implemented	Environment Officer
Plantation will be carried out on surface dumps, backfilled area and top benches of the mined out area	Environment Officer
Water reservoir will be developed in the left over mined out pit, which will serve as additional surface water resources for the nearby villages	Environment Officer
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution and noise generation	Mines Manager
Over loading of trucks should be avoided	Mines Manager
All the mining equipment and trucks has been controlled with emission norms	Environment Officer
The village roads used for mineral transport will be maintained weekly and monthly basis to avoid fugitive dust emissions	Mines Manager
Dust mask are provided to the workers working in high dust generating areas and continue to provide the same	Mines Manager
Weekly and Monthly maintenance of deployed machineries, to reduce gaseous emission	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Environment Officer
Monitor meteorological conditions (temperature, wind, rainfall)	Environment Office

Source: Proposed by FAE"s & EIA Coordinator

10.6 Noise Management

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

Table 10.5: Proposed Controls for Noise Environment

Control	Responsibility
A thick greenbelt to be developed all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Plantation activities to be carried out on surface dumps and infrastructure facilities, these plantations will help in attenuating the noise levels	Environment Officer
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Manager
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Environment Officer
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Environment Officer
Provision of effective silencers for mining machinery and transport vehicles	Environment Officer
Provision of sound proof AC operator cabins to HEMM	Environment Officer
Sharp drill bits are used to minimize noise from drilling	Environment Officer
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring to be carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Environment Officer
Undertake noise or vibration monitoring in response to a complaint (from any sensitive receptor).	Mines Manager
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination during initial stage of operation	Mines Manager
If a noise or vibration complaint is received, follow the complaints and inquiries	Environment Officer
Undertake noise or vibration monitoring half yearly	Environment Officer

Source: Proposed by FAE‟s & EIA Coordinator

10.7 Ground Vibration and Fly Rock Control

Table 10.6: Proposed Controls for Ground vibration & Fly rocks

Control	Responsibility
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting during initial stage will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Prior to blasting within 500 meters of the lease boundary, establish a fly rock exclusion zone within adjacent properties and check with landholders that the area is not occupied by humans, blast clearance zones are applied for all blasts.	Environment Officer
Undertake vibration monitoring	Environment Officer

Source: Proposed by FAE‟s & EIA Coordinator

10.8 Biological Environment Management

The mine management will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of mined out area, backfilled area, etc., the water reservoir will be developed in lower benches of the mined-out area at conceptual stage will be used for the maintenance of green belt after the closure of mine.

Following control measures are proposed for its management and will be the responsibility of the environment officer.

- Greenbelt development all along the safety barrier of the project area
- The main attributes that retard the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and constructing a sprinkler near the newly planted area.
- Year wise plantation should be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well-planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.1 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

Table 10.7: Recommended Species to Plant in the Greenbelt

SI.No	*Name of the plant (Botanical)*	*Family Name*	*Common Name*	*Habit*
1	*Azadirachta indica*	Meliaceae	Neem, Vembu	Tree
2	*Albiziafalcatoria*	Fabaceae	Tamarind, Puliyamaram	Tree
3	*Polyalthialongifolia*	Annonaceae	Kattumaram	Tree
4	*Borassus Flabellifer*	Arecaceae	Palmyra Palm	Tree

Source: Proposed by FAE's & EIA Coordinator

10.9 Occupational Safety & Health Management

Occupational safety and health are very closely related to productivity and good employer-employee relationship. The main factors of occupational health in mines are fugitive dust and noise. Safety of employees during mining operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a detail's medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The above tests keep upgrading the database of medical history of the employees.

10.9.2 Proposed Occupational Health and Safety Measures –

- Providing a clean working environment that is conductive to safety & health annually
- Employee involvement and commitment in the implementation of health and safety guidelines
- Implementing safety and health management system and assessing the effectiveness through periodic audits
- Setting of safety and health objectives based on comprehensive strategic plans and measure performance against these plans
- Provision of necessary standard personal protective equipment's (PPE)
- Ensuring that all employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities.
- Provision of rest shelters for mine workers with amenities like drinking water, fans, toilets urinals, canteen etc.,
- Rotation of workers exposed to noisy areas.
- Daily dust suppression on haul roads to prevent fugitive dust emission into the air.
- First-aid facility at the mine office.

10.9.3 Health and Safety Training Programme

The company shall provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employ to carry out the mining operation in and eco-friendly manner.

Table 10.8: List of Periodical Trainings Proposed for employees

Course	Personnel	Frequency	Duration	Instruction
New-hire Training	All new hires exposed to mine hazards	Once	One week	Employee rights, Supervisor responsibilities, Self-rescue Respiratory devices, Transportation controls, Communication systems, Escape and emergency evacuation, Ground control hazards, Occupational health hazards, Electrical hazards, First aid, Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul Road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations, Fire warning Ground control hazards First aid, Electrical hazards Accident prevention Explosives, Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules, Respiratory devices

Source: Proposed by FAE‟s & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.11 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT

	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	20050	20050
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring	800000	50000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance - 4 Units	100000	10000
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governers @ Rs. 5000/- per Tipper/Dumper deployed - 2 Units	10000	500
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour	0	5000
	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Provision for 2 labours @ Rs.10,000/labour (Contractual) per Hectare	0	40100
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	20000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0

	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	0
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff managent	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	20050	5000
	2. Progressive Closure Activity Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	401000	10000

	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 1200 Trees - (300 Inside Lease Area & 900 Outside Lease Area)	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @ 200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring)	60000	9000
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	270000	27000
	4. Implementation of Final Mine Closure Actity as per Approved Mining Plan on Last Year	Few activities already covered as progressive closure activities as greenbelt development, wire fencing, garland drain. *For Final Closure Activities 15% of the proposed closure cost will be spent during the final mine closure stage - Last Year	64800	0
	5. Contribution towards Green Fund. As per TNMMCR 1959, Rule 35 A	The Contribution towards Green Funds @ 10% of Seigniorage fee are indicated as part of EMP Budge and not necessarily implemented in the Project Site	2120001	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6’ X 5’ with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000
	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) - 22 Employees	88000	22000

	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	22000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	4010
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	100250	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Anna university Star rating	Star Rating @ Rs.1,00,000/-Per year	500000	
	Monitoring of Granite Quarrying Operation by Anna University	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
CER	As per MoEF &CC OM 22-65/2017-IA.III Dated 25.02.2021	Detailed Description in following slides and Budget allocation is included as per MoeEF & CC OM	500000	
TOTAL			**3029350**	**1136660**

In order to implement the environmental protection measures, an amount of Rs.30.29 lakhs as capital cost and recurring cost as Rs. 11.36 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	41,66,010
2nd Year	11,93,493
3rd Year	12,53,168
4th Year	13,15,826
5th Year	14,46,417
Total	94 lakhs

10.11 Conclusion

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

CHAPTER - 10: ENVIRONMENTAL MANAGEMENT PLAN -P2

10.0 General

Environment Management Plan (EMP) aims at the preservation of ecological system by considering in-built pollution abatement facilities at the proposed site. Good practices of Environmental Management plan will ensure to keep all the environmental parameters of the project in respect of Ambient Air quality, Water quality, Socio – economic improvement standards.

Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

10.1 Environmental Policy

The Project Proponent committed to conduct all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will **– Thiru. B. Venkatesh**

- Allocate necessary resources to ensure the implementation of the environmental policy
- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement

10.1.1 Description of the Administration and Technical Setup –

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 the proposed quarry.

The said team will be responsible for:

- Analysis of the water and air samples collected through external laboratory
- Monitoring of the water/ waste water quality, air quality and solid waste generated
- 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.

10.2 Land Environment Management –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir and the remaining part of the area (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation will be developed under greenbelt development programme.

Table 10.1: Proposed Controls for Land Environment

Control	Responsibility
Designing vehicle wash-down system so that all washed water is captured and passed through grease and oil separators.	Mines Manager
Refueling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
No external dumping i.e., outside the project area	Mine Foreman
Greenbelt on dumps and its maintenance	Environment Officer
Garland drains with catch pits to be provided all around the project area to prevent run off affecting the surrounding lands.	Environment Officer
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager
Thick plantation using native flora spices will be carried out on the backfilled area.	Mines Manager
There will be formation of a small surface water body in the mined-out area, which can be used for watering the greenbelt at the conceptual stages.	Environment Officer

10.3 Soil Management

10.3.1 Top Soil Management –

There is no topsoil and preserve it to facilitate greenbelt development on the backfilled area during period of mine.

10.3.2 Overburden / Waste and Side Burden Management –

It is anticipating to remove 71,614m^3 of waste (Granite waste@ 40%) which will temporarily store at predetermined places as per mining plan and will be backfilled during mine closure.

Table 10.2: Proposed Controls for Soil Management

Control	Responsibility
backfilling process during mine closure as per mining plan	Mines Manager
The dump slopes will be planted with deep rooting shrubs, grasses and creepers for stabilizing them	Environment Officer
Garland drains are to be paved around the dump area to arrest possible wash off in the rainy seasons	Mines Manager
Surface run-off from the surface dumps via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
The backfilled area shall be covered with the soil for green belt development	Environment Officer
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Environment Officer
keeping records of mitigation of erosion events, to improve on management techniques	Environment Officer
The overall slope of the dump is maintained at angle of repose not exceeding 37° from horizontal	Mines Manager
The retaining wall has to be made to arrest the waste dump spills	Mines Manager
A monitoring map with information including their GPS coordinates, erosion type, intensity, and the extent of the affected area, as well as existing control measures and assessment of their performance	Environment Officer
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Environment Officer
Test soils for pH, EC, chloride, exchangeable cations, particle size and water holding capacity	Mines Manager

10.4 Water Management

Water is a key component in mining projects as it is required for, and affected by, mining activities. Effective water management is important for a variety of reasons including: uninterrupted operation of the mine, compliance with operational permissions and applicable legislation, and minimization of effects on the receiving environment.

This section focuses on actions for avoidance, mitigation, and control, as well as a water management monitoring program –

- To protect water-related resources, and avoid harmful impacts;
- To supply and retain water for mine operations;
- to Define water-related environmental control structures; and
- To manage water to ensure that any discharges are following the applicable water quality levels and guidelines.

Table 10.3: Proposed Controls for Water Environment

Control	Responsibility
To maximize the reuse of pit water for water supply	Mines Manager
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Environment Officer
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations Safety distance of 50m will be always maintained from the odai and oorani	Mines Manager
Mine pit water is used for dust suppression and greenbelt development utilization of mine pit water is optimal and effective ways	Environment Officer
Ensure there is no process effluent generation or discharge from the project area into water bodies	Environment Officer
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Manager
Fast growing grasses, small plants and bushes will be grown on the overburden dumps to control soil erosion and siltation	Mines Manager
Retention walls and garland drains will be constructed around toe of waste dumps to arrest silt wash off from dumps during monsoon	Environment Officer
Rainwater harvesting measures will be adopted in the project area and in nearby villages to maintain and enhance the ground water table of the area	Environment Officer
Regularly assess and modify Water Management Plan to adapt to changing work plans and site conditions	Environment Officer
Familiarize all site personnel with the purpose and content of the Water Management Plan, and their responsibilities in its implementation	Environment Officer
Water management and sediment control structures and facilities will be regularly inspected and maintained according to the monitoring schedules	Environment Officer
Monthly or after rainfall, inspection for performance of water management structures and systems	Environment Officer
Conduct ground water and surface water monitoring for parameters specified by State Pollution Control Board (SPCB)	Mines Manager

Source: Proposed by FAE‟s & EIA Coordinator

10.5 Air Quality Management

The proposed mining activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements.

Table 10.4: Proposed Controls for Air Environment

Control	Responsibility
Generation of dust during excavation is minimized by water sprinkling on working face	Mines Manager
Develop thick Greenbelt with tall growing trees and thick foliage cover all along the boundary of the project (7.5 Meter Buffer Zone) to arrest dust spreading outside the project area and to be maintained. This plantation cover will also act as an acoustic barrier	Environment Officer
Daily maintenance of haul roads and daily water sprinkling to minimize the generation of fugitive dust due to movement of heavy earth moving machineries on it	Mines Manager
Handle the waste from the mine pit to respective dumps and backfilling during closure process, fugitive dust is anticipated. this fugitive emission can be controlled by well-maintained machineries, well maintained haul roads water sprinkling on haul roads twice a day. Besides it is also advised not to handle the waste during high windy periods	Mines Manager & Environment Officer
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself to be implemented	Environment Officer
Plantation will be carried out on surface dumps, backfilled area and top benches of the mined out area	Environment Officer
Water reservoir will be developed in the left over mined out pit, which will serve as additional surface water resources for the nearby villages	Environment Officer
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution and noise generation	Mines Manager
Over loading of trucks should be avoided	Mines Manager
All the mining equipment and trucks has been controlled with emission norms	Environment Officer
The village roads used for mineral transport will be maintained weekly and monthly basis to avoid fugitive dust emissions	Mines Manager
Dust mask are provided to the workers working in high dust generating areas and continue to provide the same	Mines Manager
Weekly and Monthly maintenance of deployed machineries, to reduce gaseous emission	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Environment Officer
Monitor meteorological conditions (temperature, wind, rainfall)	Environment Office

Source: Proposed by FAE"s & EIA Coordinator

10.6 Noise Management

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

Table 10.5: Proposed Controls for Noise Environment

Control	Responsibility
A thick greenbelt to be developed all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Plantation activities to be carried out on surface dumps and infrastructure facilities, these plantations will help in attenuating the noise levels	Environment Officer
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Manager
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Environment Officer
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Environment Officer
Provision of effective silencers for mining machinery and transport vehicles	Environment Officer
Provision of sound proof AC operator cabins to HEMM	Environment Officer
Sharp drill bits are used to minimize noise from drilling	Environment Officer
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring to be carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Environment Officer
Undertake noise or vibration monitoring in response to a complaint (from any sensitive receptor).	Mines Manager
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination during initial stage of operation	Mines Manager
If a noise or vibration complaint is received, follow the complaints and inquiries	Environment Officer
Undertake noise or vibration monitoring half yearly	Environment Officer

Source: Proposed by FAE‟s & EIA Coordinator

10.7 Ground Vibration and Fly Rock Control

Table 10.6: Proposed Controls for Ground vibration & Fly rocks

Control	Responsibility
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting during initial stage will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Prior to blasting within 500 meters of the lease boundary, establish a fly rock exclusion zone within adjacent properties and check with landholders that the area is not occupied by humans, blast clearance zones are applied for all blasts.	Environment Officer
Undertake vibration monitoring	Environment Officer

Source: Proposed by FAE‟s & EIA Coordinator

10.8 Biological Environment Management

The mine management will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of mined out area, backfilled area, etc., the water reservoir will be developed in lower benches of the mined-out area at conceptual stage will be used for the maintenance of green belt after the closure of mine.

Following control measures are proposed for its management and will be the responsibility of the environment officer.

- Greenbelt development all along the safety barrier of the project area
- The main attributes that retard the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and constructing a sprinkler near the newly planted area.
- Year wise plantation should be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well-planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.1 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

Table 10.7: Recommended Species to Plant in the Greenbelt

SI.No	*Name of the plant (Botanical)*	*Family Name*	*Common Name*	*Habit*
1	*Azadirachta indica*	Meliaceae	Neem, Vembu	Tree
2	*Albiziafalcatoria*	Fabaceae	Tamarind, Puliyamaram	Tree
3	*Polyalthialongifolia*	Annonaceae	Kattumaram	Tree
4	*Borassus Flabellifer*	Arecaceae	Palmyra Palm	Tree

Source: Proposed by FAE's & EIA Coordinator

10.9 Occupational Safety & Health Management

Occupational safety and health are very closely related to productivity and good employer-employee relationship. The main factors of occupational health in mines are fugitive dust and noise. Safety of employees during mining operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a detail's medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The above tests keep upgrading the database of medical history of the employees.

10.9.2 Proposed Occupational Health and Safety Measures –

- Providing a clean working environment that is conductive to safety & health annually
- Employee involvement and commitment in the implementation of health and safety guidelines
- Implementing safety and health management system and assessing the effectiveness through periodic audits
- Setting of safety and health objectives based on comprehensive strategic plans and measure performance against these plans
- Provision of necessary standard personal protective equipment's (PPE)
- Ensuring that all employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities.
- Provision of rest shelters for mine workers with amenities like drinking water, fans, toilets urinals, canteen etc.,
- Rotation of workers exposed to noisy areas.
- Daily dust suppression on haul roads to prevent fugitive dust emission into the air.
- First-aid facility at the mine office.

10.9.3 Health and Safety Training Programme

The company shall provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employ to carry out the mining operation in and eco-friendly manner.

Table 10.8: List of Periodical Trainings Proposed for employees

Course	Personnel	Frequency	Duration	Instruction
New-hire Training	All new hires exposed to mine hazards	Once	One week	Employee rights, Supervisor responsibilities, Self-rescue Respiratory devices, Transportation controls, Communication systems, Escape and emergency evacuation, Ground control hazards, Occupational health hazards, Electrical hazards, First aid, Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul Road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations, Fire warning Ground control hazards First aid, Electrical hazards Accident prevention Explosives, Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules, Respiratory devices

Source: Proposed by FAE‟s & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.11 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT

	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	23150	23150
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring	800000	50000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance - 7 Units	175000	17500
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governers @ Rs. 5000/- per Tipper/Dumper deployed - 2 Units	10000	500
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour	0	5000
	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Provision for 2 labours @ Rs.10,000/labour (Contractual) per Hectare	0	46300
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	20000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0

	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	0
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff managent	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	23150	5000
	2. Progressive Closure Activity Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	463000	10000

	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 1400 Trees - (400 Inside Lease Area & 1000 Outside Lease Area)	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @ 200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring)	80000	12000
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	300000	30000
	4. Implementation of Final Mine Closure Actity as per Approved Mining Plan on Last Year	Few activities already covered as progressive closure activities as greenbelt development, wire fencing, garland drain. *For Final Closure Activities 15% of the proposed closure cost will be spent during the final mine closure stage - Last Year	66450	0
	5. Contribution towards Green Fund. As per TNMMCR 1959, Rule 35 A	The Contribution towards Green Funds @ 10% of Seigniorage fee are indicated as part of EMP Budge and not necessarily implemented in the Project Site	17438137	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6’ X 5’ with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000
	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) - 41 Employees	164000	41000

	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	41000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	4630
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	115750	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Anna university Star rating	Star Rating @ Rs.1,00,000/-Per year	500000	
	Monitoring of Granite Quarrying Operation by Anna University	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
CER	As per MoEF &CC OM 22-65/2017-IA.III Dated 25.02.2021	Detailed Description in following slides and Budget allocation is included as per MoeEF & CC OM	500000	
TOTAL			**3314050**	**1198080**

In order to implement the environmental protection measures, an amount of Rs.33.14 lakhs as capital cost and recurring cost as Rs. 11.98 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	4512130
2nd Year	1257984
3rd Year	1320883
4th Year	1386927
5th Year	1522724
Total	₹ 100 lakhs

10.11 Conclusion

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

CHAPTER - 10: ENVIRONMENTAL MANAGEMENT PLAN -P3

10.0 General

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Mitigation measures at the source level and an overall environment management plan at the study area are elicited so as to improve the supportive capacity of the receiving bodies. The EMP presented in this chapter discusses the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored after approval of the EIA.

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The Proponent will **– Thiru. B. Venkatesh**

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- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities.
- Implement a program to train employees in general environmental issues and individual workplace environmental responsibilities.
- Ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts.
- Implement monitoring programmes to provide early warning of any deficiency or unanticipated performance in environmental safeguards.
- Conduct periodic reviews to verify environmental performance and to continuously strive towards improvement.

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The said team will be responsible for:

- Analysis of the water and air samples collected through external laboratory
- Monitoring of the water/ waste water quality, air quality and solid waste generated
- 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.

10.2 Land Environment Management –

Landscape of the area will be changed due to the quarrying operation, restoration of the land by converting the quarry pit into temporary reservoir and the remaining part of the area (un utilized areas, infrastructure, haul Roads) will be utilized for greenbelt development. Aesthetic of the Environment will not be affected. There is no major vegetation in the project area during the course of quarrying operation and after completion of the quarrying operation thick plantation will be developed under greenbelt development programme.

Table 10.1: Proposed Controls for Land Environment

Control	Responsibility
Designing vehicle wash-down system so that all washed water is captured and passed through grease and oil separators.	Mines Manager
Refuelling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
No external dumping i.e., outside the project area	Mine Foreman
Greenbelt on dumps and its maintenance	Environment Officer
Garland drains with catch pits to be provided all around the project area to prevent run off affecting the surrounding lands.	Environment Officer
The periphery of Project area will be planted with thick plantation to arrest the fugitive dust, which will also act as acoustic barrier.	Mines Manager
Thick plantation using native flora spices will be carried out on the backfilled area.	Mines Manager
There will be formation of a small surface water body in the mined-out area, which can be used for watering the greenbelt at the conceptual stages.	Environment Officer

10.3 Soil Management

10.3.1 Top Soil Management –

It is anticipated to remove 16,083m^3 of topsoil and preserve it to facilitate greenbelt development on the backfilled area during mine closure.

10.3.2 Overburden / Waste and Side Burden Management –

It is anticipating to remove 2,46,522m^3 of waste (Granite waste@ 60%) which will temporarily store at predetermined places as per mining plan and will be backfilled during mine closure.

Table 10.2: Proposed Controls for Soil Management

Control	Responsibility
backfilling process during mine closure as per mining plan	Mines Manager
The dump slopes will be planted with deep rooting shrubs, grasses and creepers for stabilizing them	Environment Officer
Garland drains are to be paved around the dump area to arrest possible wash off in the rainy seasons	Mines Manager
Surface run-off from the surface dumps via garland drains will be diverted to the mine pits	Mine Foreman & Mining Mate
The backfilled area shall be covered with the soil for green belt development	Environment Officer
Design haul roads and other access roads with drainage systems to minimize concentration of flow and erosion risk	Environment Officer
keeping records of mitigation of erosion events, to improve on management techniques	Environment Officer
The overall slope of the dump is maintained at angle of repose not exceeding 37° from horizontal	Mines Manager
The retaining wall has to be made to arrest the waste dump spills	Mines Manager
A monitoring map with information including their GPS coordinates, erosion type, intensity, and the extent of the affected area, as well as existing control measures and assessment of their performance	Environment Officer
Empty sediment from sediment traps Maintain, repair or upgrade garland drain system	Environment Officer
Test soils for pH, EC, chloride, exchangeable cations, particle size and water holding capacity	Mines Manager

10.4 Water Management

Water is a key component in mining projects as it is required for, and affected by, mining activities. Effective water management is important for a variety of reasons including: uninterrupted operation of the mine, compliance with operational permissions and applicable legislation, and minimization of effects on the receiving environment.

This section focuses on actions for avoidance, mitigation, and control, as well as a water management monitoring program –

- To protect water-related resources, and avoid harmful impacts;
- To supply and retain water for mine operations;
- to Define water-related environmental control structures; and
- To manage water to ensure that any discharges are following the applicable water quality levels and guidelines.

Table 10.3: Proposed Controls for Water Environment

Control	Responsibility
To maximize the reuse of pit water for water supply	Mines Manager
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Environment Officer
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations Safety distance of 50m will be always maintained from the odai and oorani	Mines Manager
Mine pit water is used for dust suppression and greenbelt development utilization of mine pit water is optimal and effective ways	Environment Officer
Ensure there is no process effluent generation or discharge from the project area into water bodies	Environment Officer
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Manager
Fast growing grasses, small plants and bushes will be grown on the overburden dumps to control soil erosion and siltation	Mines Manager
Retention walls and garland drains will be constructed around toe of waste dumps to arrest silt wash off from dumps during monsoon	Environment Officer
Rainwater harvesting measures will be adopted in the project area and in nearby villages to maintain and enhance the ground water table of the area	Environment Officer
Regularly assess and modify Water Management Plan to adapt to changing work plans and site conditions	Environment Officer
Familiarize all site personnel with the purpose and content of the Water Management Plan, and their responsibilities in its implementation	Environment Officer
Water management and sediment control structures and facilities will be regularly inspected and maintained according to the monitoring schedules	Environment Officer
Monthly or after rainfall, inspection for performance of water management structures and systems	Environment Officer
Conduct ground water and surface water monitoring for parameters specified by State Pollution Control Board (SPCB)	Mines Manager

Source: Proposed by FAE‟s & EIA Coordinator

10.5 Air Quality Management

The proposed mining activity would result in the increase of particulate matter concentrations due to fugitive dust. Daily water sprinkling on the haul roads, approach roads in the vicinity would be undertaken and will be continued as there is possibility for dust generation due to truck mobility. It will be ensured that vehicles are properly maintained to comply with exhaust emission requirements.

Table 10.4: Proposed Controls for Air Environment

Control	Responsibility
Generation of dust during excavation is minimized by water sprinkling on working face	Mines Manager
Develop thick Greenbelt with tall growing trees and thick foliage cover all along the boundary of the project (7.5 Meter Buffer Zone) to arrest dust spreading outside the project area and to be maintained. This plantation cover will also act as an acoustic barrier	Environment Officer
Daily maintenance of haul roads and daily water sprinkling to minimize the generation of fugitive dust due to movement of heavy earth moving machineries on it	Mines Manager
Handle the waste from the mine pit to respective dumps and backfilling during closure process, fugitive dust is anticipated. this fugitive emission can be controlled by well-maintained machineries, well maintained haul roads water sprinkling on haul roads twice a day. Besides it is also advised not to handle the waste during high windy periods	Mines Manager & Environment Officer
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself to be implemented	Environment Officer
Plantation will be carried out on surface dumps, backfilled area and top benches of the mined-out area	Environment Officer
Water reservoir will be developed in the left over mined out pit, which will serve as additional surface water resources for the nearby villages	Environment Officer
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution and noise generation	Mines Manager
Over loading of trucks should be avoided	Mines Manager
All the mining equipment and trucks has been controlled with emission norms	Environment Officer
The village roads used for mineral transport will be maintained weekly and monthly basis to avoid fugitive dust emissions	Mines Manager
Dust mask are provided to the workers working in high dust generating areas and continue to provide the same	Mines Manager
Weekly and Monthly maintenance of deployed machineries, to reduce gaseous emission	Mines Manager
Ambient Air Quality Monitoring carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted air pollution control measures	Environment Officer
Monitor meteorological conditions (temperature, wind, rainfall)	Environment Office

Source: Proposed by FAE"s & EIA Coordinator

10.6 Noise Management

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and cutting activities. No mining activities are planned during night time.

Table 10.5: Proposed Controls for Noise Environment

Control	Responsibility
A thick greenbelt to be developed all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Plantation activities to be carried out on surface dumps and infrastructure facilities, these plantations will help in attenuating the noise levels	Environment Officer
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Manager
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Environment Officer
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Environment Officer
Provision of effective silencers for mining machinery and transport vehicles	Environment Officer
Provision of sound proof AC operator cabins to HEMM	Environment Officer
Sharp drill bits are used to minimize noise from drilling	Environment Officer
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring to be carried out in the project area and in surrounding villages to access the impact due to the mining activities and the efficacy of the adopted noise control measures. Additional noise control measures will be adopted if required as per the observations during monitoring	Environment Officer
Undertake noise or vibration monitoring in response to a complaint (from any sensitive receptor).	Mines Manager
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination during initial stage of operation	Mines Manager
If a noise or vibration complaint is received, follow the complaints and inquiries	Environment Officer
Undertake noise or vibration monitoring half yearly	Environment Officer

Source: Proposed by FAE‟s & EIA Coordinator

10.7 Ground Vibration and Fly Rock Control

Table 10.6: Proposed Controls for Ground vibration & Fly rocks

Control	Responsibility
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting during initial stage will be carried under the supervision of qualified persons	Mines Manager
Proper stemming of holes should be carried out with statutory competent qualified blaster under the supervision of statutory mines manager to avoid any anomalies during blasting	Mines Manager
Prior to blasting within 500 meters of the lease boundary, establish a fly rock exclusion zone within adjacent properties and check with landholders that the area is not occupied by humans, blast clearance zones are applied for all blasts.	Environment Officer
Undertake vibration monitoring	Environment Officer

Source: Proposed by FAE‟s & EIA Coordinator

10.8 Biological Environment Management

The mine management will take all necessary steps to avoid the impact on the ecology of the area by adopting suitable management measures in the planning and implementation stage. During mining, thick plantation will be carried out around the project periphery, on safety barrier zone, on top benches of mined out area, backfilled area, etc., the water reservoir will be developed in lower benches of the mined-out area at conceptual stage will be used for the maintenance of green belt after the closure of mine.

Following control measures are proposed for its management and will be the responsibility of the environment officer.

- Greenbelt development all along the safety barrier of the project area
- The main attributes that retard the survival of sapling is fugitive dust, this fugitive dust can be controlled by water sprinkling on the haul roads and constructing a sprinkler near the newly planted area.
- Year wise plantation should be recorded and monitored
    - Based on the area of plantation.
    - Period of plantation
    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
    - Density of plantation
- The ultimate reclamation planned leaves a congenial environment for development of flora & immigration of small fauna through green belt and water reservoir. The green belt and water reservoir developed within the Project at the end of mine life will attract the birds and animals towards the project area in the post mining period.

The objectives of the greenbelt development plan are –

- Provide a green belt around the periphery of the quarry area to combat the dispersal of dust in the adjoining areas,
- Protect the erosion of the soil, Conserve moisture for increasing ground water recharging,
- Restore the ecology of the area, restore aesthetic beauty of the locality and meet the requirement of fodder, fuel and timber of the local community.

A well-planned Green Belt with multi rows (three tiers) preferably with long canopy leaves shall be developed with dense plantations around the boundary and haul roads to prevent air, dust noise propagation to undesired places and efforts will be taken for the enhancement of survival rate.

10.8.1 Species Recommended for Plantation

Following points have been considered while recommending the species for plantation:

- Creating of bio-diversity.
- Fast growing, thick canopy cover, perennial and evergreen large leaf area,
- Efficient in absorbing pollutants without major effects on natural growth

Table 10.7: Recommended Species to Plant in the Greenbelt

SI.No	*Name of the plant (Botanical)*	*Family Name*	*Common Name*	*Habit*
1	*Azadirachta indica*	Meliaceae	Neem, Vembu	Tree
2	*Albiziafalcatoria*	Fabaceae	Tamarind, Puliyamaram	Tree
3	*Polyalthialongifolia*	Annonaceae	Kattumaram	Tree
4	*Borassus Flabellifer*	Arecaceae	Palmyra Palm	Tree

Source: Proposed by FAE's & EIA Coordinator

10.9 Occupational Safety & Health Management

Occupational safety and health are very closely related to productivity and good employer-employee relationship. The main factors of occupational health in mines are fugitive dust and noise. Safety of employees during mining operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.9.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.
- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a detail's medical examination at the time of employment. The medical examination covers the following tests under mines act 1952.

- General Physical Examination and Blood Pressure
- X-ray Chest and ECG
- Sputum test
- Detailed Routine Blood and Urine examination

The medical histories of all employees will be maintained in a standard format annually. Thereafter, the employees will be subject to medical examination annually. The above tests keep upgrading the database of medical history of the employees.

10.9.2 Proposed Occupational Health and Safety Measures –

- Providing a clean working environment that is conductive to safety & health annually
- Employee involvement and commitment in the implementation of health and safety guidelines
- Implementing safety and health management system and assessing the effectiveness through periodic audits
- Setting of safety and health objectives based on comprehensive strategic plans and measure performance against these plans
- Provision of necessary standard personal protective equipment's (PPE)
- Ensuring that all employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities.
- Provision of rest shelters for mine workers with amenities like drinking water, fans, toilets urinals, canteen etc.,
- Rotation of workers exposed to noisy areas.
- Daily dust suppression on haul roads to prevent fugitive dust emission into the air.
- First-aid facility at the mine office.

10.9.3 Health and Safety Training Programme

The company shall provide special induction program along with machinery manufacturers for the operators and co-operators to run and maintain the machinery effectively and efficiently. The training program for the supervisors and office staffs will be arranged in the Group Vocational Training Centres in the State. And engage an Environmental Consultants to provide periodical training to all the employ to carry out the mining operation in and eco-friendly manner.

Table 10.8: List of Periodical Trainings Proposed for employees

Course	Personnel	Frequency	Duration	Instruction
New-hire Training	All new hires exposed to mine hazards	Once	One week	Employee rights, Supervisor responsibilities, Self-rescue Respiratory devices, Transportation controls, Communication systems, Escape and emergency evacuation, Ground control hazards, Occupational health hazards, Electrical hazards, First aid, Explosives
Task Training Like Drilling, Blasting, Stemming, safety, Slope stability, Dewatering, Haul Road maintenance,	Employees assigned to new work tasks	Before new Assignments	Variable	Task-specific health &safety procedures and SOP for various mining activity. Supervised practice in assigned work tasks.
Refresher Training	All employees who received new-hire training	Yearly	One week	Required health and safety standards Transportation controls Communication systems Escape ways, emergency evacuations, Fire warning Ground control hazards First aid, Electrical hazards Accident prevention Explosives, Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules, Respiratory devices

Source: Proposed by FAE‟s & EIA Coordinator as per DGMS Norms

10.9.4 Budgetary Provision for Environmental Management

Adequate budgetary provision has been made by the Company for execution of Environmental Management Plan. The Table 10.11 gives overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT

	Mitigation Measure	Provision for Implementation	Capital	Recurring
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	31200	31200
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring	800000	50000
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	5000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit recurring cost for maintenance - 7 Units	175000	17500
	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5000
	Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin	0	10000
	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governers @ Rs. 5000/- per Tipper/Dumper deployed - 2 Units	10000	500
	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour	0	5000
	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Provision for 2 labours @ Rs.10,000/labour (Contractual) per Hectare	0	62400
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	20000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0

	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Compentent Person	0	0
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	2000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	0
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	5000	20000
		Installation of dust bins	5000	2000
	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	0
Mine Closure	1. Progressive Closure Activity - Surface Runoff managent	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	31200	5000
	2. Progressive Closure Activity Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	624000	10000

	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 1900 Trees - (400 Inside Lease Area & 1500 Outside Lease Area)	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @ 200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring)	100000	15000
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	420000	42000
	4. Implementation of Final Mine Closure Actity as per Approved Mining Plan on Last Year	Few activities already covered as progressive closure activities as greenbelt development, wire fencing, garland drain. *For Final Closure Activities 15% of the proposed closure cost will be spent during the final mine closure stage - Last Year	109500	0
	5. Contribution towards Green Fund. As per TNMMCR 1959, Rule 35 A	The Contribution towards Green Funds @ 10% of Seigniorage fee are indicated as part of EMP Budge and not necessarily implemented in the Project Site	17438137	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6’ X 5’ with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000
	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) - 41 Employees	164000	41000

	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	41000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	6240
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000
	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	156000	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Anna university Star rating	Star Rating @ Rs.1,00,000/-Per year	500000	
	Monitoring of Granite Quarrying Operation by Anna University	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	780000
CER	As per MoEF &CC OM 22-65/2017-IA.III Dated 25.02.2021	Detailed Description in following slides and Budget allocation is included as per MoeEF & CC OM	500000	
TOTAL			**3671400**	**1238840**

In order to implement the environmental protection measures, an amount of Rs.36.71 lakhs as capital cost and recurring cost as Rs. 12.38 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	49,10,240
2nd Year	13,00,782
3rd Year	13,65,821
4th Year	14,34112
5th Year	16,15,318
Total	₹ 106 lakhs

10.11 Conclusion

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

CHAPTER – 11: SUMMARY AND CONCLUSIONS

Devannagoundanur and Thangayur Village Multi Colour Granite Quarry cluster over an Extent of 21.07.0 ha falls under “B” category as per MoEF & CC Notification (S.O. 3977 (E)).

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.

A detailed Draft EIA/ EMP Report is prepared for public and other stakeholders’ suggestions and a Final EIA/ EMP Report will be prepared based on the outcome of Public Consultation.

Environmental monitoring and audit mechanism have been recommended before and after commencement of the project, where necessary, to verify the accuracy of the EIA predictions and the effectiveness of recommended mitigation measures.

The main scope of the EIA study is to quantify the cumulative impact in the study area due to cluster quarries and formulate the effective mitigation measures for each individual leases. A detailed account of the emission sources, emissions control equipment, background Air quality levels, Meteorological measurements, Dispersion model and all other aspects of pollution like effluent discharge, Dust generation etc., have been discussed in this report. The baseline monitoring study has been carried out during the month of March to May 2023 for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suitable mitigation measures for likely adverse impacts due to the cluster proposed project is suggested individually for the respective proposed project under Chapter 10.

The project proponent ensures to obtain necessary clearances and quarrying will be carried out as per rules and regulations. The Mining Activity will be carried out in a phased manner as per the approved mining plan after obtaining EC, CTO from TNPCB, execution of lease deed and obtaining DGMS Permission and working will be carried out under the supervision of Competent Persons employed.

Overall, the EIA report has predicted that the project will comply with all environment standards and legislation after commencement of the project and operational stage mitigation measures are implemented.

Mining operations has positive impact on environment and socio economy such as landscape improvement, water as by-product, economy development and better public services, providing and supply of Multi Colour Granite Quarry as per market demand.

Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 104 people directly in the cluster and indirectly around 200 people.

As discussed, it is safe to say that the proposed quarries are not likely to cause any significant impact to the ecology of the area, as adequate preventive measures will be adopted to keep the various pollutants within the permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigate technique, as well as to serve as biological indicators for the pollutants released from Devannagoundanur and Thangayur Village Multi Colour Granite Quarry cluster over an Extent of 21.07.0 ha.

12. DISCLOSURE OF CONSULTANTS

Devannagoundanur and Thangayur Multi Colour Granite Quarry have engaged M/s Geo Exploration and Mining Solutions, an Accredited Organization under Quality Council of India – National Accreditation Board for Education & Training, New Delhi, for carrying out the EIA Study as per the ToR Issued.

Name and address of the consultancy:

GEO EXPLORATION AND MINING SOLUTIONS
No 17, Advaitha Ashram Road,
Alagapuram, Salem – 636 004
Tamil Nadu, India
Email: infogeoexploration@gmail.com
Web: www.gemssalem.com
Phone: 0427 2431989.

The Accredited Experts and associated members who were engaged for this EIA study as given below

Sl.No.	Name of the expert	In house/ Empanelled	EIA Coordinator		FAE	
			Sector	Category	Sector	Category
1	**Dr. M. Ifthikhar Ahmed**	**In-house**	**1**	**A**	WP GEO SC	B A A
2	Dr. P. Thangaraju	In-house	-	-	HG GEO	A A
3	Mr. A. Jagannathan	In-house	-	-	AP NV SHW	B A B
4	Mr. N. Senthilkumar	Empanelled	38 28	B B	AQ WP RH	B B A
5	Mrs. Jisha parameswaran	In-house	-	-	SW	B
6	Mr. Govindasamy	In-house	-	-	WP	B
7	Mrs. K. Anitha	In-house	-	-	SE	A
8	Mrs. Amirtham	In-house	-	-	EB	B
9	Mr. Alagappa Moses	Empanelled	-	-	EB	A
10	Mr. A. Allimuthu	In-house	-	-	LU	B
11	Mr. S. Pavel	Empanelled	-	-	RH	B
12	Mr. J. R. Vikram Krishna	Empanelled	-	-	SHW RH	A A

Abbreviations	
EC	EIA Coordinator
AEC	Associate EIA Coordinator
FAE	Functional Area Expert
FAA	Functional Area Associates
TM	Team Member
GEO	Geology
WP	Water pollution monitoring, prevention and control
AP	Air pollution monitoring, prevention and control
LU	Land Use
AQ	Meteorology, air quality modeling, and prediction
EB	Ecology and bio-diversity
NV	Noise and vibration
SE	Socio economics
HG	Hydrology, ground water and water conservation
SC	Soil conservation
RH	Risk assessment and hazard management
SHW	Solid and hazardous wastes
MSW	Municipal Solid Wastes
ISW	Industrial Solid Wastes
HW	Hazardous Wastes

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

Declaration by experts contributing to the EIA/EMP for Devannagoundanur and Thangayur Multi Colour Granite Quarry cluster over an **Extent of 21.07.0 ha** in Devannagoundanur and Thangayur Village of Sankari and Edappadi Taluk, Salem District of Tamil Nadu. It is also certified that information furnished in the above EIA study are true and correct to the best of our knowledge.

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the EIA/EMP Report.

Name**:** **Dr. M. Ifthikhar Ahmed**

Designation**:** **EIA Coordinator**

Date & Signature:

Period of Involvement: **Dec 2022 to till date**

Associated Team Member with EIA Coordinator:

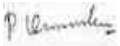
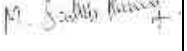
1. **Mr.S.Nagamani**
2. **Mr. P.Viswanathan**
3. **Mr. Santhoshkumar**
4. **Mr. S. Ilavarasan**

FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

Sl. No.	Functional Area	Involvement	Name of the Expert/s	Signature
1	AP	▪ Identification of different sources of air pollution due to the proposed mine activity ▪ Prediction of air pollution and propose mitigation measures / control measures	Mr. A. Jagannathan	
2	WP	▪ Suggesting water treatment systems, drainage facilities ▪ Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	Dr. M. Ifthikhar Ahmed	
			Mr. N. Senthilkumar	
3	HG	▪ Interpretation of ground water table and predict impact and propose mitigation measures. ▪ Analysis and description of aquifer Characteristics	Dr. P. Thangaraju	
4	GEO	▪ Field Survey for assessing the regional and local geology of the area. ▪ Preparation of mineral and geological maps. ▪ Geology and Geo morphological analysis/description and Stratigraphy/Lithology.	Dr. M. Ifthikhar Ahmed	
			Dr. P. Thangaraju	
5	SE	▪ Revision in secondary data as per Census of India, 2011. ▪ Impact Assessment & Preventive Management Plan ▪ Corporate Environment Responsibility.	Mrs. K. Anitha	
6	EB	▪ Collection of Baseline data of Flora and Fauna.	Mrs. Amirtham	

		▪ Identification of species labelled as Rare, Endangered and threatened as per IUCN list. ▪ Impact of the project on flora and fauna. ▪ Suggesting species for greenbelt development.	Mr. Alagappa Moses	
7	RH	▪ Identification of hazards and hazardous substances ▪ Risks and consequences analysis ▪ Vulnerability assessment ▪ Preparation of Emergency Preparedness Plan ▪ Management plan for safety.	Mr. N. Senthilkumar	
			Mr. S. Pavel	
			Mr. J. R. Vikram Krishna	
8	LU	▪ Construction of Land use Map ▪ Impact of project on surrounding land use ▪ Suggesting post closure sustainable land use and mitigative measures.	Mr. A. Allimuthu	
9	NV	▪ Identify impacts due to noise and vibrations ▪ Suggesting appropriate mitigation measures for EMP.	Mr. A. Jagannathan	
10	AQ	▪ Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. ▪ Recommending mitigations measures for EMP	Mr. N. Senthilkumar	
11	SC	▪ Assessing the impact on soil environment and proposed mitigation measures for soil conservation	Dr. M. Ifthikhar Ahmed	
12	SHW	▪ Identify source of generation of non-hazardous solid waste and hazardous waste. ▪ Suggesting measures for minimization of generation of waste and how it can be reused or recycled.	Mr. A. Jagannathan	
			Mr. J. R. Vikram Krishna	

LIST OF TEAM MEMBERS ENGAGED IN THIS PROJECT

Sl.No.	Name	Functional Area	Involvement	Signature
1	Mr. S. Nagamani	AP; GEO; AQ	▪ Site Visit with FAE ▪ Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures ▪ Provide inputs on Geological Aspects ▪ Analyse & provide inputs and assist FAE with meteorological data, emission estimation, AERMOD modelling and suggesting control measures	
2	Mr. Viswanathan	AP; WP; LU	▪ Site Visit with FAE ▪ Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures ▪ Assisting FAE on sources of water pollution, its impacts and suggest control measures ▪ Assisting FAE in preparation of land use maps	
3	Mr. Santhoshkumar	GEO; SC	▪ Site Visit with FAE ▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	

			▪ Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
4	Mr. Umamahesvaran	GEO	▪ Site Visit with FAE ▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	
5	Mr. A. Allimuthu	SE	▪ Site Visit with FAE ▪ Assist FAE with collection of data's ▪ Provide inputs by analysing primary and secondary data	
6	Mr. S. Ilavarasan	LU; SC	▪ Site Visit with FAE ▪ Assisting FAE in preparation of land use maps ▪ Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
7	Mr. E. Vadivel	HG	▪ Site Visit with FAE ▪ Assist FAE & provide inputs on aquifer characteristics, ground water level/table ▪ Assist with methods of ground water recharge and conduct pump test, flow rate	
8	Mr. D. Dinesh	NV	▪ Site Visit with FAE ▪ Assist FAE and provide inputs on impacts due to proposed mine activity and suggest mitigation measures ▪ Assist FAE with prediction modelling	
9	Mr. Panneer Selvam	EB	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	
10	Mrs. Nathiya	EB	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above-mentioned Functional Area Experts and Team Members prepared the EIA/EMP for Multi colour Granite quarry cluster over an **Extent of 21.07.0 ha** in Devannagoundanur & Thangayur Village Village of Sankari and Edappadi Taluk, Salem District of Tamil Nadu. It is also certified that information furnished in the EIA study are true and correct to the best of our knowledge.

Signature & Date:

Name: **Dr. M. Ifthikhar Ahmed**

Designation: **Managing Partner**

Name of the EIA Consultant Organization: **M/s. Geo Exploration and Mining Solutions**

NABET Certificate No & Issue Date: **NABET/EIA/2225/RA0276 Dated: 20-02-2023**

Validity: **Valid till 06.08.2025**