DRAFT ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENT MANAGEMENT PLAN

FOR OBTAINING

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

("B1" CATEGORY – MINOR MINERAL – CLUSTER – NON-FOREST LAND)

For

THIRU. M.GANESAN ROUGH STONE AND GRAVEL QUARRY

Name and Address of the proponent

Thiru. M. GANESAN,

S/o. Manivel,
No. 36/1, Mallampatti Village,
Kalamavur Post, Kulathur Taluk,
Pudukkottai District – 622 502

Location: Sirudhamur Village, Uthiramerur Taluk, Kancheepuram District.

Quarry Code	S.F. Nos	Extent in ha	ToR Letter No.
P1	320/1A, 1B,2	1.98.0	Lr. No. SEIAA-TN/F.No.**8968**/SEAC/ToR-1254/2022 Dated: 19.09.2022
P2	323/1B, 2B, 2C, 3, 4, 5B,5C	2.13.0	Lr. No. SEIAA-TN/F.No.**8978**/SEAC/ToR-1257/2022 Dated: 19.09.2022
P3	324/1A,1B1,1B2,2A, 2B, 2C1, 2C2, 3, 8A, 9A, 9B2	2.40.0	Lr. No. SEIAA-TN/F.No.**8966**/SEAC/ToR-1255/2022 Dated: 19.09.2022

(Baseline Monitoring period – October – December 2022 – Post Monsoon)

ENVIRONMENTAL CONSULTANT	LABORATORY
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 Cat 'A' & 38 Cat 'B'** **Certificate No : NABET/EIA/1922/SA 0139** Phone: 0427-2431989, Email: infogeoexploration@gmail.com **Web: www.gemssalem.com**	**CHENNAI METTEX LAB PRIVATE LIMITED** (Approved by AAI, AGMARK, APEDA, BIS, EIC FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD) **Jothi Complex, 83,** **M.K.N Road, Guindy,** **Chennai – 600 032**

JANUARY 2023

PROPOSED QUARRIES					
Code	**Name and address of the proponent**	**Name of the Village, and Taluk, & S.F. Nos.**	**Extent in (ha)**	**Status**	**Remarks**
P1	**M.Ganesan,** S/o. Manivel, No.36/1, Mallampatti village, Kalamavur Post, Kulathur Taluk, Pudukkottai District.	Sirudhamur Village, Uthiramerur Taluk 320/1A, 1B,2	1.98.00	Obtained TOR Vide Lr.No.SEIAA-TN/F.No.8968/Tor-1254/2022 dated 19.09.2022	-
P2	**M.Ganesan,** S/o. Manivel, No.36/1, Mallampatti village, Kalamavur Post, Kulathur Taluk, Pudukkottai District.	Sirudhamur Village, Uthiramerur Taluk 323/1B, 2B, 2C, 3, 4, 5B,5C	2.13.00	Obtained TOR Vide Lr.No.SEIAA-TN/F.No.8978/Tor-1257/2022 dated 19.09.2022	-
P3	**M.Ganesan,** S/o. Manivel, No.36/1, Mallampatti village, Kalamavur Post, Kulathur Taluk, Pudukkottai District.	Sirudhamur Village, Uthiramerur Taluk 324/1A,1B1,1B2,2A, 2B, 2C1, 2C2, 3, 8A, 9A, 9B2	2.40.00	Obtained TOR Vide Lr.No.SEIAA-TN/F.No.8966/Tor-1255/2022 dated 19.09.2022	-
Total			**6.51.00**		
EXISTING QUARRIES					
SL.No.	**Name of the Lessee**	**Name of the Village, and Taluk, & S.F. Nos.**	**Extent in (ha)**	**Lease Period**	**Remarks**
E1	**D. Uma Sankar**	Sirudhamur Village, Uthiramerur Taluk 334/1B	2.72.00	31.01.2017 To 30.01.2022	-
E2	**S. Vaithialingam**	Sirudhamur Village, Uthiramerur Taluk 314/6B,314/7A,314/7B,314/8,314/10	1.08.00	22.02.2018 To 21.02.2023	-
E3	**S.Murugesan,**	Sirudhamur Village, Uthiramerur Taluk 324/4A, 4B1, 4B2, 5, 6, 7A, 8B, 10A, 10C, 11, 327/2, 3A	3.11.0	09.05.2018 to 08.05.2023	-
E4	**N. Kanniyappan,**	Sirudhamur Village, Uthiramerur Taluk 320/3A, 3B, 4, 332/lA, 1B, 2	2.41.00	15.06.2018 To 14.06.2023	-
E5	**D. Sarathkumar,**	Sirudhamur Village, Uthiramerur Taluk 325/4, 109/1A1, 1A2	3.01.50	20.12.2018 to 19.12.2023	-
E6	**S. Kothandaraman,**	Sirudhamur Village, Uthiramerur Taluk 115/1A, 1B, 2A1, 2A2B, 2B1, 2C,2D1	2.69.06	07.08.2017 to 06.08.2022	
E7	**R. Selvendrakumar**	Sirudhamur Village, Uthiramerur Taluk 308/1,2,3A, 3B, 3C, 3D, 3E, 3F, 5, 6, 7A, 7B, 8, 9, 10A, 10B, 10C, 11	2.92.50	08.11.2018 to 07.11.2023	
		Total	**17.95.06**		
ABANDONED QUARRIES					
Sl.No.	**Name of the Lessee**	**Name of the Village, and Taluk, & S.F. Nos.**	**Extent (ha)**	**Lease Period**	**Remarks**
AB1	**S.Jayachandran,**	Sirudhamur Village, Uthiramerur Taluk 326(P)	2.00.00	16.02.2007 to 15.02.2012	Lease Expired

AB2	**PJR Sathishkumar**	Sirudhamur Village, Uthiramerur Taluk 334/1(P)	1.80.00	20.05.2010 To 19.05.2015	Lease Expired
AB3	**M/s.RCS Infrastructures Ltd,**	Sirudhamur Village, Uthiramerur Taluk 327/6	2.39.00	20.12.2011 To 19.12.2016	Lease Expired
AB4	**RCS Infrastructure Pvt Ltd,**	Sirudhamur Village, Uthiramerur Taluk 323/1A, 2A, 324/10B, 7B, 327/3B, 327/4	1.80.00	23.02.2015 to 22.02.2020	Lease Expired
AB5	**S.Kothandaraman,**	Sirudhamur Village, Uthiramerur Taluk 338(P) Q.No.1 (Govt. Land)	5.00.0	09.08.2005 To 08.08.2010	Lease Expired
AB6	**C. Ranganathan**	Sirudhamur Village, Uthiramerur Taluk338(P) Q.No.2 (Govt. Land)	5.00.0	04.10.2005 To 03.10.2010	Lease Expired
AB7	B.S.Mohan	Sirudhamur Village, Uthiramerur Taluk 107(P)	5.00.0	05.02.2007 to 04.02.2017	Lease Expired
AB8	**Tvl.Annai Blue Metals**	Sirudhamur Village, Uthiramerur Taluk 109/D, 114/4, 5, 6, 7A, 7B, 113/2B, 3B	2.26.50	06.20.2014 to 05.02.2019	Lease Expired
AB9	**Tvl.Arupadai Infrastructure Company,**	Sirudhamur Village, Uthiramerur Taluk 109/1B, 1F, 1G, 1H, 114/1, 2, 3	3.77.00	15.04.2015 to 14.04.2020	Lease Expired
AB10	**S.Krishnakumar**	Sirudhamur Village, Uthiramerur Taluk338(P) 106	0.79.50	22.12.2011 To 21.12.2016	Lease Expired
		Total	**29.82.00**		
		Total Cluster Extent	**24.46.06**		

Source:

1. Letter from Department of Geology and Mining Rc.No. 220/Q3/2021, Dated 11.10.2021
2. Letter from Department of Geology and Mining Rc.No. 221/Q3/2021, Dated 11.10.2021
3. Letter from Department of Geology and Mining Rc.No. 222/Q3/2021, Dated 11.10.2021

Note: -

- As per the MoEF & CC Notification – S.O. 2269 (E) Dated: 01.07.2016 (Cluster Notification) the above quarries have been identified and studied for preparing this EIA & EMP report based on this notification it is calculated total Extent of the quarries in the cluster is **24.46.06 Ha** (3 proposed quarries + 7 Existing quarries)
- For the easy identification unique codes have been given for the quarries (P- Proposed quarry, E- Existing quarries & AB – Abandoned quarries)

Terms of Reference (TOR) – Thiru.M.Ganesan – P1

"ToR issued vide Lr.No. SEIAA-TN/F.No.8968/SEAC/ToR-1254/2022 Dated: 19.09.2022

SPECIFIC CONDITIONS		
1.	The proponent shall obtain NBWL Clearance as the Karikili Birds Sanctuary is located within at a distance of 8.5km from the proposed mining area while submitting EIA study), along with minutes public hearing.	DFO letter and NBWL Clearance details will be submitted along with the final EIA report.
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.	It is a fresh quarry; the mining operation will be carried out as per the bench formations proposed in the Mining plan.
3.	The Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30m below ground level .	The entire life of the project is 10 years upto the depth of 37m bgl. For the first five years it is proposed to operate 32m bgl only.
4	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 196l such as blaster. mining mate, mine foreman, III Class mines manager appointed by the proponent.	The affidavit and other evidences will be submitted along with the final EIA report.
5	The PP shall present 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 arc controlled as well as no fly rock travel beyond 30 m from the blast site.	This quarry operation using NONEL blasting techniques and strictly follow guidelines of Deputy General of Mines Safety. This method will involve closed spaced perimeter holes to reduce the over break /back break on a blast. The objective of the blasting design is to prevent fly rocks from damaging the nearby structures.
6	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.	It is a fresh quarry, no other quarries in the name of project proponent.

7	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	Not Applicable. This project proposal comes under fresh lease category for quarrying of Rough Stone & Gravel.
8.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Toposheet, 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).	Project area lease boundary coordinates details are given in Chapter II and Figure No. 2.2. Refer: p.no.10 Geology map of the project area covering 10km radius map has been included in Chapter II and Figure No. 2.3. Refer: p. no. 19 Geomorphology Map of the Study Area covering 10 km radius map has been included in Chapter II and Figure No. 2.3. Refer: p.no. 19.
9	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	The drone survey will be conducted and the report will be submitted along with the final EIA report.
10	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.	The green belt development proposal has been discussed in the Chapter IV, Table No 4.11, Pg. No. 109. The photographs of Wire fencing will be submitted along with final EIA report.
11	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.	The details of mineral reserves have been provided in Chapter No 2, Table No2.4, Pg.No.17.
12	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	Standard operating procedures as per DGMS for safety and health aspects of the workers and for surrounding habitants during mining operations should be followed.

	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.	The safety and the health aspects of workers have been discussed in chapter -4, table 4.74 page No 111.
13	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 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.	Detailed hydrogeological studies were conducted for the period of 3 months (October – December 2022). Results have been discussed chapter No 3, Pg No. 42.
14	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.	The details have been provided under chapter III, Pg No.84. Traffic details have been given in chapter No 2, Page No 24.
15	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.	Cumulative impact study results related to air pollution, water pollution, & health impacts have been given in chapter VII. Based on the results, environmental management plan has been prepared and given in Pae No 113-124.
16	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	This project involved exploration of rough stone. Part of the working pit will be allowed to collect rain water during the spell of rain. The water thus collected will be used for greenbelt development and dust suppression.
17	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 plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No 2, Table No 2.3, Pg. No 17. 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 has been discussed in Chapter No. 3, Table No 3.2, Page No 28.

18	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. There is no waste anticipated during this quarry operation. The entire quarried out rough stone will be transported to the needy customers. Hence, no dumps are proposed outside the lease area.
19	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.
20	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. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan has been prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for the project village during draught season.
21	lmpact on local transport infrastructure due to the Project should be indicated.	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 have been provided in Chapter No.2, Pg.No 24.
22	A tree survey study shall be carried out (nos. name of the species, age, diameter etc.,) both withing the mining leases applied area & 300m buffer zone and its management during mining activity.	The details have been provided in Chapter No. 3, Pg.No 67-83. The details of green belt development proposal have been included in Chapter No.4, Table No 4.11, Pg No. 109.
23	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure details have been provided under Chapter No 4, Page No 111.
24	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 SETAA/SEAC with regard to the Office Memorandum of MoEF & CC accordingly.	Public Hearing points raised and commitments of the Project Proponent on the same will be updated in the Final EIA report.
25	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	The public hearing advertisement information will be provided in the final EIA report.

26	The PP shall produce/display the EIA report, Executive summery and other related information with respect to public hearing in Tamil Language also.	A draft EIA report, executive summary in English and Tamil have been prepared for submission to TNPCB for conducting public hearing.
27	As a pan 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.	The EIA coordinator visited the project site, met the local people and student, and educated the importance of protecting the environment.
28	The purpose of green belt around the project is to capture the fugitive emissions and to attenuate the noise generated, in addition to the improvement in 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 and local school/ college authorities. 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 in the mixed manner.	The detailed greenbelt development plan has been provided in Chapter No.4, Table No 4.11, Page No 109.
29	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted in proper escapement 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.	The FAE of ecology and biodiversity has advised the project proponent that saplings of one year old raised in the eco-friendly bags should be purchased and planted with the spacing of 3 m between each plant around the proposed project area as per the advice of local forest authorities/botanist.
30	A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	Details regarding disaster management plan have been provided in Chapter No 7, Page No 120.
31	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	The details have been provided in Chapter No.7, Page No 118.
32	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 have been explained in detail in Chapter No.10, Section 10.9, Pg.No 119

33	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 are anticipated due to this project. Details of CER and CSR have been given in Chapter No.8, Table No 8.1, Pg.No111.
34	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.	The socio – economic studies were carried out and the result have been discussed in Chapter No.3, Page No 84-98.
35	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.
36	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.	Project Cost is Rs.60,96,000 /- CER Cost Rs 5,00,000/- In order to implement the environmental protection measures, an amount of Rs. 18,02,000/-lakhs as capital cost and recurring cost as Rs. 11,21,480/-lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.
37	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.	No other quarries in the name of Project proponent
38	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating he would abide the EMP for the entire life of mine.	The EMP has been prepared and given in Chapter No.10, Table No 10.9, Page No 121-123
39	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.	The EIA report has been prepared keeping in mind the fact that concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may lead to withdrawal of this terms of reference besides attracting penal provisions in the Environment (Protection) Act, 1986.
ADDITIONAL CONDITIONS		
1	Cluster Management Committee, which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Cluster Management Committee will be constituted.

2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Warer sprinkling, tree plantation, blasting etc..	The information will be shared to the cluster management committee.
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.	The list of members of the committee formed will be submitted to AD/Mines before the execution of mining lease.
4	Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	All the information has been discussed in Chapter No.2, Page No 23.
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.	It will be informed to the committee.
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.	It will be advised to the cluster management committee 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 will be given in detail.
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.	A proper action plan regarding the restoration will be followed by the committee.
8	The committee shall furnish the Emergency Management plan within the cluster.	The committee will submit the emergency management plan to the respective authority in the stipulated time period.
9	The committee shall deliberate on the health of the worker staff involved in the mining as well as the health of the public.	The information on the health of the workers and the local people will be updated periodically.
10	Detailed study shall be caried out in the regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following a) Soil health & bio-diversity. b) Climate change leading to Droughts, Floods etc.	The study is in process. The results will be updated in the final EIA report.

	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. f) 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 streams.	
11	The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety.	A proper action plan with reference to water, sanitation & safety will be devised and submitted by the committee to the respective authority.
12	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	The fire safety and evacuation plan will be submitted by the committed to the corresponding authority.
13	The measures taken to control Noise, Air, Water, Dust and steps adopted to efficiently utilise the Energy shall be furnished.	The measures to control air, noise, and water pollution due to dust have been provided in Chapter No.4, Page No 99-110
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.	The vegetation details have been provided in Chapter No 3, Page No 67. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
15	Impact on surrounding agricultural fields around the proposed mining Area.	As the proposed lease area is dominantly surrounded by mining land, barren land, and fallow land, the impact on the surrounding agricultural fields if present will be low. With proper mitigation measures, the project will be carried out to reduce the impact further to the level of negligence.
16	Erosion Control measures.	Garland drainage structures will be constructed around the lease area to control the erosion, as discussed in Section 4.3 under Chapter IV, Pg.No.100
17	Impact on soil flora & vegetation around the project site	The vegetation details have been provided in chapter III. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
18	Detailed study shall 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.	The matter has been discussed under Chapter No.4, Pg.No100.
19	The project proponent shall furnish VAO certificate with reference to 300m radius regard	The VAO certificate of 300 m radius as per the requirement will be given along with final EIA report.

	to approved habitations, schools, Archaeological sites, Structures, railway lines. roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	
20	As per the MoEF & CC office Memorandum F.No. 22-65/2017-IA.III 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 Plan.	The concerns raised during the public consultation and all the activities proposed will be updated in the final EIA report.
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 reduction including control of other emission and climate mitigation activities.	Greenbelt development plan as discussed in chapter No.4, Table No 4.11, Pg. No109.
22	The environmental impact assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed bank and suggest measures to maintain natural ecosystem.	The matter including the results of the soil's micro flora, fauna and soil seed banks and the suitable remedial measures will be included in the final EIA report.
23	Action should specifically suggested for sustainable management of the area and restoration of ecosystem for flow of goods and services.	The FAE of ecology and biodiversity has advised the project proponent that replantation work, particularly for the project area where plants of 4 years old exist should be carried out in the vacant areas available.
24	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and reservoir.	An analysis for food chain in aquatic ecosystem is under process and report will be added to the final EIA report.
25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The impact of mining on soil environment has been discussed in Chapter No.4, Page No 99.
26	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	This report has included studies of ecology and biodiversity covering vegetation, endemic, vulnerable and endangered indigenous flora and fauna in Chapter No3, Page No.67. According to the ecological report, there is no endemic, vulnerable and endangered indigenous flora and fauna.
27	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	The ecological details have been provided in Chapter No 3, Page No 67.
28	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	All the studies including wetlands, water bodies, river streams, lakes and farmer sites have been included in Chapter No 3, Page No 67.
29	The Environmental Impact Assessment should hold detailed study on EMP with budget for	The details have been given in Chapter No 10, Table No 10.10.

	green belt development and mine closure plan including disaster management plan.	
30	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The information will be included in the final EIA report.
31	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	There are no Protected Areas, National Parks, Corridors and Wildlife pathways near project site. The list of reserve forests within 10 km radius has been provided in Chapter No 3, Table No.3.3, Pg.no 31.
32	The Project proponent shall study and furnish the impact of project on plantations in adjoining Patta lands, Horticulture, Agriculture and livestock.	The impact of project on the land environment has been discussed in section 4.1 under chapter IV, p.110.
33	The project proponent shall study and furnish the details on potential fragmentation impact of natural environment, by the activities.	The impacts of the proposed project have been discussed in chapter 4, Pg No. 99 – 112.
34	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damage to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	The impact of the proposed project on aquatic plants and animals in water bodies has been discussed in Chapter No.3, Table No.3.28, Page No 31.
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 &microplastic on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	The matter on plastic waste management has been given in Chapter No.7.
36	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	There are three reserve forest within the radius of 10km, details of Ecology and Biodiversity studies described in the Chapter No -III, Table No 3.3, Pg.no.31
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 1o 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.	Details on the nearest surface water bodies such as rivers, tanks, canals, ponds etc. have been given in Chapter No.3, Table No 3.4.
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards	The disaster management plan for this project has been provided in Chapter No. 7, Pg.No120.

	& 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.	
39	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	The risk assessment and management plan for this project has been provided in Chapter No. 7, Pg.No118.
40	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Detailed mine closure plan has been attached with the approved mining plan report in Annexure III.
41	Detailed Environment Management plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	A detailed Environment Management plan has been given in Chapter No.10, Pg.No.121.

"ToR issued vide Lr.No. SEIAA-TN/F.No.8978/SEAC/ToR-1257/2022 Dated: 19.09.2022

SPECIFIC CONDITIONS		
1.	The proponent shall obtain NBWL Clearance as the Karikili Birds Sanctuary is located at a distance of 8.5 km from the proposed mining area while submitting EIA study), along with minutes public hearing.	DFO letter and NBWL Clearance details will be submitted along with the final EIA report.
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.	It is a fresh quarry; the mining operation will be carried out as per the bench formations proposed in the Mining plan.
3.	The Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30m below ground level .	The entire life of the project is 10 years upto the depth of 42m bgl. For the first five years it is proposed to operate 42m bgl only.
4	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 196l such as blaster. mining mate, mine foreman, III Class mines manager appointed by the proponent.	The affidavit and other evidences will be submitted along with the final EIA report.
5	The PP shall present 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 arc controlled as well as no fly rock travel beyond 30 m from the blast site.	This quarry operation using NONEL blasting techniques and strictly follow guidelines of Deputy General of Mines Safety. This method will involve closed spaced perimeter holes to reduce the over break/back break on a blast. The objective of the blasting design is to prevent fly rocks from damaging the nearby structures.
6	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.	It is a fresh quarry, no other quarries in the name of project proponent.
7	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. i. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? j. Quantity of minerals mined out. k. Highest production achieved in any one year l. Detail of approved depth of mining. m. Actual depth of the mining achieved earlier.	Not Applicable. This project proposal comes under fresh lease category for quarrying of Rough Stone & Gravel.

	n. Name of the person already mined in that leases area o. If EC and CTO already obtained, the copy of the same shall be submitted p. Whether the mining was carried out as per the approved mine plan (or EC if issued with stipulated benches	
8.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Toposheet, 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).	Project area lease boundary coordinates details are given in Chapter II and Figure No. 2.2. Refer: p.no.11. Geology map of the project area covering 10km radius map has been included in Chapter II and Figure No. 2.8. Refer: p. no. 19 Geomorphology Map of the Study Area covering 10 km radius map has been included in Chapter II and Figure No. 2.8. Refer: p.no. 19.
9	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	The drone survey will be conducted and the report will be submitted along with the final EIA report.
10	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.	The green belt development proposal has been discussed in the Chapter IV and section 4.11. Refer: pp.109. The photographs of Wire fencing will be submitted along with final EIA report.
11	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.	The details of mineral reserves have been provided in pp.17 under chapter II and section 2.4.
12	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.	Standard operating procedures as per DGMS for safety and health aspects of the workers and for surrounding habitants during mining operations should be followed. The safety and the health aspects of workers have been discussed in section 4.7.4, under chapter IV, pp.111.
13	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 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.	Detailed hydrogeological studies were conducted for the period of 3 months (October -December,2022). Results have been discussed in Page.No:12.

14	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.	The details have been provided under chapter III, Pg No.84. Traffic details have been given in chapter No 2, Page No 24.
15	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.	Cumulative impact study results related to air pollution, water pollution, & health impacts have been given in chapter VII. Based on the results, environmental management plan has been prepared and given in Pae No 113-122.
16	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	This project involved exploration of rough stone. Part of the working pit will be allowed to collect rain water during the spell of rain. The water thus collected will be used for greenbelt development and dust suppression.
17	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 plan of the project area showing pre-operational, operational and post-operational phases are discussed in Table 2.3, p.17 under chapter II. 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 has been discussed in Figure 3.2, p.30 under chapter III.
18	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. There is no waste anticipated during this quarry operation. The entire quarried out rough stone will be transported to the needy customers. Hence, no dumps are proposed outside the lease area.
19	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.
20	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. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan has been prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for the project village during draught season.

21	lmpact on local transport infrastructure due to the Project should be indicated.	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 have been provided in Chapter No.2, Pg.No 24.
22	A tree survey study shall be carried out (nos. name of the species, age, diameter etc.,) both withing the mining leases applied area & 300m buffer zone and its management during mining activity.	The details have been provided in Chapter No. 3, Pg.No 67-83. The details of green belt development proposal have been included in Chapter No.4, Table No 4.11, Pg No. 109.
23	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure details have been provided under Chapter No 4, Page No 111.
24	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 SETAA/SEAC with regard to the Office Memorandum of MoEF & CC accordingly.	Public Hearing points raised and commitments of the Project Proponent on the same will be updated in the Final EIA report.
25	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	The public hearing advertisement information will be provided in the final EIA report.
26	The PP shall produce/display the EIA report, Executive summery and other related information with respect to public hearing in Tamil Language also.	A draft EIA report, executive summary in English and Tamil have been prepared for submission to TNPCB for conducting public hearing.
27	As a pan 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.	The EIA coordinator visited the project site, met the local people and student, and educated the importance of protecting the environment.
28	The purpose of green belt around the project is to capture the fugitive emissions and to attenuate the noise generated, in addition to the improvement in 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 and local school/ college authorities. 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 in the mixed manner.	The detailed greenbelt development plan has been provided in Chapter No.4, Table No 4.11, Page No 109.
29	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted in proper escapement 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	The FAE of ecology and biodiversity has advised the project proponent that saplings of one year old raised in the eco-friendly bags should be purchased and planted with the spacing of 3 m between each plant around the proposed project area as per the advice of local forest authorities/botanist.

	meters wide and in between blocks in an organized manner.	
30	A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	Details regarding disaster management plan have been provided in Chapter No 7, Page No 120.
31	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	The details have been provided in Chapter No.7, Page No 118.
32	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 have been explained in detail in Chapter No.10, Section 10.9, Pg.No 142
33	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 are anticipated due to this project. Details of CER and CSR have been given in Chapter No.8, Table No 8.1, Pg.No135.
34	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.	The socio – economic studies were carried out and the result have been discussed in Chapter No.3, Page No 84-97.
35	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.
36	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.	Project Cost is Rs.65,24,000 /- CER Cost Rs 5,00,000/- In order to implement the environmental protection measures, an amount of Rs. 40,29,085/-lakhs as capital cost and recurring cost as Rs. 18,00,043/-lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.
37	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.	No other quarries in the name of Project proponent

<table>
<tr><td>38</td><td>The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating he would abide the EMP for the entire life of mine.</td><td>The EMP has been prepared and given in Chapter No.10, Table No 10.10, Page No 145-147</td></tr>
<tr><td>39</td><td>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.</td><td>The EIA report has been prepared keeping in mind the fact that concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may lead to withdrawal of this terms of reference besides attracting penal provisions in the Environment (Protection) Act, 1986.</td></tr>
<tr><td colspan="3">Additional Conditions</td></tr>
<tr><td>1</td><td>The proponent shall furnish the following details
a. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? (if it was in operation)
b. Quantity of minerals mined out.
c. Details of approved depth of mining
d. Actual depth of the mining achieved earlier
e. Name of the person already mined in that leases area.
f. If EC and ETO already obtained compliance report from competent authority.</td><td>Not Applicable
It is new quarry</td></tr>
<tr><td>2</td><td>There appears to be patchy vegetation, hence the proponent is requested 1o provide detailed report on the nature of vegetation. further, will there be any soil erosion due to removal of this vegetation and also its effect on low lying area.</td><td>It is plain topography. No erosion of the area due to the removal of vegetation.
Biodiversity study is covered under chapter No.3</td></tr>
<tr><td>3</td><td>The depth is restricted to 42m in Section XY-CD (2m Gravel and 40m Rough Stone), 42m in Section XY-AB (2m - Gravel and 40m - Rough Stone) and no quarrying shall be carried out in Section X1Y1-GH and also in Section XY-EF. Further. the width in the section XY-CD is restricted to l8m in bench 1 considering the safety aspect and to maintain contiguity. Hence. the revised quantity of Rough Stone is 1,80,940m^3 and Gravel is 21,366 m^3. Hence. The proponent is requested to provide the Survey Number corresponding to the above restricted proposed mine lease area</td><td>
<table>
<tr><td>Description</td><td>As per Mining plan upto 47m</td><td>As per ToR Upto the depth of 42m</td></tr>
<tr><td>Mineable Reserves</td><td>2,59,485m^3 of Rough stone & 27,790m^3 of Gravel</td><td>2,34,620m^3 of Rough stone and 27,142m^3 of Gravel</td></tr>
<tr><td>Production for five years</td><td>2,34,620m^3 of Rough stone</td><td>1,80,940m^3 of Rough stone and 27,142m^3 of Gravel</td></tr>
<tr><td>Production for last five years</td><td>76,515m^3 of Rough stone</td><td>53,680m^3 of Rough stone</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological Structures, etc.</td><td>The VAO certificate of 300 m radius as per the requirement will be given along with final EIA report.</td></tr>
</table>

5	As per the MoEF & CC office Memorandum F.No. 22-65/2017-IA.III 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 Plan.	The concerns raised during the public consultation and all the activities proposed will be updated in the final EIA report.
6	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 of other emission and climate mitigation activities.	Greenbelt development plan as discussed in chapter No.4, Table No 4.11, Pg. No. 99.
7	The environmental impact assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed bank and suggest measures to maintain natural ecosystem.	The matter including the results of the soil's micro flora, fauna and soil seed banks and the suitable remedial measures will be included in the final EIA report.
8	Action should specifically suggested for sustainable management of the area and restoration of ecosystem for flow of goods and services.	The FAE of ecology and biodiversity has advised the project proponent that replantation work, particularly for the project area where plants of 4 years old exist should be carried out in the vacant areas available.
9	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and reservoir.	An analysis for food chain in aquatic ecosystem is under process and report will be added to the final EIA report.
10	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The impact of mining on soil environment has been discussed in Chapter No.4, Page No 98.
11	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	This report has included studies of ecology and biodiversity covering vegetation, endemic, vulnerable and endangered indigenous flora and fauna in Chapter No3, Page No.67. According to the ecological report, there is no endemic, vulnerable and endangered indigenous flora and fauna.
12	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	The ecological details have been provided in Chapter No 3, Page No 67.
13	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	All the studies including wetlands, water bodies, river streams, lakes and farmer sites have been included in Chapter No 3, Page No 67.
14	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	The details have been given in Chapter No 10, Table No 10.10.
15	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The information will be included in the final EIA report.
16	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	There are no Protected Areas, National Parks, Corridors and Wildlife pathways near project site. The list of reserve forests within 10 km radius has been provided in Chapter No 3, Table No.3.3, Pg.no 33.

17	The Project proponent shall study and furnish the impact of project on plantations in adjoin Patta lands, Horticulture, Agriculture and livestock.	The impact of project on the land environment has been discussed in section 4.1 under chapter IV, p.110.
18	The project proponent shall study and furnish the details on potential fragmentation impact of natural environment, by the activities.	The impacts of the proposed project have been discussed in chapter 4, Pg No. 98 – 112.
19	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damage to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	The impact of the proposed project on aquatic plants and animals in water bodies has been discussed in Chapter No.3, Table No.3.28, Page No 79.
20	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 &microplastic on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	The matter on plastic waste management has been given in Chapter No.7.
21	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	There are three reserve forest within the radius of 10km, details of Ecology and Biodiversity studies described in the Chapter No -III, Table No 3.3, Pg.no.31
22	Detailed study shall be caried out in the regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area 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. f) 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 streams.	The study is in process. The results will be updated in the final EIA report.
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 1o 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.	Details on the nearest surface water bodies such as rivers, tanks, canals, ponds etc. have been given in Chapter No.3, Table No 3.4.

24	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.	The disaster management plan for this project has been provided in Chapter No. 7, Pg.No120.
25	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	The risk assessment and management plan for this project has been provided in Chapter No. 7, Pg. No118.
26	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Detailed mine closure plan has been attached with the approved mining plan report in Annexure III.
27	Detailed Environment Management plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	A detailed Environment Management plan has been given in Chapter No.10, Pg.No.137.

Terms of Reference (TOR) – Thiru.M.Ganesan – P3

"ToR issued vide Lr.No. SEIAA-TN/F.No.8966/SEAC/ToR-1255/2022 Dated: 19.09.2022

SPECIFIC CONDITIONS		
1.	The proponent shall obtain NBWL Clearance as the Karikili Birds Sanctuary is located within I0 km from the proposed mining area while submitting EIA study), along with minutes public hearing.	DFO letter and NBWL Clearance details will be submitted along with the final EIA report.
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.	It is a fresh quarry; the mining operation will be carried out as per the bench formations proposed in the Mining plan.
3.	The Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30m below ground level .	The entire life of the project is 10 years upto the depth of 47m bgl. For the first five years it is proposed to operate 42m bgl only.
4	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 196l such as blaster. mining mate, mine foreman, III Class mines manager appointed by the proponent.	The affidavit and other evidences will be submitted along with the final EIA report.
5	The PP shall present 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 arc controlled as well as no fly rock travel beyond 30 m from the blast site.	This quarry operation using NONEL blasting techniques and strictly follow guidelines of Deputy General of Mines Safety. This method will involve closed spaced perimeter holes to reduce the overbreak/backbreak on a blast. The objective of the blasting design is to prevent fly rocks from damaging the nearby structures.
6	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.	It is a fresh quarry, no other quarries in the name of project proponent.

7	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	Not Applicable. This project proposal comes under fresh lease category for quarrying of Rough Stone & Gravel.
8.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Toposheet, 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).	Project area lease boundary coordinates details are given in Chapter II and Figure No. 2.2. Refer: pg.no.11 Geology map of the project area covering 10km radius map has been included in Chapter II and Figure No. 2.8. Refer: p. no. 19 Geomorphology Map of the Study Area covering 10 km radius map has been included in Chapter II and Figure No. 2.8. Refer: p.no. 19.
9	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	The drone survey will be conducted and the report will be submitted along with the final EIA report.
10	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.	The green belt development proposal has been discussed in the Chapter IV, Table No 4.11, Pg.No. 111. The photographs of Wire fencing will be submitted along with final EIA report.
11	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.	The details of mineral reserves have been provided in Chapter No 2, Table No2.4, Pg.No.17.
12	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	Standard operating procedures as per DGMS for safety and health aspects of the workers and for surrounding habitants during mining operations should be followed.

	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.	The safety and the health aspects of workers have been discussed in chapter -4, page No 112.
13	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 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.	Detailed hydrogeological studies were conducted for the period of 3 months (October – December 2022). Results have been discussed chapter No 3, Pg No. 44.
14	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.	The details have been provided under chapter III, Pg No.28-100. Traffic details have been given in chapter No 2, Page No 24.
15	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.	Cumulative impact study results related to air pollution; water pollution, & health impacts have been given in chapter VII. Based on the results, environmental management plan has been prepared and given in Pg No 138-150.
16	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	This project involved exploration of rough stone. Part of the working pit will be allowed to collect rain water during the spell of rain. The water thus collected will be used for greenbelt development and dust suppression.
17	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 plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No 2, Table No 2.3, Pg. No 17. 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 has been discussed in Chapter No. 3, Table No 3.2, Pg. No 30

18	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. There is no waste anticipated during this quarry operation. The entire quarried out rough stone will be transported to the needy customers. Hence, no dumps are proposed outside the lease area.
19	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.
20	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. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan has been prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for the project village during draught season.
21	lmpact on local transport infrastructure due to the Project should be indicated.	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 have been provided in Chapter No.2, Pg. No 24.
22	A tree survey study shall be carried out (nos. name of the species, age, diameter etc.,) both withing the mining leases applied area & 300m buffer zone and its management during mining activity.	The details have been provided in Chapter No. 3, Pg. No 68-85. The details of green belt development proposal have been included in Chapter No.4, Table No 4.11, Pg No. 111.
23	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure details have been provided under Chapter No 4, Page No 111.
24	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 SETAA/SEAC with regard to the Office Memorandum of MoEF & CC accordingly.	Public Hearing points raised and commitments of the Project Proponent on the same will be updated in the Final EIA report.
25	The Public hearing advertisement shall be published in one major National daily and one most circulated vernacular daily.	The public hearing advertisement information will be provided in the final EIA report.

26	The PP shall produce/display the EIA report, Executive summery and other related information with respect to public hearing in Tamil Language also.	A draft EIA report, executive summary in English and Tamil have been prepared for submission to TNPCB for conducting public hearing.
27	As a pan 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.	The EIA coordinator visited the project site, met the local people and student, and educated the importance of protecting the environment.
28	The purpose of green belt around the project is to capture the fugitive emissions and to attenuate the noise generated, in addition to the improvement in 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 and local school/ college authorities. 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 in the mixed manner.	The detailed greenbelt development plan has been provided in Chapter No.4, Table No 4.11, Page No 111.
29	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted in proper escapement 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.	The FAE of ecology and biodiversity has advised the project proponent that saplings of one year old raised in the eco-friendly bags should be purchased and planted with the spacing of 3 m between each plant around the proposed project area as per the advice of local forest authorities/botanist.
30	A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	Details regarding disaster management plan have been provided in Chapter No 7, Page No 122.
31	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	The details have been provided in Chapter No.7, Page No 120.
32	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 have been explained in detail in Chapter No.10,Pg.No 143

33	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 are anticipated due to this project. Details of CER and CSR have been given in Chapter No.8, Table No 8.1, Pg. No 136.
34	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.	The socio – economic studies were carried out and the result have been discussed in Chapter No.3, Page No 86-100.
35	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.
36	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.	Project Cost is Rs.68,99,000 /- CER Cost Rs 5,00,000/- In order to implement the environmental protection measures, an amount of Rs. 43,99,603/-lakhs as capital cost and recurring cost as Rs. 18,94,335/-lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.
37	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.	No other quarries in the name of Project proponent
38	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating he would abide the EMP for the entire life of mine.	The EMP has been prepared and given in Chapter No.10, Table No 10.10, Page No 147-149
39	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.	The EIA report has been prepared keeping in mind the fact that concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may lead to withdrawal of this terms of reference besides attracting penal provisions in the Environment (Protection) Act, 1986.
Additional Conditions		
1	Detailed study shall 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.	The matter has been discussed under Chapter No.4, Pg. No 102.

2	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.	The VAO certificate of 300 m radius as per the requirement will be given along with final EIA report.
3	As per the MoEF & CC office Memorandum F.No. 22-65/2017-IA.III 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 Plan.	The concerns raised during the public consultation and all the activities proposed will be updated in the final EIA report.
4	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 of other emission and climate mitigation activities.	Greenbelt development plan as discussed in chapter No.4, Table No 4.11, Pg. No 111.
5	The environmental impact assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed bank and suggest measures to maintain natural ecosystem.	The matter including the results of the soil's micro flora, fauna and soil seed banks and the suitable remedial measures will be included in the final EIA report.
6	Action should specifically suggested for sustainable management of the area and restoration of ecosystem for flow of goods and services.	The FAE of ecology and biodiversity has advised the project proponent that replantation work, particularly for the project area where plants of 4 years old exist should be carried out in the vacant areas available.
7	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and reservoir.	An analysis for food chain in aquatic ecosystem is under process and report will be added to the final EIA report.
8	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	The impact of mining on soil environment has been discussed in Chapter No.4, Page No 101.
9	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	This report has included studies of ecology and biodiversity covering vegetation, endemic, vulnerable and endangered indigenous flora and fauna in Chapter No3, Page No.68 According to the ecological report, there is no endemic, vulnerable and endangered indigenous flora and fauna.
10	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	The ecological details have been provided in Chapter No 3, Page No 68-85.
11	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	All the studies including wetlands, water bodies, river streams, lakes and farmer sites have been included in Chapter No 3, Page No 68.

12	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	The details have been given in Chapter No 10, Table No 10.10. Page No 147.
13	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The information will be included in the final EIA report.
14	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	There are no Protected Areas, National Parks, Corridors and Wildlife pathways near project site. The list of reserve forests within 10 km radius has been provided in Chapter No 3, Table No.3.3, Pg.no 33.
15	The Project proponent shall study and furnish the impact of project on plantations in adjoing Patta lands, Horticulture, Agriculture and livestock.	The impact of project on the land environment has been discussed in section 4.1 under chapter IV, Pg.101.
16	The project proponent shall study and furnish the details on potential fragmentation impact of natural environment, by the activities.	The impacts of the proposed project have been discussed in chapter 4, Pg No. 101– 114.
17	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damage to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	The impact of the proposed project on aquatic plants and animals in water bodies has been discussed in Chapter No.3, Table No.3.28, Page No 80.
18	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 &microplastic on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	The matter on plastic waste management has been given in Chapter No.7.
19	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	There are three reserve forest within the radius of 10km, details of Ecology and Biodiversity studies described in the Chapter No -III, Table No 3.3, Pg.no.33
20	Detailed study shall be caried out in the regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area 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.	The study is in process. The results will be updated in the final EIA report.

	d) Possibilities of water contamination and impact on aquatic ecosystem health. e) Agriculture, Forestry & Traditional practices. f) 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 streams.	
21	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 1o 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.	Details on the nearest surface water bodies such as rivers, tanks, canals, ponds etc. have been given in Chapter No.3, Table No 3.4, Pg No. 33.
22	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.	The disaster management plan for this project has been provided in Chapter No. 7, Pg. No122.
23	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	The risk assessment and management plan for this project has been provided in Chapter No. 7, Pg. No120.
24	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Detailed mine closure plan has been attached with the approved mining plan report in Annexure III.
25	Detailed Environment Management plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	A detailed Environment Management plan has been given in Chapter No.10, Pg.No.138-150.

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. It is a new project, not a violation category. This proposal falls under B1 category.
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 proposed site for quarrying is a patta land. Document is enclosed along with the approved mining plan in Annexure III.
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.	All the documents related to mining plan, EIA and public hearing are compatible to each other and have been provided in the annexure part.
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).	Project area lease boundary coordinates details are given in Chapter 2, Figure No 2.2, Pg No 11. Geology map of the project area covering 10km radius map has been included in Chapter 2 and Figure No. 2.8, Pg.No. 19 Geomorphology Map of the Study Area covering 10 km radius map has been included in Chapter 2 and Figure No. 2.8, Pg.No. 19.
5.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geology 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.	Soil, water, air and noise sampling locations have been provided in toposheets of survey of India in Chapter No.3, Pg.No.33.
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 hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC	The proponent has framed Environmental Policy and the same has been discussed in Chapter No.10, Pg.No.113.

	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 involving opencast mechanized method. As the rock is a hard, compact and homogeneous body, the height 5m and width of the bench 5m will be maintained as 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.	The study area considered for this study is of 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 plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No.2, Table No2.3, Pg.No17 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 has been discussed in Chapter No.3,Table No 3.2, Page No 28.
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 rough stone will be transported to the needy customers. Hence, no dumps are 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 within the proposed project area. Moreover, a certificate from DFO will be obtained and attached with the final EIA report.

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. There are neither forests nor forest dwellers / 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
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	There are three reserve forest within the radius of 10km. And details of vegetation found in the forest is discussed in the Chapter No 3, Table No 3.3, Pg.No 31.
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 is no wildlife/protected area within 10 km radius from the periphery of the project area. Information regarding the same has been given in Chapter No.3, Table No 3.3, Pg.No.31
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, Chapter No.3, Table No 3.3, Pg.No.31
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	A detailed biological study was carried out in both core and buffer zones and the results have been discussed in Chapter No.3, Page no 67. There is no schedule I species of animals observed within study area as per Wildlife Protection Act, 1972 and no species falls in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.

	furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	
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 mine lease with respect to 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).	Not Applicable. 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 programs prepared and submitted accordingly, integrating the sectoral programs 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 is no houses/habitations within the radius of 300m from the project site. Therefore, R&R plan / compensation details for the Project Affected People (PAP) is not anticipated.
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.	Baseline data were collected for the period of October – December 2022 as per CPCB notification and MoEF & CC Guidelines. Primary baseline data and the results have been included in Chapter No.3.

	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 predominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	
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 predominant wind direction may also be indicated on the map.	Air quality modelling for prediction of incremental GLCs of pollutants was carried out using AERMOD view 9.6.1. The model results have been given in Chapter No.4, Pg.No.101.
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.	The water requirement for the project, its availability and source have been provided in Chapter No.2, Table No.2.11, Pg.No.25
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. The water thus collected will be used for greenbelt development and dust suppression. The mine closure plan has been 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 have been discussed in Chapter No.4, Pg.No 100.

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 hydrogeological 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 should be furnished.	The ground water table is found at the depth of 53-58m below ground level. The depth of quarry is 37m BGL for the entire life, Therefore, the mining activity will not intersect the ground water table.
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 are no streams, seasonal or other water bodies passing within the project area. Therefore, no modification or 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 Highest elevation of the project area is 53m AMSL. Ultimate depth of the mine is 37 m below ground level (BGL). Depth to the water level in the area is 53-58 m BGL.
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 prior to 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 has been given in Chapter No.4, Table No 4.11, Pg.No 109.
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	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 have been provided in Chapter No.2, Pg.No 24.

	proponent shall conduct impact of transportation study as per Indian Road Congress Guidelines.	
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 Chapter No.2, Pg.No 23.
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.	Mine closure plan is a part of approved mining plan enclosed in Annexure III.
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 have been explained in detail in Chapter No.10, Pg.No 119.
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 are anticipated due to this project. Details of CSR and CER activities have been discussed in Chapter No.10, Pg.No.111.
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 of the study area is anticipated and this project shall benefit the socio-economic environment by offering employment for 15 people directly as discussed in Chapter No.4, Pg No 110
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 has been included in chapter No.10, Pg.No. 110
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/EMP 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	The environmental implementation and protection measure can be achieved as per the EMP committee an

	implementation of EMP should be clearly spelt out.	amount of Rs. 29,23,480 /- as capital cost and recurring cost as Rs. 11,77,554 /- as recurring cost/annum is proposed considering present market price considering present market scenario for the proposed project. After the adjustment of 5% inflation per year, the overall EMP cost for 5 years will be Rs. 79,98,885/-. The Budgetary Provision for Environmental Management given in Chapter No.10, Table No 10.10, Pg.no 121.
42	A Disaster management plan shall be prepared and included in the EIA/EMP report.	Details regarding disaster management plan have been provided in Chapter No.7, Pg.No 120
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.	Benefits of the project details have been given in Chapter No 8, Pg.No.110.
44	**Besides the above, the below mentioned general points are also to be followed:**	
a)	Executive summary of the EIA/EMP report	Enclosed as a separate booklet.
b)	All documents to be properly referenced with index and continuous page numbering.	All the documents have been 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 have been mentioned.
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 Chapter No. 3, Pg.no 27 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.	The questionnaire 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.	Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) dated 4th August, 2009 have been followed while preparing the EIA report.
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	Not applicable.

	modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	
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 the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable because it is a fresh lease.
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 & geological plans have been included in Annexures III. Progressive closure plan and sections has been included in Annexures III.

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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.

Rough Stone and Gravel are the major requirements for construction industry. This EIA report is prepared for Thiru. M.Ganesan Rough stone and Gravel quarry over an extent of **1.98.0 Ha (**S.F.Nos 320/1A, 1B & 2)**, 2.13.0 Ha** (S.F.Nos 323/1B, 2B, 2C, 3, 4, 5B & 5C) **and 2.40.0 Ha** (S.F.Nos 324/1A,1B1,1B2,2A, 2B, 2C1, 2C2, 3, 8A, 9A, 9B2) **totally** located of Siruthamur Village, Uthiramerur Talur, Kanchipuram District. This EIA Report is prepared in compliance with ToR obtained vide

1. **Lr.No.SEIAA-Tn/F.No.8968/Tor-1254/2022 dated 19.09.2022 – P1**
2. **Lr.No.SEIAA-TN/F.No.8978/Tor-1257/2022 dated 19.09.2022 – P2**
3. **Lr.No. SEIAA-TN/F.No.8966/Tor-1255/2022 dated 19.09.2022– P3**

The Baseline Monitoring study has been carried out during Post monsoon season (October – December 2022).

While preparing the EIA/EMP Cumulative load has been taken into consideration for the proposed & existing quarries there are Three Proposed and Seven Existing Quarries forming the cluster, Total Extent of the Cluster is 24.46.06 ha, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

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 14thAugust 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.

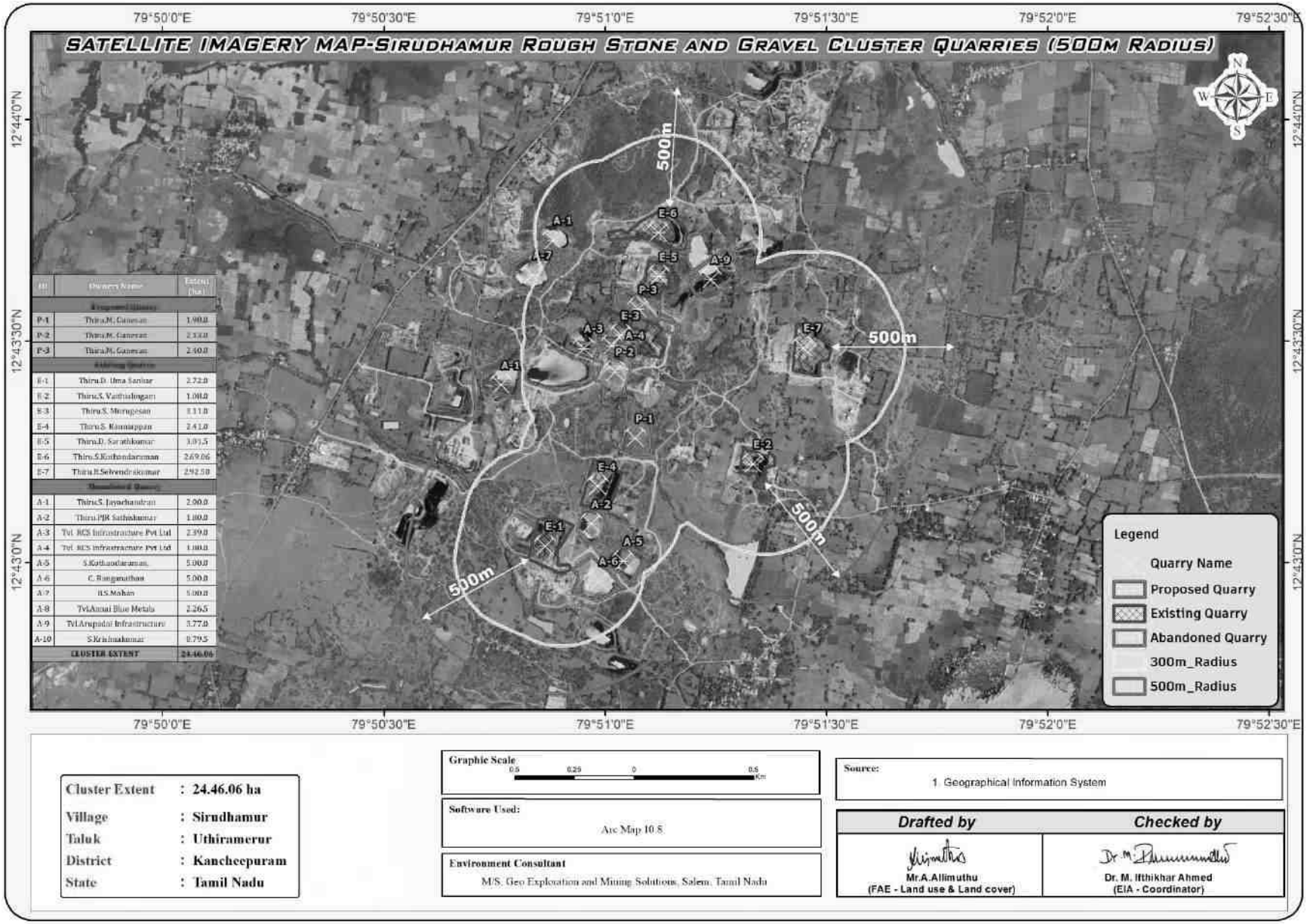
Now, as per Order Dated: 04.09.2018 & 13.09.2018 passed by Hon'ble National Green Tribunal, New Delhi in O.A. No. 173 of 2018 & O.A. No, 186 of 2016 and MoEF & CC Office Memorandum F. No. L-11011/175/2018-IA-II (M) Dated: 12.12.2018 clarified the requirement for EIA, EMP and therefore, Public Consultation 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 project is categorized under category "B1" Activity 1(a) (mining lease area in cluster situation) and will be considered at SEIAA – TN after conducting Public Hearing and Submission of EIA/EMP Report for Grant of Environmental Clearance.

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.

"Draft EIA & EMP report prepared on the basis of ToR obtained for the grant of Environmental Clearance from SEIAA, Tamil Nadu"

Figure 1.1 Satellite Imagery of Cluster Quarries



P-1	Thiru.M. Ganesan	1.90.0
P-2	Thiru.M. Ganesan	2.33.0
P-3	Thiru.M. Ganesan	2.40.0
E-1	Thiru.D. Uma Sankar	2.72.0
E-2	Thiru.S. Vaithialingam	1.08.0
E-3	Thiru.S. Murugesan	1.11.0
E-4	Thiru.S. Kannappan	2.41.0
E-5	Thiru.D. Sarathkumar	3.01.5
E-6	Thiru.S.Kuthandaraman	2.69.06
E-7	Thiru.R.Selvendrakumar	2.92.50
A-1	Thiru.S. Jayachandran	2.00.0
A-2	Thiru.PJR Sathishkumar	1.80.0
A-3	Tvl. RCS Infrastructure Pvt Ltd	2.39.0
A-4	Tvl. RCS Infrastructure Pvt Ltd	1.80.0
A-5	S.Kuthandaraman.	5.00.0
A-6	C. Ranganathan	5.00.0
A-7	B.S.Mahan	5.00.0
A-8	Tvl.Annai Blue Metals	2.26.5
A-9	Tvl.Arupadai Infrastructure	3.77.0
A-10	S.Krishnakumar	0.79.5
CLUSTER EXTENT		24.46.06

1.2 Identification of Project and Project Proponent

1.2.1 Identification of Project

TABLE 1.1: IDENTIFICATION OF PROJECT

P1	
Description	**Details**
Name of the Project	M. Ganesan Rough Stone & Gravel Quarry
S.F. No.	320/1A, 320/1B & 320/2
Extent	1.98.0 ha
P2	
Description	**Details**
Name of the Project	M. Ganesan Rough Stone & Gravel Quarry
S.F. No.	323/1B, 2B, 2C, 3, 4, 5B and 323/5C
Extent	2.13.0 ha
P3	
Description	**Details**
Name of the Project	M. Ganesan Rough Stone & Gravel Quarry
S.F. No.	324/1A,1B1, 1B2, 2A,2B,2C1, 2C2, 3, 8A, 9A and 9B2
Extent	2.40.0 ha

The above proposals belonging to Proponent Own Patta Land situated in Sirudhamur Village, Uthiramerur Taluk, Kancheepuram District.

Source: Approved Mining Plan

1.2.2 Identification of Project Proponent

TABLE 1.2: DETAILS OF PROJECT PROPONENT

Name of the Project	**Thiru.M.Ganesan** No. 36/1, Mallampatti Village, Kalamavur Post, Kulathur Taluk, Pudukkottai District – 622 502
Mobile No	+91 97509 71109
Status	Individual
Email	ganesan45454ganesan@gmail.com

Source: Approved Mining Plan

1.3 Brief description of the project

1.3.1 Nature and Size of the Project

The quarrying operations are proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying Jack Hammer Drilling & Slurry Explosive during blasting. Hydraulic Excavator and tippers are used for Loading and transportation. Rock Breakers are deployed to avoid secondary blasting.

TABLE 1.3: SALIENT FEATURES OF THE PROPOSED PROJECT-P1

Name of the quarry	**Thiru. M.Ganesan Rough stone & Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43'14.06"N to 12°43'22.54"N	
Longitude	79°51'01.92"E to 79°51'06.63"E	
Highest elevation	52 m AMSL	
Proposed depth of mining	Five Years Plan Period	Ten Year Plan Period
	32m BGL (2 m Gravel +30 m rough stone	37m BGL (2 m Gravel +35 m rough stone
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	6,93,000	39,600
Minable reserves	**1,64,165**	**22,338**
First Five-year production	1,03,520	22,338
Next Five-Year Production	60,645	-

Existing pit dimension	It is New Quarry	
Ultimate pit dimension	I -V Year	180m (L) x 81 m (W) x 32m (D)
	IV-X Year	180m (L) x 81 m (W) x 37m (D)
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 52m maximum from the MSL. The area is sloping towards Southeastern side covered clayey soil with rough stone which does not sustain any type of vegetation.	
Machinery proposed	Jack hammer	2
	Compressor	1
	Excavator	1
	Tippers	1
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 52,18,000/-	
CER cost @ 2% of project cost	Rs. 1,05,000/-	
Proposed water requirement	2.5 KLD	
Nearest habitation	720m Southeast	

TABLE 1.3: SALIENT FEATURES OF THE PROPOSED PROJECT – P2

Name of the quarry	**Thiru.M.Ganesan Rough Stone and Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43'22.38"N to 12°43'28.94"N	
Longitude	79°50'58.58"E to 79°51'05.50"E	
Highest elevation	56m AMSL	
Proposed depth of mining for ten years as per ToR	42m BGL (2 m Gravel +40 m rough stone)	
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	9,58,500	42,600
Minable reserves	2,57,455	21,366
First Five-year production (As per TOR)	1,80,940	21,366
Next Five-Year Production	79,515	-
Existing pit dimension	It is New Quarry	
Ultimate pit dimension	149m (L) x 117m (W) x 42m (D)	
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 56m maximum from the MSL. The area is sloping towards Southeastern side covered clayey soil with rough stone	
Machinery proposed	Jack hammer	3
	Compressor	1
	Excavator	1
	Tippers	2
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 65,24,000/-	
CER cost @ 2% of project cost	Rs 5,00,000	
Proposed water requirement	2.5 KLD	
Nearest habitation	950m Southeast	

TABLE 1.3: SALIENT FEATURES OF THE PROPOSED PROJECT – P3

Name of the quarry	**Thiru. M. Ganesan Rough Stone and Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43'30.90"N to 12°43'37.05"N	
Longitude	79°51'00.54"E to 79°51'10.04"E	
Highest elevation	62m AMSL	
Proposed depth of mining for ten years	47m BGL (2 m Gravel +45 m rough stone)	
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	10,80,000	48,000
Minable reserves	2,82,475	33,312
First Five-year production	1,59,350	33,312
Next Five-Year Production	1,23,125	-
Existing pit dimension	It is New Quarry	
Ultimate pit dimension	167m (L) x 125m (W) x 47m (D)	
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 62m maximum from the MSL. The area is sloping towards Southeastern side covered clayey soil with rough stone which does not sustain any type of vegetation.	
Machinery proposed	Jack hammer	4
	Compressor	1
	Excavator	1
	Tippers	2
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 68,99,000/-	
CER cost	Rs. 5,00,000/-	
Proposed water requirement	4.2 KLD	
Nearest habitation	950m Southeast	

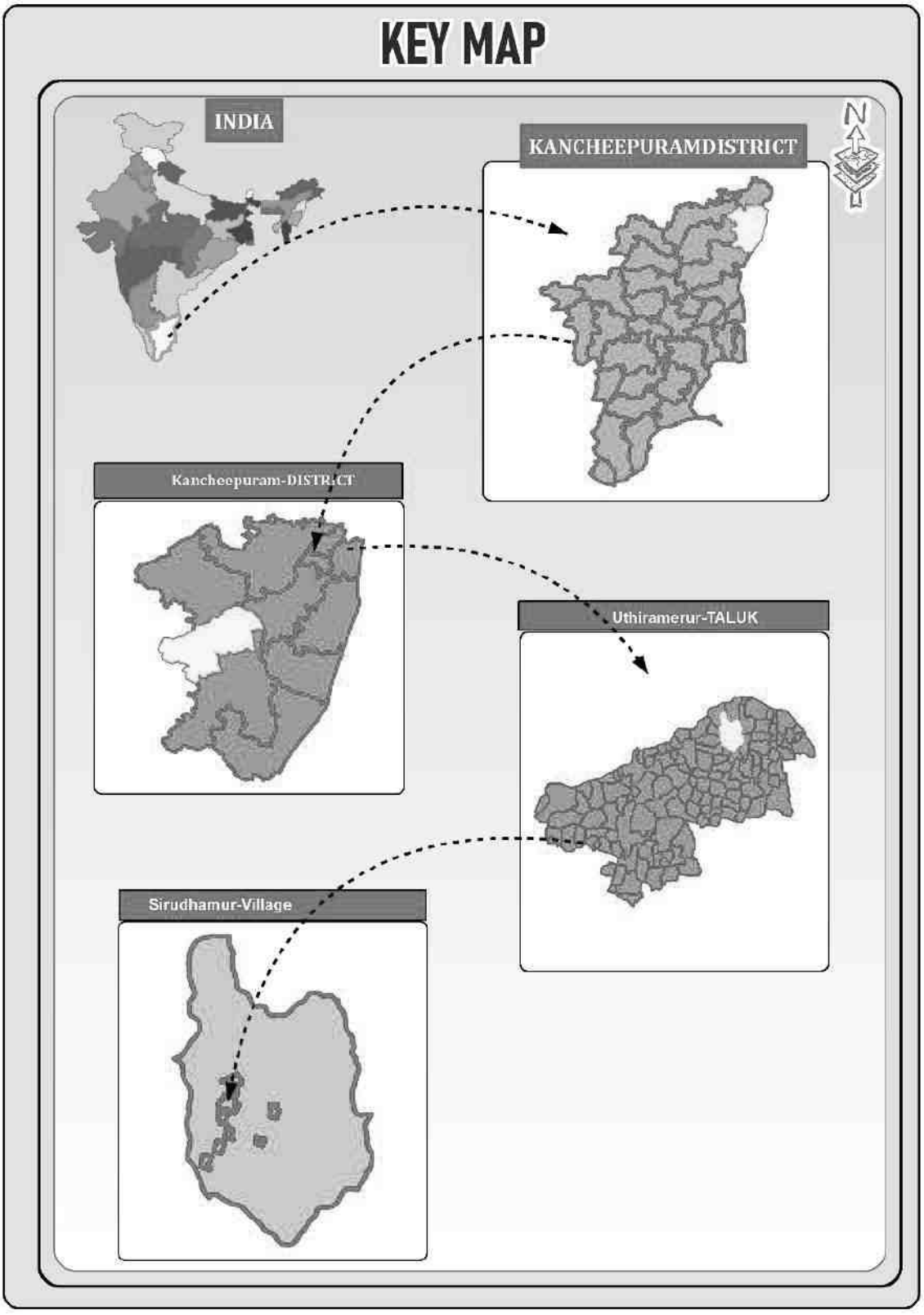
Source: Approved Mining Plans of the respective projects

1.3.2 Location of the project

The Proposed project falls in Sirudhamur Village, Uthiramerur Taluk and Kanchipuram District.

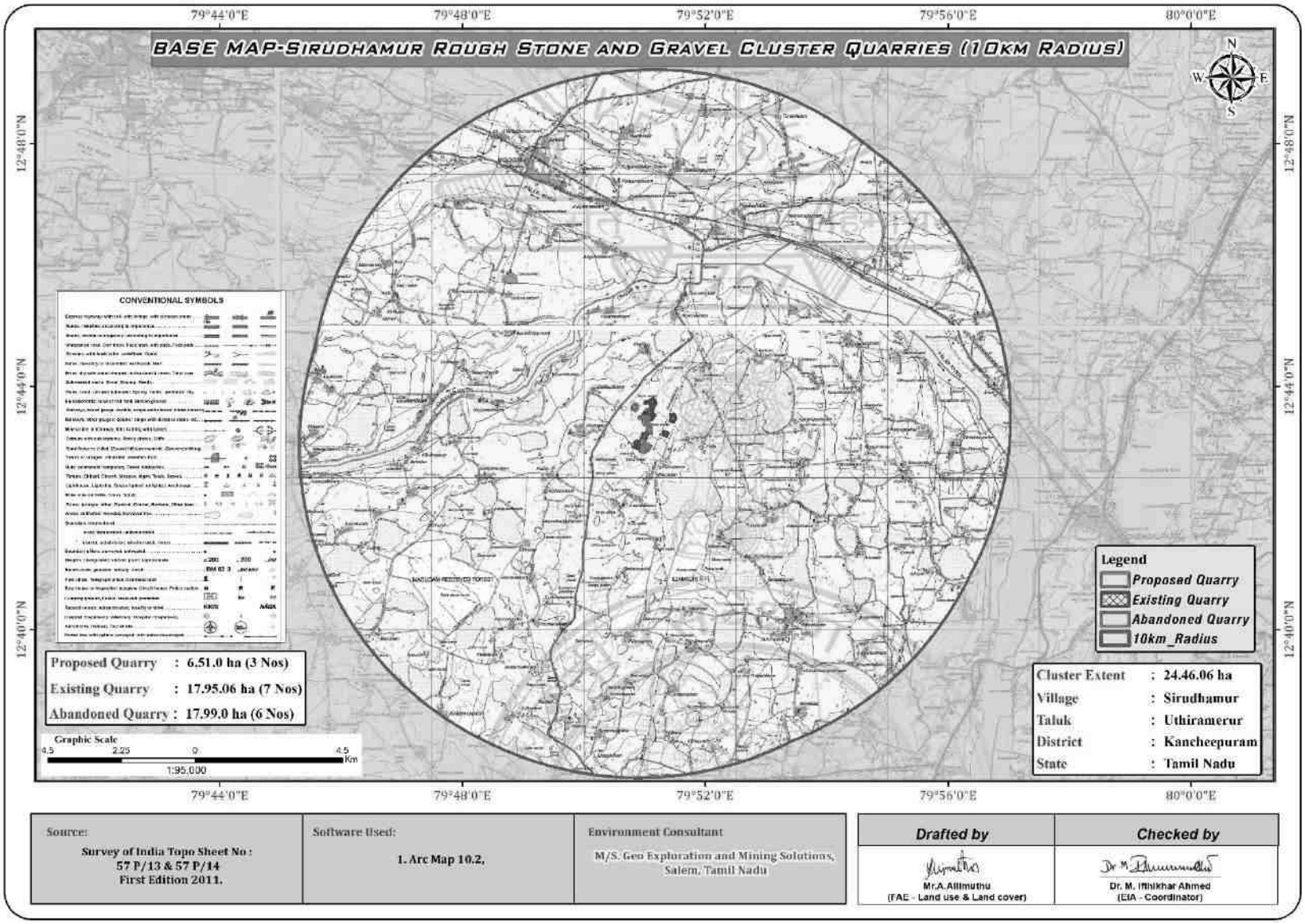
The Proposed Project is located about 1.8 km Northeast side of Sirudhamur village, 15.0km Northeast of Uthiramerur taluk and 20.0km of Kanchipuram District.

Figure 1.2 Key map showing the location of the project site



Source: Survey of India Toposheet 57 P/14

Figure 1.3: **Toposheet Map of the Study area 10 Km Radius**



1.4 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 Rough Stone and Gravel Quarry Lease, Dated: 27.07.2021
- Precise Area Communication Letter was issued by the Deputy Director, Geology and Mining, Kanchipuram, vide Rc.No. 220/Q3/2021, Dated 08.10.2021
- The Mining Plan was prepared and got approved by Assistant Director, Geology and Mining, Kanchipuram District, vide Rc.No: 220/Q3/2021, Dated 08.10.2021
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/71526/2022 Dated: 28.01.2022

SCREENING –P2

- The proponent applied for Rough Stone and Gravel Quarry Lease, Dated: 27.07.2021
- Precise Area Communication Letter was issued by the Deputy Director, Geology and Mining, Kanchipuram, vide Rc.No. 221/Q3/2021, Dated 08.10.2021
- The Mining Plan was prepared and got approved by Assistant Director, Geology and Mining, Kanchipuram District, vide Rc.No: 221/Q3/2021, Dated 11.10.2021
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/71533/2022 Dated: 28.01.2022

SCREENING –P3

- The proponent applied for Rough Stone and Gravel Quarry Lease, Dated: 27.07.2021
- Precise Area Communication Letter was issued by the Deputy Director, Geology and Mining, Kanchipuram, vide Rc.No. 222/Q3/2021, Dated 08.10.2021
- The Mining Plan was prepared and got approved by Assistant Director, Geology and Mining, Kanchipuram District, vide Rc. No: 222/Q3/2021, Dated 11.10.2021
- Proponent applied for ToR for Environmental Clearance vide online Proposal No. SIA/TN/MIN/71654/2022 Dated: 29.01.2022

SCOPING – P1

- The proposal was placed in 306th SEAC Meeting held on 08.04.2022 and the committee recommended for issue of ToR.
- The proposal was considered in 551st SEIAA Meeting Dated:.19.09.2022 and issued ToR vide Letter No SEIAA-TN/F.No.8968/SEAC/ToR- 1254/2022 Dated: 19.09.2022

SCOPING – P2

- The proposal was placed in 306th SEAC Meeting held on 25.08.2022 and the committee recommended for issue of ToR.
- The proposal was considered in 551st SEIAA Meeting Dated:.19.09.2022 and issued ToR vide Letter No SEIAA-TN/F.No.8978/SEAC/ToR- 1257/2022 Dated: 19.09.2022

SCOPING – P3

- The proposal was placed in 306th SEAC Meeting held on 25.08.2022 and the committee recommended for issue of ToR.
- The proposal was considered in 551st SEIAA Meeting Dated:.19.09.2022 and issued ToR vide Letter No SEIAA-TN/F.No.8966/SEAC/ToR- 1255/2022 Dated: 19.09.2022

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.

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, 2010
- EIA Notification, 14th September, 2006
- ToR Letter No. SEIAA-TN/F.No.8968/SEAC/ToR- 1254/2022 Dated: 19.09.2022 – P1
- ToR Letter No. SEIAA-TN/F.No.8978/SEAC/ToR- 1257/2022 Dated: 19.09.2022 – P2
- ToR Letter No. SEIAA-TN/F.No.8966/SEAC/ToR- 1255/2022 Dated: 19.09.2022 – P3
- Approved Mining Plans of the respective project

*1.*5 Post Environment Clearance Monitoring

The Project Proponent will 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 every year.

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. A brief description of each Chapter is presented in Table No. 1.4.

TABLE 1.4: STRUCTURE OF THE EIA REPORT

S. No	Chapters	Title	Particulars
1	Chapter 1	Introduction	Presents, an Introduction along with Scope and Objective of this EIA/EMP Studies
2	Chapter 2	Project Description	Presents the Technical Details of the Project
3	Chapter 3	Description of Environment	Presents the Baseline Status for various Environmental Parameters in the Study Area for One Season (3 Months)
4	Chapter 4	Anticipated Environmental Impacts and Mitigation Measures	Presents the Identification, Prediction and Evaluation of overall Environmental Impacts due to the Proposed Projects Activities. Also presents Proposed Mitigation Measures.
5	Chapter 5	Analysis of Alternatives (Technology & Site)	Presents Analysis of alternatives with respect to site

6	Chapter 6	Environment Monitoring Programme	Present details of post project environment monitoring
7	Chapter 7	Additional Studies	Presents Public Consultation, Risk Assessment and Disaster Management Plan
8	Chapter 8	Project Benefits	Presents project benefits as: Improvements in the Physical Infrastructure, Social Infrastructure Employment Potential – Skilled; Semi-Skilled and Unskilled etc.,
9	Chapter 9	Cost Benefit Analysis	Environmental Cost Benefit Analysis has not been recommended at Scoping Stage – thus no analysis carried out separately in this EIA/EMP Report
10	Chapter 10	Environmental Management Plan	Description of the administrative aspects to ensure the Mitigation Measures are implemented and their effectiveness monitored, after approval of the project.
11	Chapter 11	Summary & Conclusion	Summary of the EIA Report
	Chapter 12	Disclosure of Consultants Engaged	Disclosure of the Consultants

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. 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 Post Monsoon (October 2022 to December 2022) 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 projects.

TABLE 1.5 ENVIRONMENT ATTRIBUTES

Sl.No.	Attributes	Parameters	Source and Frequency
1	Ambient Air Quality	PM_{10}, PM $_{2.5}$, SO_2, NO_2	24 hourly samples twice a week for three months at 9 locations
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, Kanchipuram
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.	Primary survey and secondary data
5	Noise levels	Noise levels in dB(A)	At 9 locations data monitored once for 24 hours during EIA study.
6	Soil Characteristics	Physical and Chemical Parameters	Once at 7 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 assessment done for the mining associated activities

Source: Field Monitoring Data

The data has been collected as per the requirement of the ToR issued by SEIAA – TN and Standard ToR Published by MoEF & CC.

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 Rough Stone and Gravel quarry has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959
- ToR Letter No. SEIAA-TN/F.No.8968/SEAC/ToR- 1254/2022 Dated: 19.09.2022 – P1
- ToR Letter No. SEIAA-TN/F.No.8978/SEAC/ToR- 1257/2022 Dated: 19.09.2022 – P2
- ToR Letter No. SEIAA-TN/F.No.8966/SEAC/ToR- 1255/2022 Dated: 19.09.2022- P3

CHAPTER – 2: PROJECT DESCRIPTION

2.0 General

This Project at Sirudhanur Village, Uthiramerur Taluk, Kanchipuram District and Tamil Nadu State fall under Cluster Situation as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 24.46.06 ha consisting of three proposed and Seven existing quarries. As the extent of cluster are 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 applied area is rocky barren patta land with no major vegetation or trees within the project area, the project is site specific and there is no additional area required for this project. There is no effluent generation/discharge from the proposed projects.

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

2.2 Location of the Project

- This project area located in Sirudhamur Village, Uthiramerur Taluk and Kanchipuram District, and Tamil Nadu State.
- The project falls in Toposheet No: 57-P/14
- Latitude between 12°43'37.05"N to 12°43'14.06"N
- Longitude between 79°51'10.04"E to 79°50'58.66"E
- The project area is patta land (Non-Forest Land) & does not fall within 10 km radius of any eco – sensitive zone, Wild life Sanctuary, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves

TABLE 2.1 SITE CONNECTIVITY

Description	Details
Nearest Village	Sirudhanur village– 1.8km - SE
Nearest Town	Uthiramerur – 15.0 km – Southwest
Nearest Roadway	The approach (metal) road is situated on the Southeast side which connects the Panchayat Road at a distance of 900m of the applied area. NH-132B – Chengalpattu – Kanchipuram – 6.0km – North SH-118A – Kanchipuram – Uthiramerur – 10.0km – West
Nearest Railway	Chengalpattu Railway station – 14km – SE The Nearest Railway line Arakkonam – Chengalpattu – 7km – North
Nearest Airport	Chennai Airport – 46km – NE
Seaport	Chennai 61 km Northeast side
Interstate boundary	Andhra Pradesh Interstate boundary – 54 km –North

Source: Survey of India Toposheet

TABLE 2.2: BOUNDARY CO-ORDINATES OF PROPOSED PROJECT

P1		
Pillar ID	**Latitude**	**Longitude**
1	12°43'14.06"N	79°51'06.63"E
2	12°43'14.40"N	79°51'04.26"E
3	12°43'14.19"N	79°51'04.18"E
4	12°43'15.11"N	79°51'01.92"E
5	12°43'17.28"N	79°51'02.53"E
6	12°43'22.54"N	79°51'03.13"E
7	12°43'22.21"N	79°51'03.71"E
8	12°43'21.20"N	79°51'04.22"E
9	12°43'19.91"N	79°51'04.29"E
10	12°43'19.09"N	79°51'05.42"E
11	12°43'19.15"N	79°51'06.37"E
12	12°43'17.85"N	79°51'06.18"E
13	12°43'15.96"N	79°51'05.86"E
P2		
Pillar ID	**Latitude**	**Longitude**
1	12°43'22.38"N	79°50'59.83"E
2	12°43'24.49"N	79°50'59.35"E
3	12°43'24.68"N	79°50'58.66"E
4	12°43'27.16"N	79°50'59.62"E
5	12°43'27.53"N	79°50'58.58"E
6	12°43'28.30"N	79°50'59.02"E
7	12°43'28.94"N	79°50'58.97"E
8	12°43'27.72"N	79°51'03.89"E
9	12°43'28.19"N	79°51'03.89"E
10	12°43'28.11"N	79°51'04.17"E
11	12°43'28.78"N	79°51'04.59"E
12	12°43'28.19"N	79°51'05.50"E
13	12°43'27.06"N	79°51'04.69"E
14	12°43'26.93"N	79°51'03.54"E
15	12°43'25.03"N	79°51'03.11"E
16	12°43'23.18"N	79°51'02.45"E
P3		
Pillar ID	**Latitude**	**Longitude**
1	12°43'34.27"N	79°51'00.54"E
2	12°43'34.77"N	79°51'01.19"E
3	12°43'37.05"N	79°51'01.53"E
4	12°43'36.21"N	79°51'04.73"E
5	12°43'35.69"N	79°51'07.50"E
6	12°43'33.09"N	79°51'07.26"E
7	12°43'32.03"N	79°51'10.04"E
8	12°43'30.90"N	79°51'09.37"E
9	12°43'31.71"N	79°51'07.44"E
10	12°43'32.44"N	79°51'06.86"E
11	12°43'32.71"N	79°51'05.80"E
12	12°43'31.35"N	79°51'05.45"E
13	12°43'31.81"N	79°51'03.37"E
14	12°43'33.26"N	79°51'03.67"E
15	12°43'33.58"N	79°51'02.30"E

Source: Quarry Lease Plan

Figure 2.1: Photographs of the Proposed Quarry -P1

Figure 2.1: Photographs of the Proposed Quarry-P2

Figure 2.1: Photographs of the Proposed Quarry-P3

Figure 2.2: Google Image Showing Quarry Lease Boundary-P1

Figure 2.2: Google Image Showing Quarry Lease Boundary-P2

Figure 2.2: Google Image Showing Quarry Lease Boundary -P3

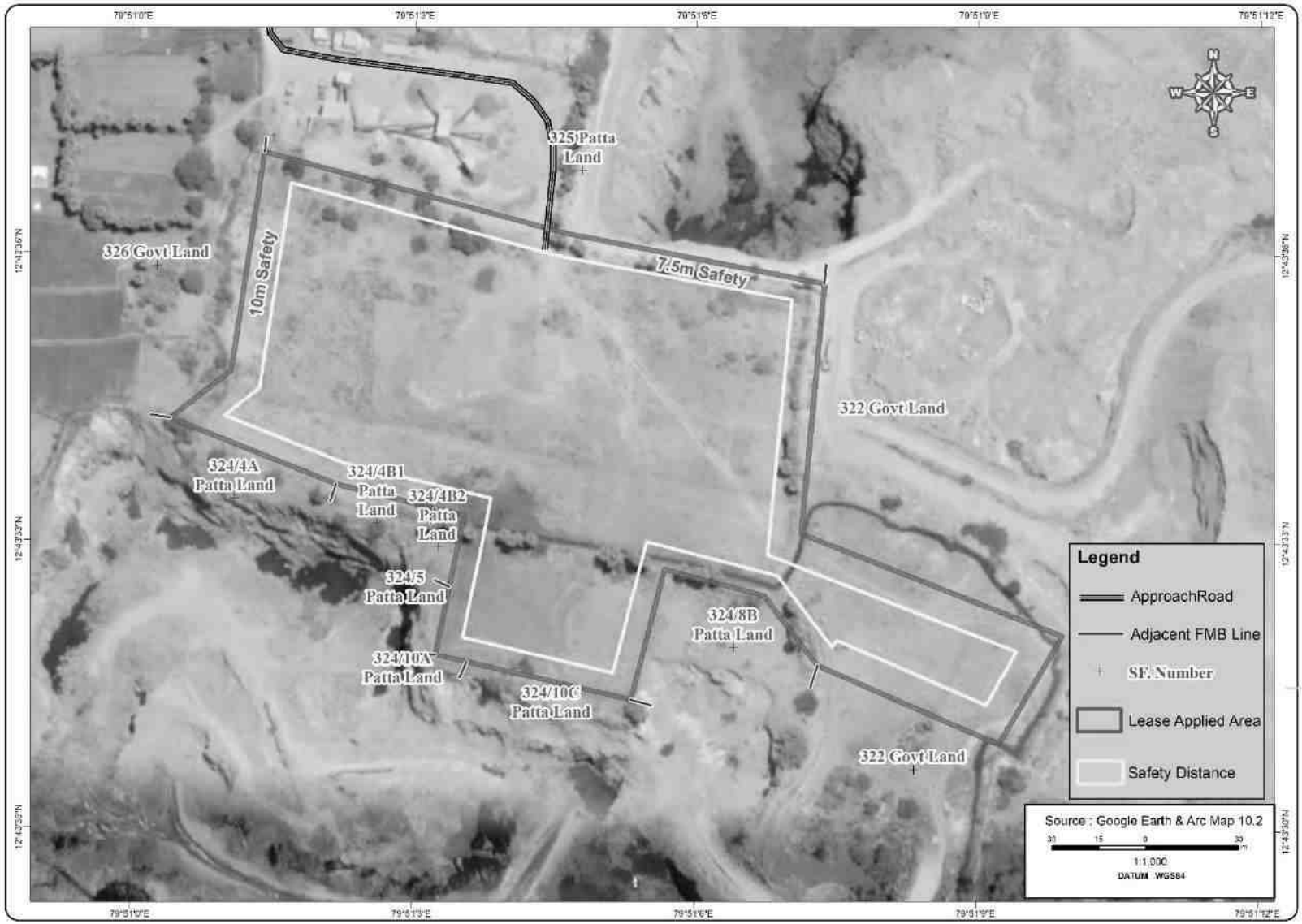
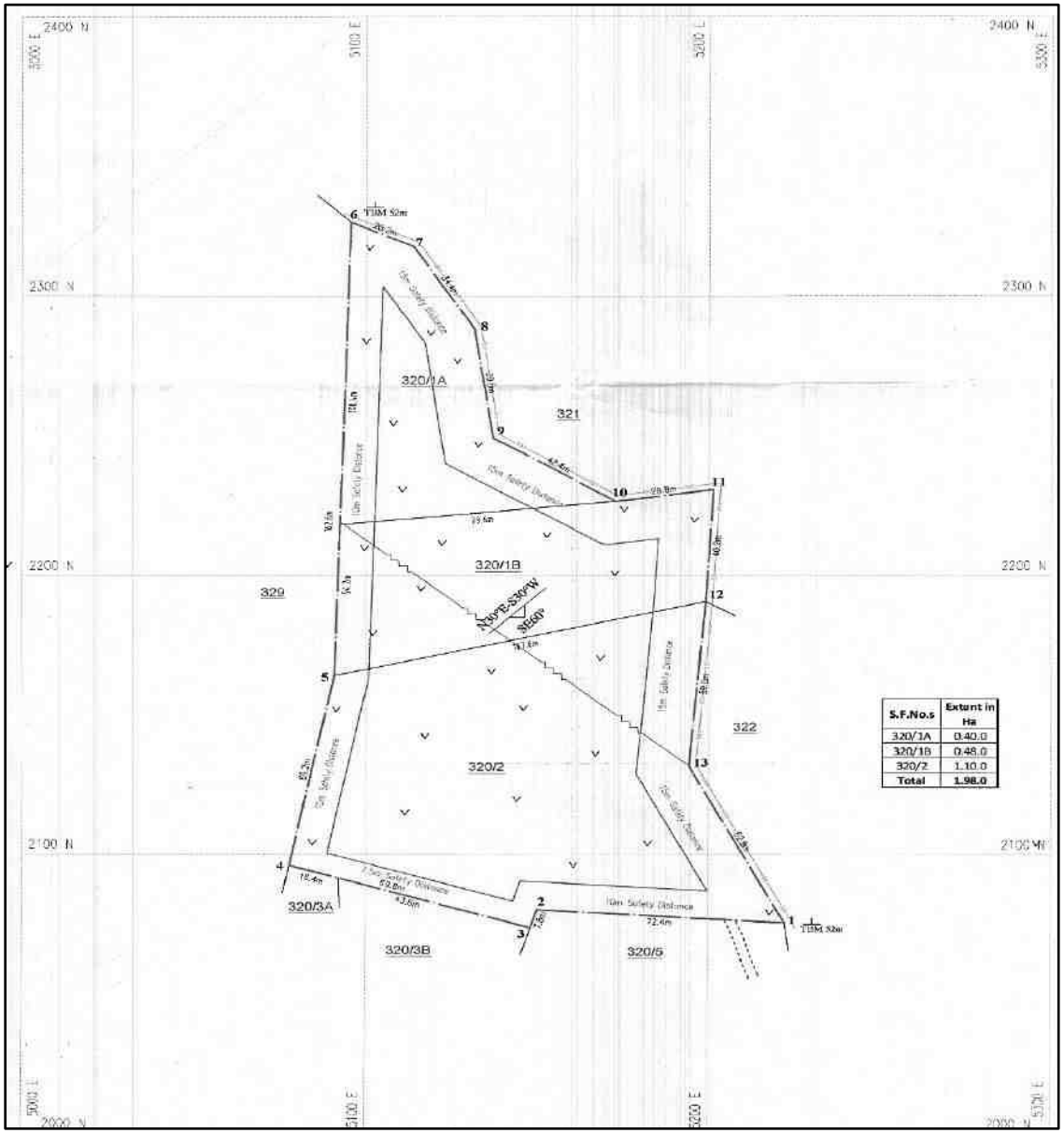


Figure : 2.3 Quarry lease and urface plan – P1



Source: Approved Mining Plan

Figure : 2.3 Quarry lease and Surface plan – P2

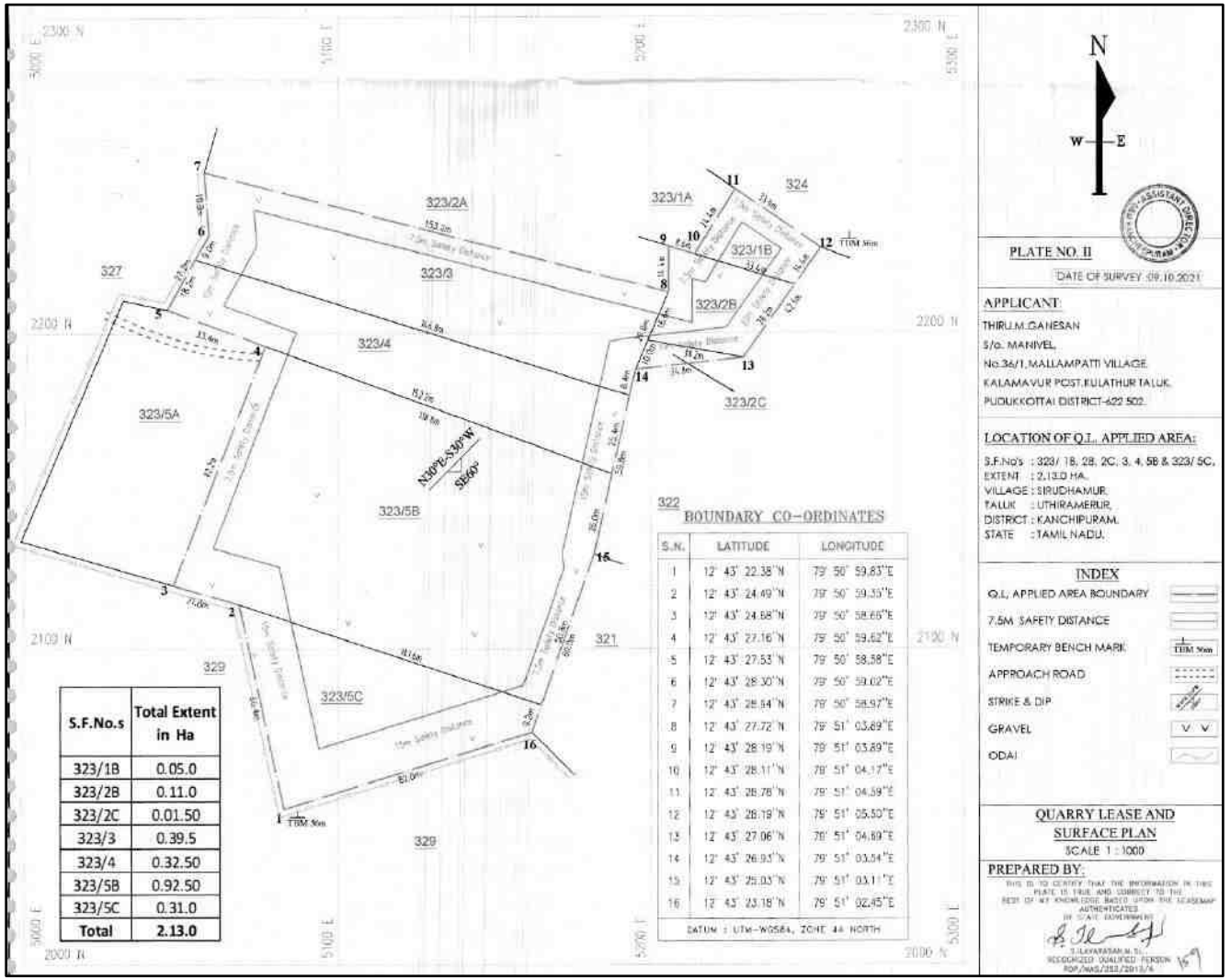


Figure : 2.3 Quarry lease and Surface plan – P3

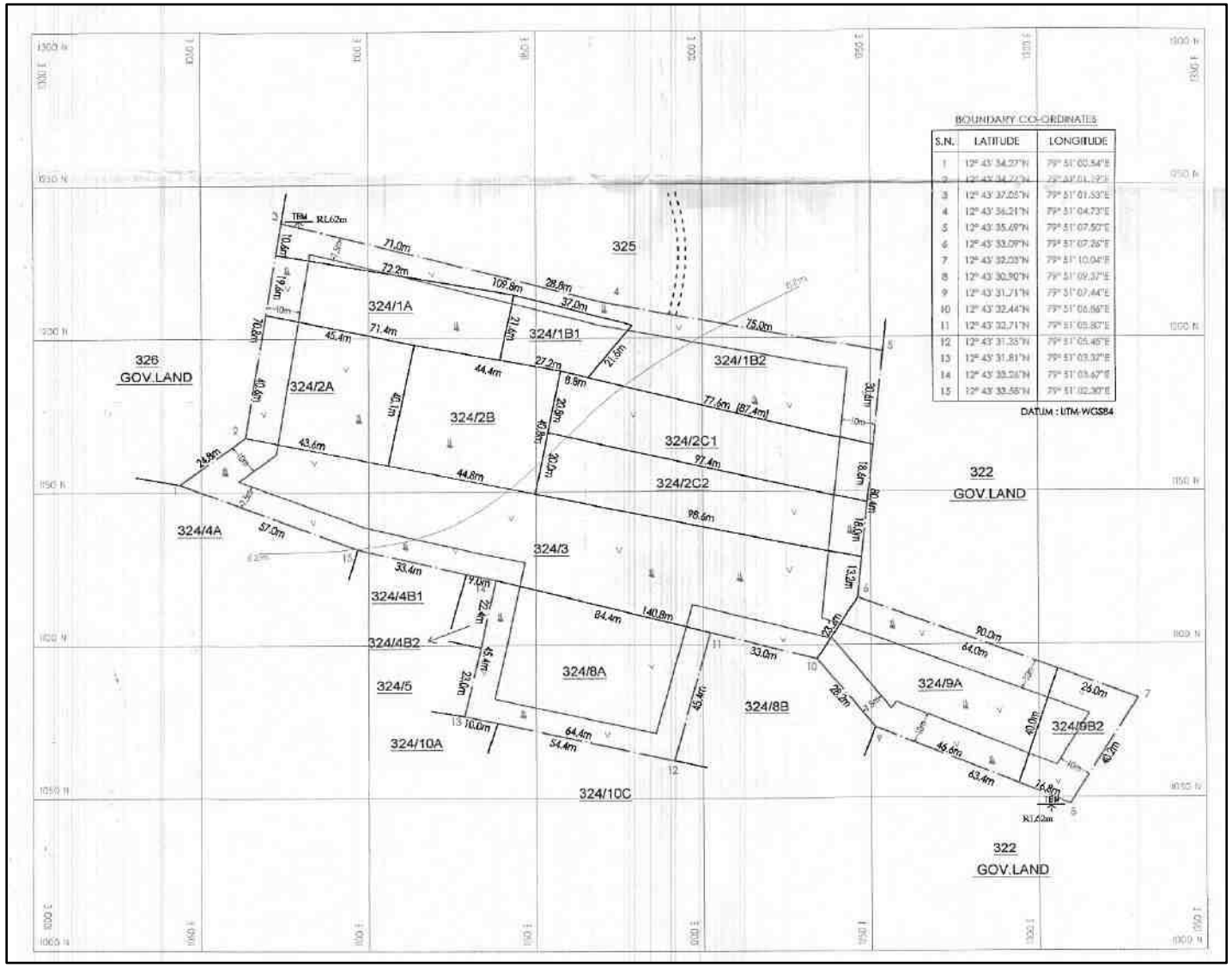


Figure 2.4: Village Map Superimposed on Google Earth Image Showing 300 and 500mRadius from Cluster

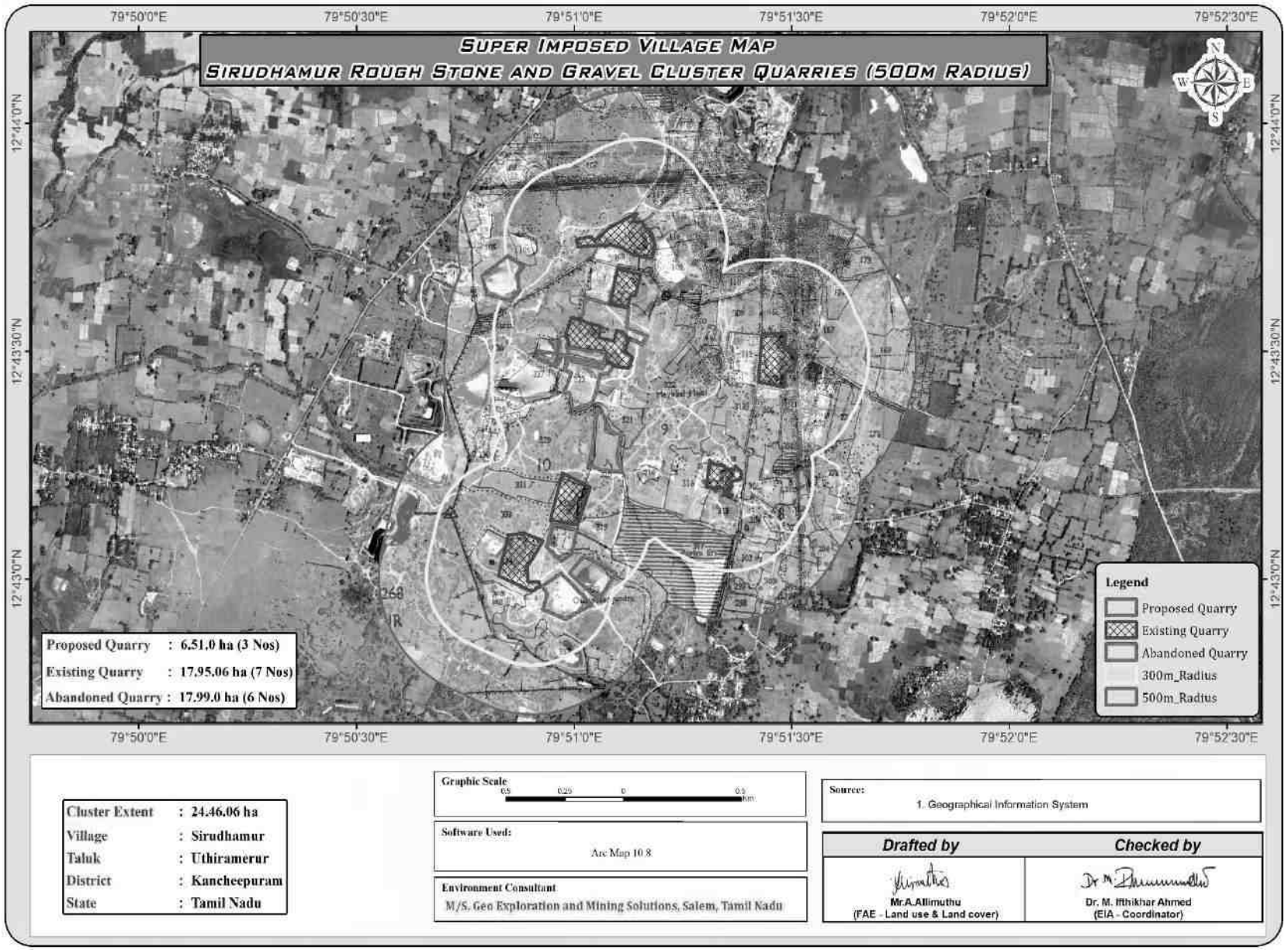


Figure 2.5: Digitized map of the study area (10 Km Radius)

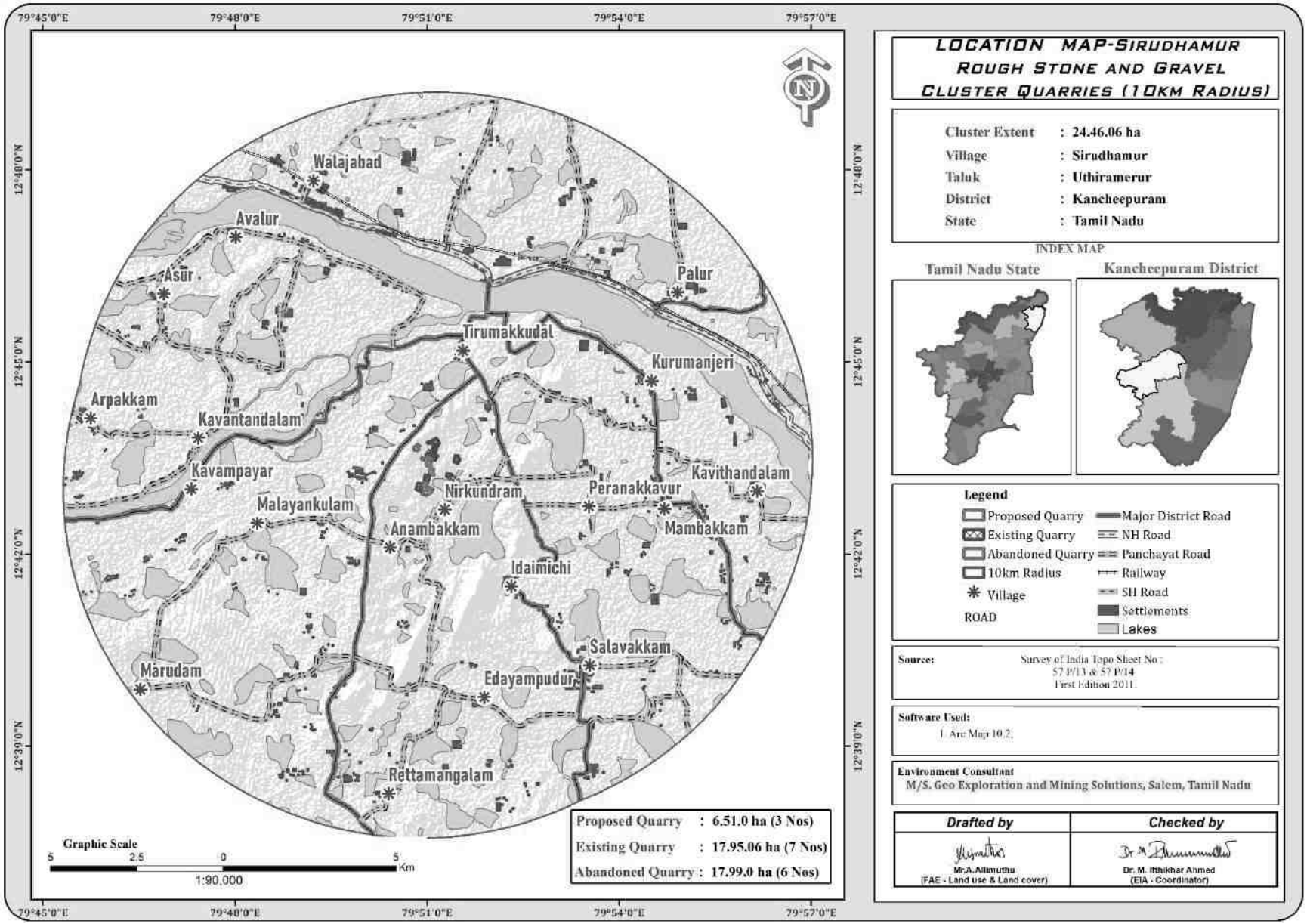


Figure 2.6: Digitized map of the study area (5 Km Radius)

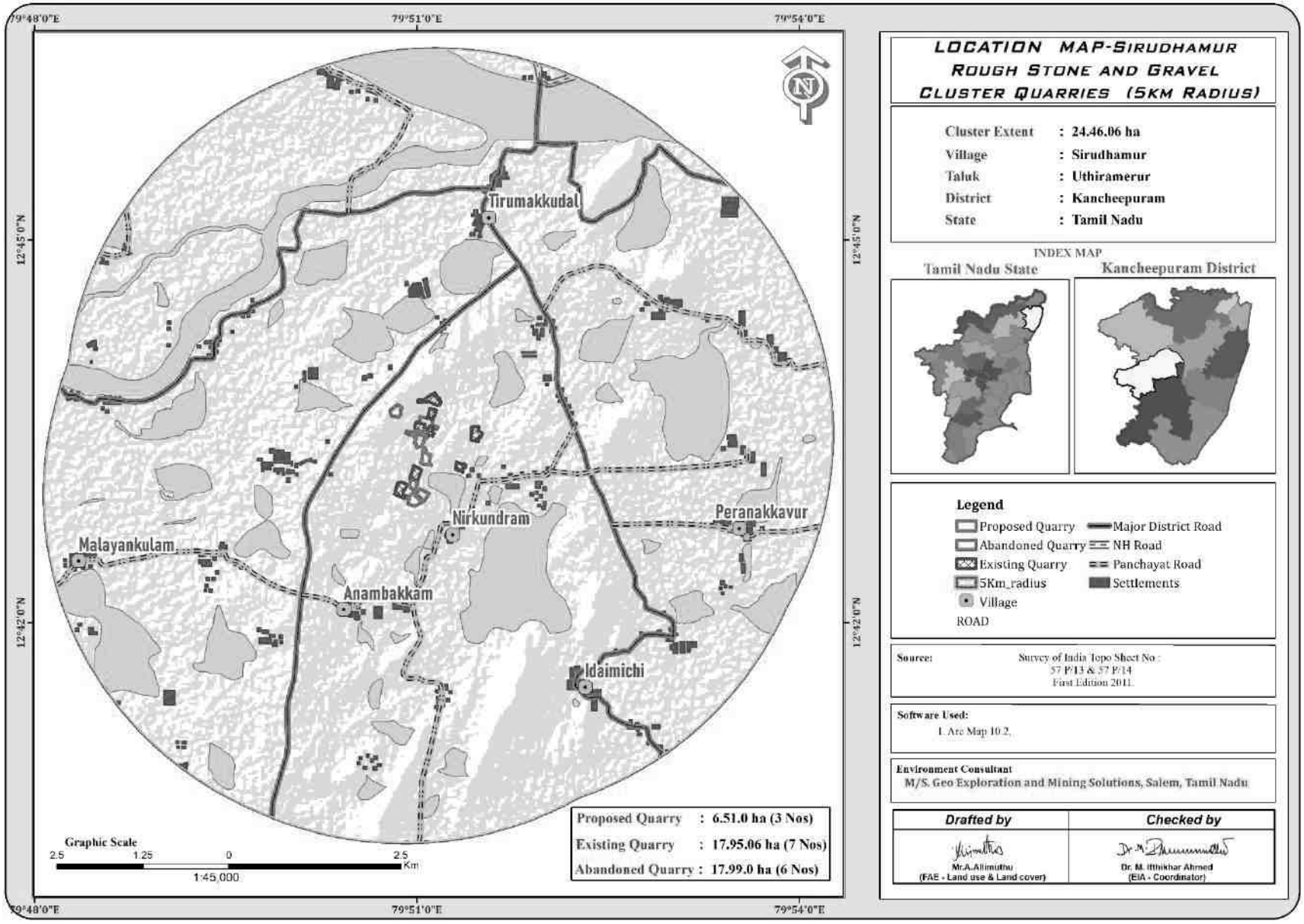
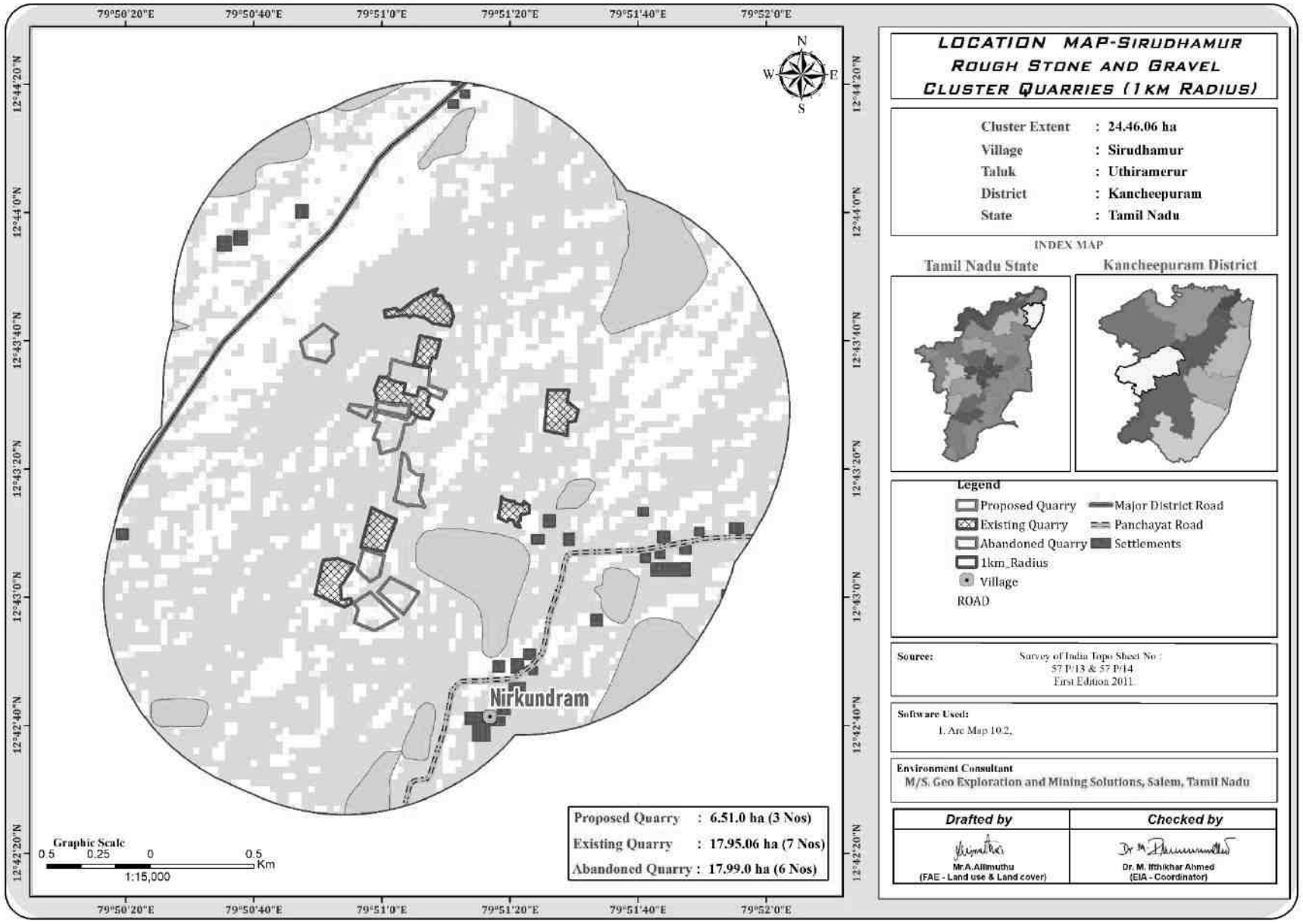


Figure 2.7: Digitized map of the study area (1 Km Radius)



2.2.1 Project Area

- The project area is site specific

(i) There is No beneficiation or processing proposed inside the project area.

(ii) There is no forest land involved in the proposed project area and is devoid of major cultivation and trees.

TABLE 2.3: LAND USE PATTERN OF THE PROPOSED PROJECT

P1			
Description	**Present area (ha)**	**Area required during the first five years of the plan period (ha)**	**Area at the end of life of quarry (ha)**
Area under quarry	Nil	1.24.0	1.24.0
Infrastructure	Nil	0.01.0	0.01.0
Roads	Nil	0.02.0	0.03.0
Green Belt	Nil	0.35.0	0.70.0
Unutilized area	1.98.0	0.36.0	Nil
Total	**1.98.0**	**1.98.0**	**1.98.0**
P2			
Description	**Present area (ha)**	**Area required during the first five years of the plan period (ha)**	**Area at the end of life of quarry (ha)**
Area under quarry	Nil	1.37.0	1.37.0
Infrastructure	Nil	0.01.0	0.01.0
Roads	Nil	0.02.0	0.03.0
Green Belt	Nil	0.40.3	0.72.0
Unutilized area	2.13.0	0.32.7	Nil
Total	**2.13.0**	**2.13.0**	**2.13.0**
P3			
Description	**Present area (ha)**	**Area required during the first five years of the plan period (ha)**	**Area at the end of life of quarry (ha)**
Area under quarry	Nil	1.74.0	1.74.0
Infrastructure	Nil	0.01.0	0.01.0
Roads	Nil	0.02.0	0.03.0
Green Belt	Nil	0.29.0	0.58.0
Unutilized area	2.40.0	0.34.0	0.04.0
Total	**2.40.0**	**2.40.0**	**2.40.0**

Source: Approved Mining Plan of the respective proposals

2.2.2 Size or Magnitude of Operation

TABLE 2.4: OPERATIONAL DETAILS FOR PROPOSED PROJECT

P1		
PARTICULARS	**DETAILS**	
	Rough Stone (10 Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	6,93,000 m^3	39,600m^3
Mineable Reserves	1,64,165 m^3	22,338 m^3
Mining Plan Period	10 Years	
Proposed Production for first five-year plan	1,03,520 m^3	22,338 m^3
Proposed Production for next five year plan	60,645 m^3	-
Number of Working Days	300 Days	
Production per day	55 m^3	25 m^3
No of Lorry loads (6m^3 per load)	9 Nos	4 Nos
Total Depth of Mining	37 meters (35m Rough Stone + 2m Gravel)	

P2		
PARTICULARS	**DETAILS**	
	Rough Stone (10 Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	9,58,500	42,600
Mineable Reserves	2,57,455	21,366
Mining Plan Period	10 Years	
Proposed Production for first five year plan	1,80,940 m^3	21,366 m^3
Proposed Production for next five year plan	76,515 m^3	-
Number of Working Days	300 Days	
Production per day	86 m^3	24 m^3
No of Lorry loads (6m^3 per load)	14 Nos	4 Nos
Total Depth of Mining	42 meters (40m Rough Stone + 2m Gravel)	

P3		
PARTICULARS	**DETAILS**	
	Rough Stone (10 Year Plan period)	**Gravel (3 Years Plan period)**
Geological Resources	10,80,800 m^3	48,000m^3
Mineable Reserves	2,82,475 m^3	33,315 m^3
Mining Plan Period	10 Years	
Proposed Production for first five year plan	1,59,350 m^3	33,315 m^3
Proposed Production for next five year plan	1,23,125 m^3	-
Number of Working Days	300 Days	
Production per day	94 m^3	37 m^3
No of Lorry loads (6m^3 per load)	16 Nos	6 Nos
Total Depth of Mining	47 meters (45m Rough Stone + 2m Gravel)	

Source: Approved mining plan

2.3 Geology

2.3.1 Regional Geology

The Archaean rocks are represented by Khondalite Group, Charnockite Group and Migmatite complex. Garnet sillimanite gneiss is well exposed in the northeastern part of the district in Pachchamalai hill at Chrompet, Parangimalai and southeast of Pallavaram. In Pachchamalai hill it is essentially a quartz sillimanite rich rock with minor amount of felspar. In Tambaram hill, chamockite and metapellite are intimately interbanded, particularly along the hinge zones. Isolated outcrops are also seen on either side of National Highway No.45 near Kadaperi.

The major part of the district is occupied by charnockite with enclaves of khondalite, leptynite and BMQ seen around St. Thomas Mount, east of Guduvancheri, Madurantakam, Paler and around Tirukkalukkunram. St. Thomas mount is an extensively studied type area for the chamockite. It is a typical rock with bluish grey quartz, hard and compact, jointed showing recognisable foliation at places. The outcrop stands out prominently as isolated cluster of hills.

The general geological sequences of the rocks in this area are given below:

Age		Formation	Group	Rock Types
Quaternary	Recent to Late Pleistocene			Fluvial/Marine
				Laterite
	Early to middle Pleistocene			Quartz conglomerate angles (Conjeevaram gravels)
				Calcareous Gritty Sandstone and clay
	Mio Pliocene	Cuddalore		Sandstone
Mesozoic	Lower Cretaceous	Sriperumbudur		Sandstone/Shale/Conglomerate
Paleozoic	Permian	Talchir	Lower Gondwana	Khaki Green Shale/Conglomerate/Sandstone
Archaean		Younger Intrusives		Basic Dyke
			Migmatite Complex	Migmatite Gneiss
			Charnockite	Magnetite Quartzite Pyroxene Granulite Charnockite
			Khondalite	Garnet Sillimanite Gneiss

Local Geology: -

The study area follows the regional trend and mainly comprises of Hard Rock Formation as a homogeneous formation / Batholith formation of Charnockite. The project area is a plain terrain, with gentle slope toward South east and with a highest altitude of 52 m AMSL. The project area is covered with Gravel formation of 2m thickness followed by Massive Charnockite formation. On Regional Scale the charnockite body trends $N30^0E$ $S30^0W$ with dipping towards SE 60^0.

Hydrogeology

The origin, occurrence and movement of groundwater are controlled by geological setup of a terrain. During the study it is inferred that the entire cluster area is a Hard rock terrain and the low resistance encountered at the depth between 48 – 53m, hence it is assumed that the possibility of Ground water occurrence will be below this level and it also proved that this hard batholith above 50m will not encounter any subsurface water.

There is a possibility of seepage water from the surface levels i.e., below 20m, this surface water will be collected in the mine pits and later used for dust suppression and afforestation. In the geophysical study it has been clearly inferred that the depth of the quarrying operation will not intersect the ground water table.

Figure 2.8: Regional Geology Map

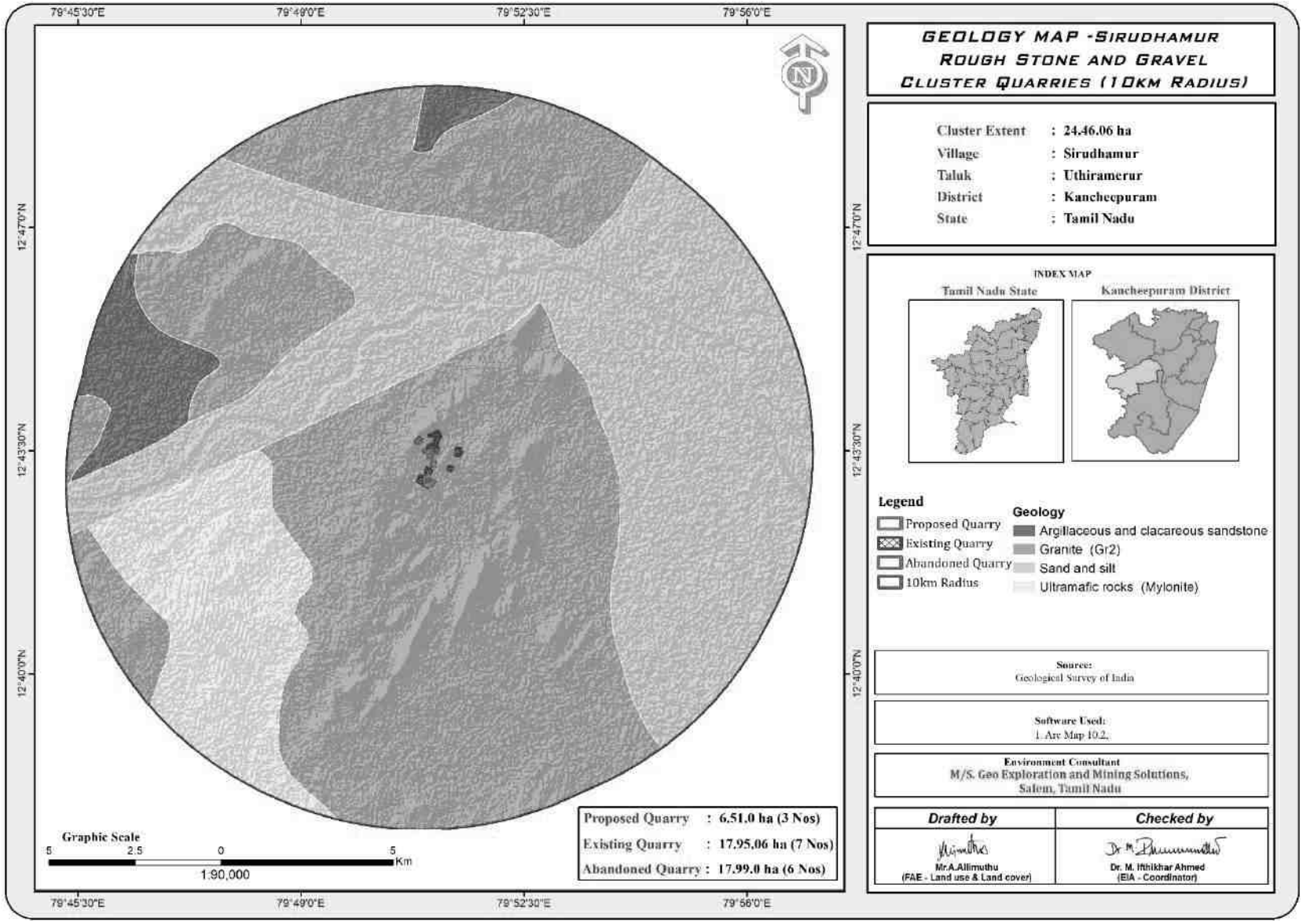
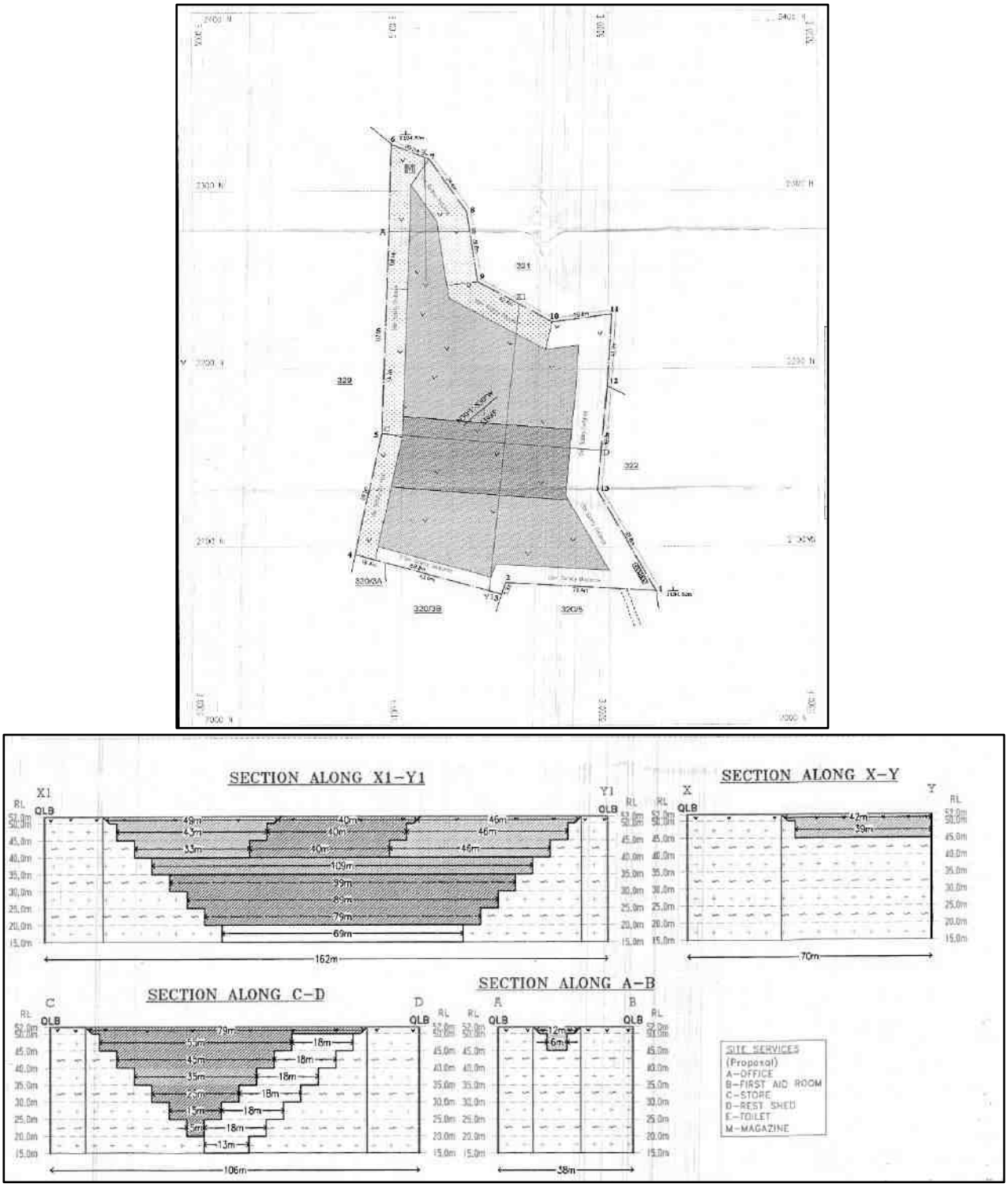
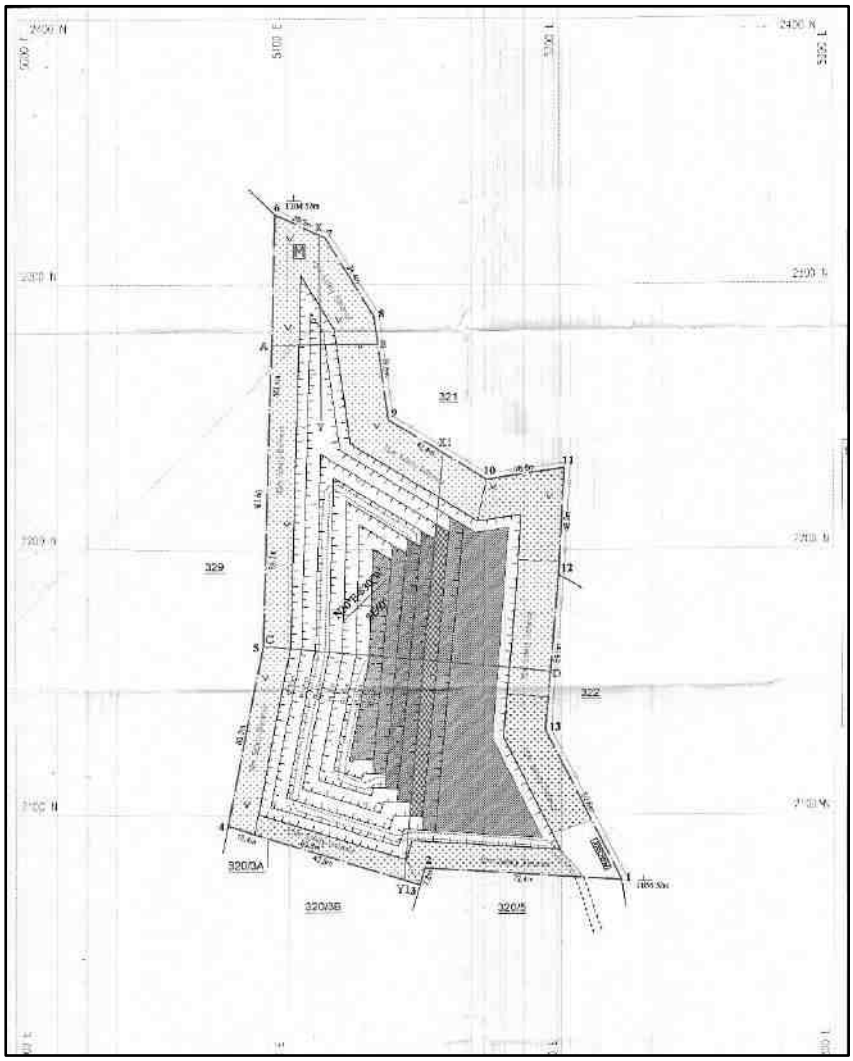


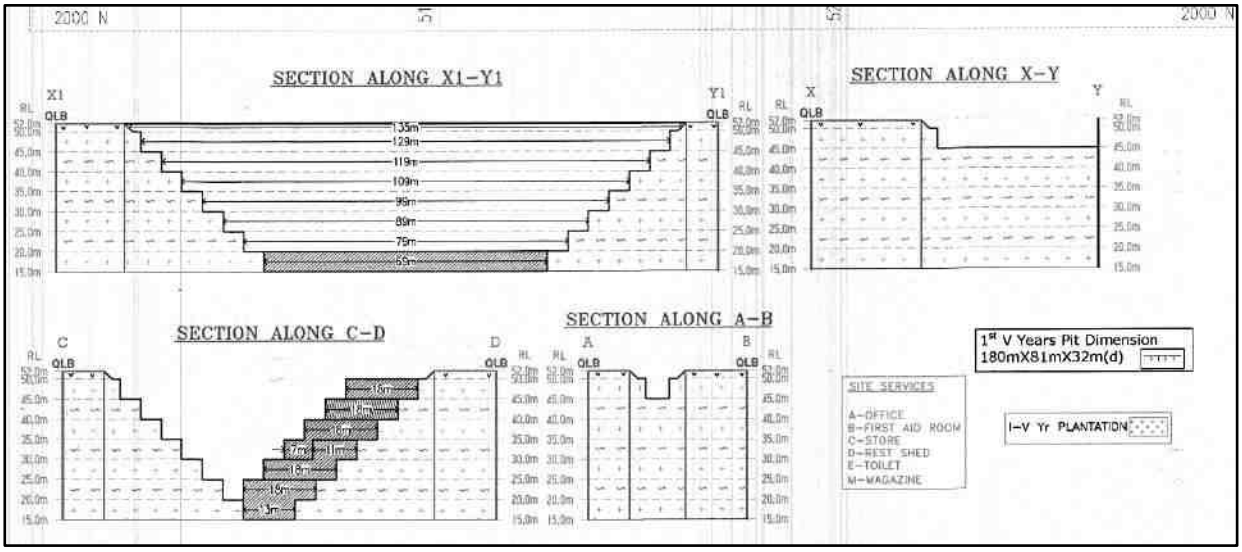
Figure 2.9: Topography, Geological, Year wise Development Production Plan and Sections – For 1st Five-year Plan Period – P1



Source: Approved Mining plan

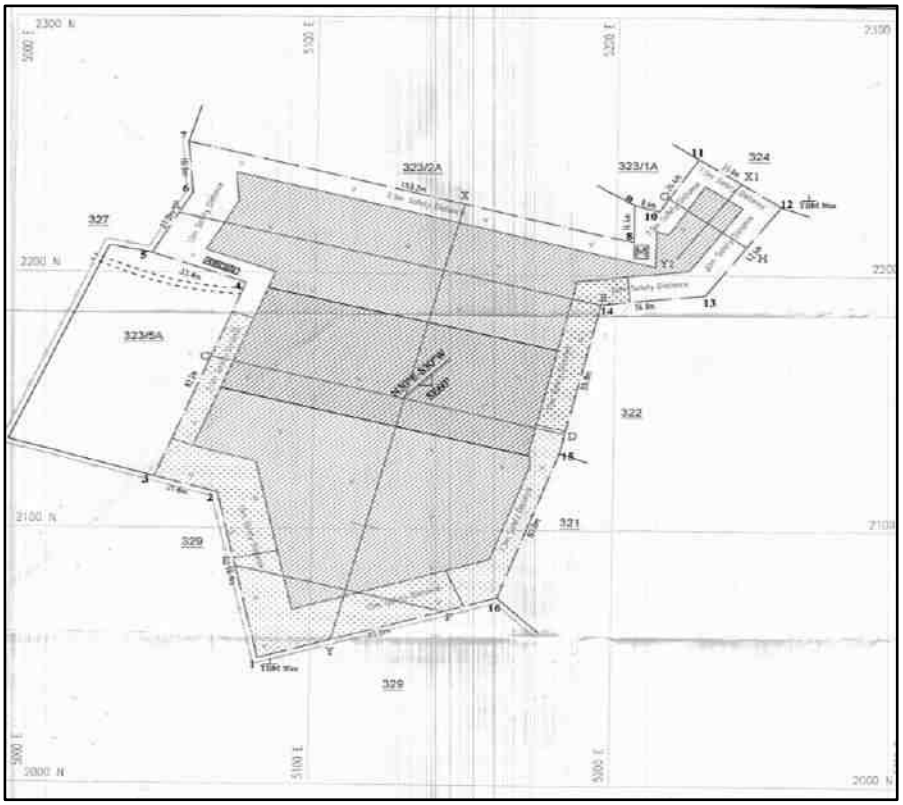
Figure 2.9A: Topography, Geological, Year wise Development Production Plan and Sections – For 6th to 10th year Plan Period – P1

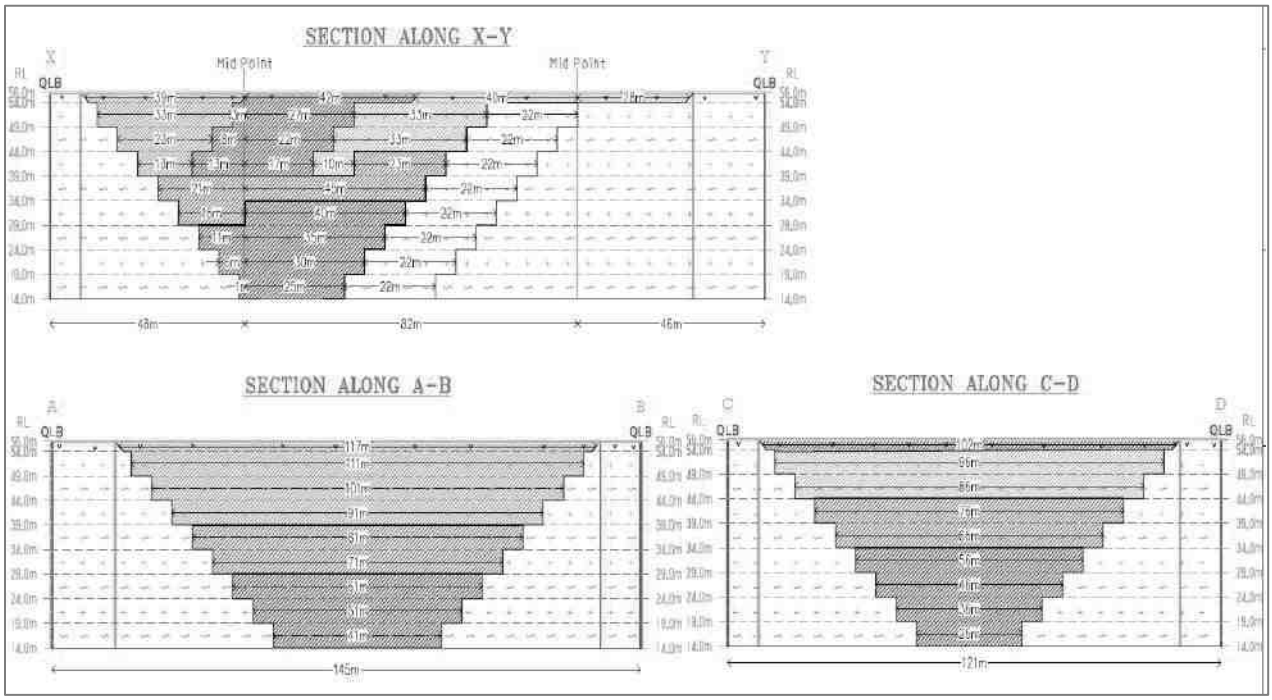




Source: Approved Mining plan

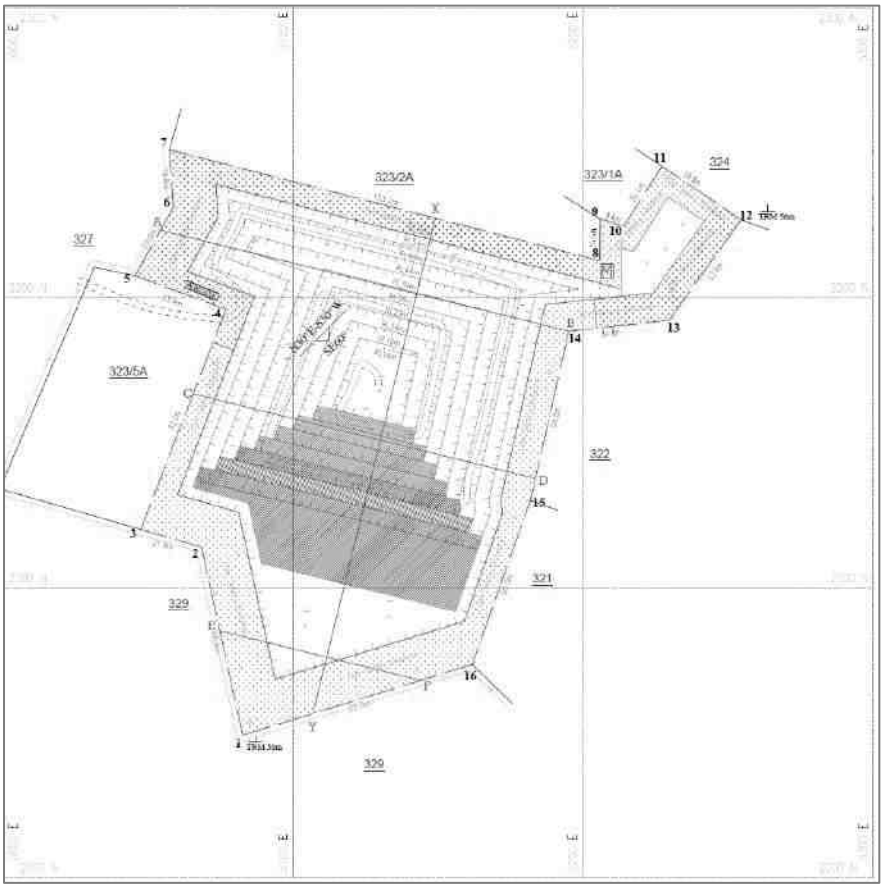
Figure 2.9: Topography, Geological, Year wise Development Production Plan and Sections – For 1st Five year Plan Period – P2





- Depth reduced in Section as per ToR Condition

Figure 2.10: Topography, Geological, Year wise Development Production Plan and Sections – For 6th to 10th year Plan Period – P2



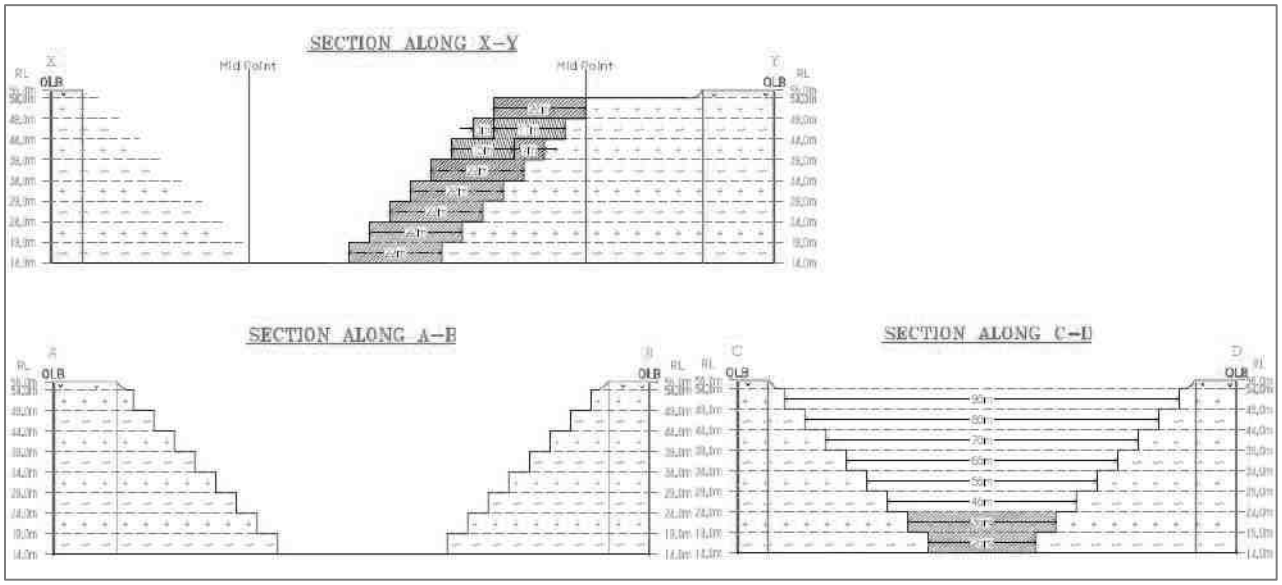
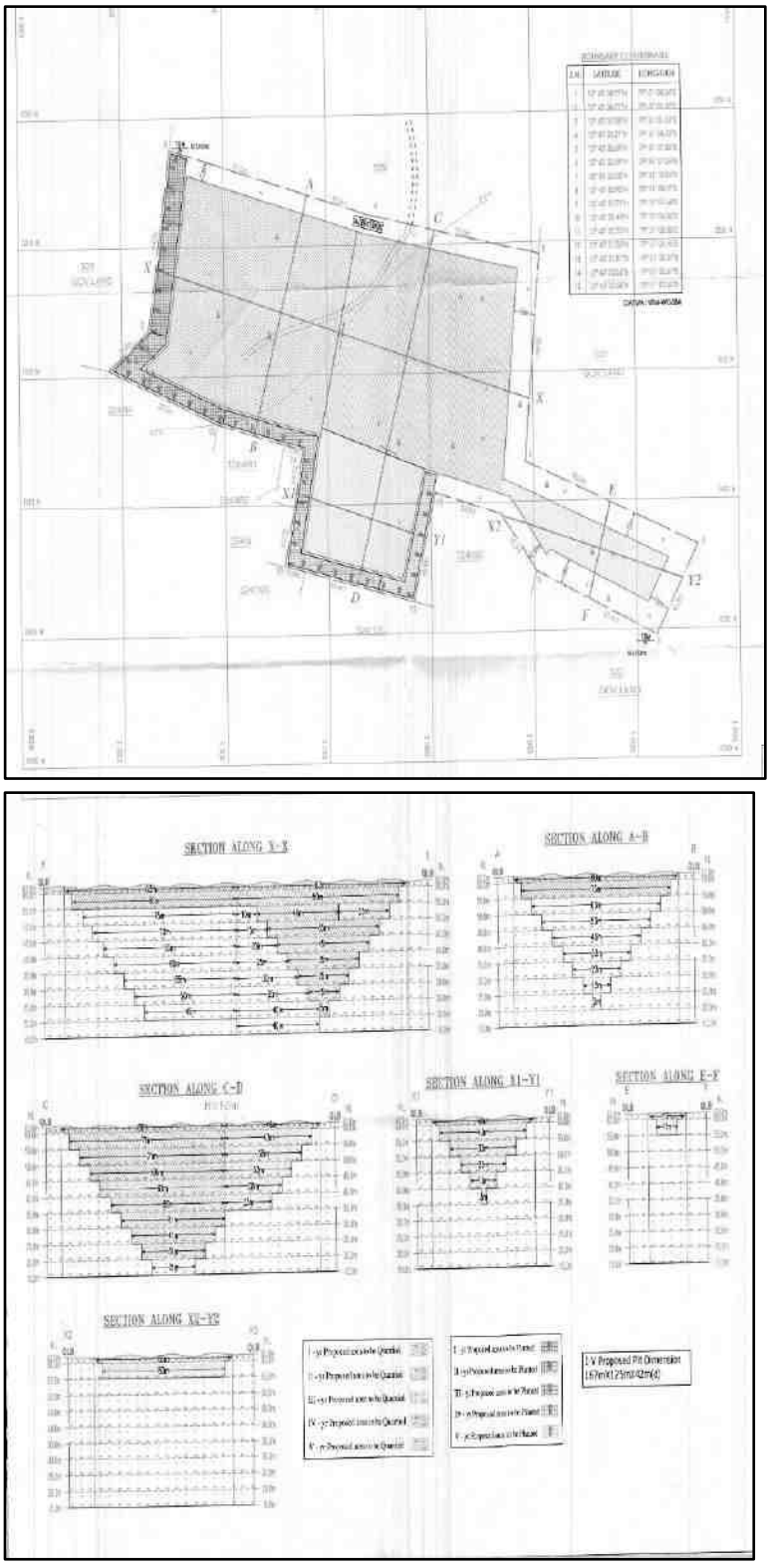
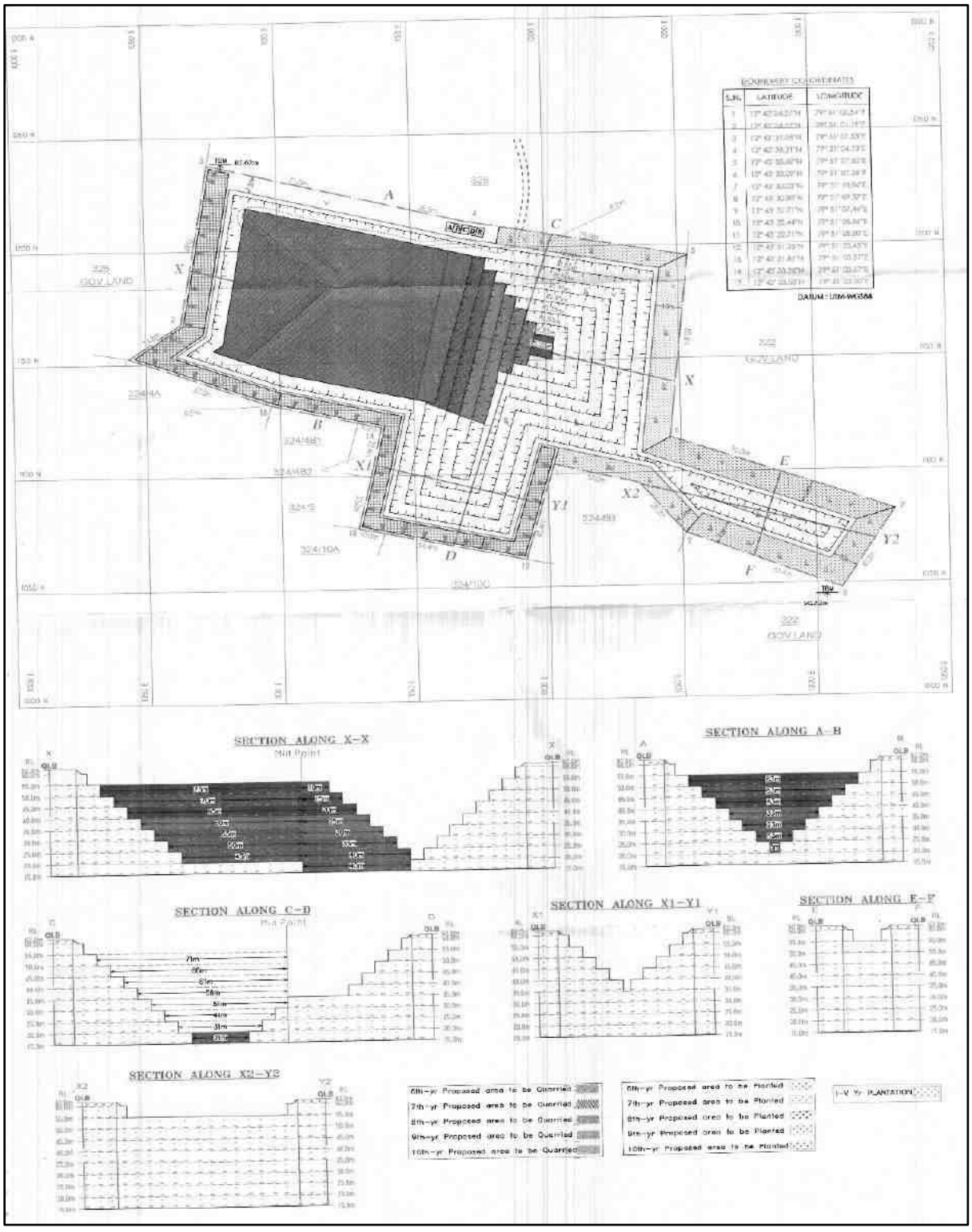


Figure 2.9: **Topography, Geological, Year wise Development Production Plan and Sections – For 1st Five year Plan Period – P3**



Source: Approved Mining plan

Topography, Geological, Year wise Development Production Plan and Sections – For 6th to 10th Year Plan Period – P3



Source: Approved Mining plan

2.4 Resources and Reserves

The Resources and Reserves of Rough Stone and Gravel were calculated based on Cross-Section Method by to cover the maximum lease area.

TABLE 2.5: AVAILABLE GEOLOGICAL RESOURCES OF PROPOSED PROJECT

PROPOSED -P1		
Geological Resources	Rough Stone	Gravel
	6,93,000 m^3	39,600m^3
Mineable Reserves	1,64,165 m^3	22,338m^3
PROPOSED -P2		
Geological Resources	Rough Stone m^3	Gravel m^3
	9,58,500	42,600
Mineable Reserves	2,57,455	21,366
PROPOSED -P3		
Geological Resources	Rough Stone	Gravel
	10,80,800 m^3	48,000m^3
Mineable Reserves	2,82,475 m^3	33,315 m^3

Source: Approved Mining Plan

Now based on the availability of Geological Resources the Mineable Reserves are calculated by considering excavation system of bench formation and leaving essential safety distance of 7.5 m from the adjacent patta Lands and 10m safety distance to the Government land as per precise area communication letter and deducting the locked up reserves during bench formation (Also called as Bench Loss) and the Mineable Reserves is calculated considering there is no waste / overburden / side burden (100% Recovery Anticipated).

TABLE 2.6: YEAR-WISE PRODUCTION DETAILS FOR FIRST FIVE YEARS

P1		
Year	**Rough stone (m^3)**	**Gravel (m^3)**
I	20,420	8,750
II	20,000	6,320
III	23,000	7,268
IV	19,075	---
V	21,025	---
Total	**1,03,520**	**22,338**
P2		
Year	**Rough stone (m^3)**	**Gravel (m^3)**
I	**36,595**	**9,774**
II	**40,500**	**8,568**
III	**33,830**	**3,024**
IV	**37,775**	**-**
V	**32,240**	**-**
Total	**1,80,940**	**21,366**
P3		
Year	**Rough stone (m^3)**	**Gravel m^3**
I	29,200	13,280
II	30,400	13,280
III	33,650	6,752
IV	32,350	---
V	33,750	---
Total	**1,59,350**	**33,315**

Source: Approved Mining Plan

TABLE 2.6A: YEAR-WISE PRODUCTION DETAILS FOR NEXT FIVE YEARS

P1		
Year	**Rough stone (m^3)**	**Gravel (m^3)**
VI	11,610	-
VII	10,710	-
VIII	13,275	-
IX	13,455	-
X	11,595	-
Total	**60,645**	**-**
P2		
Year	**Rough stone (m^3)**	**Gravel (m^3)**
VI	**15535**	**-**
VII	**15160**	**-**
VIII	**17020**	**-**
IX	**16320**	**-**
X	**12480**	**-**
Total	**76515**	**-**
P3		
Year	**Rough stone (m^3)**	**Gravel (m^3)**
VI	**23,625**	**-**
VII	**22,100**	**-**
VIII	**25,025**	**-**
IX	**24,550**	**-**
X	**27,825**	**-**
Total	**1,23,125**	**-**

Source: Approved Mining Plan

Disposal of Waste

There is no waste anticipated in this Rough Stone and Gravel quarrying operation. The entire quarried out materials will be utilized (100%).

2.5 Method of Mining

The method of mining Opencast Mechanized Mining Method is being proposed by formation of 5.0 meter height bench with a bench width not less than the bench height.

The top layer of overburden (Gravel) will be Excavate directly by Hydraulic Excavators and loaded into tippers directly and sold to needy customers. The Rough Stone is a batholith formation and the splitting of rock mass of considerable volume from the parent rock mass will be carried out by deploying jackhammer drilling and Slurry Explosives will be used for blasting. Hydraulic Excavators attached with Rock Breakers unit will be deployed for breaking large boulders to required fragmented sizes to avoid secondary blasting and hydraulic excavators attached with bucket unit will be deployed for loading the Rough Stone into the tippers and then the stone is transported from pithead to the nearby crushers.

2.5.1 Drilling & Blasting Parameters

Drilling & Blasting will be carried out as per parameters given below: -P1

Spacing	=	1.2m
Burden	=	1.0 m
Depth of hole	=	1.5 m
Charge per hole	=	0.50 – 0.75kg
Powder factor	=	6.0 tonnes/kg
Diameter of hole	=	32 mm

No of Holes to be drilled per day: -

Volume of Rough Stone will be excavated from one hole	=	3 Tonnes
Total Volume	=	1,64,165 m^3
	=	1,64,165/10
	=	16,416/300
	=	55m^3 * 2.6 (Specific Gravity)
	=	143 Tonnes per day
Therefore, Number of Holes per day	=	143/3
	=	48 Holes per day

Drilling & Blasting will be carried out as per parameters given below: -P2

Spacing	=	1.2m
Burden	=	1.0 m
Depth of hole	=	1.5 m
Charge per hole	=	0.50 – 0.75kg
Powder factor	=	6.0 tonnes/kg
Diameter of hole	=	32 mm

No of Holes to be drilled per day: -

Volume of Rough Stone will be excavated from one hole	=	3 Tonnes
Total Volume	=	2,57,455 m^3
	=	2,57,455/10
	=	25,745/300
	=	86m^3 * 2.6 (Specific Gravity)
	=	224 Tonnes per day
Therefore, Number of Holes per day	=	224/3
	=	75 Holes per day

Drilling & Blasting will be carried out as per parameters given below: - P3

Spacing	=	1.2m
Burden	=	1.0 m
Depth of hole	=	1.5 m
Charge per hole	=	0.50 – 0.75kg
Powder factor	=	6.0 tonnes/kg
Diameter of hole	=	32 mm

No of Holes to be drilled per day: -

Volume of Rough Stone will be excavated from one hole	=	3 Tonnes
Total Volume	=	2,82,475 m^3
	=	2,82,475/10
	=	28,247/300
	=	94m^3 * 2.6 (Specific Gravity)
	=	244 Tonnes per day
Therefore, Number of Holes per day	=	244/3
	=	81 Holes per day

Type of Explosives to be used –

Slurry explosives (An explosive material containing substantial portions of a liquid, oxidizers, and fuel, plus a thickener), NONEL / Electric Detonator & Detonating Fuse

Storage of Explosives –

No proposal for storage of explosives within the project area, the proponent has made agreement with authorized explosives agencies for carrying out blasting activities and competent person as per DGMS guidelines will be employed for safety and supervision of overall quarrying activities.

The explosives will be sourced from the blasting agency on daily basis and the blasting will be carried out under the supervision of competent qualified Blaster and it will be ensured that there shall be no balance of explosive stock; any balance stock will be taken back by the supplier.

2.5.3 Extent of Mechanization

TABLE 2.7 MACHINERY DETAILS FOR PROPOSED PROJECTS

P1				
S.NO.	**TYPE**	**NOS**	**SIZE/CAPACITY**	**MOTIVE POWER**
1	Jack hammers	2	1.2m to 2.0m	Compressed air
2	Compressor	1	400 psi	Diesel Drive
3	Excavator with Bucket and Rock breaker	1	300 HP	Diesel Drive
4	Tippers / Dumpers	1	20 Tonnes	Diesel Drive
P2				
S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	2	1.2m to 2.0m	Compressed air
2	Compressor	1	400 psi	Diesel Drive
3	Excavator with Bucket and Rock breaker	1	300 HP	Diesel Drive
4	Tippers / Dumpers	2	20 Tonnes	Diesel Drive
P3				
S.NO.	TYPE	NOS	SIZE/CAPACITY	MOTIVE POWER
1	Jack hammers	4	1.2m to 2.0m	Compressed air
2	Compressor	1	400 psi	Diesel Drive
3	Excavator with Bucket and Rock breaker	1	300 HP	Diesel Drive
4	Tippers / Dumpers	2	20 Tonnes	Diesel Drive

Source: Approved Mining Plan

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 in the proposed quarry.

2.6.2 Drainage Pattern

The general drainage pattern of the area is dendritic. There are no streams, canals or water bodies crossing within the project area, hence there is no requirement of stream or canals diversion in the near future. Odai is passing along the East side of the area a safety distance of 15m provided as per the precise area communication letter.

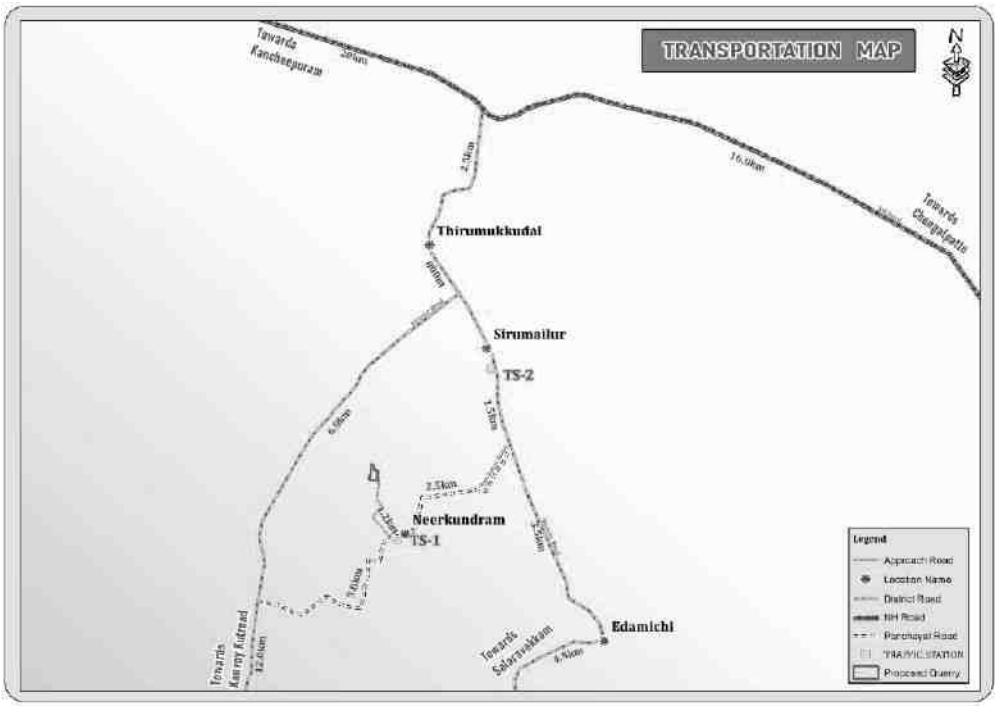
2.6.3 Traffic Density

Traffic density measurements were performed as per IRC 1960 Guidelines at two locations based on the transportation route. The monitoring was carried out on 15-01-2020. 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.

TABLE 2.8 TRAFFIC SURVEY LOCATION'S

Station Code	Road Name	Distance and Direction	Type of Road
TS1	Panchayat road	900m-Southeast	Panchayat road (Single Lane)
TS2	Salavakkam - Tirumukkudal Road	2.0 km-Northeast	Major Road (Single Lane)

Figure 2.10: Traffic Survey locations & Transportation Route map



Source: Survey of India Toposheet

TABLE 2.9 EXISTING TRAFFIC VOLUME

Station code	HMV		LMV		2/3 Wheelers		Total PCU
	No	PCU	No	PCU	No	PCU	
TS1	107	321	15	15	109	55	391
TS2	135	405	28	28	152	76	509

Source: On-site monitoring by GEMS FAE & TM

- PCU conversion factor for HMV (Trucks and Bus) = 3, LMV (Car, Jeep and Auto) = 1 and 0.5 for Motor Vehicles (2/3 Wheelers)

Transportation of Rough stone and Gravel per day = 13 Loads ie., 2 Trips per hour (6 Volume in PCU)

TABLE 2.10 SUMMARY OF TRAFFIC VOLUME

Route	Existing traffic volume in PCU	Incremental traffic due to the project	Total traffic volume	Hourly Capacity in PCU as per IRC – 1960 guidelines
Panchayat road	391	13	404	1200
Salavakkam Tirumukkudal Road	509	13	522	1200

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

As per the IRC 1960 this existing 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 transportation.

2.6.3 Mineral Beneficiation and Processing

There is no proposal for the mineral processing or ore beneficiation in these projects

2.7 Project Requirement

2.7.1 Water Source & Requirement

Detail of Total water requirements in KLD as given below:

TABLE 2.11 WATER REQUIREMENT

P1		
Purpose	**Quantity**	**Source**
Domestic & Drinking	0.5KLD	From Existing, bore wells and drinking water
Dust Suppression	1.0KLD	From Existing bore wells from nearby area/ Rain
Green Belt	1.0KLD	From Existing bore wells from nearby area / Rain
Total	**2.5KLD**	
P2		
Purpose	**Quantity**	**Source**
Domestic & Drinking	0.5KLD	From Existing, bore wells and drinking water
Dust Suppression	1.0KLD	From Existing bore wells from nearby area/ Rain
Green Belt	1.0KLD	From Existing bore wells from nearby area / Rain
Total	**2.5KLD**	
P3		
Purpose	***Quantity***	***Source***
Domestic & Drinking	0.5KLD	From Existing, bore wells and drinking water
Dust Suppression	1.0KLD	From Existing bore wells from nearby area/ Rain
Green Belt	1.0KLD	From Existing bore wells from nearby area / Rain
Total	**2.5KLD**	

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 SEB.

No workshops are proposed inside the project area hence there will not be any process effluent generation from the project 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

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

Calculation

Per hour Excavator will consume = 16 liters / hour
Per hour Excavator will excavate = 60m^3 of Gravel
Per hour Excavator will excavate = 20m^3 of Gravel

For P1	Rough stone		
	For 164165m^3	=	164165/20
		=	8208 hours
	Diesel consume 8208 working hours	=	8208 hours x 16 liters
	Total diesel consumption	=	1,31,328 Liters of HSD will be utilized for Rough stone
	Gravel		
	For 22,338m^3	=	22338/60
		=	373 hours
	Diesel consume 373 working hours	=	373 hours x 16 liters
	Total diesel consumption	=	5,968 Liters of HSD will be utilized for Gravel
	TOTAL DIESEL CONSUMPTION 1,37,296Litres for the entire project life		
For P2	Rough stone		
	For	=	2,57,455/20
		=	12,873 hours
	Diesel consume working hours	=	12,873 hours x 16 liters
	Total diesel consumption	=	2,05,968Liters of HSD will be utilized for Rough stone
	Gravel		
	For	=	21,366/60
		=	356 hours
	Diesel consume working hours	=	356 hours x 16 liters
	Total diesel consumption	=	5,696 Liters of HSD will be utilized for Gravel.
	TOTAL DIESEL CONSUMPTION 2,11,664 Litres for the entire project life		
For P3	Rough stone		
	For 2,82,475m^3	=	282475/20
		=	14124 hours
	Diesel consume 14124 working hours	=	14124 hours x 16 liters
	Total diesel consumption	=	2,25,984Liters of HSD will be utilized for Rough stone

	Gravel		
	For 33312m^3	=	33312/60
		=	555 hours
	Diesel consume 555 working hours	=	555 hours x 16 liters
	Total diesel consumption	=	8880 Liters of HSD will be utilized for Gravel
	TOTAL DIESEL CONSUMPTION 2,34,864Litres for the entire project life		

2.7.4 Employment Requirement:

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

TABLE 2.12: EMPLOYMENT POTENTIAL

P1			
S. No.	**Category**	**Role**	**Nos.**
1.	Skilled	Mine Foreman	1
		Blaster/mate	1
		Excavator – Operator & Driver	3
		Jack hammer operator	4
2.	Semi – skilled	Security	1
3.	Unskilled	Labour & Helper	2
		Co-operator and Cleaner	3
Total			**15**
P2			
S. No.	**Category**	**Role**	**Nos.**
1.	Skilled	Mine Foreman	1
		Blaster/mate	1
		Excavator – Operator & Driver	3
		Jack hammer operator	6
2.	Semi – skilled	Security	1
3.	Unskilled	Labour & Helper	3
		Co-operator and Cleaner	3
Total			**18**
P3			
S. No.	**Category**	**Role**	**Nos.**
1.	Skilled	Mine Foreman	1
		Blaster/mate	1
		Excavator – Operator & Driver	3
		Jack hammer operator	8
2.	Semi – skilled	Security	1
3.	Unskilled	Labour & Helper	4
		Co-operator and Cleaner	3
Total			**21**
Total No of Direct employment from the three proposals is 54.			

2.7.4 Project Cost

TABLE 2.13 PROJECT COST OF PROPOSED PROJECT

P1	
Description	Cost
Project Cost	**Rs 52,18,000/-**
CER Cost	**Rs 5,00,000/-**
P2	
Project Name	Project Cost
Project Cost	**Rs 65,24,000/-**
CER Cost	**Rs 5,00,000/-**
P3	
Description	Cost
Project Cost	**Rs 68,99,000/-**
CER Cost	**Rs 5,00,000/-**

Source: Approved Mining Plan & Prefeasibility Report

2.8 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 2.14 EXPECTED TIME SCHEDULE FOR THE PROJECT

S.No	Particulars lease execution	Remarks if any				
		1st	2nd	3rd	4th	
1	Environmental Clearance					
2	Consent to operate					Production start period

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

CHAPTER – 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 status of the project environment is described section wise for better understanding of the broad-spectrum conditions. 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 during the Post Monsoon (October to December 2022) with CPCB guidelines. Environmental data has been collected with reference to proposed mine by **CHENNAI METTEX LAB PRIVATE LIMITED** Approved by AAI, AGMARK, APEDA, BIS, EIC FSSAI, GAFTA, IOPEPC, MOEF & TEA BOARD Certified & MoEF Notified Laboratory, 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 and buffer zone taken as 10km radius from the periphery of the Cluster. Both Core zone and Buffer zone is taken as the study area.

Study Period

The baseline study was conducted during the Post Monsoon i.e., October – December 2022

Study Methodology

The parameters, frequency of monitoring and No. of locations for the baseline monitoring has been described below.

TABLE 3.1 ENVIRONMENTAL 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	Physico - Chemical Characteristics	Once during the study period	7 (3 core & 4 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 CO & Fugitive Dust	24 hourly twice a week (October – December 2022)	9 (3 core & 6 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB
Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	9 (3 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
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 Chennai Mettex Lab 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

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

TABLE 3.2: LAND USE / LAND COVER TABLE 10 KM RADIUS

S.No	CLASSIFICATION	AREA_HA	AREA_%
	BUILTUP		
1	SETTLEMENT	550	1.71
2	MINING	175	0.54
	AGRICULTURAL LAND		
3	CROP LAND	13250	41.11
4	PLANTATION	5248	16.28
5	FALLOW LAND	4240	13.16
	FOREST		
6	DENSE FOREST	1518	4.71
	BARREN/WASTE LANDS		
7	SCRUB LAND	3820	11.85
	WETLANDS/ WATER BODIES		
8	WATER BODIES/LAKE/RIVER	3428	10.64
TOTAL		32229.00	100.00

Source: Survey of India Toposheet and Landsat Satellite Imagery

Figure 3.1: Land Use Land Cover Map 10km Radius

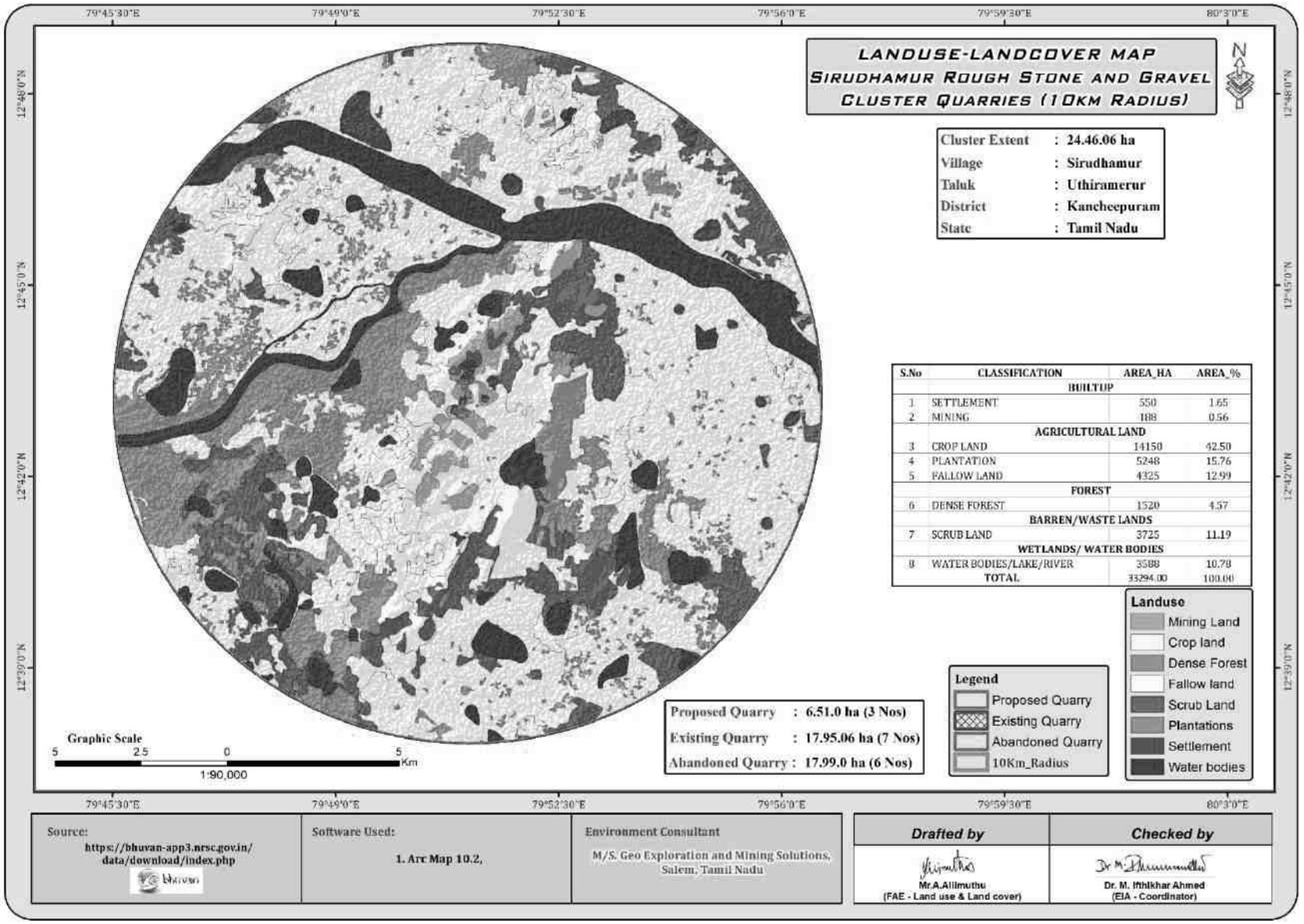
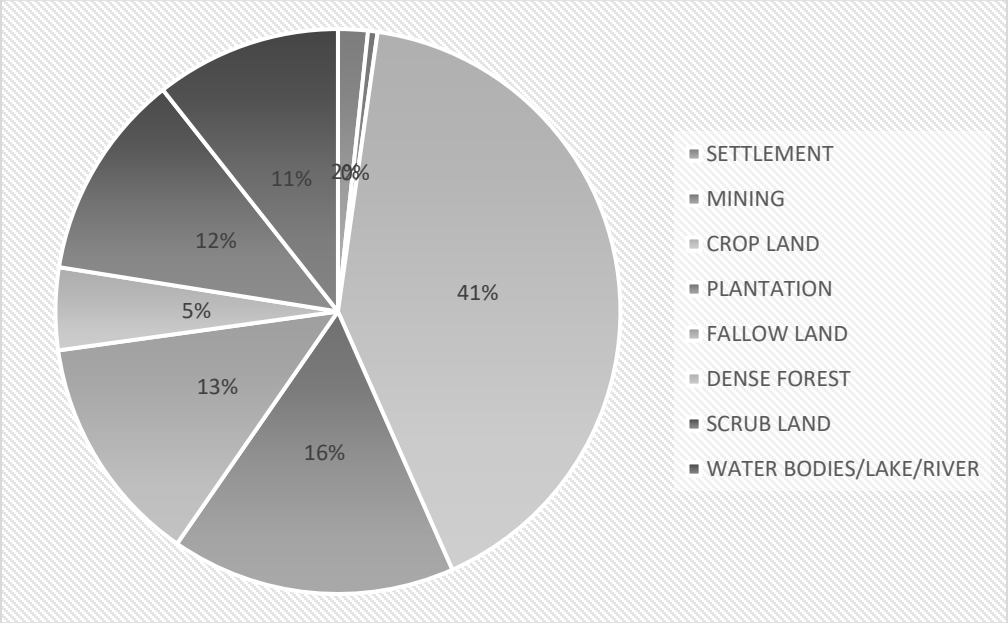


Figure 3.2: PIE Diagram of Land Use & Land Cover



Source: Table 3.2

Interpretation:

From the above table and pie diagram it is inferred that the majority of the land in the study area is Agriculture land (includes crop land) 70.55 % followed by water bodies (Rivers Stream Canals) 10.64 %.

The total mining area within the study area is 175 ha i.e., 0.54%. The cluster area of 24.46.06 ha contributes about 13.97 % of the total mining area within the study area. This small percentage of Mining Activities shall not have any significant impact on the environment.

3.1.2 Topography

The project area is almost plain terrain with gentle gradient towards South East, maximum elevation of the area is 52 m above AMSL. There are no hilly regions in and around the area. The area is surrounded by barren land on the North side, East, West and south side. Existing quarry is about 80m from the south side of the area

3.1.3 Drainage Pattern of the Area

There are no developed surface drainage channels in the study area. Two rivers are passing within the study area (Palar River – 4.7 km North & Cheyyar River – 3.0km Northwest). The area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. For the P1 project The area is mostly dry in all seasons except rainy seasons. Odai is located North East side of the project area the flow direction of the odai is South East and the odai is joining in periya Eri.

The general drainage pattern of the area is of sub dendritic and dendritic pattern. No prominent water course or nallah is inferred. During rainy season the surface runoff flows in W to E 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.

3.1.4 Seismic Sensitivity

The proposed project site falls in the seismic Zone III, 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.

3.1.2 Environmental Features in the Study Area

There is no Wildlife Sanctuaries, National Park and Archaeological monuments within the study area. No Protected and Reserved Forest area is involved in the project area. Therefore, there will be no need to acquisition/diversion of forest land. The details related to the environment sensitivity around the mine lease area i.e. 10 km radius of the mine lease area, are given in the below Table 3.3.

TABLE 3.3: DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE CLUSTER

Sl.No	Sensitive Ecological Features	Name	Arial Distance in km from Mine Lease Boundary
1	National Park / Wild life Sanctuaries	Karikili birds Sanctuary	13.5 km South
		Vedanthangal birds Sanctuary	19.5 Km South
2	Reserve Forest	Kavanipakkam RF Edamachi RF Marduham RF	2.0km East 2.5km SE 6.3km SW
3	Tiger Reserve/ Elephant Reserve/ Biosphere Reserve	None	Nil within 10km Radius
4	Critically Polluted Areas	None	Nil within 10km Radius
5	Mangroves	None	Nil within 10km Radius
6	Mountains/Hills	None	Nil within 10km Radius
7	Notified Archaeological Sites	Thirumukkoodal sri appan Prasanna venkatesa perumal temple	4.31 km North
8	Industries/ Thermal Power Plants	None	Nil within 10km Radius
9	Defence Installation	None	Nil within 10km Radius

Source: Survey of India Toposheet, Village Cadastral Map& Google Earth/Maps

TABLE 3.4: WATER BODIES FROM PROPOSED PROJECT

P1		
S.No	**Name**	**Distance & Direction**
1	Odai	Adjacent Lease Area(North East - East)
2	Periya Eri	100m SE (North East Corner)
3	Pond	600m East
4	Lake near Sirudhamur	1.2km South
5	Edaimatchi Eri	1.5km SE
6	Cheyyar River	3.3km NW
7	Palar River	4.5km North
P2		
S.No	**NAME**	**DISTANCE & DIRECTION**
1	Odai	Adjacent Leas Area (West and south side)
2	ODai	200m East
3	Periya Eri	400m SE
4	Pond	740m SE
5	Lake near Sirudhamur	1.4km South

6	Edaimatchi Eri	1.8km SE
7	Cheyyar River	3.0km NW
S.No	Palar River	4.3km North
P3		
S.No	**NAME**	**DISTANCE & DIRECTION**
1	Odai	100m SE
2	ODai	200m SW
3	Periya Eri	600m SE
4	Pond	720m SE
5	Lake near Sirudhamur	1.7km South
6	Edaimatchi Eri	1.7km SE
7	Cheyyar River	3.0km NW
8	Palar River	4.0km North

Source: Village Cadastral Map and Field Survey

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 3.6 and Figure 3.3.

The objective of the soil sampling is -

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

TABLE 3.5: SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Core Zone	-	12°43'18.28"N 79°51'4.99"E
2	S-2	Core Zone	-	12°43'27.02"N 79°51'2.96"E
3	S-3	Core Zone	-	12°43'34.96"N 79°51'5.09"E
4	S-4	Madhur	1.7km NNE	12°44'17.91"N 79°51'8.08"E
5	S-5	Vayalakkavoor	3.4km NW	12°44'4.31"N 79°49'20.61"E
6	S-6	Mambudur	5.5 km SE	12°40'19.54"N 79°51'41.29"E
7	S-7	Mambakkam	6.2km SE	12°42'49.79"N 79°54'29.40"E

Source: On-site monitoring/sampling by Chennai Mettex Lab Private Limited in association with GEMS

Methodology –

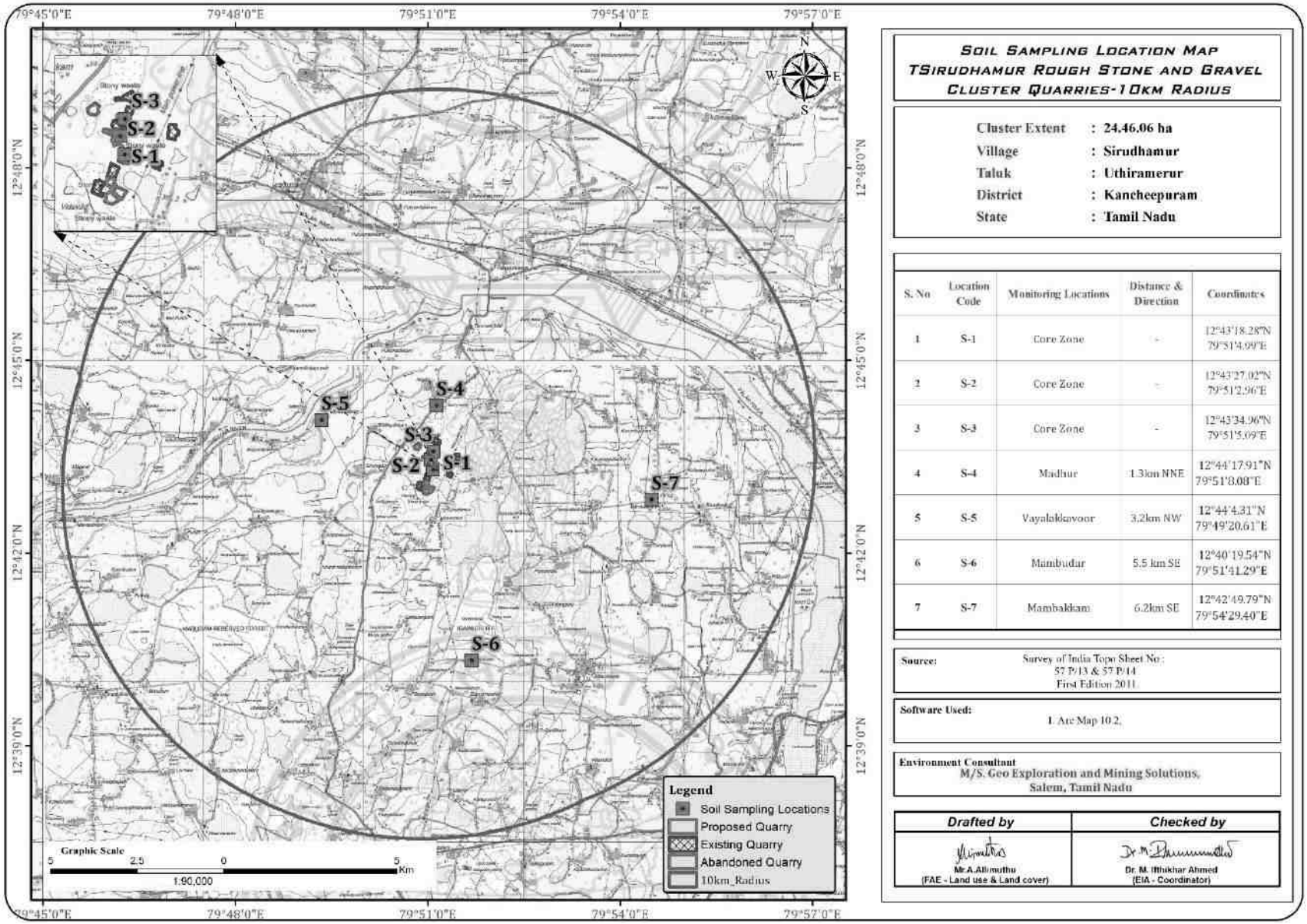
For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the proposed quarry site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. seven (7) locations were selected for soil sampling 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 sealed 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 Chennai Mettex Lab Private Limited in association with GEMS

Figure 3.3: Soil Sampling Locations around 10 Km Radius



SOIL SAMPLING LOCATION MAP
TSIRUDHAMUR ROUGH STONE AND GRAVEL CLUSTER QUARRIES-10KM RADIUS

Cluster Extent	: 24.46.06 ha
Village	: Sirudhamur
Taluk	: Uthiramerur
District	: Kancheepuram
State	: Tamil Nadu

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Core Zone	-	12°43'18.28"N 79°51'4.99"E
2	S-2	Core Zone	-	12°43'27.02"N 79°51'2.96"E
3	S-3	Core Zone	-	12°43'34.96"N 79°51'5.09"E
4	S-4	Madhur	1.3km NNE	12°44'17.91"N 79°51'8.08"E
5	S-5	Vayalakkavoor	3.2km NW	12°44'4.31"N 79°49'20.61"E
6	S-6	Mambudur	5.5 km SE	12°40'19.54"N 79°51'41.29"E
7	S-7	Mambakkam	6.2km SE	12°42'49.79"N 79°54'29.40"E

Source: Survey of India Topo Sheet No : 57 P/13 & 57 P/14 First Edition 2011

Software Used: 1. Arc Map 10.2.

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Drafted by	Checked by
Mr.A.Alimuthu (FAE - Land use & Land cover)	Dr. M. Iffikhar Ahmed (EIA - Coordinator)

Figure 3.4: Soil Map of the study area

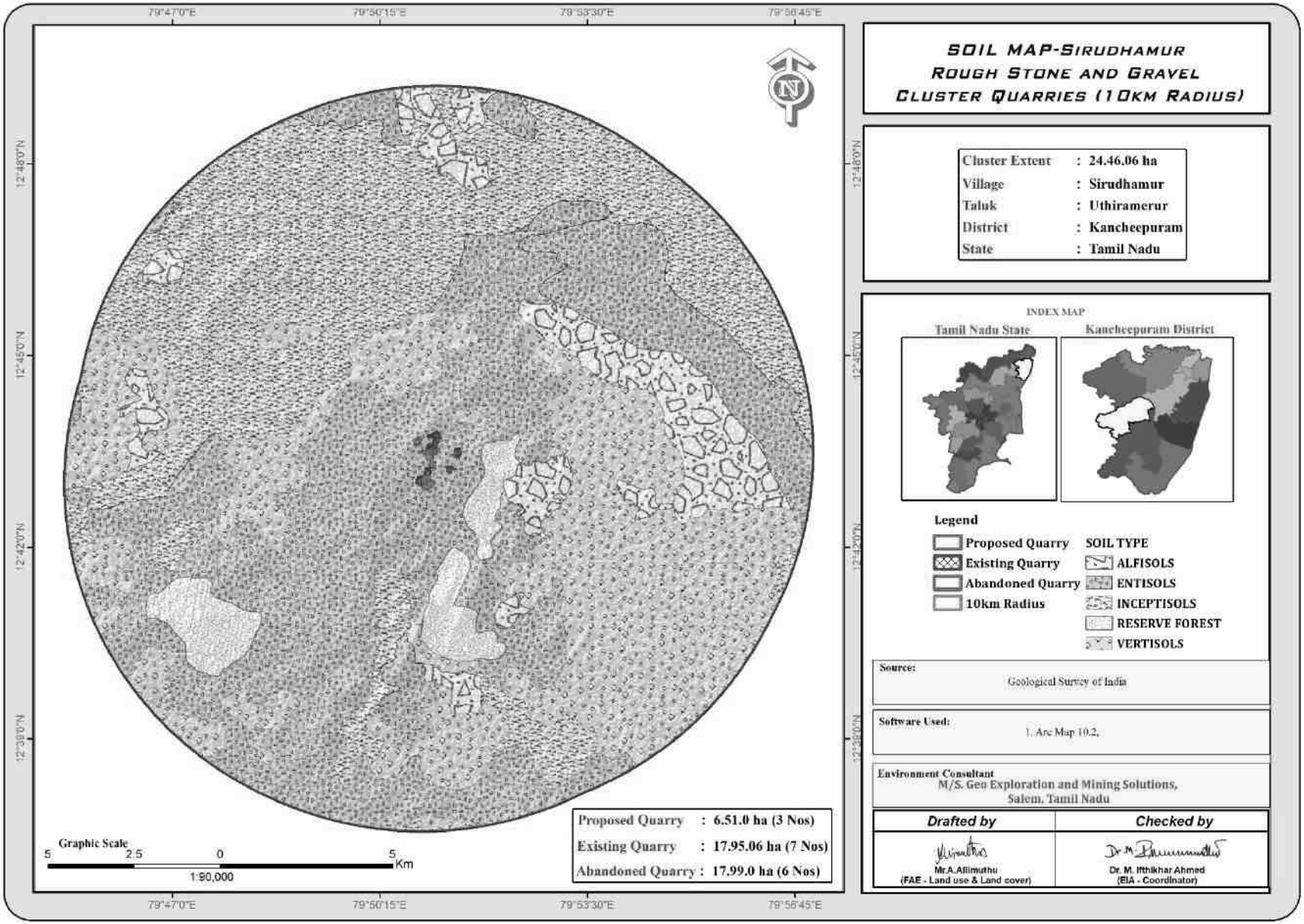


TABLE 3.7 SOIL QUALITY MONITORING DATA

S.No	Parameters	Units	S1	S2	S3	S4	S5	S6	S7
1	pH at 27°C	-	8.46	8.52	8.56	8.2	8.56	8.4	8.26
2	Electrical Conductivity@25°C	µmhos/cm	618	620	620	590	626	590	628
3	Texture	-	Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Loam	Clay loam
4	Sand	%	35.0	37.2	35.4	37.1	33.2	33.2	37.2
5	Slit	%	46.0	44.0	44.7	44.0	44.0	42.4	44.6
6	Clay	%	19.0	18.8	19.9	18.9	22.8	24.4	18.2
7	Water Holding Capacity	%	45.2	45.0	45.7	45.8	45.2	47.2	47.2
8	Bulk Density	g/cc	1.51	1.35	1.36	1.22	1.36	1.45	1.32
9	Porosity	%	40.8	38.0	41.0	38.1	41.4	41.4	39.6
10	Calcium (as Ca)	mg/Kg	215	230	210	228	210	224	212
11	Magnesium (as Mg)	mg/Kg	110	126	128	130	110	130	115
12	Manganese (as Mn)	mg/Kg	21.0	24.2	23.1	18.4	18.6	25.6	23.4
13	Zinc as Zn	mg/Kg	0.86	1.20	1.10	1.12	1.20	1.18	1.18
14	Available Boron (as B)	mg/Kg	1.70	1.60	1.52	1.56	1.40	1.42	1.70
15	Soluble Chloride (as Cl)	mg/Kg	212	198	190	186	212	194	190
16	Soluble Sulphate (as $S0_4$)	%	0.18	0.02	0.022	0.022	0.020	0.024	0.012
17	Available Potassium (as K)	mg/Kg	35.4	35.0	36.8	34.8	37.4	37.4	37.2
18	Available Phosphorous (as P)	mg/Kg	1.52	1.30	1.52	1.32	1.60	1.54	1.36
19	Available Nitrogen (as N)	mg/Kg	176	192	190	190	176	190	190
20	Cadmium (as Cd)	mg/Kg	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
21	Chromium (asCr)	mg/Kg	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
22	Copper(asCu)	mg/Kg	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)	BDL (DL: 1.0)
23	Lead (asPb)	mg/Kg	0.38	0.38	0.38	0.38	0.30	0.38	0.36
24	Total Iron	mg/Kg	1.8	1.8	1.4	1.8	1.7	1.2	1.8
25	Organic Matter	%	2.8	3.2	4.2	4.2	3.8	4.6	3.8
26	Organic Carbon	%	1.6	1.86	2.4	2.4	2.2	2.6	2.2
27	CEC	meq/l00g	37.8	37.6	37.8	39.2	37.6	37.8	36.2

Source: Sampling Results by Chennai Mettex Lab Private Limited

Interpretation & Conclusion

Physical Characteristics –

The physical properties of the soil samples were examined for texture, bulk density, porosity and water holding capacity. The soil texture found in the study area is Clay Loam Soil and Bulk Density of Soils in the study area varied between 1.22 – 1.51 g/cc. The Porosity of the soil samples is found to be medium i.e., ranging from 38 – 41.4 %.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline in nature with pH range 8.2 to 8.56
- The available Nitrogen content range between 176 to 192 kg/ha
- The available Phosphorus content range between 1.30 to 1.60 kg/ha
- The available Potassium range between 34.8to 37.4 mg/kg

Whereas, the micronutrient as zinc (Zn), iron (Fe) and copper (Cu) were found in the range of 0.86 to 1.2mg/kg; 1.2 to 1.8mg/kg and ND

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

3.2 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:

Two rivers are passing on the North and West side (Palar River – 4.7 km North & Cheyyar River – 3.0km Northwest). The area is studded with few tanks that serve as the source for agriculture and also their surplus feeds adjoining tanks.

3.2.2 Ground Water Resources:

The district is underlain by both porous and fissured formations, Unconsolidated & Semi-consolidated formations and Weathered, Fissured and fractured crystalline rocks constitute the important aquifer systems in the Kanchipuram region. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter points. Proterozoic formation is the basement rocks which consist of quartzite, crystalline limestone, calcgranulite, hornblende – biotite gneiss, charnockite or pyroxene granulite, granite and pegmatite. Weathered, a fissured crack, shear zones and joints in the basement rock act as a good groundwater potential zone in the study area

The study area falls in the Vembakkam block which is categorized as safe zone as per G.O (MS) No 113 dated 09.06.2016.

3.2.3 Methodology

Reconnaissance survey was undertaken to collect the sampling and locations were finalized based on;

1. Drainage pattern;
2. Location of residential areas representing different activities/likely impact areas; and
3. Likely areas, which can represent baseline conditions

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

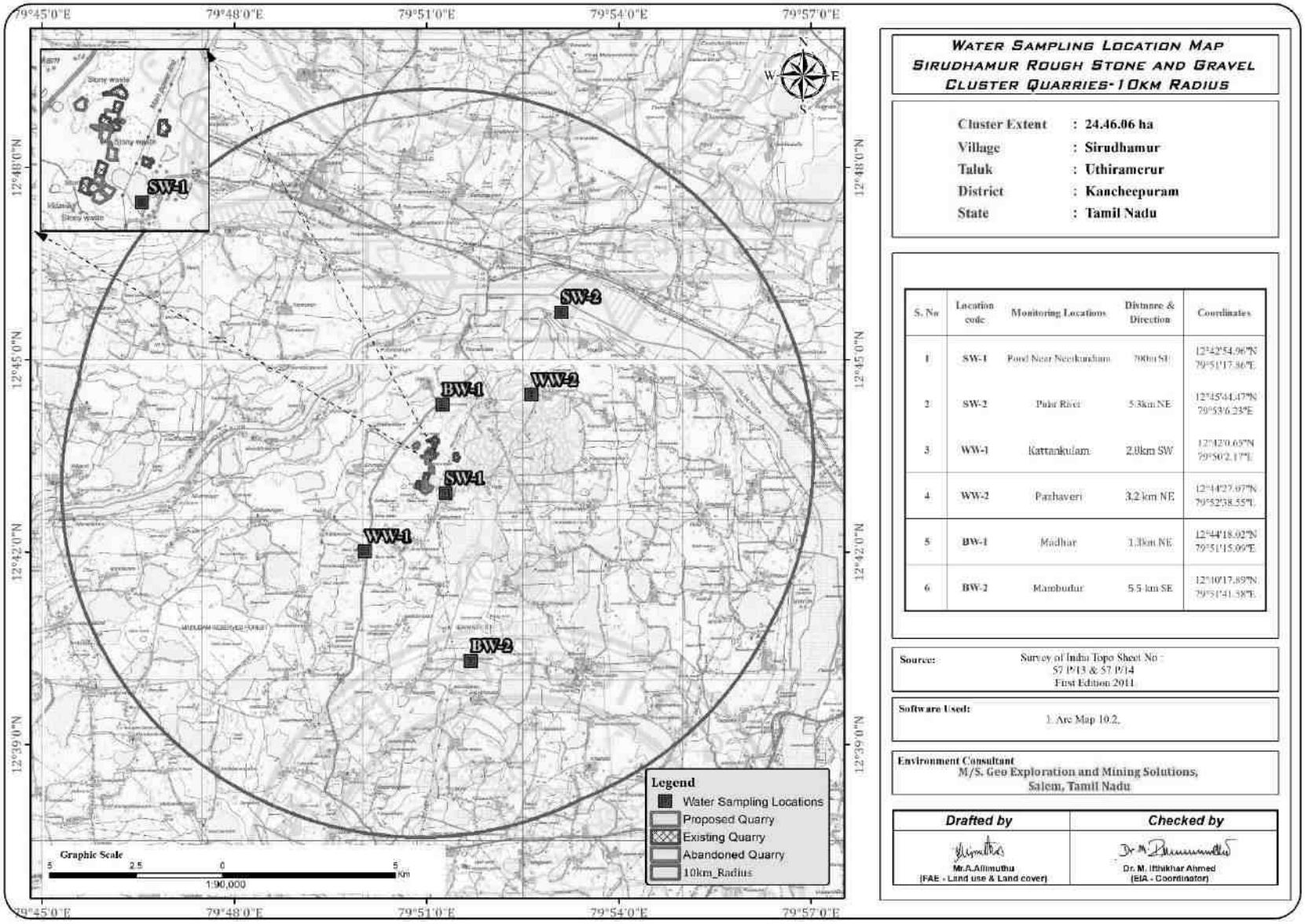
TABLE 3.8: WATER SAMPLING LOCATIONS

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	SW-1	Pond Near Neerkundram	700m SE	12°42'54.96"N 79°51'17.86"E
2	SW-2	Palar River	5.8km NE	12°45'44.47"N 79°53'6.23"E
3	WW-1	Kattankulam	2.8km SW	12°42'0.65"N 79°50'2.17"E
4	WW-2	Pazhaveri	3.5 km NE	12°44'27.07"N 79°52'38.55"E
5	BW-1	Madhur	1.7km NE	12°44'18.02"N 79°51'15.09"E
6	BW-2	Mambudur	5.5 km SE	12°40'17.89"N 79°51'41.58"E

Source: On-site monitoring/sampling by Chennai Mettex Lab Private Limited in association with GEMS

Figure 3.5: Water Sample Collection Photographs

Figure 3.6: Water Sampling Locations around 10 Km Radius



WATER SAMPLING LOCATION MAP
SIRUDHAMUR ROUGH STONE AND GRAVEL CLUSTER QUARRIES-10KM RADIUS

Cluster Extent	: 24.46.06 ha
Village	: Sirudhamur
Taluk	: Uthiramerur
District	: Kancheepuram
State	: Tamil Nadu

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	SW-1	Pond Near Neelkundram	700m SE	12°42'54.96"N 79°51'17.86"E
2	SW-2	Palar River	5.8km NE	12°45'44.47"N 79°53'6.23"E
3	WW-1	Kattankulam	2.8km SW	12°42'0.69"N 79°50'2.17"E
4	WW-2	Pazhaveri	3.2 km NE	12°44'27.97"N 79°52'38.55"E
5	BW-1	Madhar	1.3km NE	12°44'18.02"N 79°51'15.09"E
6	BW-2	Mambudur	5.5 km SE	12°40'17.89"N 79°51'41.38"E

Source: Survey of India Topo Sheet No : 57 P/13 & 57 P/14 First Edition 2011

Software Used: 1. Arc Map 10.2.

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Drafted by	Checked by
Mr.A.Alimuthu (FAE - Land use & Land cover)	Dr. M. Ithikhar Ahmed (EIA - Coordinator)

TABLE 3.9 GROUND WATER ANALYSIS RESULTS

S.No	Parameters	Units	Results				Standards as Per IS 10500: 2012	
			WW1	WW2	BW1	BW2	Requirement (Acceptable limit)	Permissible limit in the absence of alternate source
1	Color	Hazen	< 5	6	5	< 5	5	15
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	pH@ 25ºC	-	7.78	7.52	7.58	7.66	6.5-8.5	No relaxation
5	Conductivity @ 25°C	µmhos/cm	874	872	874	882		
6	Turbidity	NTU	1.8	1.5	2.0	2.0	1	5
7	Total Dissolved Solids	mg /l	524	480	480	485	500	2000
8	Total Hardness as $CaCO_3$	mg/l	168	164	148	160	200	600
9	Calcium as Ca	mg/l	52	48	42	44	75	200
10	Magnesium as Mg	mg/l	9.3	10.6	10.4	12.1	30	100
11	Total Alkalinity as $CaCO_3$	mg/l	184	178	196	180	200	600
12	Chloride as Cl^-	mg/l	148	146	138	152	250	1000
13	Sulphate as SO_4^-	mg/l	42	32	40	44	200	400
14	Iron as Fe	mg/l	0.28	0.30	0.28	0.28	0.3	No relaxation
15	Free Residual Chlorine	mg/l	BDL (DL:0.1)				0.2	1
16	Fluoride as F	mg/l	0.36	0.35	0.45	0.36	1.0	1.5
17	Nitrates as NO_3	mg/l	15.0	15.4	18.4	20.1	45	No relaxation
18	Copper as Cu	mg/l	BDL (DL:0.01)				0.05	1.5
19	Manganese as Mn	mg/l	BDL (DL:0.02)				0.1	0.3
20	Mercury as Hg	mg/l	BDL (DL:0.0005)				0.001	No relaxation
21	Cadmium as Cd	mg/l	BDL (DL:0.001)				0.003	No relaxation
22	Selenium as Se	mg/l	BDL (DL:0.005)				0.01	No relaxation
23	Aluminium as Al	mg/l	BDL (DL:0.005)				0.03	0.2
24	Lead as Pb	mg/l	BDL (DL:0.005 l)				0.01	No relaxation
25	Zinc as Zn	mg/l	BDL (DL: 0.05)				5	15

26	Total Chromium	mg/l	BDL (DL: 0.02)				0.05	No relaxation
27	Boron as B	mg/l	BDL (DL: 0.05)				0.5	1.0
28	Mineral Oil	mg/l	BDL (DL: 0.01)				0.5	No relaxation
29	Phenolic Compounds as C_6H_5OH	mg/l	BDL (DL:0.0005)				0.001	0.002
30	Anionic Detergents as MBAS	mg/l	BDL (DL:0.01 l)				0.2	1.0
31	Cyanide as CN	mg/l	BDL (DL:0.01 l)				0.05	No relaxation
35	Barium as Ba	mg/l	BDL(DL:0.05)					Shall not be detectable in any100 ml
36	Ammonia (as total ammonia-N)	mg/l	BDL (DL:0.01)					
37	Sulphide as H2S	mg/l	BDL (DL:0.01)				0.7	No relaxation
38	Molybdenum as Mo	mg/l	BDL (DL:0.02)				0.5	No relaxation
39	Total Arsenic as As	mg/l	BDL (DL:0.005 l)				0.05	No relaxation
40	Total Suspended Solids	mg/l	BDL (DL:1.0 l)				0.07	No relaxation
41	Total Coliform	MPN/100ml	350	240	280	210		
42	Escherichia coli	MPN/100ml	<1.8				0.01	0.05

Source: Sampling Results by Chennai Mettex Lab Private Limited

* IS: 10500:2012-Drinking Water Standards; # within the permissible limit as per the WHO Standard. The water can be used for drinking purpose in the absence of alternate sources. Note: SW- Surface water, GW – Ground water.

TABLE 3.10: SURFACE WATER ANALYSIS RESULTS

Sl. No.	Parameter	Unit	Results		CPCP Designated Best Use
			SW1	SW2	
1	Color	Hazen	7 Hazen	10 Hazen	300
2	Odour	-	Agreeable	Agreeable	Not specified
3	Taste	-	Agreeable	Agreeable	Not specified
4	pH@ 25ºC	-	7.58	7.78	6.5 – 8.5
5	Conductivity @ 25°C	µmhos/cm	915	920	Not specified
6	Turbidity	NTU	2.8	2.5	1500
7	Total Dissolved Solids	mg /l	549	552	Not specified
8	Total Hardness as $CaCO_3$	mg/l	166	168	Not specified
9	Calcium as Ca	mg/l	52	48	Not specified
10	Magnesium as Mg	mg/l	8.7	11.6	Not specified
11	Total Alkalinity as $CaCO_3$	mg/l	210	208	600
12	Chloride as Cl^-	mg/l	140	146	400
13	Sulphate as SO_4^-	mg/l	32	42	50
14	Iron as Fe	mg/l	0.28	0.44	400
15	Free Residual Chlorine	mg/l	BDL (DL:0.1)		1.5
16	Fluoride as F	mg/l	0.38	0.36	50
17	Nitrates as NO_3	mg/l	18.2	24.8	1.5
18	Copper as Cu	mg/l	BDL (DL:0.01)		Not specified
19	Manganese as Mn	mg/l	BDL (DL:0.02)		Not specified
20	Mercury as Hg	mg/l	BDL (DL:0.0005)		0.01
21	Cadmium as Cd	mg/l	BDL (DL:0.001)		Not specified
22	Selenium as Se	mg/l	BDL (DL:0.005)		Not specified
23	Aluminium as Al	mg/l	BDL (DL:0.005)		0.1
24	Lead as Pb	mg/l	BDL (DL:0.005 l)		15
25	Zinc as Zn	mg/l	BDL (DL: 0.05)		0.05
26	Total Chromium	mg/l	BDL (DL: 0.02)		Not specified
27	Boron as B	mg/l	BDL (DL: 0.05)		Not specified
28	Mineral Oil	mg/l	BDL (DL: 0.01)		0.005
29	Phenolic Compounds as C_6H_5OH	mg/l	BDL (DL:0.0005)		Not specified
30	Anionic Detergents as MBAS	mg/l	BDL (DL:0.01 l)		0.05
31	Cyanide as CN	mg/l	BDL (DL:0.01 l)		5000
32	BOD @ 27°C for 3 days	mg/l	BDL(DL:2.0 mg/l)	4	Not specified
33	Chemical Oxygen Demand	mg/l	10	12	300
34	Dissolved Oxygen	mg/l	6.2	5.8	Not specified
35	Barium as Ba	mg/l	BDL(DL:0.05 mg/l)		Not specified
36	Ammonia (as total ammonia-N)	mg/l	BDL (DL:0.01 mg/l)		Not specified
37	Sulphide as H2S	mg/l	BDL (DL:0.01 mg/l)		0.2
38	Molybdenum as Mo	mg/l	BDL (DL:0.02 mg/l)		Not specified
39	Total Arsenic as As	mg/l	BDL (DL:0.005 mg/l)		Not specified
40	Total Suspended Solids	mg/l	22	18	Not specified
41	Total Coliform	MPN/100ml	1600	1600	Not specified
42	Escherichia coli	MPN/100ml	140	110	Not specified

Source: Sampling Results by Chennai Mettex Lab Private Limited

3.2.4 Interpretation& Conclusion

Surface Water

The pH varied from 7.58 to 7.78 while turbidity found within the standards. Total Dissolved Solids varied from 549 to 552mg/l and Chloride varied between 140 mg/l and 146.0 mg/l. Nitrates varied from 18.2 to 24.8mg/l, while sulphates varied from 32 to 42mg/l.

Ground Water

The pH of the water samples collected ranged from 7.52 to 7.78 and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. on Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 480-524 mg/l in all samples. The Total hardness varied between 148-168 mg/l for all samples.

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

3.2.5 Hydrology and Hydrogeological studies

The district is underlain by both porous and fissured formations. Unconsolidated & Semi-consolidated formations and Weathered, Fissured and Fractured crystalline rocks constitute the important aquifer systems in the district. The porous formations in the district include sandstones and clays of Recent to sub recent and Tertiary age (Quaternary). The alluvial formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district. The area falls in two major river basins namely Palar River and Cheyyar River. River Palar originates from the Nandi hills in Chikkabalapur District, Karnataka State and flows in the easterly and south-eastern direction before it debouches into Gulf of Mannar. The river has a number of tributaries and major tributes of Ponnai and Cheyyar river.

TABLE 3.11: POST MONSOON WATER LEVEL OF OPEN WELLS 1 KM RADIUS

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Oct 2022	Nov 2022	Dec 2022	Average		
OW1	8	10	11	9.7	12° 44' 16.10"N	79° 41' 57.52"E
OW2	7	9	10	8.7	12° 44' 20.80"N	79° 42' 00.44"E
OW3	9	11	12	10.7	12° 44' 34.97"N	79° 42' 06.91"E
OW4	9.5	11.5	12.5	11.2	12° 44' 32.98"N	79° 42' 17.70"E
OW5	7.8	9.8	10.8	9.5	12° 44'15.19"N	79°42'32.16"E
OW6	8	10	11	9.7	12° 44' 07.95"N	79° 42' 31.76"E
OW7	8.2	10.2	11.2	9.9	12° 43' 53.11"N	79° 42' 32.08"E
OW8	8.8	10.8	11.8	10.5	12° 43' 50.72"N	79° 42' 14.18"E
OW9	7.5	9.5	10.5	9.2	12° 43' 30.32"N	79° 42' 16.56"E
OW10	7.3	9.3	10.3	9.0	12° 43' 36.62"N	79° 41' 49.88"E
OW11	8.4	10.4	11.4	10.1	12° 43' 31.71"N	79° 41' 38.54"E
OW12	9.2	11.2	12.2	10.9	12° 43' 50.91"N	79° 41' 48.36"E
OW13	8.2	10.2	11.2	9.9	12° 44' 02.69"N	79° 41' 26.42"E
OW14	7.5	9.5	10.5	9.2	12° 44' 06.85"N	79° 41' 37.46"E
OW15	8	10	11	9.7	12° 44' 40.71"N	79° 41' 39.72"E
OW16	7	9	10	8.7	12° 44' 32.55"N	79° 41' 54.47"E
OW17	7.8	9.8	10.8	9.5	12° 44' 46.64"N	79° 41' 47.87"E
OW18	9.5	11.5	12.5	11.2	12° 44' 43.45"N	79° 42' 15.85"E
OW19	9.3	11.3	12.3	11.0	12° 44' 55.54"N	79° 42' 18.84"E
OW20	8.4	10.4	11.4	10.1	12° 44' 38.42"N	79° 42' 34.91"E
OW21	7.3	9.3	10.3	9.0	12° 44' 34.46"N	79° 42' 39.96"E

Source: Onsite monitoring data

TABLE 3.12: POST MONSOON WATER LEVEL OF BOREWELLS 1 KM RADIUS

Station Code	Water Level in Meters bgl				Latitude	Longitude
	Oct 2022	Nov 2022	Dec 2022	Average		
BW1	82	84	86	84	12° 43' 57.14"N	79° 41' 55.29"E
BW2	80	82	84	82	12° 44' 23.33"N	79° 41' 59.20"E
BW3	77	79	81	79	12° 44' 24.27"N	79° 41' 31.89"E
BW4	65	67	69	67	12° 44' 55.05"N	79° 42' 01.46"E
BW5	76	78	80	78	12° 44' 40.69"N	79° 42' 25.66"E
BW6	65	67	69	67	12° 44' 45.99"N	79° 42' 40.75"E
BW7	63	65	67	65	12° 44' 08.14"N	79° 42' 18.82"E
BW8	68	70	72	70	12° 43' 42.16"N	79° 42' 24.13"E
BW9	60	62	64	62	12° 43' 26.92"N	79° 42' 24.70"E
BW10	75	77	79	77	12° 43' 37.61"N	79° 41' 32.67"E

Source: Onsite monitoring data

Figure 3.7: Open Well Contour Map – October 2022

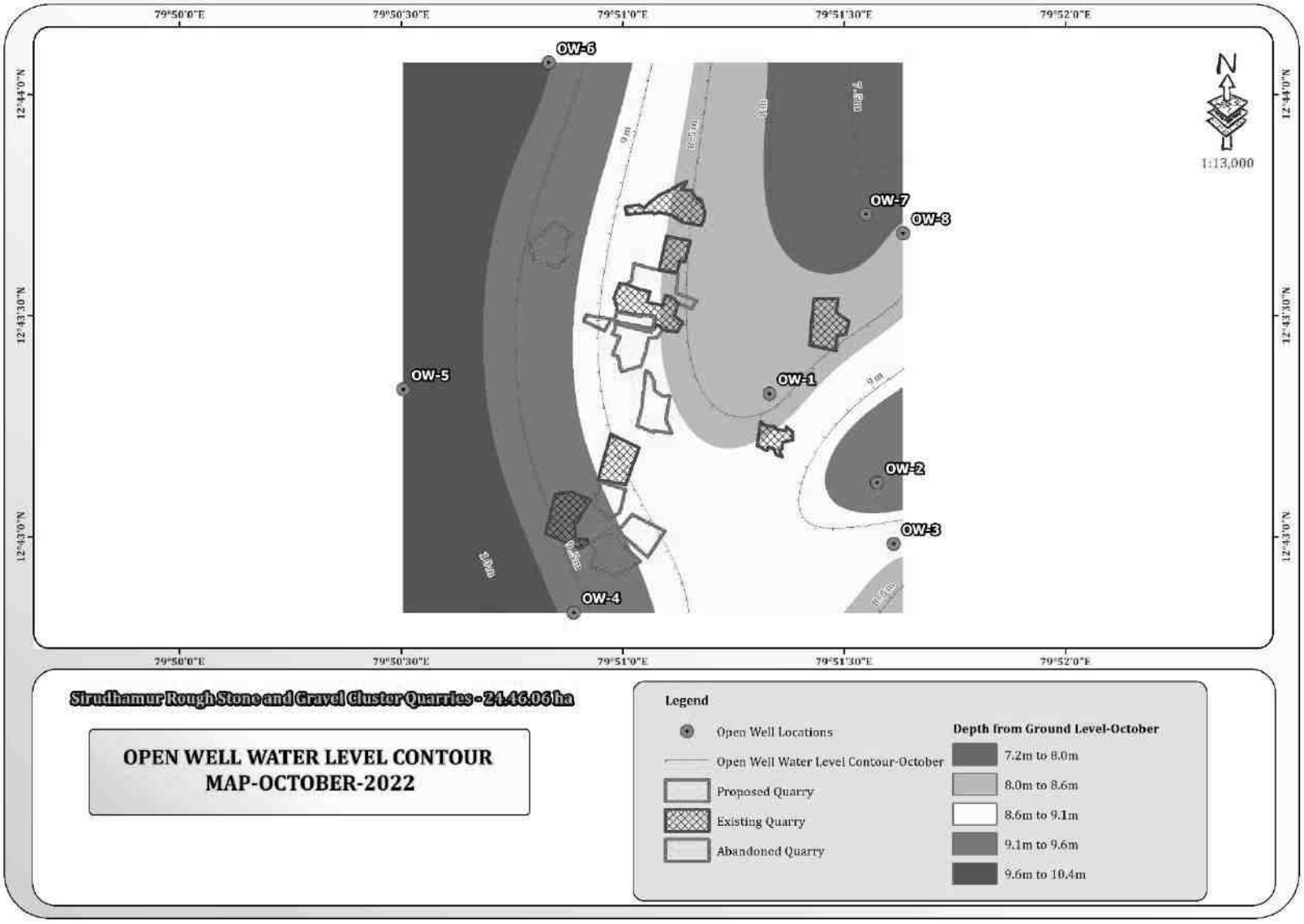


Figure 3.8: Open Well Contour Map – November 2022

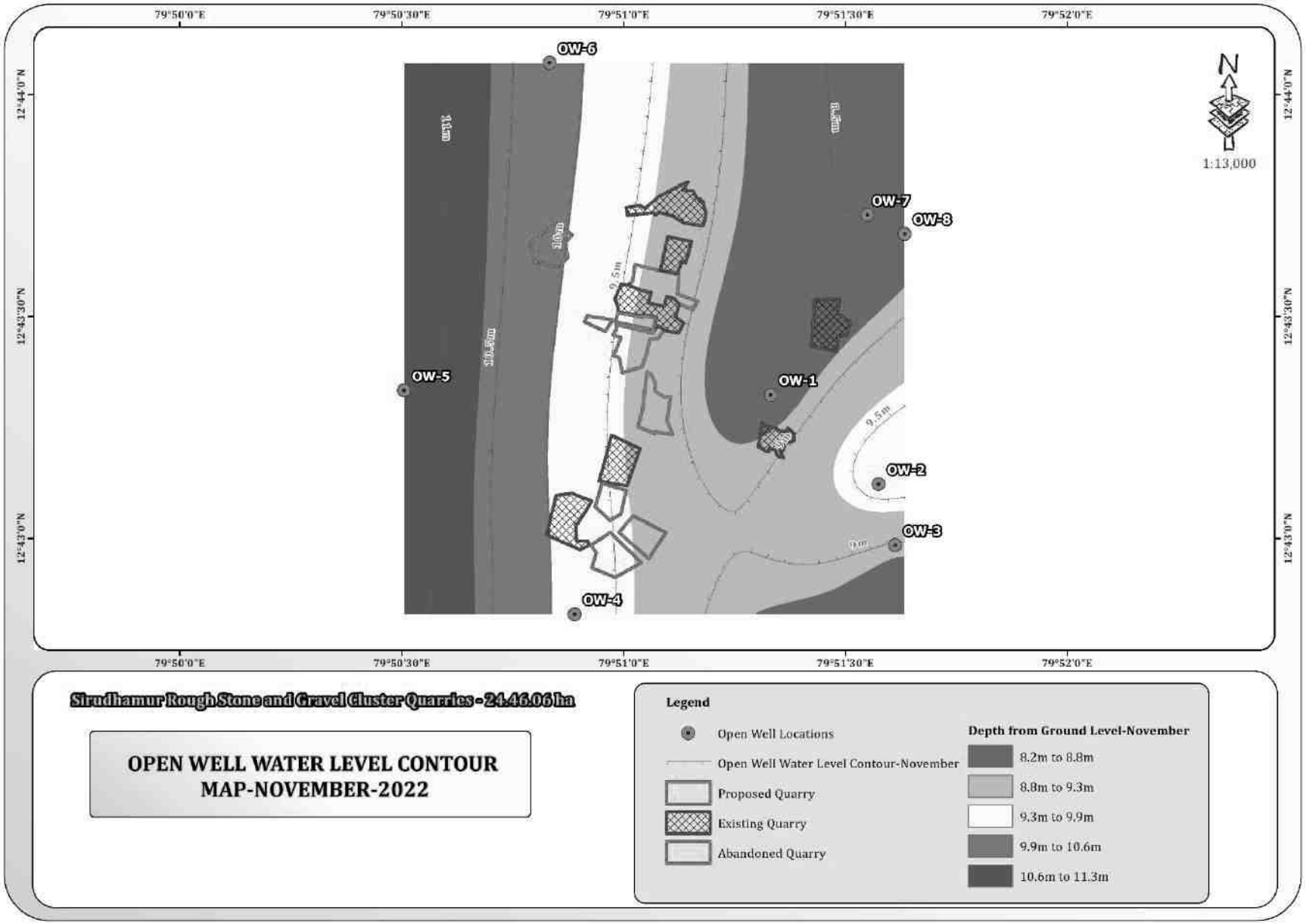


Figure 3.9: Open Well Contour Map – December 2022

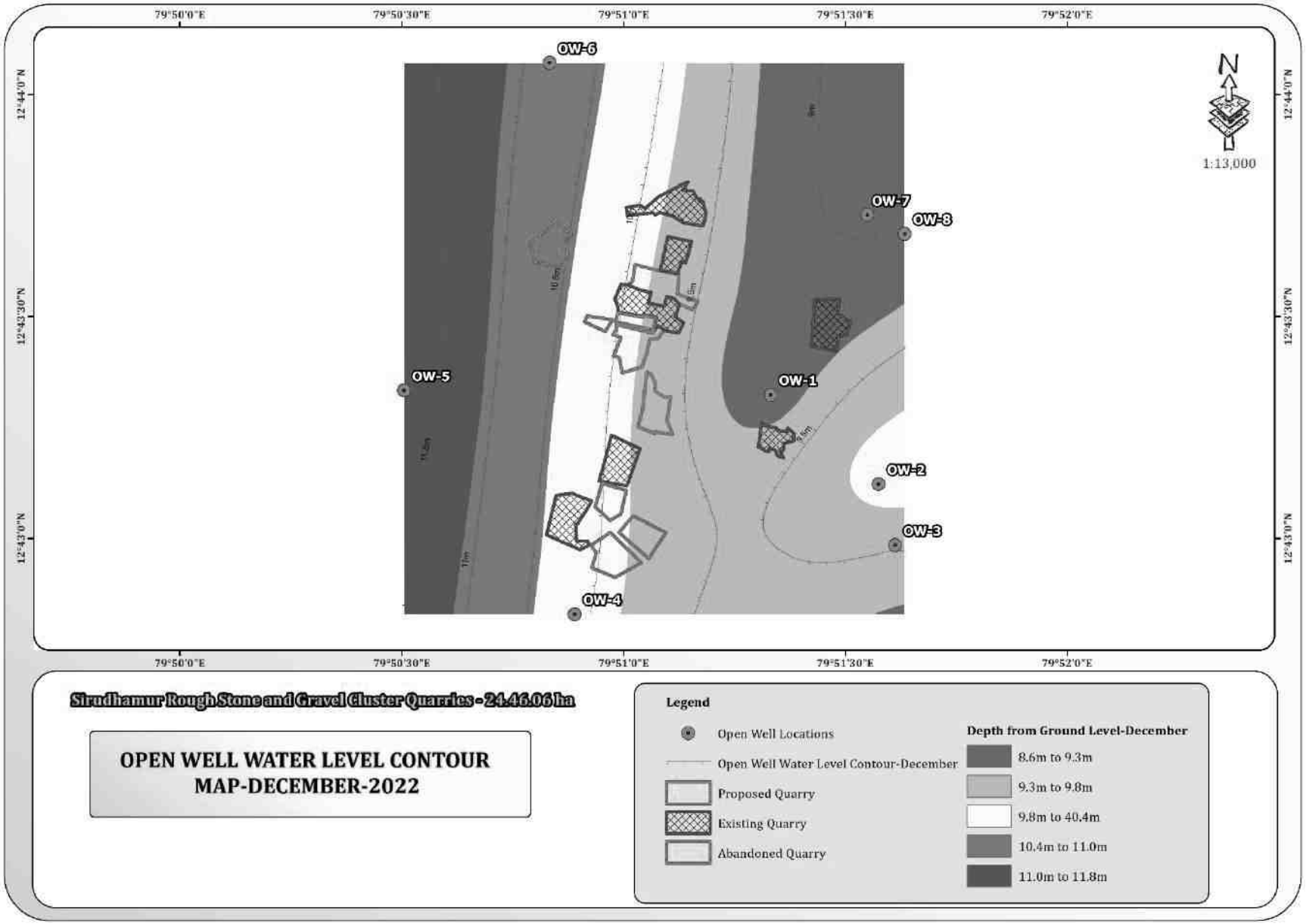


Figure 3.10: Borewell Contour Map – October 2022

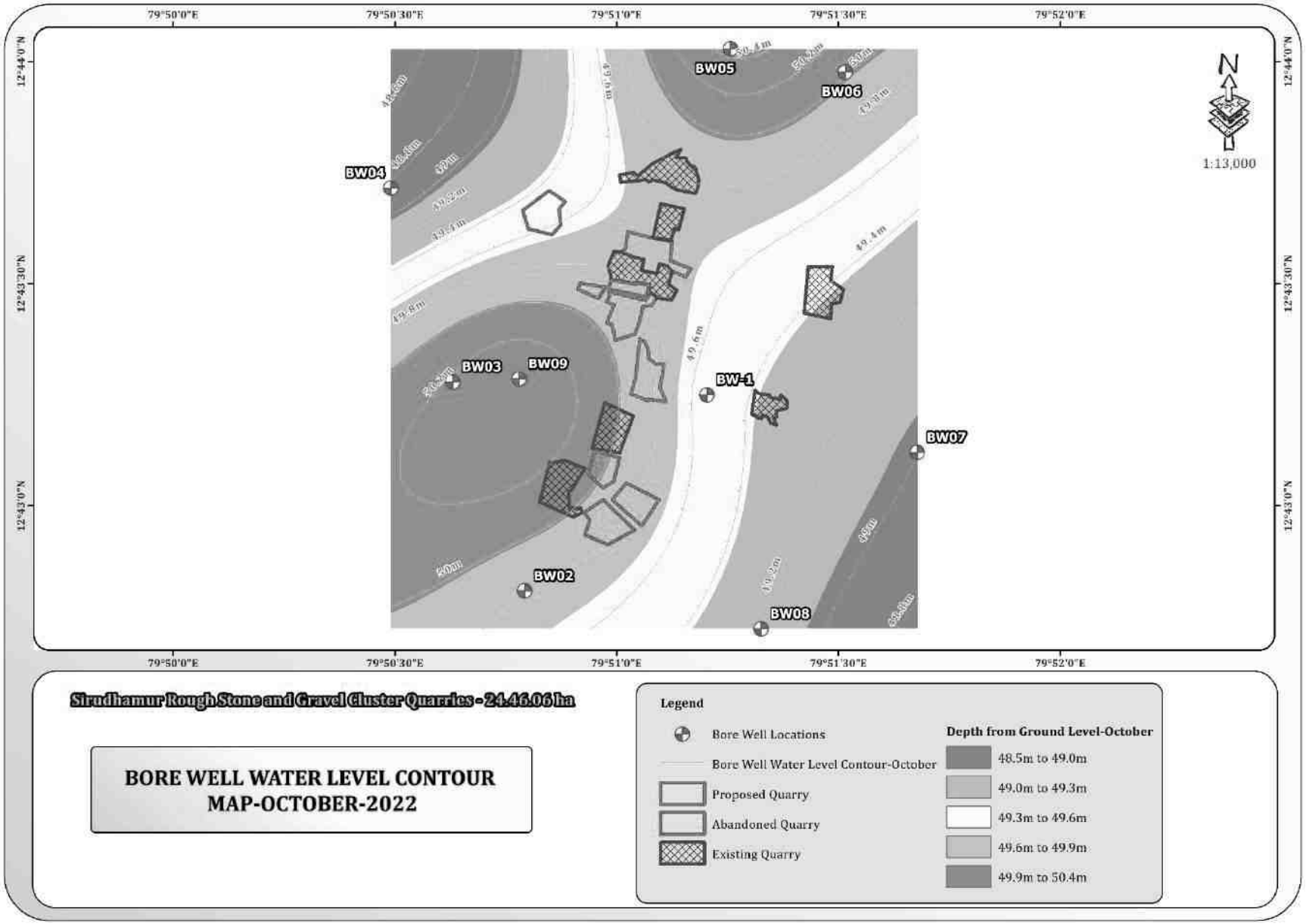


Figure 3.11: Borewell Contour Map – November 2022

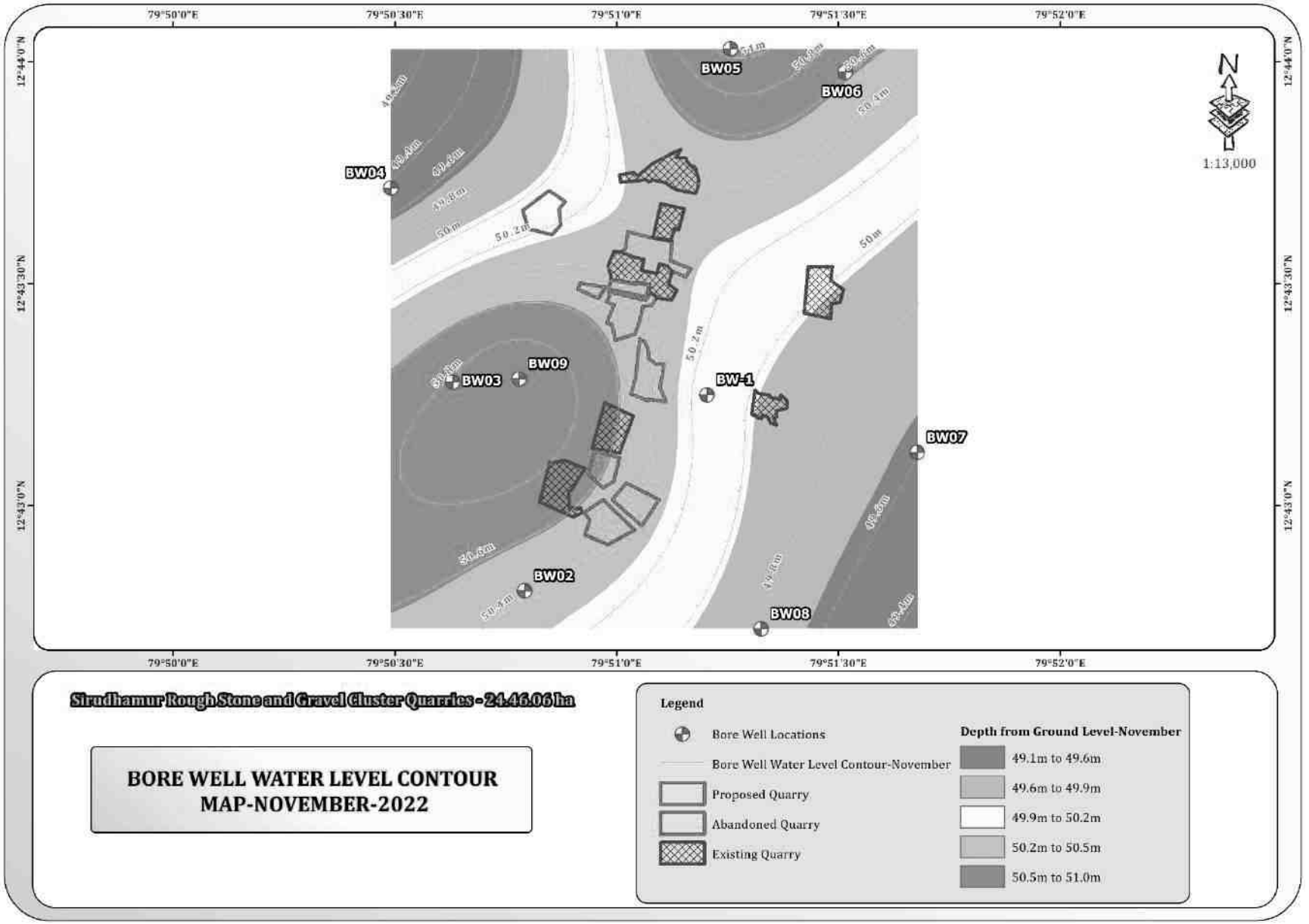


Figure 3.12: Borewell Contour Map – December 2022

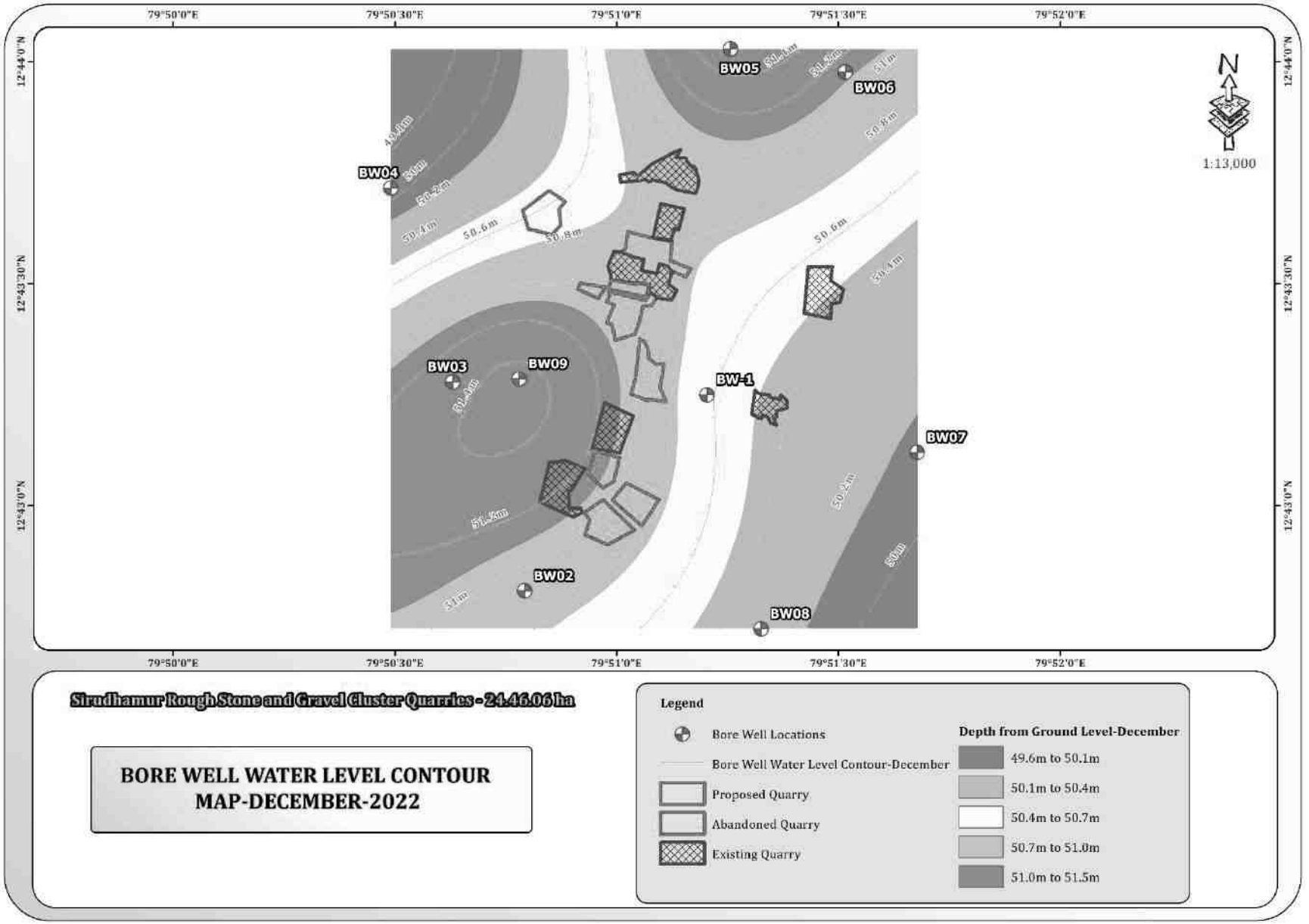


Figure 3.13: Drainage Map Around 10 Km Radius from Project Site

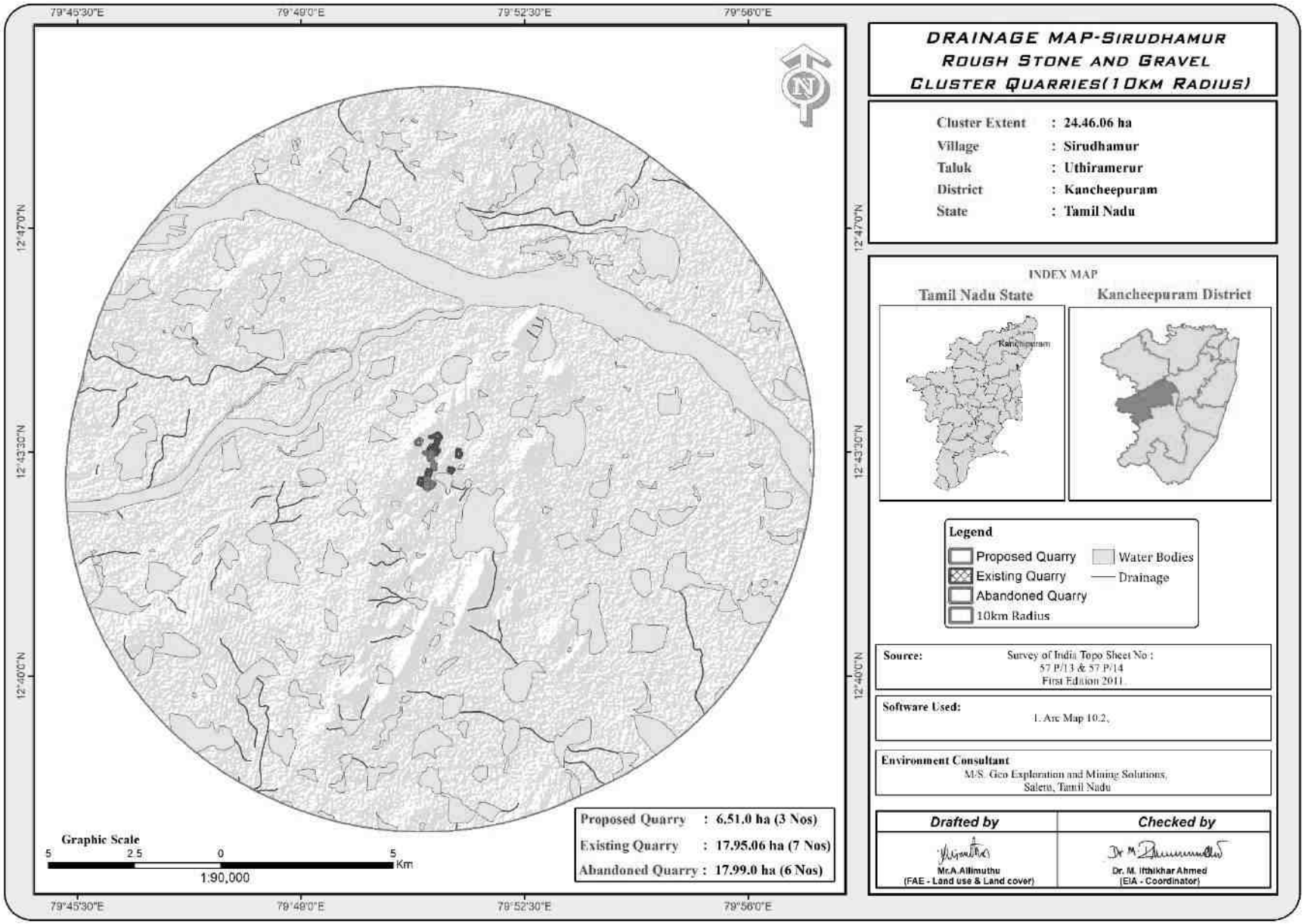
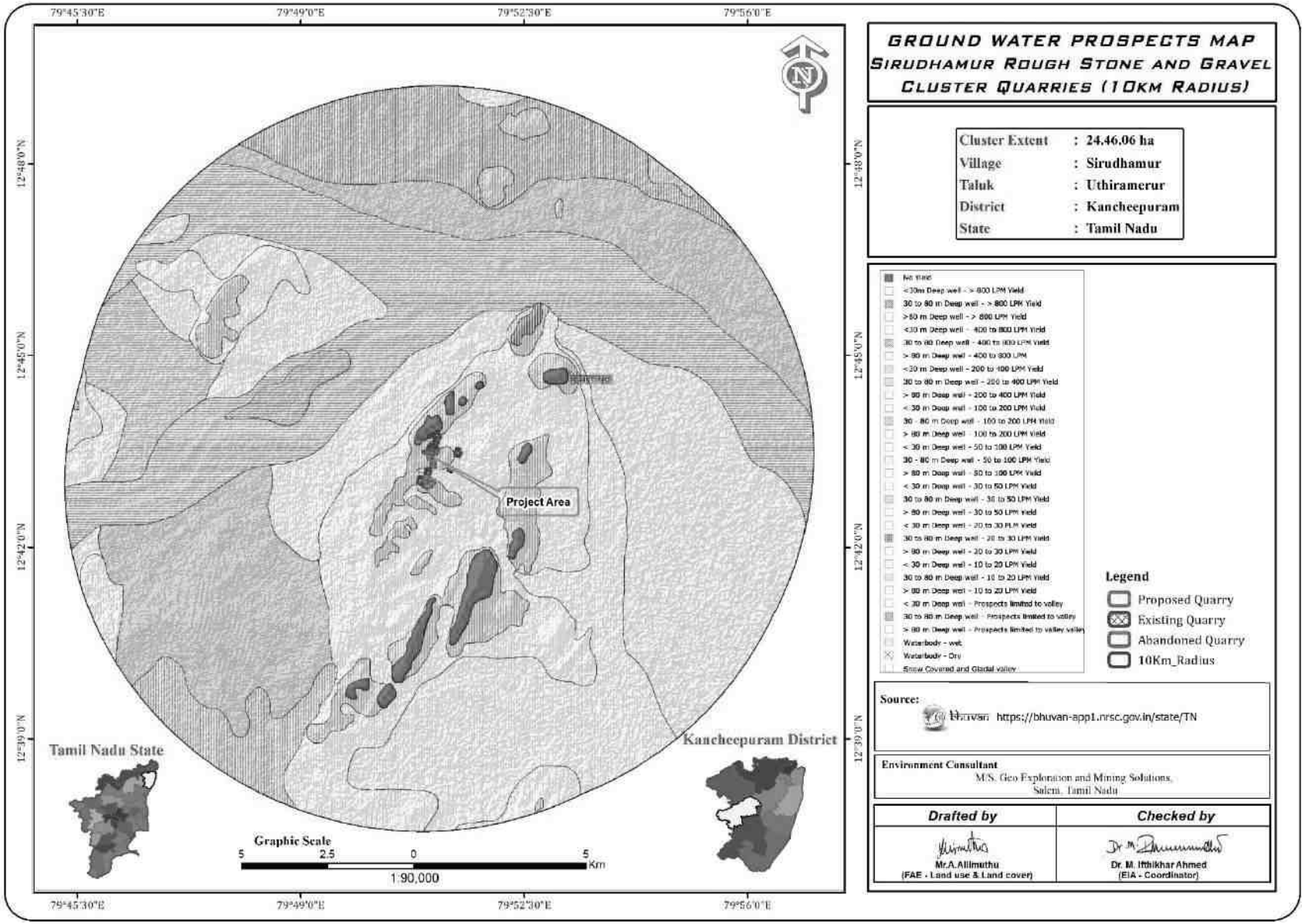


Figure 3.14: Ground Water Level Map



Source: Bhuvan

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 proposed quarry forms the baseline information. The sources of air pollution in the region are mostly due to vehicular traffic, Crushing units near to the project site, 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 mine.

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 the project sites by covering cluster quarries. The station was installed at a height of 3 m above the ground level as there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature. Meteorological data obtained from the onsite monitoring station are provided in Table 3.12.

According to the onsite data, the temperature in October 2022 varied from 26.63 to 28.050C with the average of 27.310C; in November, 2022 from 24.73 to 27.030C with the average of 23.440C; and in December, 2022 from 23.13 to 26.640C with the average of 25.420C. During the period of the three months, relative humidity ranged from 80.79 to 83.94 % in average. The highest average humidity was measured in December 2022, whereas the lowest in November 2022. When speaking about wind speed, the wind speed in October, 2022 varied from 1.46 to 6.38 m/s with the average of 3.36 m/s; in Nov, 2022 from 2.11 to 6.63 m/s with the average of 3.81 m/s; and in Dec, 2022 from 1.91 to 8.97m/s with the average of 4.86 m/s.

Climate –

- ✓ The Kancheepuram are in the middle and the summers are that easy to define.
- ✓ The month with the highest relative humidity is November (78.47 %). The month with the lowest relative humidity is June (55.74 %).
- ✓ The month with the highest number of rainy days is October (19.20 days). The month with the lowest number of rainy days is February (2.43 days).
- ✓ This city has a tropical climate. In winter, there is much less rainfall in Kancheepuram than in summer. The climate here is classified as Aw by the Köppen-Geiger system. The average annual temperature in Kancheepuram is 27.7 °C | 81.9 °F. About 967 mm | 38.1 inch of precipitation falls annually. The temperatures are highest on average in May, at around 31.8 °C | 89.3 °F. January has the lowest average temperature of the year. It is 23.6 °C | 74.5 °F.

- ✓ The variation in the precipitation between the driest and wettest months is 185 mm | 7 inch. During the year, the average temperatures vary by 8.2 °C | 14.8 °F.

Source: https://en.climate-data.org/asia/india/tamil-nadu/kancheepuram-26316/

Rainfall –

TABLE 3.13: RAINFALL DATA

Actual Rainfall in mm					Normal Rainfall in mm
2017	**2018**	**2019**	**2020**	**2021**	
1191.7	833.0	1131.4	1258.4	1698.1	985

TABLE 3.14: METEOROLOGICAL DATA RECORDED AT SITE

S. No.	Parameters		Oct-2022	Nov-2022	Dec-2022
1	Temperature (^{0}C)	Min	26.63	24.73	23.13
		Max	28.05	27.03	26.64
		Avg	**27.31**	**23.44**	**25.42**
2	Relative Humidity (%)	Min	89.88	74.69	78.75
		Max	79.0	91.5	89.31
		Avg	**80.79**	**75.28**	**83.94**
3	Wind Speed (m/s)	Min	1.46	2.11	1.91
		Max	6.38	6.63	8.97
		Avg	**3.36**	**3.81**	**4.86**
4	Wind Direction (degree)	Min	29.62	15	29
		Max	307.44	331.06	345
		Avg	**133.94**	**65.10**	**83.60**
5	Surface Pressure(kPa)	Min	100.1	100.48	100.20
		Max	100.78	100.98	101.33
		Avg	**100.50**	**90.65**	**100.73**

Source: On-site monitoring/sampling by Chennai Mettex Lab Private Limited in association with GEMS

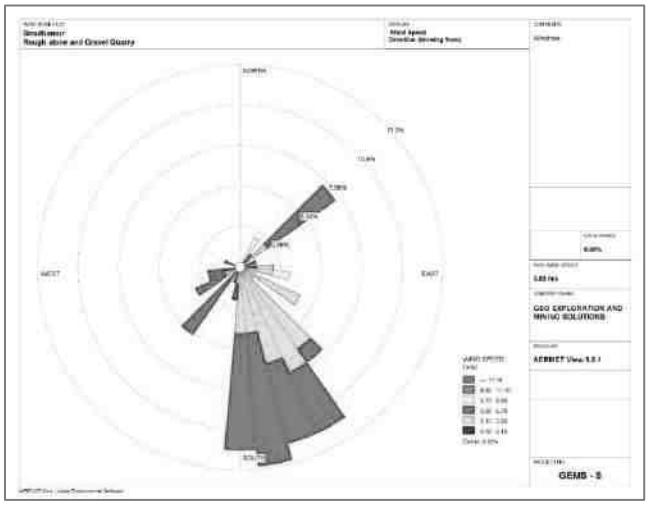
Correlation between Secondary and Primary Data

The meteorological data collected at the site is almost similar to that of secondary data collected from IMD Kancheepuram. A comparison of site data generated during the three months with that of IMD, Kancheepuram reveals the following:

- The average maximum and minimum temperatures of IMD, Kancheepuram showed a higher in respect of on-site data i.e. in Sirudhamur village.
- The relative humidity levels were lesser at site as compared to IMD, Kancheepuram.
- The wind speed and direction at site shows similar trend that of IMD, Kancheepuram.

Windrose diagram of the study site is depicted in Figure. 3.15. Predominant downwind direction of the area during study season is South-East to North West.

Figure 3.15: Wind rose



Environmental in the abstract of collected data wind rose were drawn on presented in figure No.3.15 during the monitoring period in the study area

1. Predominant winds were from South East – North West
2. Wind velocity readings were recorded between 0.50 to 11.10 km / hour
3. Calm conditions prevail of about 6% of the monitoring period
4. Temperature readings ranging from 26.56 to 31.9^{0}C
5. Relative humidity ranging from 70.5 to 75.56 %
6. The monitoring was carried out continuously for three months

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

TABLE 3.15: METHODOLOGY AND INSTRUMENT USED FOR AIR QUALITY ANALYSIS

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 Chennai Mettex Lab Private Limited & 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 (μg/m^3)	Annual Avg.* 24 hours**	50.0 80.0	20.0 80.0
2	Nitrogen Dioxide (μg/m^3)	Annual Avg. 24 hours	40.0 80.0	30.0 80.0
3	Particulate matter (size less than 10μm) PM_{10} (μg/m^3)	Annual Avg. 24 hours	60.0 100.0	60.0 100.0
4	Particulate matter (size less than 2.5 μm $PM_{2.5}$ (μg/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 Nine (9) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period October to December, 2022. 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.

3.3.5 Ambient Air Quality Monitoring Stations

Nine (9) monitoring stations were set up in the study area as depicted in Figure 3.6.1 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

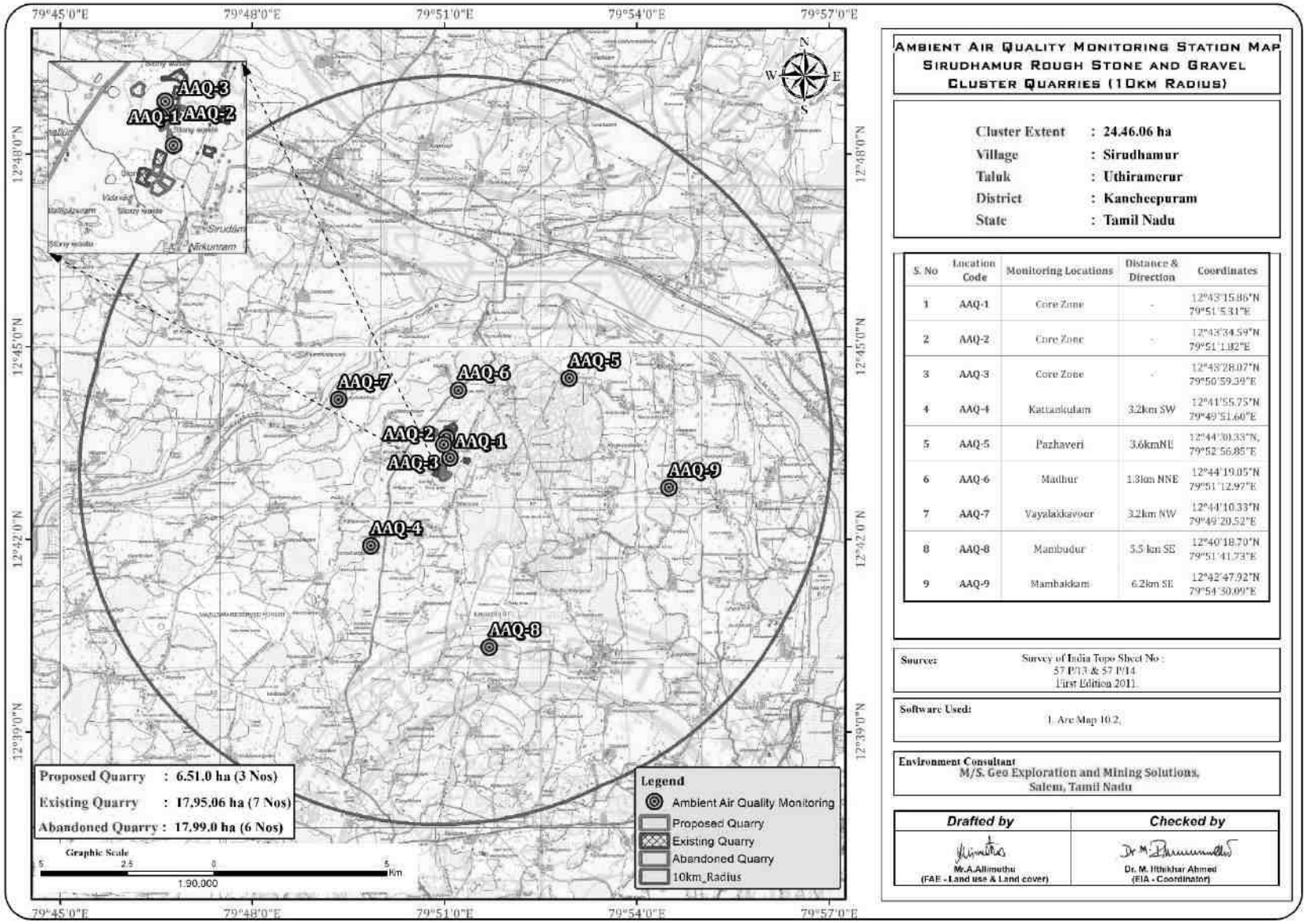
S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ-1	Core Zone	-	12°43'15.86"N 79°51'5.31"E
2	AAQ-2	Core Zone	-	12°43'34.59"N 79°51'1.82"E
3	AAQ-3	Core Zone	-	12°43'28.07"N 79°50'59.39"E
4	AAQ-4	Kattankulam	3.2km SW	12°41'55.75"N 79°49'51.60"E
5	AAQ-5	Pazhaveri	4.0kmNE	12°44’30.33” N, 79°5256.85” E
6	AAQ-6	Madhur	1.7km NNE	12°44'19.05"N 79°51'12.97"E
7	AAQ-7	Vayalakkavoor	3.4km NW	12°44'10.33"N 79°49'20.52"E
8	AAQ-8	Mambudur	5.5 km SE	12°40'18.70"N 79°51'41.73"E
9	AAQ-9	Mambakkam	6.2km SE	12°42'47.92"N 79°54'30.09"E

Source: On-site monitoring/sampling by Chennai Mettex Lab Private Limited in association with GEMS

Figure 3.16: Site photographs of Ambient Air Monitoring

Source: Monitoring photographs by FAE and Team Members

Figure 3.17: Ambient Air Quality Locations around 10 Km Radius



S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ-1	Core Zone	-	12°43'15.86"N 79°51'5.31"E
2	AAQ-2	Core Zone	-	12°43'34.59"N 79°51'1.82"E
3	AAQ-3	Core Zone	-	12°43'28.07"N 79°50'59.39"E
4	AAQ-4	Kattankulam	3.2km SW	12°41'55.75"N 79°49'51.60"E
5	AAQ-5	Pazhaveri	3.6kmNE	12°44'30.33"N, 79°52'56.85"E
6	AAQ-6	Madhur	1.3km NNE	12°44'19.05"N 79°51'12.97"E
7	AAQ-7	Vayalakkavoor	3.2km NW	12°44'10.33"N 79°49'20.52"E
8	AAQ-8	Manibudur	5.5 km SE	12°40'18.70"N 79°51'41.73"E
9	AAQ-9	Mambakkam	6.2km SE	12°42'47.92"N 79°54'30.09"E

TABLE 3.18 SUMMARY OF AAQ RESULT

$PM_{2.5}$					
Station ID	**Max**	**Min**	**Mean**	**98th Percentile**	**STDEV**
AAQ-1	39.4	20.3	29.4	38.61	2.22
AAQ-2	38.3	20.1	29.9	37.53	1.10
AAQ-3	39.4	20.8	29.4	38.61	1.24
AAQ-4	39.2	21.0	28.4	38.42	0.79
AAQ-5	39.2	21.4	29.1	38.42	2.48
AAQ-6	39.8	20.5	29.3	39.00	1.25
AAQ-7	38.8	21.2	29.4	38.02	1.97
AAQ-8	39.9	20.5	28.6	39.10	1.66
AAQ-9	39.9	20.8	30.1	39.10	2.24
PM_{10}					
Station ID	**Max**	**Min**	**Mean**	**98 th Percentile**	**STDEV**
AAQ-1	68.4	51.8	60.4	67.03	2.02
AAQ-2	69.1	50.0	60.5	67.72	1.35
AAQ-3	69.7	50.9	59.2	68.31	1.32
AAQ-4	68.5	51.0	59.6	67.13	1.12
AAQ-5	68.5	51.1	58.3	67.13	1.40
AAQ-6	69.3	52.1	59.5	67.91	1.45
AAQ-7	69.1	50.2	59.9	67.72	1.20
AAQ-8	66.4	51.5	59.8	65.07	1.70
AAQ-9	66.4	50.5	58.1	65.07	2.01
SO_2					
Station ID	**Max**	**Min**	**Mean**	**98 th Percentile**	**STDEV**
AAQ-1	10.3	7.5	8.9	10.09	1.39
AAQ-2	9.3	6.5	8.0	9.11	1.35
AAQ-3	9.3	6.5	8.0	9.11	0.90
AAQ-4	9.3	6.5	8.2	9.11	0.69
AAQ-5	9.3	6.5	8.1	9.11	0.82
AAQ-6	9.3	6.5	8.0	9.11	0.49
AAQ-7	9.3	6.5	8.0	9.11	0.77
AAQ-8	9.3	6.5	7.9	9.11	0.96
AAQ-9	8.4	6.5	7.7	8.23	1.38
NO_2					
Station ID	**Max**	**Min**	**Mean**	**98 th Percentile**	**STDEV**
AAQ-1	23.2	19.8	21.6	22.74	2.49
AAQ-2	23.2	20.7	21.7	22.74	1.63
AAQ-3	23.2	20.7	21.6	22.74	2.41
AAQ-4	23.2	20.7	21.7	22.74	1.41
AAQ-5	23.2	20.7	21.8	22.74	1.07
AAQ-6	23.2	20.7	21.6	22.74	1.28
AAQ-7	23.2	20.7	21.7	22.74	1.34
AAQ-8	23.2	20.7	21.7	22.74	1.75
AAQ-9	23.2	20.7	21.9	22.74	2.51

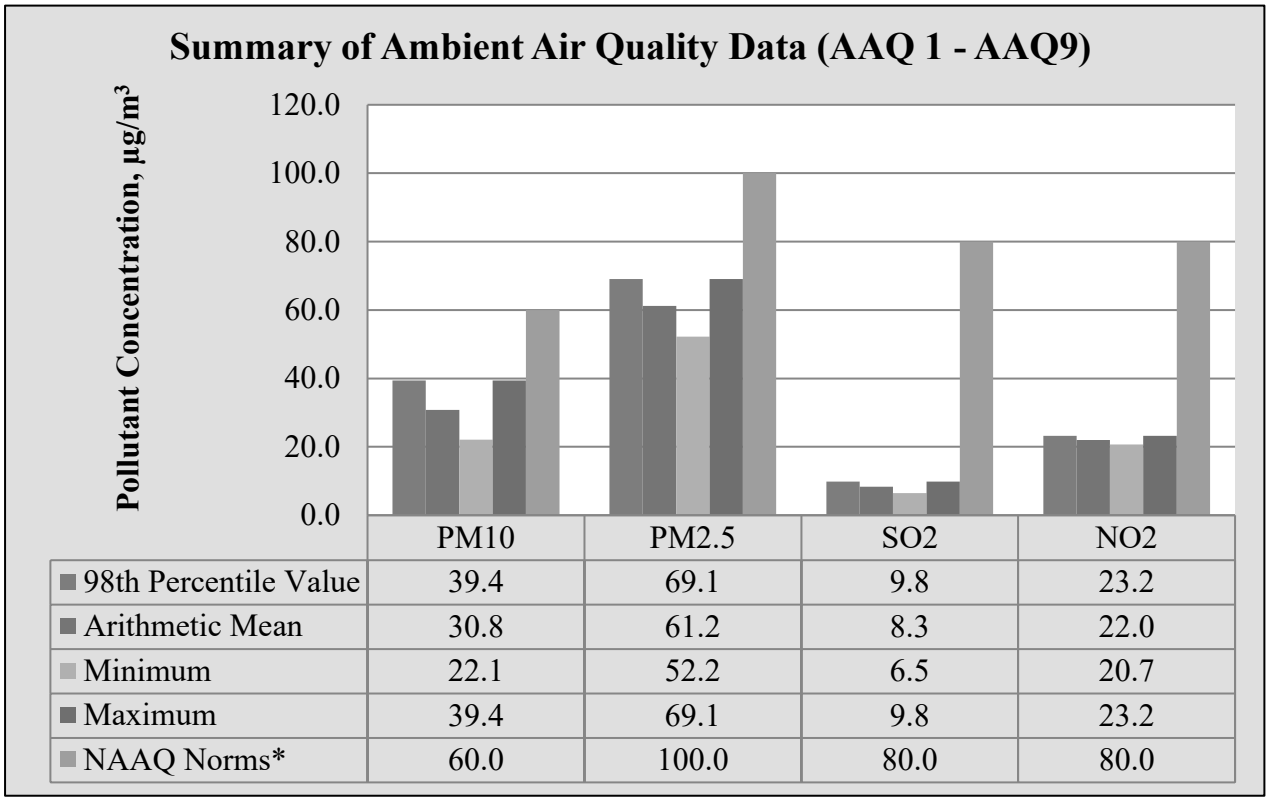
TABLE 3.19: ABSTRACT OF AMBIENT AIR QUALITY DATA

Sl. No.	Parameter	Pollutant Concentration, µg/m^3			
		PM_{10}	**$PM_{2.5}$**	**SO_2**	**NO_2**
1	No. of Observations	260	260	260	260
2	10th Percentile Value	52.2	22.1	6.5	20.7
3	20th Percentile Value	53.8	23.1	6.5	20.7
4	30th Percentile Value	55.5	25.4	7.5	20.7
5	40th Percentile Value	57.6	26.4	8.4	21.5
6	50th Percentile Value	59.2	28.8	8.4	21.5
7	60th Percentile Value	61.9	31.1	8.4	22.3
8	70th Percentile Value	63.2	32.4	8.4	22.3
9	80th Percentile Value	65.5	35.1	9.3	22.3
10	90th Percentile Value	66.9	36.6	9.3	23.2
11	95th Percentile Value	68.4	38.8	9.3	23.2
12	98th Percentile Value	69.1	39.4	9.8	23.2
13	Arithmetic Mean	61.2	30.8	8.3	22.0
14	Geometric Mean	60.9	30.3	8.3	21.9
15	Standard Deviation	6.0	6.2	1.1	1.0
16	Minimum	52.2	22.1	6.5	20.7
17	Maximum	69.1	39.4	9.8	23.2
18	NAAQ Norms*	**100.0**	**60.0**	**80.0**	**80.0**
19	% 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.

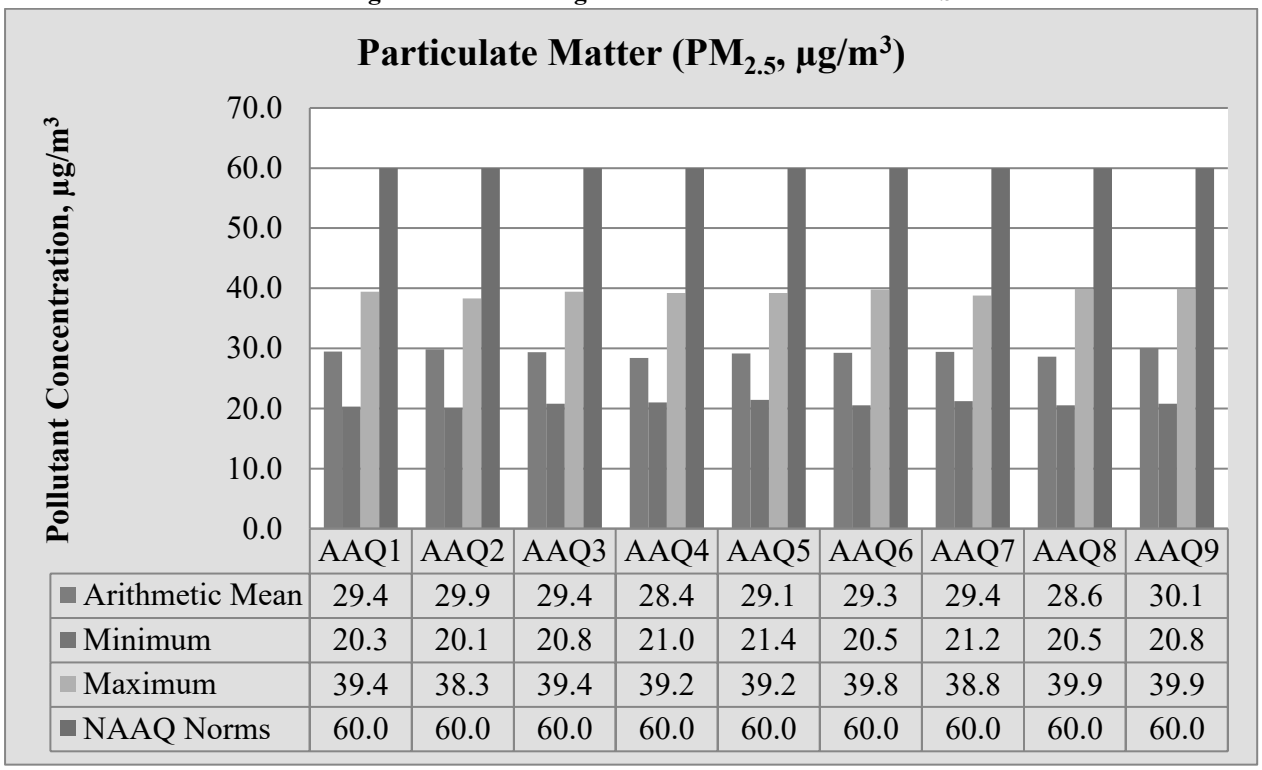
* NAAQ Norms-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Area.

Figure 3.18: Bar Diagram Of Summary Of AAQ 1 – AAQ 9



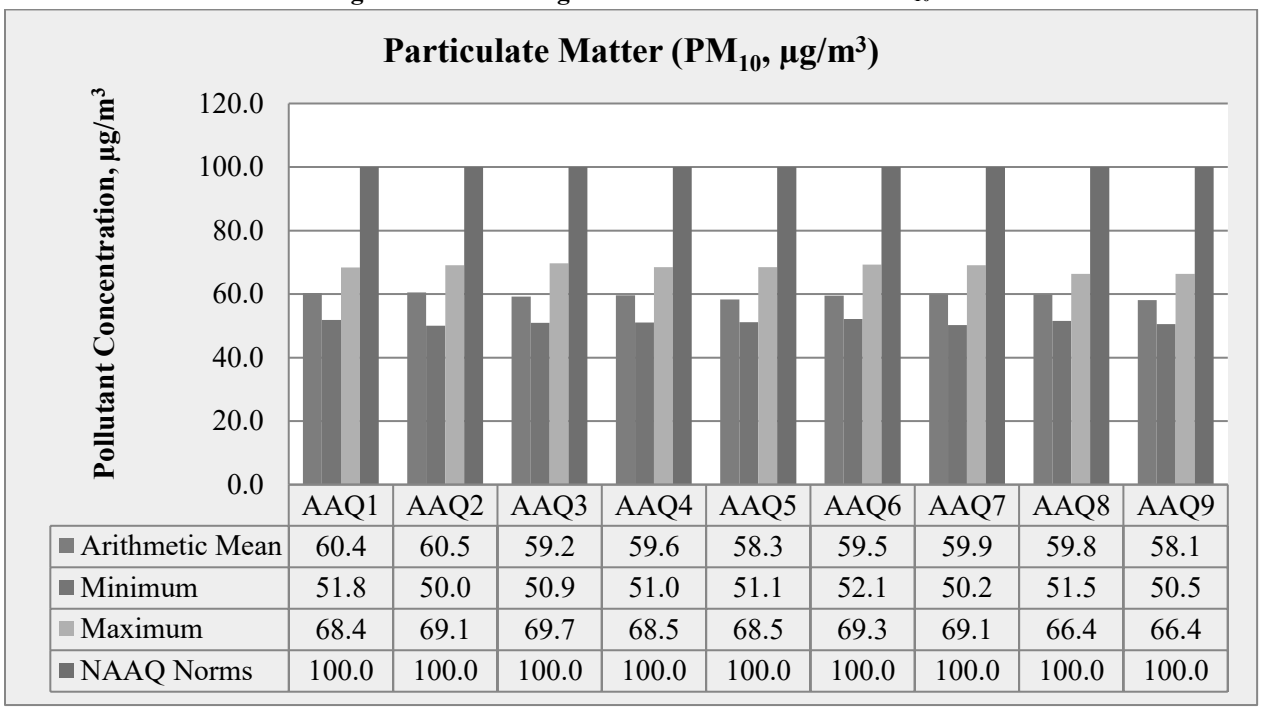
	PM10	PM2.5	SO2	NO2
98th Percentile Value	39.4	69.1	9.8	23.2
Arithmetic Mean	30.8	61.2	8.3	22.0
Minimum	22.1	52.2	6.5	20.7
Maximum	39.4	69.1	9.8	23.2
NAAQ Norms*	60.0	100.0	80.0	80.0

Figure 3.19: Bar diagram of Particulate Matter $PM_{2.5}$



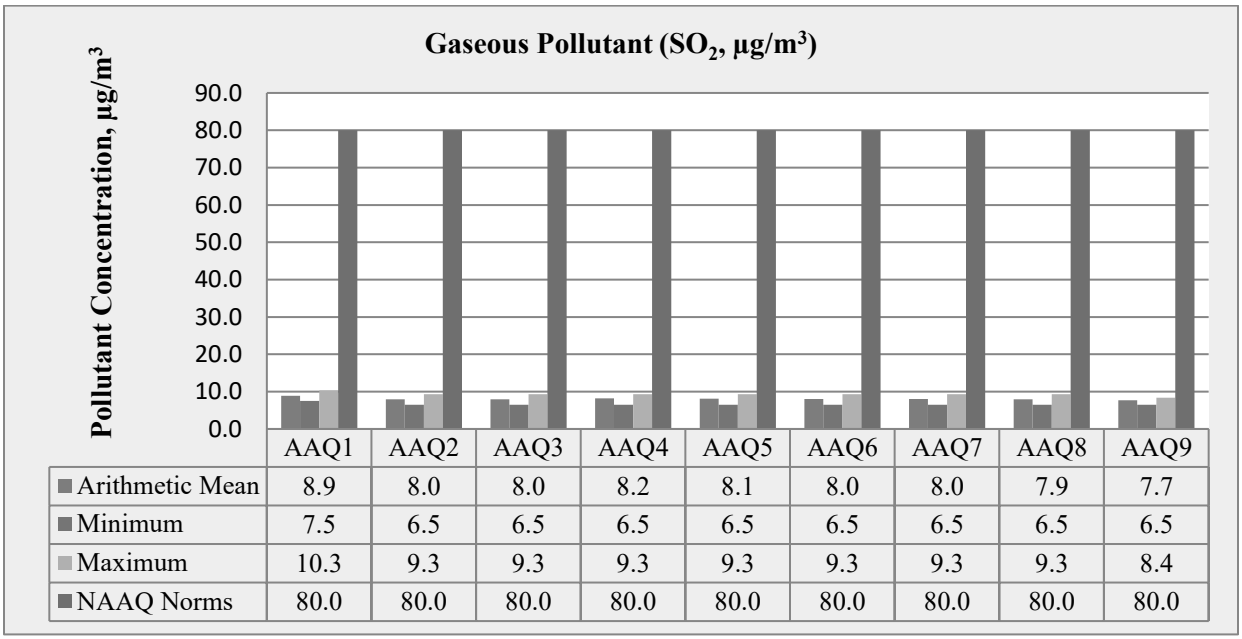
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Arithmetic Mean	29.4	29.9	29.4	28.4	29.1	29.3	29.4	28.6	30.1
Minimum	20.3	20.1	20.8	21.0	21.4	20.5	21.2	20.5	20.8
Maximum	39.4	38.3	39.4	39.2	39.2	39.8	38.8	39.9	39.9
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0

Figure 3.20: Bar diagram of Particulate Matter PM_{10}



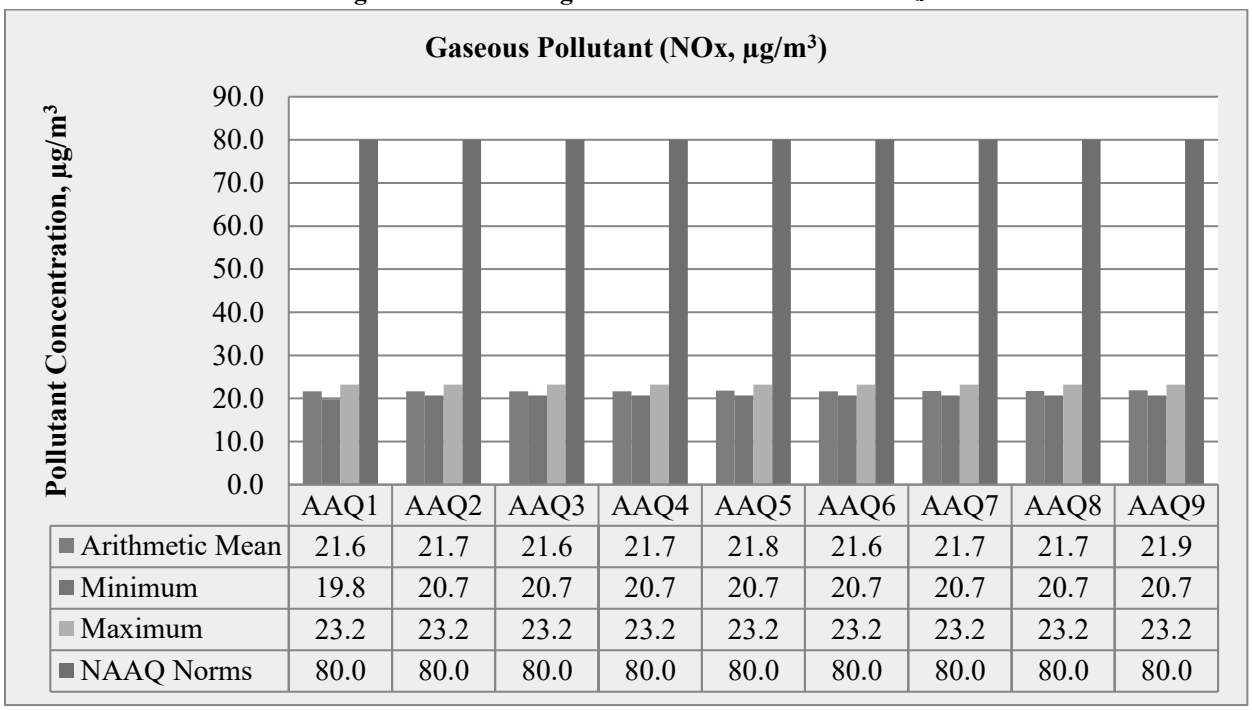
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Arithmetic Mean	60.4	60.5	59.2	59.6	58.3	59.5	59.9	59.8	58.1
Minimum	51.8	50.0	50.9	51.0	51.1	52.1	50.2	51.5	50.5
Maximum	68.4	69.1	69.7	68.5	68.5	69.3	69.1	66.4	66.4
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Figure 3.18: Bar diagram of Particulate Matter So_2



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Arithmetic Mean	8.9	8.0	8.0	8.2	8.1	8.0	8.0	7.9	7.7
Minimum	7.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Maximum	10.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	8.4
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0

Figure 3.21: Bar diagram of Particulate Matter NO_x



3.3.6 Interpretations & Conclusion

As per monitoring data, PM_{10} ranges from 52.2 µg/m^3 to 61.2 µg/m^3, $PM_{2.5}$ data ranges from 22.1 µg/m^3 to 39.4 µg/m^3, SO_2 ranges from 6.5 µg/m^3 to 9.8 µg/m^3 and NO_2 data ranges from 20.7 µg/m^3 to 23.7 µg/m^3. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

3.3.7 Fugitive Dust Emission –

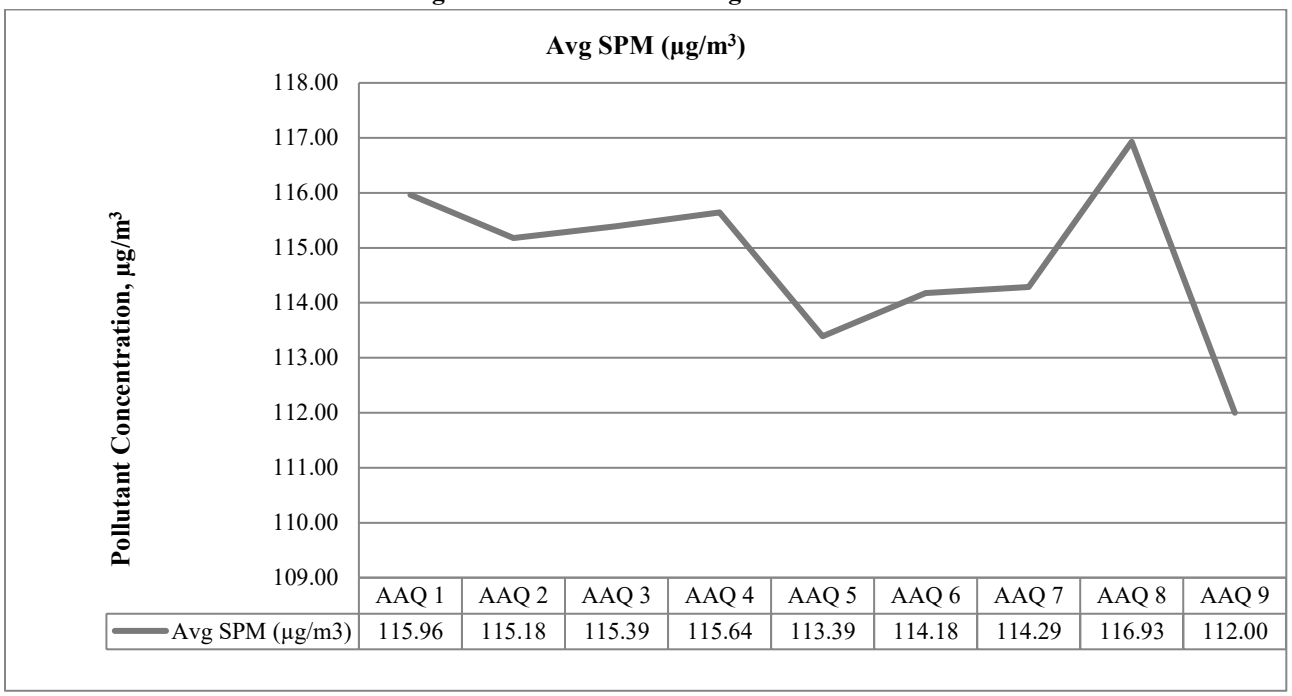
Fugitive dust was recorded at 9 AAQ monitoring stations for 30 days average during the study period.

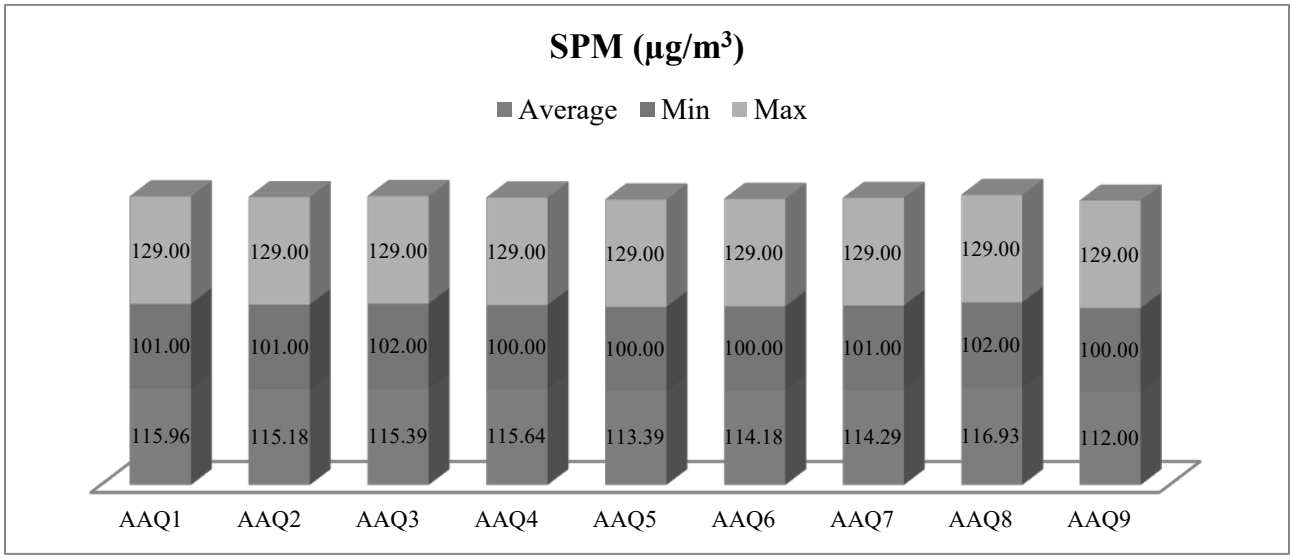
TABLE 3.20: AVERAGE FUGITIVE DUST SAMPLE VALUES IN µg/m^3

AAQ Locations	Avg SPM (µg/m^3)
AAQ 1	115.96
AAQ 2	115.18
AAQ 3	115.39
AAQ 4	115.64
AAQ 5	113.39
AAQ 6	114.18
AAQ 7	114.29
AAQ 8	116.93
AAQ 9	112.00

Source: Onsite monitoring/ sampling by Chennai Mettex Lab Private Limited

Figure 3.22: Bar Chart – Fugitive Dust





Source: Line Diagram of Table 3.27

TABLE 3.21: FUGITIVE DUST SAMPLE VALUES IN µg/m³ –

SPM (µg/m³)	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8	AAQ9
Average	115.96	115.18	115.39	115.64	113.39	114.18	114.29	116.93	112.00
Max	101.00	101.00	102.00	100.00	100.00	100.00	101.00	102.00	100.00
Min	129.00	129.00	129.00	129.00	129.00	129.00	129.00	129.00	129.00

Source: Calculations from Lab Analysis Reports

Source: Bar Diagram of table 3.28

3.4 Noise Environment

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 impact of noise sources on surrounding community depends on:

The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise. The environmental impact assessment of noise from the project operation, vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

3.4.1 Identification of Sampling Locations

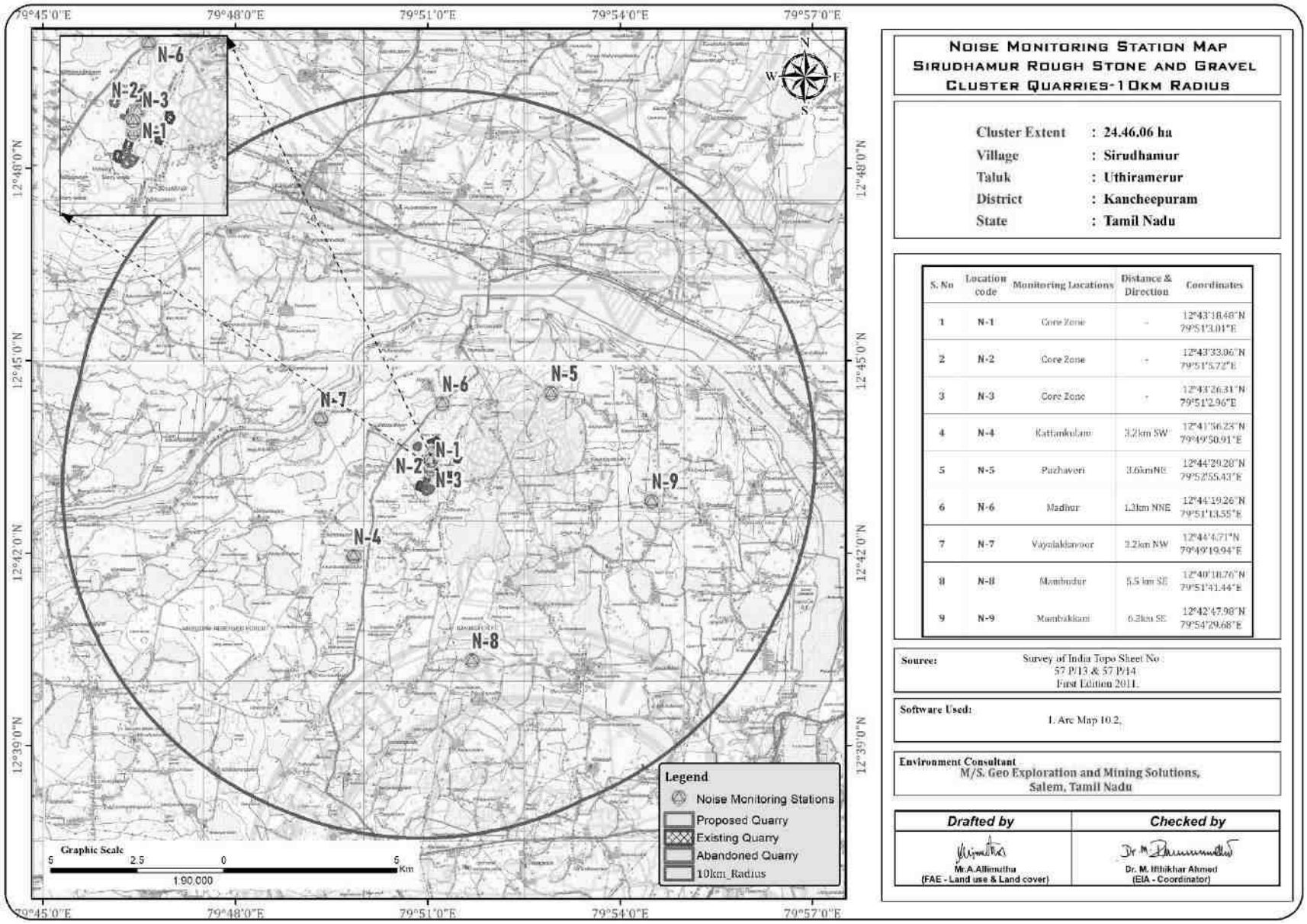
In order to assess the ambient noise levels within the study area, noise monitoring was carried out at nine (9) locations. The noise level monitoring locations were carried out by covering commercial, residential, rural areas within the radius of 10km. A noise monitoring methodology was chosen such that it best suited the purpose and objectives of the study.

Table 3.22 Details of Surface Noise Monitoring Locations

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	N-1	Core Zone	-	12°43'18.48"N 79°51'3.01"E
2	N-2	Core Zone	-	12°43'33.06"N 79°51'5.72"E
3	N-3	Core Zone	-	12°43'26.31"N 79°51'2.96"E
4	N-4	Kattankulam	3.2km SW	12°41'56.23"N 79°49'50.91"E
5	N-5	Pazhaveri	4.0 km NE	12°44'29.28"N 79°52'55.43"E
6	N-6	Madhur	1.7km NNE	12°44'19.26"N 79°51'13.55"E
7	N-7	Vayalakkavoor	3.4km NW	12°44'4.71"N 79°49'19.94"E
8	N-8	Mambudur	5.5 km SE	12°40'18.76"N 79°51'41.44"E
9	N-9	Mambakkam	6.2km SE	12°42'47.98"N 79°54'29.68"E

Source: On-site monitoring/sampling by Chennai Mettex Lab Private Limited in association with GEMS

Figure 3.23: Noise Monitoring Stations Around 10 Km Radius



S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	N-1	Core Zone	-	12°43'18.48"N 79°51'3.01"E
2	N-2	Core Zone	-	12°43'33.06"N 79°51'5.72"E
3	N-3	Core Zone	-	12°43'26.31"N 79°51'2.96"E
4	N-4	Kattankulam	3.2km SW	12°41'56.23"N 79°49'50.91"E
5	N-5	Puzhaveri	3.6kmNE	12°44'29.20"N 79°52'55.43"E
6	N-6	Madhur	1.2km NNE	12°44'19.26"N 79°51'13.55"E
7	N-7	Vayalakkavoor	3.2km NW	12°44'4.71"N 79°49'19.94"E
8	N-8	Mambakkam	5.5 km SE	12°40'18.76"N 79°51'41.44"E
9	N-9	Mambakkam	6.2km SE	12°42'47.98"N 79°54'29.68"E

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. The equivalent noise level is defined mathematically as

Leq = 10 Log L / T∑ (10Ln/10)

Where L = Sound pressure level at function of time dB (A)

T = Time interval of observation

3.4.3 Analysis of Ambient Noise Level in the Study Area

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 3.30

Day time : 6:00 hours to 22.00 hours.

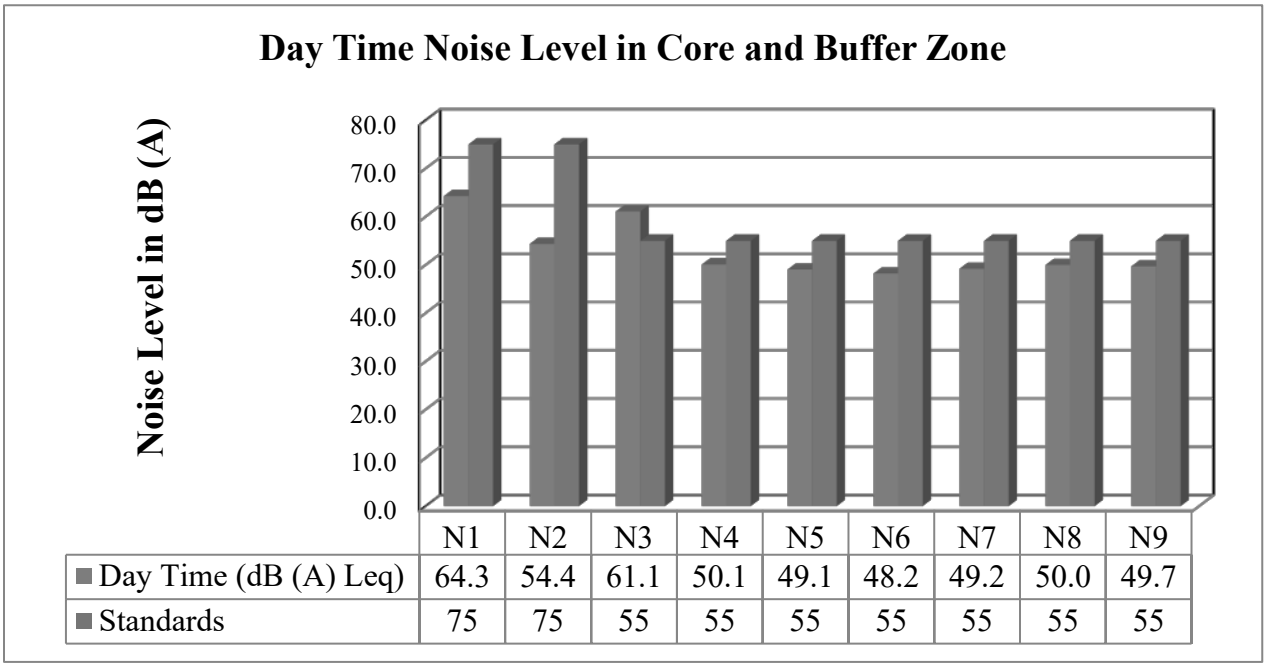
Night time : 22:00 hours to 6.00 hours

TABLE 3.23: NOISE MONITORING RESULTS IN CORE AND BUFFER ZONE

S. No	Locations	Noise level (dB (A) Leq)		Ambient Noise Standards
		Day Time	Night Time	
1	Core Zone	64.3	52.7	**Industrial** **Day Time- 75 dB (A)** **Night Time- 70 dB (A)**
2	Core Zone	54.4	51.4	
3	Core Zone	61.1	50.9	
4	Kattankulam	50.1	41.5	
5	Pazhaveri	49.1	40.7	
6	Madhur	48.2	40.5	**Residential** **Day Time– 55 dB (A)** **Night Time- 45 dB (A)**
7	Vayalakkavoor	49.2	40.8	
8	Mambudur	50.0	44.2	
9	Mambakkam	49.7	40.6	

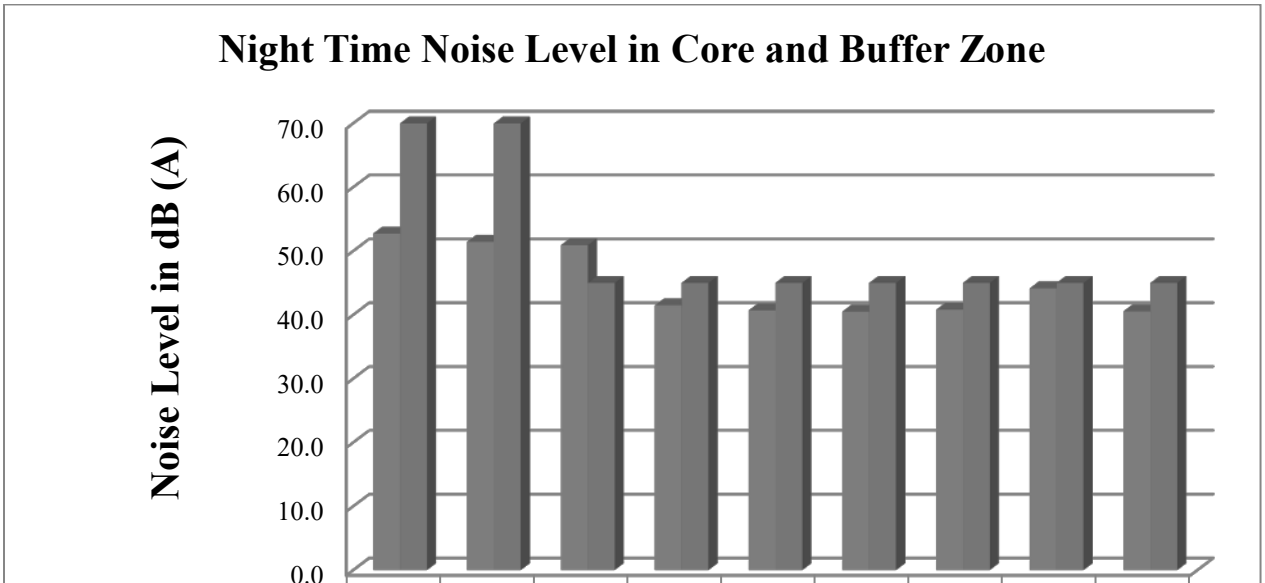
Source: On-site monitoring/sampling by Chennai Mettex Lab Private Limited in association with GEMS

Figure 3.24: Day Time Noise Levels In Core And Buffer Zone



	N1	N2	N3	N4	N5	N6	N7	N8	N9
Day Time (dB (A) Leq)	64.3	54.4	61.1	50.1	49.1	48.2	49.2	50.0	49.7
Standards	75	75	55	55	55	55	55	55	55

Figure 3.25: Night time noise levels in core and buffer zone



	N1	N2	N3	N4	N5	N6	N7	N8	N9
Night Time (dB (A) Leq)	52.7	51.4	50.9	41.5	40.7	40.5	40.8	44.2	40.6
Standards	70	70	45	45	45	45	45	45	45

3.4.4 Interpretation & Conclusion:

Ambient noise levels were measured at 9 (Nine) locations around the proposed quarry lease area. Noise levels recorded in core zone during day time were from 54.4 – 64.3 dB (A) Leq and during night time were from 50.9 – 52.7 dB (A) Leq. Noise levels recorded in buffer zone during day time were from 48.2 – 50.1 dB (A) Leq and during night time were from 40.5 – 44.2 dB (A) Leq.

3.5 Ecological Environment

Ecology is a branch of science which dealing the relations and interactions between organisms and their environment. An ecological survey of the study area was conducted, particularly with reference to listing of species and assessment of the existing baseline ecological conditions in the study area. The main objective of biological study is to collect the baseline data regarding flora and fauna in the study area. Data has been collected through extensive survey of the area with reference to flora and fauna. Information is also collected from different sources i.e., government departments such as District Forest Office, Government of Tamil Nadu. On the basis of onsite observations as well as forest department records the checklist of flora and fauna was prepared.

3.5.1 Study area

As the proposed project has an impact on diversity of flora and fauna of the study area including core area and buffer area of 10 km radius from the periphery of the lease area, a detailed biological study was carried out over the study area. The following methods were applied during the baseline study of flora, fauna and diversity assessment.

3.5.2 Objectives

The present study was undertaken with the following objectives:

- To study the likely impact of the proposed mining project on the local biodiversity and to suggest mitigation measures, if required, for vulnerable biota.
- To assess the nature and distribution of vegetation (Terrestrial and Aquatic) in and around the mining activity.
- To collect details of flora and fauna, Endemic, Rare, Endangered and Threatened (RET Species) separately from the core and buffer area and to clearly indicate the schedule of fauna present.
- To prepare the necessary plan along with budgetary provisions for their conservation in consultation with State Forest and Wildlife Department and details furnished, in case of any schedule- I fauna found in the study area.
- To devise effective management & conservation measures for biodiversity.

3.5.3 Site selection

Selection of sampling locations was made with reference to topography, land use, vegetation pattern, etc. The observations were taken on natural vegetation, roadside plantation and non-forest area (agricultural field, in plain areas, Village wasteland, etc.) for quantitative representation of different species. A methodology of Sampling Flora and fauna studies were carried out during the post monsoon 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 (25x25-m), shrubs (10x10-m) and herbs (2x2-m) depending upon prevailing geographical conditions and bio-diversity aspects of study area.

3.5.4 Quadrats Method

Quadrats of 25 × 25m were laid down randomly within core and 10km buffer area; each quadrat was laid to assess the trees (>5 cm GBH) and one, 10 × 10m 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 (25 × 25m) and shrub (10 × 10m) were recorded separately and have been identified on the field.

3.5.5 Phyto-Sociological Survey

Phyto sociological parameters, such as ***Density, Frequency, Abundance and Importance Value Index*** of individual species (Trees) were determined in randomly placed quadrate of different sizes in the study area. Relative frequency, and relative density were calculated and the sum of these three represented Importance Value Index (IVI) for various species. For shrubs, herbs and grasses, ***Density, Frequency, Relative Density & Relative Frequency were found***. Sample plots were selected in such a way to get maximum representation of different types of vegetation and plots were laid out in different part of the study area of 10 km radius. Analysis of the vegetation will help in determining the relative importance of each species in the study area and to reveal if any economically valuable species is threatened in the process.

Table 3.24 Calculation of density, frequency (%), dominance, relative density, relative frequency, relative dominance & important value index

Parameters	Formula
Density	Total No. of individuals of species/ Total No. of Quadrats used in sampling
Frequency (%)	(Total No. of Quadrats in which species occur/ Total No. of Quadrats studied)100
Abundance	Total No. of individuals of species/ No. of Quadrats in which they occur
Relative Density	(Total No. of individuals of species/Sum of all individuals of all species) * 100
Relative Frequency	(Total No. of Quadrats in which species occur/ Total No. of Quadrats occupied by all species) * 100
Important Value Index	Relative Density + Relative Frequency

3.5.5.1 Shannon – Wiener Index, Evenness and Richness

Biodiversity index is a quantitative measure that reflects how many different types of species, there are in a dataset, and simultaneously takes into account how evenly the basic entities (such as individuals) are distributed among those types of species. The value of biodiversity index increases both when the number of types increases and when evenness increases. For a given number of type of species, the value of a biodiversity index is maximized when all type of species is equally abundant.

Table 3.25 Calculation of species diversity by shannon – wiener index, evenness and richness

Description	Formula
Species diversity – Shannon – Wien Index	**$H= E [(p_i)*In(p_i)]$** Where p_i: Proportion of total sample represented by species i: number of individuals of species i/ total number samples
Evenness	H/H max H_{max} = ln(s)= maximum diversity possible S=No. of species
Species Richness by Margalef	RI = S-1/ln N Where S = Total Number of species in the community N = Total Number of individuals of all species in the community

3.5.6 Flora

Flora study was conducted using the above said methodology to inventory the existing terrestrial plants in both core and buffer zones. Details of plants have been described in the succeeding sections.

3.5.6.1 Flora in Core Zone

Taxonomically a total of 21 species belonging to 17 families have been recorded from the core mining lease area. The lease applied area is flat terrain. Based on habitat classification of the enumerated plants the majority of species were Climbers, Grass, Herbs, (12) followed by trees (03) Shrub (04) and the result of core zone of flora studies shows that Fabaceae and Lamiaceae are the main dominating species and Species Richness (margalef Index) in the study area it mentioned in Table 3.23-3.25. Moreover, no species are found as threatened category. The proposed lease area following plant types such as Prosopis juliflora, Borassus flabellifer, Azadirachta indica, is abundant in meagre amount. The project proponent plan to removing all the trees and regeneration in the adjacent safety area. The regenerated trees are possible to growing only for forty percentage, hence we recommend to project proponent 1:10 ratio of new seedling planning to established within the safety barriers, nearest forests land, road side and government Porampoke lands

3.5.6.2 Flora in Buffer Zone

Similar type of environment also in buffer area but with more flora diversity compare than core zone area because nearby agriculture land but presently there are no cultivation. It contains a total of 91 species belonging to 41 families have been recorded from the buffer zone. The floral (81) varieties among them Trees (31), shrubs (18) and herbs (20) and Climbers (12) Creepers (5), Grasses (4) Cactus (1) were identified. The result of buffer zone of flora studies shows that Fabaceae and Poaceae, are the main dominating species and Species Richness (margalef Index) in the study area it mentioned in Table 3.26-3.28. There is no Rare, Endangered and Threatened Flora species in mining area and their surrounding area. Details of flora with the scientific name were mentioned in Table 3.26.

Table 3.26: List of flora in core zone

S.No	*Local* Name	Scientific name	Family name	Total No. of species	Total of Quadrants with species	Total No. of Quadrants	Density	Frequency (%)	Abundance	Relative Density	Relative Frequency	IVI	IUCN Conservation Status
Tree													
1	Velikathan maram	Prosopis juliflora	Fabaceae	3	2	5	0.6	40.0	1.5	17.6	16.7	34.3	Not Listed
2	Vembu	Azadirachta indica	Meliaceae	5	4	5	1.0	80.0	1.3	29.4	33.3	62.7	Not Listed
3	Eshamaram	*Phoenix Reclinata*	Arecaceae	2	2	5	0.6	40.0	1.5	17.6	16.7	34.3	Not Listed
Shrubs													
4	Erukku	Calotropis gigantea	Apocynaceae	6	5	10	0.6	50.0	1.2	21.4	20.8	42.3	Not Listed
5	Avarai	Senna auriculata	Fabaceae	9	8	10	0.9	80.0	1.1	32.1	33.3	65.5	Not Listed
6	Sappathikalli	Cereus pterogonus	Cactaceae	8	7	10	0.8	70.0	1.1	28.6	29.2	57.7	Not Listed
7	Unichedi	Lantana camara	Verbenaceae	5	4	10	0.5	40.0	1.3	17.9	16.7	34.5	Not Listed
herbs													
8	Thumbai	Leucas aspera	Lamiaceae	6	5	15	0.4	33.3	1.2	6.0	5.8	11.8	Not Listed
9	Poolai poondu	Aerva lanata	Amaranthaceae	7	6	15	0.5	40.0	1.2	7.0	7.0	14.0	Not Listed
10	Korai	Cyperus rotundus	Cyperaceae	5	4	15	0.3	26.7	1.3	5.0	4.7	9.7	Not Listed
11	Nerunji	Tribulus terrestris	Zygophyllales	8	7	15	0.5	46.7	1.1	8.0	8.1	16.1	Not Listed
12	Nayuruv	Achyranthes aspera	Amaranthaceae	6	5	15	0.4	33.3	1.2	6.0	5.8	11.8	Not Listed
13	Pink Blumea	Blumea axillaris	Asteraceae	5	4	15	0.3	26.7	1.3	5.0	4.7	9.7	Not Listed
14	Rail Pindu	Croton bonplandianus	Euphorbiaceae	6	5	15	0.4	33.3	1.2	6.0	5.8	11.8	Not Listed
15	Communist pacha	Chromolaena odorata	Asteraceae	7	6	15	0.5	40.0	1.2	7.0	7.0	14.0	Not Listed
16	veattukayapundu	Tridax Procumbens	Asteraceae	8	7	15	0.5	46.7	1.1	8.0	8.1	16.1	Not Listed
17	Mosukkattan	Passiflora foetida	Passifloraceae	6	5	15	0.4	33.3	1.2	6.0	5.8	11.8	Not Listed
18	Perandai	Cissus quadrangularis	Vitaceae	9	8	15	0.6	53.3	1.1	9.0	9.3	18.3	Not Listed
19	Arugam Pill	Cynodon dactylon	Poaceae	10	9	15	0.7	60.0	1.1	10.0	10.5	20.5	Not Listed

TABLE 3.27 FLORA IN BUFFER ZONE

S.No	Local Name	Scientific name	Family name	Total No. of species	Total of Quadrants with species	Total No. of Quadrants	Density	Frequency (%)	Abundance	Relative Density	Relative Frequency	IVI	IUCN Conservation Status
TREE													
1	Vembu	*Azadirachta indica*	Meliaceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
2	Pongam oiltree	*Pongamia pinnata*	Fabaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
3	Karuvelam	*Acacia nilotica*	Mimosaceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
4	Thennai maram	*Cocos nucifera*	Arecaceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed
5	Puliyamaram	*Tamarindus indica*	Legumes	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
6	Athi	*Ficus recemosa*	Moraceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed
7	Vazhaimaram	*Musa*	Musaceae	5	4	10	0.5	40.0	1.3	5.0	5.7	10.7	Not Listed
8	Nettilinkam	*Polylathia longifolia*	Annonaceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed
9	Amanakku	*Ricinus communis*	Euphorbiaceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
10	Perumungil	*Bambusa bambos*	Poaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
11	Karungali	*Acacia sundra*	Legumes	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
12	Sapota	*Manilkara zapota*	Sapotaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
13	Eucalyptus	*Eucalyptus globules*	Myrtaceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
14	Navalmaram	*Sygygium cumini*	Myrtaceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed
15	Ezhumuchaipalam	*Citrus lemon*	Rutaceae	5	4	10	0.5	40.0	1.3	5.0	5.7	10.7	Not Listed
16	Alamaram	*Ficus benghalensis*	Moraceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
17	Panai maram	*Borassus flabellifer*	Arecaceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed
18	Manga	*Mangifera indica*	Anacardiaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
19	Thekku	*Tectona grandis*	Verbenaceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
20	Nelli	*Emblica officinalis*	Phyllanthaceae	5	4	10	0.5	40.0	1.3	5.0	5.7	10.7	Not Listed
21	Karuvelam maram	*Vachellia nilotica*	Fabaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
22	Vadanarayani	*Delonix elata*	Fabaceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed
23	Marudaani	*Lawsonia inermis*	Lythraceae	5	4	10	0.5	40.0	1.3	5.0	5.7	10.7	Not Listed
24	Pappali maram	*Carica papaya L*	Caricaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
25	Nochi	*Vitex negundo*	Verbenaceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed
26	Vilvam	*Aegle marmelos*	Rutaceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
27	Nuna maram	*Morinda citrifolia*	Rubiaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
28	Koyya	*Psidium guajava*	Myrtaceae	5	4	10	0.5	40.0	1.3	5.0	5.7	10.7	Not Listed
29	Seethapazham	*Annona reticulata*	Annonaceae	4	3	10	0.4	30.0	1.3	4.0	4.3	8.2	Not Listed
30	vagai	*albizia lebbeck*	Fabaceae	3	2	10	0.3	20.0	1.5	3.0	2.9	5.8	Not Listed

31	Savuku	*Casuarina equisetifolia*	Casuarinaceae	2	1	10	0.2	10.0	2.0	2.0	1.4	3.4	Not Listed
SHRUBS													
32	Avarai	*Senna auriculata*	Fabaceae	7	6	15	0.5	40.0	1.2	5.8	5.9	11.7	Not Listed
33	Sundaika	*Solanum torvum*	Solanaceae	8	7	15	0.5	46.7	1.1	6.7	6.9	13.5	Not Listed
34	Arali	*Nerium indicum*	Apocynaceae	9	8	15	0.6	53.3	1.1	7.5	7.8	15.3	Not Listed
35	Idlipoo	*xoracoc cinea*	Rubiaceae	6	5	15	0.4	33.3	1.2	5.0	4.9	9.9	Not Listed
36	Neermulli	*Hydrophila auriculata*	Acanthaceae	7	6	15	0.5	40.0	1.2	5.8	5.9	11.7	Not Listed
37	Icham	*Phoenix pusilla*	Arecaceae	5	4	15	0.3	26.7	1.3	4.2	3.9	8.1	Not Listed
38	Chaturakalli	*Euphorbia antiquorum*	Euphorbiaceae	8	7	15	0.5	46.7	1.1	6.7	6.9	13.5	Not Listed
39	Kattamanakku	*Jatropha curcas*	Euphorbiaceae	6	5	15	0.4	33.3	1.2	5.0	4.9	9.9	Not Listed
40	Thuthi	*Abutilon indicum*	Meliaceae	7	6	15	0.5	40.0	1.2	5.8	5.9	11.7	Not Listed
41	Chemparuthi	*Hibiscu rosa-sinensis*	Malvaceae	8	7	15	0.5	46.7	1.1	6.7	6.9	13.5	Not Listed
42	Kundumani	*Abrus precatorius*	Fabaceae	6	5	15	0.4	33.3	1.2	5.0	4.9	9.9	Not Listed
43	Erukku	*Calotropis gigantea*	Apocynaceae	7	6	15	0.5	40.0	1.2	5.8	5.9	11.7	Not Listed
44	Kealaka	*carissa carandas*	Apocynaceae	5	4	15	0.3	26.7	1.3	4.2	3.9	8.1	Not Listed
45	cirututti	Hibiscus vitifolius	Malvaceae	6	5	15	0.4	33.3	1.2	5.0	4.9	9.9	Not Listed
46	rigida	Ehretia rigida	Boraginaceae	7	6	15	0.5	40.0	1.2	5.8	5.9	11.7	Not Listed
47	Marul-umattai	Xanthium strumarium L	Asteraceae	5	4	15	0.3	26.7	1.3	4.2	3.9	8.1	Not Listed
48	Venmalar	Ligustrum vulgare	Oleaceae	6	5	15	0.4	33.3	1.2	5.0	4.9	9.9	Not Listed
49	Unishedi	Lantana camara	Verbenaceae	7	6	15	0.5	40.0	1.2	5.8	5.9	11.7	Not Listed
HERBS&CLIMBER &CREEPER &GRASSES													
50	Nayuruv	*Achyranthes aspera*	Amaranthaceae	6	5	25	0.2	0.1	0.1	0.4	87.5	7.9	Not Listed
51	Veetukaayapoondu	*Tridax procumbens*	Asteraceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
52	Koraikkilangu	*Cyperus articulates*	Cyperaceae	5	4	25	0.2	16.0	1.3	1.8	1.6	3.4	Not Listed
53	Kuppaimeni	*Acalypha indica*	Euphorbiaceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
54	Chempu	*Colocasia indica*	Araceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
55	Karisilanganni	*Eclipta prostata*	Asteraceae	8	7	25	0.3	28.0	1.1	2.8	2.8	5.7	Not Listed
56	Korai	*Cyperus rotundus*	Cyperaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
57	Kunnakora	*Cyperus compressus*	Cyperaceae	8	7	25	0.3	28.0	1.1	2.8	2.8	5.7	Not Listed
58	Milagai	*Capsicum frutescens*	Solanaceae	7	8	25	0.3	32.0	0.9	2.5	3.3	5.7	Not Listed
59	Kanamvazha	*Commelina benghalensis*	Commelinaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
60	Nai kadugu	*Celome viscosa*	Capparidaceae	5	4	25	0.2	16.0	1.3	1.8	1.6	3.4	Not Listed
61	Thumbai	*Leucas aspera*	Lamiaceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
62	Parttiniyam	*Parthenium hysterophorus*	Asteraceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
63	Mukurattai	*Boerhavia diffusa*	Nyctaginaceae	5	4	25	0.2	16.0	1.3	1.8	1.6	3.4	Not Listed
64	Thulasi	*Ocimum tenuiflorum*	Lamiaceae	9	8	25	0.4	32.0	1.1	3.2	3.3	6.4	Not Listed
65	Manathakkali	*Solanumnigrum*	Solanaceae	8	7	25	0.3	28.0	1.1	2.8	2.8	5.7	Not Listed

66	Kumipoondu	*Gomphrena celosioides*	Amaranthaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
67	Kattuthulasi	*Ocimum sanctum*	Lamiaceae	9	8	25	0.4	32.0	1.1	3.2	3.3	6.4	Not Listed
68	Kattukolingi	*Tephrosia purpurea*	Fabaceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
69	Wight, Contrib	*Blumea axillaris*	Asteraceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
70	Kovai	*Coccinia grandis*	Cucurbitaceae	5	4	25	0.2	16.0	1.3	1.8	1.6	3.4	Not Listed
71	Perandai	*Cissus quadrangularis*	Vitaceae	9	8	25	0.4	32.0	1.1	3.2	3.3	6.4	Not Listed
72	Mudakkotan	*Cardiospermum helicacabum*	Sapindaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
73	Karkakartum	*Clitoria ternatea*	Fabaceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
74	Nannari	*Hemidesmus indicus*	Asclepiadaceae	5	4	25	0.2	16.0	1.3	1.8	1.6	3.4	Not Listed
75	Kovakkai	*Coccinia grandis (L.)*	Cucurbitaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
76	Malli	*Jasminum augustifolium*	Oleaceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
78	Musumusukkai	*Mukia maderaspatana*	Cucurbitaceae	8	7	25	0.3	28.0	1.1	2.8	2.8	5.7	Not Listed
79	Mosukkattan Poonaipiduku	*Passiflora foetida*	Passifloraceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
80	Ptruukodi	*Helinus integrifolius*	Rhamnaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
81	Kattuppirantai	*Causonis trifolia*	Vitaceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
82	Vallikeerai	*Ipomoea aquatica*	Convolvulaceae	5	4	25	0.2	16.0	1.3	1.8	1.6	3.4	Not Listed
83	Siru Puladi	*Desmodium triflorum*	Fabaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
84	Sithrapaalavi	*Euphorbia prostrata*	Euphorbiaceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
85	Korai	*Cyperus rotandus*	Poaceae	6	5	25	0.2	20.0	1.2	2.1	2.0	4.1	Not Listed
86	Malai Mookuthi Poondu	*Wedelia trilobata*	Asteraceae	7	6	25	0.3	24.0	1.2	2.5	2.4	4.9	Not Listed
87	Nellu	*Oryza sativa*	Poaceae	9	8	25	0.4	32.0	1.1	3.2	3.3	6.4	Not Listed
88	Pullu	*Eragrostis ferruginea*	Poaceae	10	9	25	0.4	36.0	1.1	3.5	3.7	7.2	Not Listed
89	Chevvarakupul	*Chloris barbata*	Amaranthaceae	8	7	25	0.3	28.0	1.1	2.8	2.8	5.7	Not Listed
90	Arugampul	*Cynodon dactylon*	Poaceae	11	10	25	0.4	40.0	1.1	3.9	4.1	7.9	Not Listed
91	kathalai	*Opuntia guatemalensis*	Cactaceae	9	8	25	0.4	32.0	1.1	3.2	3.3	6.4	Not Listed

Figure 3.26 Flora in core and buffer area

Borassus flabellifer

Helinus integrifolius

Cissus quadrangularis

Leucas aspera

Ipomoea carnea

carissa carandas

Ocimum tenuiflorum

Tephrosia purpurea

Phoenix Reclinata

croton bonplandianus

Chloris barbata

Blumea axillaris

Ruellia nudiflora

Ficus hispida

Andrographis echioides

Ehretia rigida

Prosopis juliflora

Hibiscus vitifolius L

Xanthium strumarium L

Jatropha gossypiifolia L

Panicum maximum

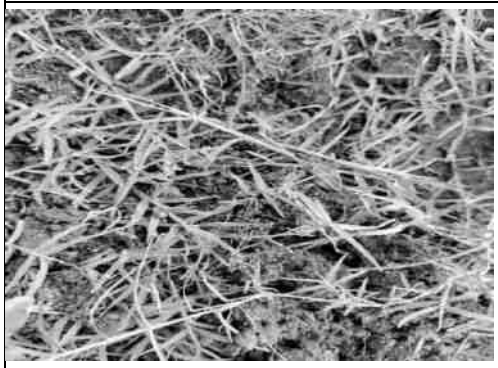
Cayratia trifolia (L.)

Coccinia grandis (L.)

Ligustrum vulgare

Lantana camara

Parthenium hysterophorus



Cynodondactylon (L.)

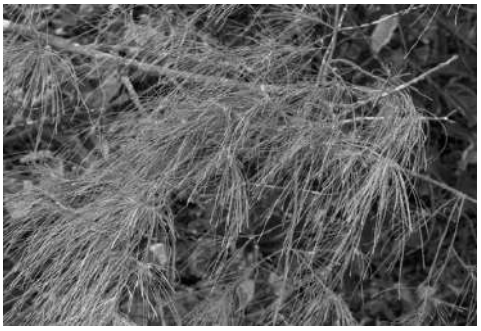
Opuntia guatemalensis

Azadirachta indica

Tectona grandis

Eucalyptus obliqua

Casuarina equisetifolia



3.5.6.3 Aquatic Vegetation

The field survey for assessing the aquatic vegetation was also undertaken during the study period. The list of aquatic plants observed in the study area is given in Table 3.29.

TABLE 3.28 AQUATIC VEGETATION

Sl.No	Scientific name	Common Name	Vernacular Name (Tamil)	IUCN Red List of Threatened Species
1	*Eichornia crassipe*	Water hyacinth	Agayatamarai	NA
2	*Aponogetonnatans*	Floating lace plant	Kottikizhnagu	NA
3	*Nymphaea nouchali*	Blue water lily	Nellambal	LC
4	*Carex cruciata*	Cross Grass	Koraipullu	NA
5	*Cynodon dactylon*	Scutch grass	Arugampul	LC
6	*Cyperus exaltatus*	Tall Flat Sedge	Koraikizhangu	LC

*LC- Least Concern, NA-Not yet assessed

3.5.6.4 Forest Vegetation

The mine lease area is exhibiting a slightly elevated terrain. Kavanippakkam Reserve Forest has located about 2.0km East side on the Idaimichi RF 2.5 km on the Southeast side and Marudam RF 6.3 km on the southwest side, all the reserve forest away from the proposed project site. It is a dense Scrub Forest Land, mostly containing Calliea cinerea, Catunaregam spinosa, Carissa spinarum, Albiziz amara, Buchanania lanzan, and Dodonaea viscosa. Reserve Forest Details mentioned in Figure 3.26.

2. Endemic Plants of the Study Area

De Candolle (1855) first used the concept of "**Endemic",** which is defined as an area of a taxonomic unit, especially a species which has a restricted distribution or habitat, isolated from its surrounding region through geographical, ecological or temporal barriers. Among recorded plant species none are assigned the status of endemic plant of this region.

3. Biodiversity Hotspots

There are no particular Biodiversity Hotspots in the study area. There is no threat to the Flora and Fauna species.

4. Reserved Forest / Forest / Social Forest / wild life sanctuary etc.

The mine lease area is exhibiting a slightly elevated terrain. Kavanippakkam Reserve Forest has located about 2.1km East side on the Idaimichi RF 2.7 km on the Southeast side and Marudam RF 6.1km on the southwest side, all the reserve forest away from the proposed project site. There are no PF and National park, Wild life sanctuary, Ramsar site, Wildlife Corridors, Tiger/Elephat Reserves, Biosphere Reserves are located near to mining lease area. Hence it is not coming under any violation.

3.5.7 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 core area.

3.5.7.1 Survey Methodology

The study of fauna takes substantial amount of time to understand the specific faunal characteristics of the area. The assessment of fauna has been done on the bases of primary data collected from the lease sites. The presence was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area. In addition, officials, local peoples were another source of information for studying the fauna of the area. Field activities are physical/active search, covering rocks, burrows, hollow inspection and location of nesting sites and habitat assessment etc. Taxonomical identification was done by the field guide book and wildlife ENVIS data base (wiienvis.nic.in/Database/Schedule Species Database) and Zoological Survey of India (ZSI). Detailed faunas are mentioned in the Table 3.30 and 3.31.

Survey and Monitoring of Mammals

Intensive survey has been done by line transect methods (Walking and in vehicle) for all major habitats for surveying of mammals by direct and indirect evidence. Indirect methods such as faecal matter (i.e., scat) and pug mark by establishing 10 × 100 -m linear transects depending on the habitat (i.e., existing wildlife game routes/forest trails used). Direct observation technique has been used for surveying large and medium sized mammals. But this technique is perfectly suitable for surveying of diurnal mammals; however, good photographs were also taken for species identification.

Survey and Monitoring of Birds

Birds are sampled by using point count methods, and opportunistic bird sightings. By the bird vocal sounds and photographs, the species were identified in consultation with village local people. Point count: in these methods, the observer will stand in a randomly chosen point and birds seen or heard in 50m radius are recorded for 5min. This observation is repeated in another point at least 30m from the first point. We have enumerated 20-point counts in each quartile, which constitute a total of 80-point counts (20 x 4) within 10 km radius area. Opportunistic bird sightings: while traveling in study area, many bird species will be detected in survey time. Such species are recoded by their appearance or by their call.

Survey and monitoring of reptiles

Several survey techniques such as standard walk transect visual encounter survey methods were used to sampling reptiles in each and every habitat of the study area. While doing this survey, photographs were taken for identification of species. Species identification was done by using standard field guides in consultation with village people expert. The butterfly was enumerated by 2 linear transects of 10 × 100 m were laid within each quartile at minimum interval of 1 km. Further, amphibians and fishes documented in existing literature and secondary information in consultation with local people and wildlife experts.

3.5.7.2 Fauna in Core Zone

A total of 16 varieties of species observed in the Core zone Of Siruthamur Village, Rough stone and gravel quarry (Table 3.30) among them numbers of Insects 6 Reptiles 3 Mammals 1 and Avian 6 A total of 16 species belonging to 15 families 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 four species are under schedule IV according to Indian wild life Act 1972. A total nine species of bird were sighted in the mining lease area. Dominant species are mostly birds and insects and no amphibians were observed during the field visit. There are no critically endangered, endangered, vulnerable and endemic species were observed.

TABLE 3.29 FAUNA IN CORE ZONE

SI. No	Common name/English Name	Family Name	Scientific Name	Schedule list wildlife Protection act 1972	IUCN Red List data
INSECTS					
1	Red-veined darter	Libellulidae	*Sympetrum fonscolombii*	NL	LC
2	Mottled emigrant	Peridae	*Catopsilia pyranthe*	NL	LC
3	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
4	Stick insect	Lonchodidae	*carausius morosus*	NL	LC
5	Blue tiger	Nymphalidae	*Tirumala limniace*	Schedule IV	LC
6	Acraea violae	Nymphalidae	*Acraea violae*	NL	LC
REPTILES					
1	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
2	Common house gecko	Gekkonidae	*Hemidactylus frenatus*	NL	LC
3	Fan-Throated Lizard	Agamidae	*Sitanaponticeriana*	NL	LC
MAMMALS					
1	Indian Field Mouse	*Muridae*	*Mus booduga*	Schedule IV	NL
AVES					
1	Asian green bee-eater	Meropidae	*Meropsorientalis*	NL	LC
2	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
3	Cattle egret	Ardeidae	*Bubulcus ibis*	NL	LC
4	House crow	Corvidae	*Corvus splendens*	NL	LC
5	Koel	Cucalidae	*Eudynamys scolopaceus*	Schedule IV	LC
6	Grey drongo	Dicruridae	*Dicrurus leucophaeus*	Schedule IV	LC

*NE- Not evaluated; LC- Least Concern, NT –Near Threatened, T-Threatened

3.5.7.3 Fauna in Buffer Zone

Taxonomically a total of 36 species belonging to 34 families have been recorded from the buffer mining lease area. Based on habitat classification the majority of species were Birds 16 followed by Insects 10 Reptiles 4 Mammals 3 and, Amphibians 3 There are four Schedule II species and twenty-six are under schedule IV according to Indian wild life Act 1972. A total 20 species of bird were sighted in the mining lease area. There are no critically endangered, endangered, vulnerable and endemic species were observed.

Dominant species are mostly birds and insects and three amphibians were observed during the extensive field visit (Hoplobatrachus tigerinus), (Rana hexadactyla), (Sphaerotheca breviceps). The result of core & Buffer zone of fauna studies shows that Nymphalidae and Agamidae, Mantidae are the main dominating species in the study area, it is mentioned in Table. 3.31 There is no schedule I Species in study area. There are no critically endangered, endangered, vulnerable and endemic species were observed.

TABLE 3.30 FAUNA IN BUFFER ZONE

S. No.	Common Name/English Name	Family Name	Scientific Name	Schedule List Wildlife Protection Act 1972	IUCN Red List Data
INSECTS					
1	Tawny coster	Nymphalidae	*Danaus chrysippus*	Schedule IV	LC
2	Milkweed butterfly	Nymphalidae	*Danainae*	NL	LC
3	Blue tiger	Nymphalidae	*Tirumala limniace*	Schedule IV	LC
4	Mottled emigrant	Peridae	*Catopsilia pyranthe*	NL	LC
5	Striped tiger	Nymphalidae	*Danaus plexippus*	Schedule IV	LC
6	Ant	Formicidae	*Camponotus Vicinus*	NL	NL
7	Lesser grass blue	Lycaenidae	*Danaus plexippus*	Schedule IV	LC
8	Praying mantis	Mantidae	*mantis religiosa*	NL	NL
9	Grasshopper	Acrididae	*Hieroglyphus sp*	NL	LC
10	Common Tiger	Nymphalidae	*Danaus genutia*	Schedule IV	LC
REPTILES					
1	Chameleon	Chamaeleonidae	*Chameleon zeylanicus*	Sch II (Part II)	LC
2	Garden lizard	Agamidae	*Calotes versicolor*	NL	LC
3	Green Vine snake	Colubridae	*Ahaetulla nasuta*	Schedule IV	LC
4	Rat snake	Colubridae	*Ptyas mucosa*	Sch II (Part II)	LC
MAMMALS					
1	Indian palm squirrel	Sciuridae	*Funambulus palmarum*	Schedule IV	LC
2	Indian Field Mouse	Muridae	*Mus booduga*	Schedule IV	LC
3	Home mouse	Muridae	*Mus musculus tytleri*	NL	LC
AVES					
1	House crow	Corvidae	*Corvussplendens*	NL	LC
2	Cattle egret	Ardeidae	*Bubulcus ibis*	NL	LC
3	Black drongo	Dicruridae	*Dicrurus macrocercus*	Schedule IV	LC
4	Red-vented Bulbul	Pycnonotidae	*Pycnonotuscafer*	Schedule IV	LC
5	Indian pond heron	Ardeidae	*Ardeola grayii*	Schedule IV	LC
6	Asian green bee-eater	Meropidae	*Meropsorientalis*	NL	LC
7	Small Sunbird	Nectariniidae	*Nectarinia asiatica*	Schedule IV	LC
8	Common myna	Sturnidae	*Acridotheres tristis*	NL	LC
9	Blue Rock Pigeon	Columbidae	*Columba livia*	Schedule IV	LC
10	Common Coot	Rallidae	*Fulica atra*	Schedule IV	LC
11	Small Sunbird	Nectariniidae	*Nectarinia asiatica*	Schedule IV	LC
12	Shikra	Accipitridae	*Accipiter badius*	NL	LC
13	Common quail	Phasianidae	*Coturnix coturnix*	Schedule IV	LC
14	Small blue Kingfisher	Alcedinidae	*Alcedo atthis*	Schedule IV	LC
15	Rose-ringed parkeet	Psittaculidae	*Psittacula krameri*	NL	LC
16	Grey Francolin	Phasianidae	*Francolinus pondicerianus*	Schedule IV	LC
AMPHIBIANS					
1	Indian Burrowing frog	Dicroglossidae	*Sphaerotheca breviceps*	Schedule IV	LC
2	Green Pond Frog	Ranidae	*Rana hexadactyla*	Schedule IV	LC
3	Tiger Frog	Chordata	*Hoplobatrachus tigerinus (Rana tigerina)*	Schedule IV	LC

*NL-Not listed, LC-Least concern, NT-Near threatened.

TABLE 3.31 AQUATIC FAUNA VEGETATION

S.No	Common Name	Scientific Name
1	Pale carplet	Amblyupharngodon mola
2	Catla catla	Labeo Catla
3	Karnataka labeo	Labio calbasi
4	Mrigal carp	Cirrhina mrigala
5	Mrigel	Cirrhina reba

As per ToR No. 16,

The total mine lease area is proposed to be used for mining activity during the first five years as per the mining plan. Blasting, noise and vibrations and other disturbances including dust generation are likely to have an adverse impact on wildlife. But these impacts are unlikely to extend beyond 500 m from the actual my area. There are two Schedule II species and twenty-two species are under schedule IV according to Indian wild life Act 1972. A total 16 species of bird were sighted in the buffer zone 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.

As per ToR No. 17,

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 reserved of even protected forests within the project area. Hence submission of clearance from the National Board of Wildlife does not arise.

As per ToR No. 18,

A detailed biological study of the study area [core zone and buffer zone of 10 km radius of the periphery of the mine lease] has been carried out and the results are presented in Tables 3.30 to 3.31. There are two species under Schedule II and twenty-Five species under schedule IV according to Indian wild life Act 1972. A total 16 species of bird were sighted in the study area. The main threat to the bird is the use of pesticides in agriculture. There is 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.

3.5.7.4 Rare and Endangered fauna of the study area

1. As per Indian Wild Life (Protection) Act, 1972,

Wild Life (Protection) Act, 1972, as amended on 17th January 2003, is an Act to provide for the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the ecological and environmental security of the country. Some of the sighted faunas were given protection by the Indian Wild Life (Protection) Act, 1972 by including them in different schedules. Here no endemic, endangered migratory fauna found in the area. This area is not also a migratory path of any faunal species.

2. As per IUCN RED (2013) List,

The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. Among reported species Schedule II and IV in the buffer zone are presented below,

1. ***Schedule II species***

   Chameleon, Rat snake, Saw scaled viper, Russell's viper.

2. ***Schedule IV species***

   Green Pond Frog, Indian Burrowing frog, Black drongo, Red-vented Bulbul, Koel, Indian Field Mouse, Indian palm squirrel, Lesser grass, Common Indian crow, striped tiger, Common Tiger, Blue tiger, Tawny coster, Indian wall lizard, Indian pond heron, Grey Heron etc.,

3.5.8 Results and Discussion

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

The study involved 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 the proposed quarry site. 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 has also been designed to suggest suitable mitigation measures, if necessary, for protection of wildlife habitats and conservation of REET species if any.

3.6 SOCIO-ECONOMIC ENVIRONMENT

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 features 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 substantially improve because of this proposed project. As the proposed project will provide direct and indirect employment and improve the infrastructural facilities in that area, thus leading to the improvement of their standard of living.

3.6.1 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 to be taken up in the study area

3.6.2 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

3.6.3 District Profile

Kancheepuram district of Tamil Nadu has total population of 3,998,252 as per the Census 2011. Out of which 1,457,242 are males while 2,012,958 are females. In 2011 there were total 41,807 families residing in Kancheepuram district. The Average Sex Ratio of Kancheepuram district is 986. As per Census 2011 out of total population, 63.49% people live in Urban areas while 36.51% lives in the Rural areas. The average literacy rate in kancheepuram is 84.49%. Also, the Sex Ratio of Urban areas in Kancheepuram district is 986 while that of Rural areas is 986.

The population of Children of age 0-6 years in Kancheepuram district is 431,574 which is 10.79% of the total population. There are 220,341 male children and 211,233 female children between the age 0-6 years. Thus, as per the Census 2011 the Child Sex Ratio of Kancheepuram is 959 which is less than Average Sex Ratio (986) of Kancheepuram district.

The total literacy rate of Kancheepuram district is 84.49%. The male literacy rate is 89.89% and the female literacy rate is 79.02% in Kancheepuram district.

3.6.4 Socio-Economic Status of Study area

Siruthamur is a large village located in Uthiramerur Taluka of Kancheepuram district, Tamil Nadu with total 755 families residing. The Siruthamur village has population of 3097 of which 1555 are males while 1542 are females as per Population Census 2011. In Siruthamur village population of children with age 0-6 is 365 which makes up 11.79 % of total population of village. Average Sex Ratio of Siruthamur village is 992 which is lower than Tamil Nadu state average of 996. Child Sex Ratio for the Siruthamur as per census is 962, higher than Tamil Nadu average of 943. Siruthamur village has lower literacy rate compared to Tamil Nadu. In 2011, literacy rate of Siruthamur village was 70.28 % compared to 80.09 % of Tamil Nadu. In Siruthamur Male literacy stands at 80.42 % while female literacy rate was 60.09 %. As per constitution of India and Panchyati Raaj Act, Siruthamur village is administrated by Sarpanch (Head of Village) who is elected representative of village. Our website, don't have information about schools and hospital in Siruthamur village.

TABLE 3.32 SIRUTHAMUR VILLAGE POPULATION FACTS

Number of Households	755
Population	3,097
Male Population	1,555
Female Population	1,542
Children Population	365
Sex-ratio	992
Literacy	70.28%
Male Literacy	80.42%
Female Literacy	60.09%
Scheduled Tribes (ST)	49
Scheduled Caste (SC)	1,090

Source:https://www.census2011.co.in/data/village/629769-sirudamur-tamil-nadu.html

TABLE 3.33 DEMOGRAPHICS POPULATION OF SIRUTHAMUR VILLAGE

Total Population	Male Population	Female Population
3,097	1,555	1,542

Source: https://www.census2011.co.in/data/village/629769-sirudamur-tamil-nadu.html

3.6.4.1 Literacy of Siruthamur Village

Siruthamur village has lower literacy rate compared to Tamil Nadu. In 2011, literacy rate of Siruthamur village was 70.28 % compared to 80.09 % of Tamil Nadu. In Siruthamur Male literacy stands at 80.42 % while female literacy rate was 60.09 %.

3.6.4.2 Worker's profile of Siruthamur village

In Siruthamur village out of total population, 1520 were engaged in work activities. 86.58 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 13.42 % were involved in Marginal activity providing livelihood for less than 6 months. Of 1520 workers engaged in Main Work, 402 were cultivators (owner or co-owner) while 581 were Agricultural labourer.

TABLE 3.34 SIRUTHAMUR VILLAGE WORKING POPULATION

Type	Total	Male	Female
Main Worker	1,316	-	-
Marginal Workers	204	94	110

Source: https://www.census2011.co.in/data/village/629769-sirudamur-tamil-nadu.html

TABLE 3.35 POPULATION AND LITERACY DATA OF STUDY AREA

S. NO	Parameters/ Village Name	Total population of village	Total population male	Total population female	Population in the age group 0-6 Male	Population in the age group 0-6 Female	SC Population	ST Population	Total Literacy Rate	Female	
										SC	ST
1	Adavapakkam	765	396	369	41	28	499	8	465	241	2
2	Alanjeri	684	334	350	40	35	679	0	560	347	0
3	Alapakkam	517	246	271	26	30	76	0	318	43	0
4	Angambakkam	1907	963	944	116	103	1408	21	1167	696	9
5	Annadhur	1239	617	622	79	80	263	6	713	129	4
6	Arpakkam	2937	1475	1462	181	197	1626	320	1794	818	149
7	Arumbuliyur	1618	777	841	92	96	470	56	1025	247	29
8	Asoor	1234	609	625	67	65	741	17	822	378	10
9	Athiyur	681	350	331	42	30	255	8	451	134	5
10	Athur	1904	982	922	95	89	706	31	1234	355	15
11	Avalur	3960	1948	2012	240	205	240	73	2377	121	39
12	Chinnalambadi	434	227	207	20	18	91	0	274	41	0
13	Chitalapakkam	592	288	304	32	37	9	0	344	4	0
14	Chithaathur	322	159	163	9	9	0	6	161	0	3
15	Devariyambakkam	875	426	449	48	54	138	0	571	75	0
16	Edamichi	1414	701	713	63	69	514	0	1021	256	0
17	Edayambudur	1304	678	626	117	67	480	19	806	234	11
18	Elapakkam	207	98	109	14	22	155	45	100	85	23
19	Elayanarvelur	1079	544	535	67	57	554	0	643	281	0
20	Ezhichur	1373	658	715	74	78	937	0	886	490	0
21	Gindangarai	391	192	199	23	20	0	85	259	0	46
22	Irumaram	223	104	119	11	16	222	0	134	118	0
23	Kadalmangalam	890	431	459	38	46	408	8	579	210	3
24	Kaithandalam	644	334	310	39	32	157	0	367	75	0
25	Kaliyapettai	1640	829	811	102	93	471	8	1012	227	4

26	Kambarajapuram	1527	766	761	93	79	273	56	944	134	30
27	Karumbakkam	850	438	412	44	37	538	0	518	265	0
28	Kattankulam	1028	514	514	59	41	289	0	606	147	0
29	Kattuputhur	171	92	79	5	7	10	0	111	6	0
30	Kavampair	682	339	343	37	51	343	39	427	171	23
31	Kavanipakkam	780	382	398	39	39	509	0	508	260	0
32	Kavanthandalam	1619	796	823	66	68	392	67	970	200	31
33	Kavithandalam	1814	904	910	89	109	1359	19	1203	681	10
34	Kilakkadi	1072	541	531	52	53	369	20	754	185	9
35	Kilputhur	170	80	90	7	5	1	0	99	0	0
36	Kodithandalam	508	254	254	27	25	366	23	333	180	9
37	Kolathur	508	243	265	35	32	402	0	306	212	0
38	Kunnavakkam	1397	698	699	89	88	622	5	724	306	3
39	Kurumanjeri	666	330	336	40	43	41	16	451	21	8
40	Kurumbarai	1424	701	723	73	74	666	100	980	337	49
41	Magaral	2834	1399	1435	154	149	1777	36	1754	882	20
42	Maiyur	2931	1452	1479	156	158	1324	140	2054	666	69
43	Malayankulam	2390	1218	1172	140	110	937	58	1438	457	23
44	Mamandur	5503	2829	2674	258	284	2844	74	4080	1432	41
45	Mambakkam	627	311	316	37	31	519	0	385	264	0
46	Mambudur	296	164	132	14	5	0	13	204	0	5
47	Marudham	1893	950	943	62	53	372	0	1345	189	0
48	Maruthuvambadi	1560	784	776	79	85	441	29	991	218	13
49	Melmanapakkam	1212	622	590	89	77	697	0	859	331	0
50	Melputhur	430	214	216	27	23	300	0	263	154	0
51	Mulaginimeni	381	201	180	25	18	0	0	241	0	0
52	Nariambakkam	35	14	21	1	0	0	0	24	0	0
53	Nariyambudur	20	11	9	2	1	0	11	8	0	5
54	Nathanallur	2158	1047	1111	113	145	651	72	1288	332	37
55	Neerkundram	314	153	161	7	14	88	0	225	47	0

56	Nelveli	667	322	345	38	50	577	0	403	297	0
57	Nerkundram	624	302	322	45	35	137	5	341	68	2
58	Neyyadivakkam	1360	666	694	62	78	682	48	896	366	24
59	Orakkattupettai	744	368	376	42	44	88	18	567	40	12
60	Ozhaiyur	888	444	444	46	47	583	0	554	288	0
61	Padoor	713	365	348	38	53	227	14	463	117	8
62	Palayaseevaram	5634	2792	2842	325	356	2442	33	3563	1234	15
63	Paleswaram	802	400	402	52	54	356	14	450	172	8
64	Palur	840	449	391	60	39	468	29	493	212	12
65	Pandavakkam	220	114	106	9	9	4	0	127	3	0
66	Pazhaveri	727	362	365	36	40	368	5	477	178	2
67	Peranakkavur	926	478	448	54	64	634	9	586	309	4
68	Pilappur	1256	650	606	47	57	53	20	772	25	10
69	Pinayur	1068	520	548	46	58	377	6	759	199	3
70	Pinnampoondi	286	147	139	21	16	0	0	221	0	0
71	Porpandal	941	491	450	59	36	429	43	640	206	16
72	Pulipakkam	719	353	366	42	38	0	0	495	0	0
73	Pulivoy	491	237	254	16	32	217	19	324	112	11
74	Puliyambakkam	2158	1253	905	109	85	813	123	1550	393	60
75	Pullampakkam	872	424	448	64	58	671	44	494	343	20
76	Puthali	1032	510	522	66	76	766	27	674	389	13
77	Rettamangalam	637	307	330	25	42	431	115	369	220	59
78	Sadachivakkam	396	198	198	22	28	16	71	215	5	32
79	Salavakkam	3311	1635	1676	195	174	1144	39	2332	569	23
80	Sampathinallur	257	137	120	22	15	255	0	169	120	0
81	Sathananjeri	2166	1095	1071	131	130	1037	15	1387	514	10
82	Seethananjeri	494	247	247	23	31	285	21	374	142	10
83	Seethapuram	40	20	20	5	5	0	0	26	0	0
84	Sembulam	148	66	82	4	7	54	0	104	31	0
85	Sirudamur	1543	790	753	87	74	517	73	784	252	40

86	Sirumailur	1029	510	519	44	57	699	4	638	348	2
87	Sirupinayur	2053	1028	1025	123	123	1070	107	1269	535	51
88	Sithanakavoor	789	391	398	55	47	675	0	472	338	0
89	Sithandi	939	481	458	70	68	792	0	627	386	0
90	Thammanur	2116	1088	1028	134	114	667	151	1231	337	68
91	Thandarai	1305	644	661	62	79	246	5	801	127	2
92	Thirumukkudal	1673	850	823	91	80	888	44	1216	435	22
93	Thiruvanaikoil	598	288	310	37	40	430	81	386	219	40
94	Thollazhi	980	501	479	60	48	443	0	587	210	0
95	Thonankulam	435	216	219	28	24	287	24	270	142	12
96	Thottanaval	660	338	322	38	33	522	0	445	257	0
97	Ullavur	1749	908	841	101	100	928	38	1096	445	21
98	Uthukadu	4528	2288	2240	241	254	1853	36	3070	928	20
99	Vadathavoor	838	422	416	44	55	724	0	527	362	0
100	Valathodu	409	195	214	22	25	267	0	269	141	0
101	Vayalakkavoor	1429	752	677	90	56	809	0	890	369	0
102	Vendivakkam	202	107	95	10	11	44	0	110	22	0
103	Vengudi	1111	542	569	56	50	614	24	877	317	15
104	Vichoor	883	439	444	47	43	731	0	559	364	0
105	Villiambakkam	1344	673	671	70	52	4	34	879	2	17
106	Vinnamangalam	421	210	211	30	18	0	0	250	0	0
107	Nelveli	351	169	182	22	25	167	49	201	88	29
108	Vitchanthangal	1016	517	499	64	56	343	13	634	168	9
109	Kilottivakkam	1320	660	660	68	69	785	0	1024	399	0
110	Seeyamangalam	564	281	283	29	23	309	0	350	144	0
111	Villivalam	1731	856	875	85	100	326	0	1036	172	0
112	Kannikulam	727	372	355	47	35	421	23	453	207	11
113	Thriupulivanam	1821	892	929	102	104	356	85	1141	190	45
114	Anambakkam	1665	833	832	73	85	534	10	1150	268	4

Source: www.censusindia.gov.in – Tamil Nadu Census of India – 2011

TABLE 3.36 EDUCATIONAL FACILITIES & WATER & DRAINAGE FACILITIES DATA OF STUDY AREA

S.No.	Village Name	Govt Primary School	Govt Vocational Training School/ITI	Primary Heallth Sub Centre	Tap Water Untreated	River/Canal	Is the Area Covered under Total Sanitation Campaign (TSC)?	Telephone (landlines)	Public Bus Service	Gravel (kuchha) Roads	Commercial Bank	Agricultural Credit Societies	Self - Help Group	Nutritional Centres-Anganwadi Centre	Community Centre with/without TV	Power Supply For Domestic Use
1	Adavapakkam	1	2	1	1	2	2	1	2	1	1	2	1	1	2	1
2	Alanjeri	1	2	0	2	2	2	1	2	1	2	2	1	1	1	1
3	Alapakkam	1	2	0	1	2	2	2	1	1	2	2	1	1	2	1
4	Angambakkam	1	2	0	1	2	2	1	2	1	2	2	1	1	1	1
5	Annadhur	1	2	1	1	2	2	1	1	1	2	2	1	1	1	1
6	Arpakkam	1	2	1	1	2	2	1	1	1	2	1	2	1	2	1
7	Arumbuliyur	1	2	1	1	2	2	1	1	1	1	1	1	1	2	1
8	Asoor	1	2	1	1	2	2	1	2	1	2	2	1	1	1	1
9	Athiyur	2	2	0	2	2	1	1	1	1	2	2	1	1	2	1
10	Athur	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
11	Avalur	1	2	1	1	2	1	1	1	1	2	2	1	1	1	1
12	Chinnalambadi	1	2	0	1	2	2	2	1	1	2	2	1	1	1	1
13	Chitalapakkam	1	2	0	2	2	2	2	1	1	2	2	1	1	1	1
14	Chithaathur	1	2	0	2	2	2	2	1	1	2	2	1	1	1	1
15	Devariyambakkam	1	2	0	1	2	2	1	1	1	2	1	1	1	2	1
16	Edamichi	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
17	Edayambudur	1	2	0	1	2	2	1	2	1	2	1	1	1	2	1
18	Elapakkam	2	2	0	2	2	2	1	1	2	2	2	1	1	1	1
19	Elayanarvelur	1	2	1	1	2	2	1	1	1	2	2	1	1	1	1
20	Ezhichur	1	2	1	1	2	1	1	1	1	2	2	1	1	2	1
21	Gindangarai	1	2	0	1	2	1	1	1	1	2	2	1	1	2	1
22	Irumaram	2	2	0	1	2	2	1	2	1	2	2	1	2	2	1
23	Kadalmangalam	1	2	0	2	2	1	1	2	1	2	2	1	1	1	1

24	Kaithandalam	1	2	0	1	2	2	1	2	1	2	2	2	1	2	1
25	Kaliyapettai	1	2	0	1	2	2	1	2	1	2	1	1	1	2	1
26	Kambarajapuram	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
27	Karumbakkam	1	2	0	1	2	2	1	1	2	2	2	1	1	1	1
28	Kattankulam	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
29	Kattuputhur	1	2	0	2	2	2	1	2	1	2	2	1	1	2	1
30	Kavampair	1	2	0	1	2	2	1	2	1	2	2	1	1	2	1
31	Kavanipakkam	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
32	Kavanthandalam	1	2	0	1	2	1	1	1	1	2	1	1	1	2	1
33	Kavithandalam	1	2	1	1	2	2	1	1	1	2	2	1	1	1	1
34	Kilakkadi	1	2	1	1	2	2	1	1	1	2	2	1	1	2	1
35	Kilottivakkam	1	2	0	1	2	1	1	1	1	2	2	1	1	1	1
36	Kilputhur	1	2	0	1	2	2	2	1	1	2	2	1	1	1	1
37	Kodithandalam	2	2	0	2	2	2	2	1	2	2	2	1	1	2	1
38	Kolathur	1	2	0	1	2	2	2	1	1	2	2	1	1	2	1
39	Kunnavakkam	1	2	1	1	2	1	1	2	1	2	2	1	1	1	1
40	Kurumanjeri	2	2	0	2	2	2	1	1	1	2	2	1	1	2	1
41	Kurumbarai	2	2	0	1	2	2	1	1	1	2	2	1	1	2	1
42	Magaral	1	2	1	1	2	2	1	1	1	1	2	2	1	2	1
43	Maiyur	1	2	1	1	2	2	1	1	1	2	1	1	1	2	1
44	Malayankulam	1	2	1	1	2	2	1	1	1	2	2	1	1	1	1
45	Mamandur	1	2	1	1	2	1	1	1	1	2	1	1	1	1	1
46	Mambakkam	1	2	1	1	2	2	1	1	1	2	1	1	1	2	1
47	Mambudur	2	2	0	1	2	2	1	2	1	2	2	1	2	1	1
48	Marudham	1	2	0	2	2	1	2	1	1	2	1	1	1	1	1
49	Maruthuvambadi	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
50	Melmanapakkam	1	2	0	1	2	1	1	2	1	2	2	1	1	2	1
51	Melputhur	2	2	0	1	2	2	1	1	1	2	2	1	1	1	1
52	Mulaginimeni	2	2	0	1	2	2	2	1	1	2	2	1	2	2	1
53	Nariambakkam	2	2	0	2	2	2	2	2	1	2	2	2	2	2	1
54	Nariyambudur	2	2	0	2	2	2	2	2	1	2	2	2	2	2	1
55	Nathanallur	1	2	1	1	2	2	1	1	1	2	2	1	1	1	1
56	Neerkundram	1	2	0	1	2	2	2	1	1	2	2	1	1	2	1

57	Nelveli	1	2	0	2	2	2	2	1	1	2	2	1	1	2	1
58	Nerkundram	2	2	0	1	2	2	1	1	1	2	2	1	1	2	1
59	Neyyadivakkam	1	2	1	1	2	1	1	1	1	2	1	1	1	2	1
60	Orakkattupettai	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
61	Ozhaiyur	1	2	1	1	2	2	1	1	1	2	2	2	1	2	1
62	Padoor	1	2	1	1	2	2	1	1	1	2	1	1	1	2	1
63	Palayaseevaram	1	2	1	1	2	2	1	1	1	1	2	1	1	1	1
64	Paleswaram	1	2	0	2	2	2	1	1	1	2	2	1	1	1	1
65	Palur	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
66	Pandavakkam	2	2	0	1	2	2	1	2	1	1	1	1	1	2	1
67	Pazhaveri	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
68	Peranakkavur	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
69	Pilappur	1	2	0	1	2	2	1	1	2	2	2	1	1	2	1
70	Pinayur	1	2	1	2	2	1	1	1	1	2	2	1	1	2	1
71	Pinnampoondi	2	2	0	1	2	2	1	1	1	2	2	1	2	2	1
72	Porpandal	1	2	1	1	2	2	1	1	1	2	2	1	1	2	1
73	Pulipakkam	1	2	1	1	2	2	1	1	1	2	2	1	1	2	1
74	Pulivoy	1	2	0	2	2	2	1	1	1	2	2	2	1	2	1
75	Puliyambakkam	1	2	0	2	2	1	1	2	1	2	2	1	1	2	1
76	Pullampakkam	1	2	0	1	2	1	1	1	1	2	2	1	1	1	1
77	Puthali	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
78	Rettamangalam	1	2	0	2	2	2	1	1	2	2	2	1	1	1	1
79	Sadachivakkam	1	2	0	1	2	2	1	2	1	2	2	1	1	2	1
80	Salavakkam	1	2	1	1	2	2	1	2	1	1	1	1	1	2	1
81	Sampathinallur	2	2	0	2	2	1	1	1	1	2	2	1	2	2	1
82	Sathananjeri	1	2	1	1	2	2	1	1	1	2	1	1	1	2	1
83	Seethananjeri	1	2	0	2	2	2	1	1	1	2	2	1	2	1	1
84	Seethapuram	2	2	0	2	2	2	2	1	1	2	2	1	2	2	1
85	Sembulam	2	2	0	1	2	2	2	1	1	2	2	1	2	2	1
86	Sirudamur	1	2	0	1	2	2	1	2	1	2	2	1	1	2	1
87	Sirumailur	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
88	Sirupinayur	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
89	Sithanakavoor	1	2	0	2	2	2	1	1	1	2	2	1	1	1	1

90	Sithandi	1	2	0	2	2	1	1	1	1	2	2	1	1	1	1
91	Thammanur	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
92	Thandarai	1	2	0	1	2	2	1	1	2	2	2	1	1	2	1
93	Thirumukkudal	1	2	1	1	2	2	1	1	1	2	2	1	1	2	1
94	Thiruvanaikoil	1	2	0	2	2	2	1	2	1	2	2	1	1	1	1
95	Thollazhi	1	2	0	2	2	2	1	1	1	2	2	1	1	2	1
96	Thonankulam	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
97	Thottanaval	1	2	0	1	2	2	1	2	1	2	2	1	1	1	1
98	Ullavur	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
99	Uthukadu	1	2	1	1	2	2	1	1	1	2	2	1	1	2	1
100	Vadathavoor	1	2	0	1	2	2	1	2	1	2	2	1	1	2	1
101	Valathodu	1	2	0	1	2	2	1	2	1	2	2	1	1	1	1
102	Vayalakkavoor	1	2	0	1	2	1	1	1	1	2	1	1	1	2	1
103	Vendivakkam	2	2	0	1	2	2	1	1	1	2	2	1	1	2	1
104	Vengudi	1	2	0	1	2	2	1	1	1	2	2	1	1	1	1
105	Vichoor	2	2	0	1	2	2	1	1	1	2	2	1	1	1	1
106	Villiambakkam	1	2	1	1	2	2	1	1	1	2	1	1	1	1	1
107	Vinnamangalam	1	2	0	2	2	2	1	1	1	2	2	1	1	1	1
108	Nelveli	1	2	0	2	2	2	2	1	1	2	2	1	1	2	1
109	Vitchanthangal	2	2	0	1	2	2	1	1	1	2	2	1	1	2	1
110	Kilottivakkam	1	2	0	1	2	1	1	1	1	2	2	1	1	1	1
111	Seeyamangalam	1	2	0	1	2	2	1	1	1	2	2	1	1	2	1
112	Villivalam	1	2	1	1	2	2	1	1	1	2	2	1	1	1	1
113	Kannikulam	1	2	0	2	2	2	1	2	1	2	2	1	1	2	1
114	Thriupulivanam	1	2	1	1	2	2	1	2	1	1	2	1	1	1	1
115	Anambakkam	1	2	1	1	2	2	1	1	1	2	2	1	1	1	1

TABLE 3.37 OTHER FACILITIES IN THE STUDY AREA

S.NO	Village Name	Tractors	Carts Drivens by	Black Topped (pucca) Road	ATM	Commercial Bank	Cooperative Bank	Agricultural Credit Societies	Public Distribution System (PDS)Shop	Mandis/Regular Market	Weekly Haat	Agricultural Marketing Society	Power Supply for Agriculture Use	Power Supply for Commercial Use	Agricultural Commodities (First)	Manu factures Commo ditties (First)	Handicrafts Commodities (First)	Forest Area (in Hectares)	Net Area Sown (in Hectares)
1	Adavapakkam	2	2	1	2	1	2	2	1	2	2	2	1	2	Paddy			2.15	58.23
2	Alanjeri	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			62.67	49.01
3	Alapakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	64.61
4	Angambakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	155.42
5	Annadhur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			1	143.4
6	Arpakkam	2	2	1	2	2	1	1	1	2	2	2	1	1	Paddy	Hollw Blocks		0	272.18
7	Arumbuliyur	2	2	1	2	1	2	1	1	2	2	2	1	2	Paddy			0	184.94
8	Asoor	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	77.95
9	Athiyur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	22.64
10	Athur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	238.45
11	Avalur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	312.79
12	Chinnalambadi	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			21	52.31
13	Chitalapakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy		Clay Pots	1	30.62
14	Chithaathur	2	2	2	2	2	2	2	1	1	2	2	1	2	Paddy			0	54.61
15	Devariyambakkam	2	2	1	2	2	1	1	1	2	2	1	1	1	Paddy			0	92.42
16	Edamichi	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy		Clay Pots	180.42	161.61
17	Edayambudur	2	2	1	2	2	2	1	1	2	2	2	1	1	Paddy			20	106.18
18	Elapakkam	2	2	1	2	2	2	2	2	2	2	2	1	2	Paddy			1	67.64
19	Elayanarvelur	2	2	1	2	2	2	2	1	1	2	2	1	2	Paddy			0	165.01
20	Ezhichur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	136.79
21	Gindangarai	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	41.28
22	Irumaram	2	2	1	2	2	2	2	1	2	2	2	2	2	Paddy			0	33.42
23	Kadalmangalam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			82	159.77
24	Kaithandalam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	121.23

25	Kaliyapettai	2	2	1	2	2	2	1	1	1	2	2	1	1	Paddy			2	116.88
26	Kambarajapuram	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	304.98
27	Karumbakkam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	77.91
28	Kattankulam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	161.09
29	Kattuputhur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			2	56.79
30	Kavampair	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			1	51.1
31	Kavanipakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	127.64
32	Kavanthandalam	2	2	1	2	2	1	1	1	2	2	2	1	2	Paddy			0	211.69
33	Kavithandalam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	184.15
34	Kilakkadi	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			16.03	211.32
35	Kilottivakkam	2	2	1	2	2	2	2	2	2	2	2	1	1	Paddy			0	81.5
36	Kilputhur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	63.67
37	Kodithandalam	2	2	1	2	2	2	2	2	2	2	2	1	1	Paddy			0	52.05
38	Kolathur	2	2	1	2	2	2	2	1	2	2	2	2	2	Paddy			0	121.82
39	Kunnavakkam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			29.69	13.15
40	Kurumanjeri	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	23.21
41	Kurumbarai	2	2	1	2	2	2	2	1	2	2	1	1	2	Paddy			0	188.85
42	Magaral	2	2	1	2	1	1	2	1	2	2	2	1	2	Paddy			0	203.23
43	Maiyur	2	2	1	2	2	1	1	1	2	2	2	1	2	Paddy			136.55	143.92
44	Malayankulam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy		Baskets	0	246.27
45	Mamandur	2	2	1	1	2	2	1	1	2	2	2	1	1	Paddy			0	100.92
46	Mambakkam	2	2	1	1	2	1	1	1	2	2	2	1	2	Paddy			65.1	117.47
47	Mambudur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	90.83
48	Marudham	2	2	1	2	2	2	1	1	2	2	2	1	2	Paddy			2	247.24
49	Maruthuvambadi	2	2	1	2	2	2	2	1	2	2	2	2	2	Paddy			0	198.52
50	Melmanapakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	54.18
51	Melputhur	2	2	1	2	2	2	2	1	2	2	2	2	2	Paddy			0	55.16
52	Mulaginimeni	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	68.67
53	Nariambakkam	2	2	1	2	2	2	2	2	2	2	2	2	2	Paddy			0	36.85
54	Nariyambudur	2	2	1	2	2	2	2	2	2	2	2	1	2	Paddy			104.47	11.42
55	Nathanallur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	190.74
56	Neerkundram	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0.48	34.03

57	Nelveli	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	71.63
58	Nerkundram	2	2	2	2	2	2	2	1	2	2	2	1	1	Paddy			36.61	71.67
59	Neyyadivakkam	2	2	1	2	2	2	1	1	2	2	2	1	2	Paddy			0	135.25
60	Orakkattupettai	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			2	28.98
61	Ozhaiyur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			1	88.62
62	Padoor	2	2	1	2	2	1	1	1	2	2	2	1	2	Paddy			5	99.74
63	Palayaseevaram	2	2	1	2	1	2	2	1	2	2	2	1	1	Paddy			0	114.71
64	Paleswaram	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			1	71.55
65	Palur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	278.1
66	Pandavakkam	2	2	1	1	1	1	1	1	2	2	2	1	2	Paddy			0	33.29
67	Pazhaveri	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy		Sculptures	31	116.48
68	Peranakkavur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			2	101.94
69	Pilappur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			134.99	124.95
70	Pinayur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			7	233.82
71	Pinnampoondi	2	2	1	2	2	2	2	2	2	2	2	1	1	Paddy			0	3.42
72	Porpandal	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			5	118.81
73	Pulipakkam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			8.4	1.28
74	Pulivoy	2	2	1	2	2	2	2	2	2	2	2	1	1	Paddy			0	97.19
75	Puliyambakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	42.81
76	Pullampakkam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy		Clay Pots	2	138.31
77	Puthali	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			112.2	117.29
78	Rettamangalam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			1	37.98
79	Sadachivakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			2	70.81
80	Salavakkam	2	2	1	2	1	2	1	1	2	2	1	1	1	Paddy			2	259.18
81	Sampathinallur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	27.1
82	Sathananjeri	2	2	2	2	2	2	1	1	2	2	2	1	2	Paddy			2	298.75
83	Seethananjeri	2	2	1	2	2	1	2	1	2	2	2	1	2	Paddy			1	63.11
84	Seethapuram	2	2	1	2	2	2	2	2	2	2	2	2	1	Paddy			0	5.82
85	Sembulam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	29.93
86	Sirudamur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	122.24
87	Sirumailur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			75.03	24.76

88	Sirupinayur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			170.52	281.73
89	Sithanakavoor	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	104.37
90	Sithandi	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy		Clay Pots	0	44.61
91	Thammanur	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	160.62
92	Thandarai	2	2	1	1	2	2	2	1	2	2	2	1	2	Paddy			84.78	143.59
93	Thirumukkudal	2	2	1	2	2	2	2	1	2	2	1	1	1	Paddy	Cloth	Clay Pots	30	113.65
94	Thiruvanaikoil	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	61.37
95	Thollazhi	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	113.29
96	Thonankulam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	81.29
97	Thottanaval	2	2	1	2	2	1	2	1	2	2	2	1	1	Paddy			1	55.01
98	Ullavur	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy	Cement Slabs		0	153.4
99	Uthukadu	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy		Clay Pots	0	521.43
100	Vadathavoor	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			61.39	91.19
101	Valathodu	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	32.73
102	Vayalakkavoor	2	2	1	2	2	2	1	1	2	2	2	1	2	Paddy			3	200.32
103	Vendivakkam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	35.85
104	Vengudi	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	13.05
105	Vichoor	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	88.8
106	Villiambakkam	2	2	1	2	2	1	1	1	2	2	2	1	1	Paddy			0	89.83
107	Vinnamangalam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			2	64.24
108	Kilottivakkam	2	2	1	2	2	2	2	2	2	2	2	1	1	Paddy			0	81.5
109	Seeyamangalam	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	20.23
110	Villivalam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			0	265.81
111	Vitchanthangal	2	2	1	2	2	2	2	1	2	2	1	1	1				0	125.52
112	Nelveli	2	2	1	2	2	2	2	1	2	2	2	1	2	Paddy			0	71.63
113	Kannikulam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			1	58.98
114	Thriupulivanam	2	2	1	2	2	1	2	1	2	2	2	1	2	Paddy			0	146.55
115	Anambakkam	2	2	1	2	2	2	2	1	2	2	2	1	1	Paddy			2	44.36

Source: www.censusindia.gov.in - Tamil Nādu Census of India – 2011

3.6.5 Recommendation and Suggestion

- Awareness program should be conducted to make the population aware of education and to get a better livelihood.
- Vocational training programme should be organized to make the people self - employed, particularly for women and unemployed youth.
- On the basis of qualification and skills local community may be preferred. Long term and short-term employments should be generated.
- Health care centre and ambulance facility should be provided to the population to get easy access to medical facilities. Maternity facility should be made available at the place to avoid going to distant places for treatment which involves risks. Apart from that, as these areas are prone to various diseases a hospital with modern facilities should be opened on a priority basis in a central place to provide better health facilities to the villagers around the project.
- While developing an Action Plan, it is very important to identify the population who falls under the marginalized and vulnerable groups. So that special attention can be given to these groups with special provisions while making action plans.

3.6.6 Summary & Conclusion

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

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

CHAPTER – 4: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 General

Environmental impacts both direct and indirect on various environmental attributes due to cluster quarries 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.

- Land environment
- Water Environment
- Air Environment
- Noise Environment
- Socio economic environment
- Solid waste
- Soil environment

Based on the baseline environmental status at the existing mine 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 extent of the proposed area is 6.51.0 ha (3 proposed quarries) and proposed depth of the quarrying is 47m Maximum 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 lease area the land use pattern will be altered. In order to minimize the adverse effects, the following control measures will be implemented:

In the Rough stone and Gravel quarrying operation the degradation of land is insignificant, after completion of the quarrying operation the land will be allowed to collect rain water which will act as temporary reservoir, this rough stone does not produce any toxic effluents in the form of solid, liquid or gas. It is a simple quarrying operation where 100% of stones will be removed systematically as per the approved Mining plan. 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 carried out at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.1.3 Soil Environment

4.1.4 Impact on Soil Environment

There is no top soil anticipated in this project, the surface consists of gravelly formation followed by Rough stone which is proposed to excavate completely during the quarrying operation, hence preservation of top soil does not exist. Erosion of top layer (gravel), extracted fine material can result in substantial sediment loading to surface waters and drainage ways. During rainy season surface run off may cause siltation in low lying areas.

4.1.5 Mitigation measures for Soil Erosion and Soil Conservation

- Garland drains will be constructed around the project area with silt traps to control the surface erosion during rainy seasons.
- Greenbelt development all along the periphery of the project area (i.e., 7.5m & 15m safety barrier) will ensure binding strength and minimizes soil erosion.
- Soil sampling will be carried out in the core zone for every six months to ensure the soil quality is not affected due to the quarrying activities.

4.1.6 Waste Dump Management

There are no wastages anticipated in this Rough stone and Gravel quarrying operation. The entire quarried out materials will be utilized (100%).

The overburden in the form of Gravel formation the gravel will be also sold to needy customers for the filling and levelling of low-lying areas.

4.2 Water Environment

4.2.1 Anticipated Impact on Surface and ground water

The impact due to quarrying on the water quality is expected to be insignificant because of no use of chemicals or hazardous substances during quarrying process. The quarrying activity will not intersect ground water table as quarrying is proposed upto 47m Maximum and water table is found at a depth of 53m – 58m BGL.

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 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 Rough stone processing.

Detail of water requirements in KLD as given below:

TABLE 4.1: WATER REQUIREMENTS

P1		
Purpose	**Quantity**	**Source**
Dust Suppression	0.5 KLD	From Existing bore wells from nearby area / Rain water harvesting pits
Green Belt development	1.0 KLD	From Existing bore wells from nearby area / Rain water harvesting pits
Drinking & Domestic purpose	1.0 KLD	Approved Water Vendors
Total	**2.5 KLD**	
P2		
Purpose	**Quantity**	**Source**
Dust Suppression	0.5 KLD	From Existing bore wells from nearby area / Rain water harvesting pits
Green Belt development	1.0 KLD	From Existing bore wells from nearby area / Rain water harvesting pits
Drinking & Domestic purpose	1.0 KLD	Approved Water Vendors
Total	**2.5 KLD**	
P3		
Purpose	**Quantity**	**Source**
Dust Suppression	0.5 KLD	From Existing bore wells from nearby area / Rain water harvesting pits
Green Belt development	1.0 KLD	From Existing bore wells from nearby area / Rain water harvesting pits
Drinking & Domestic purpose	1.0 KLD	Approved Water Vendors
Total	**2.5 KLD**	

* Water for drinking purpose will be brought from approved water vendors

Source: Approved Mining Plan Pre-Feasibility Report

4.2.2 Mitigation measures

- The following mitigation measures are suggested for water management for the cluster quarries Rainwater will be collected in lower part of the quarry pit by construction of garland drains to divert surface run-off and will be connected to setting tank of 5m (l) x 5m (w) x 3m (d) to allow suspended solids to settle down if any. This collected water will act as a rain water harvesting system and will be used for dust suppression and greenbelt development.
- Six months once analysis of quarry pit water and ground water quality in nearby villages will be carried out to ensure the water quality is not affected due to the quarrying activities.
- Domestic sewage from site office & urinals/latrines provided in project area will be discharged through septic tank followed by soak pit system.
- Only clear and settled water free from silt content will be used for dust suppression and greenbelt development.
- De-silting will be carried out before and immediately after the monsoon season and the settling tank and drains will be cleaned weekly, especially during monsoons.
- Tippers & HEMM will be washed in a designated area and the washed water will be routed through drains to a settling tank, which has an oil & grease trap, only clear water will be reused for greenbelt development.

4.3 Air Environment

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

4.3.1. Anticipated Impact

Wind erosion of the exposed areas and the air borne particulate matter generated by quarrying operation, and transportation are mainly PM_{10} & $PM_{2.5}$ and emissions of Sulphur dioxide (SO_2) & Oxides of Nitrogen (NOx) due to excavation/loading equipment and vehicles plying on haul roads are the cause of air pollution in the project area.

Similarly, loading - unloading and transportation of Rough Stone and Gravel, wind erosion of the exposed area and movement of light vehicles will be a cause of pollution due to quarrying activities within a radius of 500 meters from the project area. This leads to a cumulative impact on the ambient air environment around the project area.

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

4.3.2.1 Emission Estimation

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 PM_{10}

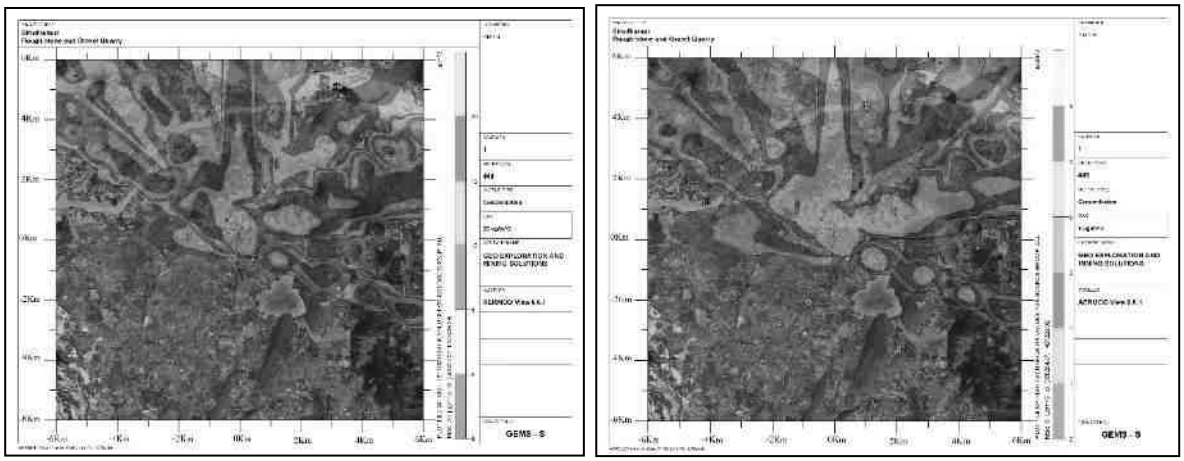
EMISSION ESTIMATION FOR QUARRY "P1"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.049752694	g/s
	Blasting	Point Source	0.000073739	g/s
	Mineral Loading	Point Source	0.039574074	g/s
	Haul Road	Line Source	0.002487087	g/s/m
	Overall Mine	Area Source	0.050837587	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000297497	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000013233	g/s
EMISSION ESTIMATION FOR QUARRY "P2"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.051432293	g/s
	Blasting	Point Source	0.000087055	g/s
	Mineral Loading	Point Source	0.041435323	g/s
	Haul Road	Line Source	0.002489962	g/s/m
	Overall Mine	Area Source	0.052827769	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000462731	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000022113	g/s
EMISSION ESTIMATION FOR QUARRY "P3"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.056386302	g/s
	Blasting	Point Source	0.000137874	g/s
	Mineral Loading	Point Source	0.041151099	g/s
	Haul Road	Line Source	0.002489443	g/s/m
	Overall Mine	Area Source	0.055344257	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000446719	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000023749	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: Incremental Ground Level Concentration (GLC) PM_{10} & $PM_{2.5}$



PM_{10} $PM_{2.5}$

TABLE 4.5: PREDICTED GLC OF PM_{10} AT RECEPTOR LOCATIONS

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	12°43'22.32"N 79°51'3.37"E	-33	132	60.4	20.94	81.34
AAQ2	12°43'42.54"N 79°52'8.29"E	1938	755	60.5	20.31	80.81
AAQ3	12°44'26.23"N 79°49'35.32"E	-2700	2101	59.2	18.64	77.84
AAQ4	12°45'32.86"N 79°51'38.77"E	1040	4161	59.6	14.96	74.56
AAQ5	12°42'2.65"N 79°50'36.54"E	-845	-2326	58.3	0	58.3
AAQ6	12°46'18.67"N 79°50'24.84"E	-1201	5574	59.5	7.15	66.65
AAQ7	12°46'20.32"N 79°53'41.09"E	4747	5627	59.9	2.00	61.9
AAQ8	12°43'16.30"N 79°50'7.81"E	-1716	-54	59.8	4.98	64.78
AAQ9	12°42'47.92"N 79°54'30.09"E	1047	2475	58.1	3.24	61.34

- NAAQ standard of PM_{10} = 100

Source: AERMOD view in Lake Environmental Software, Onsite monitoring/ sampling by CHENNAI METTEX Laboratories

The predicted increment in GLC of PM_{10} at the selected receptor locations due to Quarrying activities would vary from 0.0–60.5 $\mu g/m^3$ (Table 4.4). Thus total GLC of PM_{10} at the selected receptor locations would range from 58.3 – 81.34 $\mu g/m^3$. Therefore, it may be concluded that annual 24-h average PM_{10} concentration in and around the mine site will be less than the standard limit of 100 $\mu g/m^3$ as per the NAAQS, 2009.

TABLE 4.6: PREDICTED GLC OF $PM_{2.5}$ AT RECEPTOR LOCATIONS

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	12°43'22.32"N 79°51'3.37"E	-33	132	29.4	9.78	39.18
AAQ2	12°43'42.54"N 79°52'8.29"E	1938	755	29.9	9.13	39.03
AAQ3	12°44'26.23"N 79°49'35.32"E	-2700	2101	29.4	8.00	37.4
AAQ4	12°45'32.86"N 79°51'38.77"E	1040	4161	28.4	6.14	34.54
AAQ5	12°42'2.65"N 79°50'36.54"E	-845	-2326	29.1	0	29.1
AAQ6	12°46'18.67"N 79°50'24.84"E	-1201	5574	29.3	4.21	33.51
AAQ7	12°46'20.32"N 79°53'41.09"E	4747	5627	29.4	1.50	30.9
AAQ8	12°43'16.30"N 79°50'7.81"E	-1716	-54	28.6	2.43	31.03
AAQ9	12°42'47.92"N 79°54'30.09"E	1047	2475	30.1	1.72	31.82

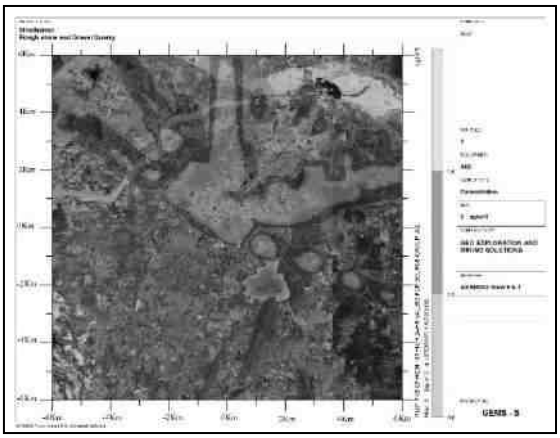
- NAAQ standard of $PM_{2.5}$ = 60

Source: AERMOD view in Lake Environmental Software, Onsite monitoring/ sampling by CHENNAI METTEX Laboratories

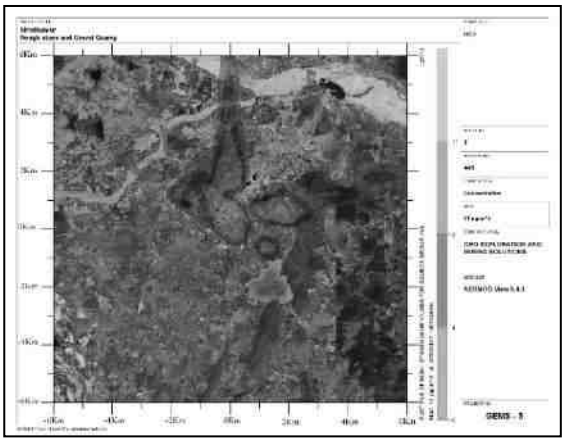
The predicted increment in GLC of $PM_{2.5}$ at the selected receptor locations due to quarry activities would vary from 0.0 – 30.1 $\mu g/m^3$ (Table 4.5). However average GLC of $PM_{2.5}$ at the selected receptor locations would range from 29.1 – 39.18 $\mu g/m^3$. Therefore, it is seen that annual 24-h average $PM_{2.5}$ concentration in and around the mine site will be less than the standard limit of 60 $\mu g/m^3$ as per the NAAQS, 2009.

The modelling results indicated that PM_{10} and $PM_{2.5}$ concentrations within the project site would be maximum, and dispersion and deposition of pollutants would take place as it travels away from the project site, thus particulate matters gradually decreases as it travels from the mine site to the surrounding location.

Figure 4.2: Incremental Ground Level Concentration (GLC) SO_2 & NO_X



SO_2



NO_X

TABLE 4.7: PREDICTED GLC OF SO_2 AT RECEPTOR LOCATIONS

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline SO2 (µg/m3)	Incremental value of SO2 due to mining (µg/m3)	Total SO2 (µg/m3) (5+6)
AAQ1	12°43'22.32"N 79°51'3.37"E	-33	132	8.9	3.47	12.37
AAQ2	12°43'42.54"N 79°52'8.29"E	1938	755	8.0	3.05	11.05
AAQ3	12°44'26.23"N 79°49'35.32"E	-2700	2101	8.0	2.68	10.68
AAQ4	12°45'32.86"N 79°51'38.77"E	1040	4161	8.2	1.75	9.95
AAQ5	12°42'2.65"N 79°50'36.54"E	-845	-2326	8.1	0	8.1
AAQ6	12°46'18.67"N 79°50'24.84"E	-1201	5574	8.0	0.27	8.27
AAQ7	12°46'20.32"N 79°53'41.09"E	4747	5627	8.0	0	8
AAQ8	12°43'16.30"N 79°50'7.81"E	-1716	-54	7.9	0	7.9
AAQ9	12°42'47.92"N 79°54'30.09"E	1047	2475	7.7	0	7.7

- NAAQ standard of SO_2 = 80

Source: AERMOD view in Lake Environmental Software, Onsite monitoring/ sampling by CHENNAI METTEX Laboratories

The predicted increment in GLC of SO_2 at the selected receptor locations due to quarrying activities would vary from 0.0 – 8.9 µg/m^3 (Table 4.6). However average GLC of SO_2 at the selected receptor locations would range from 8 – 12.37 µg/m^3. Therefore, it is seen that annual 24-h average SO_2 concentration in and around the quarry site will be less than the standard limit of 80 µg/m^3 as per the NAAQS, 2009.

TABLE 4.8: PREDICTED GLC OF NO_2 AT RECEPTOR LOCATIONS

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline NO_2 (µg/m^3)	Incremental value of NO_2 due to mining (µg/m^3)	Total NO_2 (µg/m^3) (5+6)
AAQ1	12°43'22.32"N 79°51'3.37"E	-33	132	21.6	11.45	33.05
AAQ2	12°43'42.54"N 79°52'8.29"E	1938	755	21.7	9.94	31.64
AAQ3	12°44'26.23"N 79°49'35.32"E	-2700	2101	21.6	1.00	22.6
AAQ4	12°45'32.86"N 79°51'38.77"E	1040	4161	21.7	0	21.7
AAQ5	12°42'2.65"N 79°50'36.54"E	-845	-2326	21.8	0	21.8
AAQ6	12°46'18.67"N 79°50'24.84"E	-1201	5574	21.6	0	21.6
AAQ7	12°46'20.32"N 79°53'41.09"E	4747	5627	21.7	0	21.7
AAQ8	12°43'16.30"N 79°50'7.81"E	-1716	-54	21.7	0	21.7
AAQ9	12°42'47.92"N 79°54'30.09"E	1047	2475	21.9	0	21.9

- NAAQ standard of NO_2 = 80

Source: AERMOD view in Lake Environmental Software, Onsite monitoring/ sampling by CHENNAI METTEX Laboratories

The predicted increment in GLC of NO_2 at the selected receptor locations due to quarrying activities would vary from 0.0 – 21.9 μg/m^3 (Table 4.6). However average GLC of NO_2 at the selected receptor locations would range from 21.6 – 33.05 μg/m^3. Therefore, it is seen that annual 24-h average SO_2 concentration in and around the quarry site will be less than the standard limit of 80 μg/m^3 as per the NAAQS, 2009.

4.4.3 Mitigation Measures

The pollutants from moving vehicles, residential and commercial activities are the primary sources of air pollution at present. However, in the study area adequate control measures will be implemented in future at the time of quarrying operation. Mitigation measures suggested for air pollution controls are based on the baseline ambient air quality of the area. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that air quality is monitored on a regular basis to check compliance of standards as prescribed by regulatory authorities. However, to further minimize the pollutant concentration the following control measure should be adopted by the project proponent.

The following additional measures will also be adopted such as:

- Use of Sharp drill bits for drilling holes and charging the holes by using optimum charge and using time delay detonator
    - The drilling and blasting will be carried out occasionally as per the proposals laid down in the approved plan. Use of low charge explosives for blasting and avoiding overcharging of blast holes
- Water sprinkling twice a day on haul roads, service roads and approach road will help in reducing considerable dust pollution
- Closed Cabins with AC for shovel and dumpers and dust masks to workers will be provided
- Comprehensive green belt in the safety zone will be carried out to reduce to propagation of fugitive dust emissions in order to create clean and healthy environment
- Weekly maintenance of quarrying equipment's will be carried out
- Transport of Rough stone and Gravel in tippers covered with tarpaulin
- Information on wind direction and meteorology will be considered while planning, so that pollutants, which cannot be fully suppressed by engineering technique, will be prevented from reaching the nearby agriculture area
- PPE will be provided to all workers
- Regular health check–up of workers and nearby villagers in the near vicinity of the project area will be carried out and also yearly occupational health assessment of employees will be carried out as per DGMS Guidelines
- Ambient Air Quality Monitoring will be conducted on half-yearly basis to assess the quality of ambient air

As discussed above under each activity, there will be increase in terms of dust load and gaseous emissions. However, it can be stated that these incremental contributions will remain within the prescribed limits/norms. Further, the mitigation measures will further bring down these concentrations making the mining activities more Eco friendly.

4.4 Noise Environment (Impact & Mitigation Measures)

Noise pollution is mainly due to operation like drilling & blasting 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 modelling has been carried out to assess the impact on surrounding ambient noise levels.

Basic phenomenon of the model is the geometric attenuation of sound. 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.

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

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.

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

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 taking into account of all the machinery and activities used in the mining process. Same has been listed in Table 4-9.

TABLE 4.9: ACTIVITY AND NOISE LEVEL PRODUCED BY MACHINERY

Sl.No.	Machinery / Activity	Impact on Environment?	Noise Produced in dB(A) at 50 ft from source*
1	Blasting	Yes	94
2	Jack Hammer	Yes	88
3	Compressor	No	81
4	Excavator	No	85
5	Tipper	No	84
Total Noise Produced			95.8

*50 feet from source = 15.24 meters
Source: U.S. Department of Transportation (Federal Highway Administration) – Construction Noise Handbook

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. 105 dB (A) for nose prediction modelling.

TABLE 4.10: PREDICTED NOISE INCREMENTAL VALUES

Location ID	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**	**N9**
Monitored Value (Day) dB(A)	78.5	68.9	79.5	59.5	59.7	58.4	58.3	58.9	59.5
Incremental Value dB(A)	54.1	56.6	53.3	29.5	28.5	36.6	29.7	24.8	24.1
Total Predicted Noise level dB(A)	78.5	69.1	79.5	59.5	59.7	58.4	58.3	58.9	59.5
NAAQ Standards	**Industrial Residential**		**Day Time- 75 dB (A) & Night Time- 70 dB (A) Day Time– 55 dB (A) & Night Time- 45 dB (A)**						

The incremental noise level is found within the range of 69.1 – 78.5 dB (A) in Core Zone and 58.3 – 59.7 dB (A) in Buffer 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 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 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 lease area and may cause injury to persons or damage to the structures. Considering nearest habitation from the project area is located 1.0km of sirudhamur village. 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)

Figure 4.3: Ground Vibration Prediction -P1

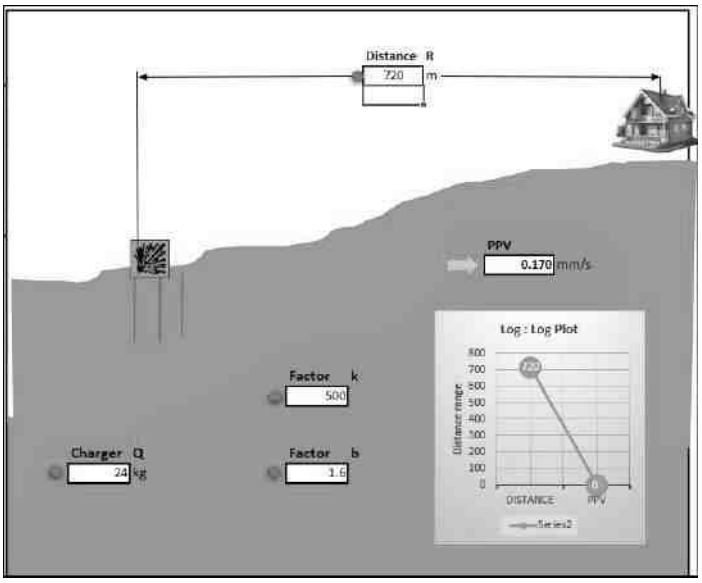


Figure 4.3: Ground Vibration Prediction -P2

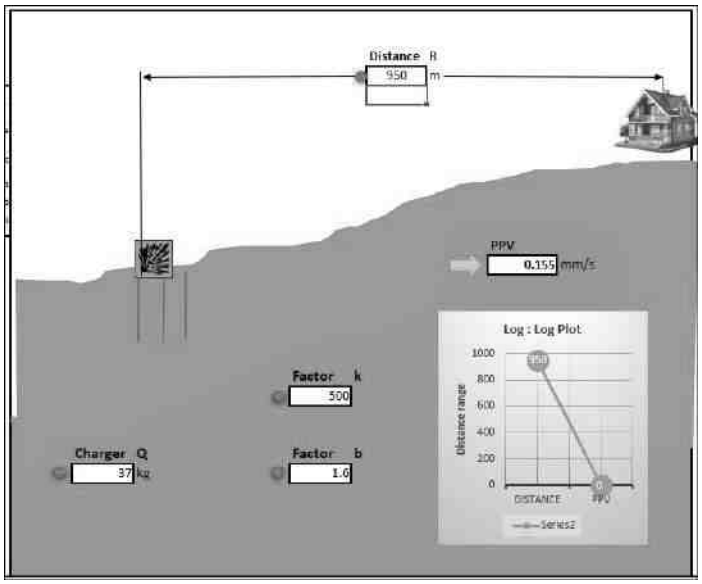
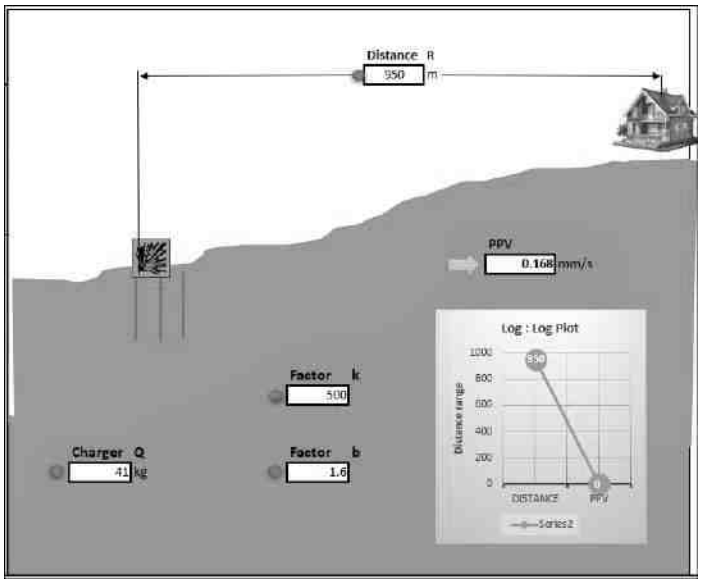


Figure 4.3: Ground Vibration Prediction -P3



From the above graph, the charge per blast of 41kg 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 24kg 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 should be provided as per DGMS guidelines;
- Blasting operations shall be carried out only during day time;
- The charge per delay shall be minimized and preferably more 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, 2nd Class Mines Manager/ 1st Class Mines Manager) will be appointed.
- A set of shot firing rules will be drawn up and blasting shall commence outlining the detailed operating procedures that will be followed to ensure that shot firing operations on site take place without endangering the workforce or public.
- Sufficient angular stemming material will be used to confine the explosive force and minimise environmental disturbance caused by venting / misfire.
- The detonators will be connected in a predetermined sequence to ensure that only one charge is detonated at any one time and a NONEL or similar type initiation system will be used.
- The detonation delay sequence shall be designed so as to ensure that firing of the holes is in the direction of free faces so as to minimise vibration effects.
- Appropriate blasting techniques shall be adopted such that the predicted peak particle velocity shall not exceed 8 mm/s.
- Vibration monitoring should be carried out every 6 months to check the efficacy of blasting practices.

4.5 Ecology and Biodiversity

4.5.1 Impact on Ecology and Biodiversity

There are no migratory corridors, migratory Avian-Fauna, Rare endemic, Endangered species and wild animals in the area. No breeding and nesting site were identified in project site. No National park and Wildlife Sanctuary found within 10km radius.

The project area is dry barren land and devoid of plantation, the area is surround by seasonal agriculture lands, Existing Rough stone quarries and crushers hence no requirement for the uprooting of trees due to this quarry project. Barbed wire fencing will be constructed around the project area to prevent the entry of cattle's. In the post mining stage, fencing is proposed constructed all around the mined-out void to prevent fall of animals in the mine pits.

No medicinal plant identified in core and buffer area.

The fauna in the vicinity of the project site is restricted to few common small species. There will be no impact on fauna due to this quarry project.

Even though there are no impact on bio diversity and flora/fauna status due to project operations, positive impacts will arise due to well-planned reclamation measures for restoration of land status in the area ultimately to productive land category with elaborately planned green belt development activities and along with creation of water resources in the working pits.

4.5.2 Mitigation measures

Keeping all this in mind the mitigations have been suggested under environmental management plan. With the understanding of the role of plant species as bio-filter to control air pollution, appropriate plant species (mainly tree species) have been suggested conceding the area/site requirements and needed performance of specific species. The details of year wise proposed plantation program are given in Table 4.10.

In order to compensate the loss of vegetation cover, it is suggested to carry out afforestation program mainly in proposed mine lease area earmarked for plantation program as per Approved Mining Plan in different phases. This habitat improvement program would ensure the faunal species to re-colonize and improve the abundance status in the core zone.

TABLE 4.11: GREEN BELT DEVELOPMENT PROGRAMME

PROPOSAL – P1					
Year	No. of trees proposed to be planted	Survival %	Area to be covered sq.m	Name of the species	No. of trees expected to be grown
I	1200	80%	Safety barrier, Village roads & Approach roads	Neem, Pongamia Pinnata, etc.,	960
PROPOSAL – P2					
I	1300	80%	Safety barrier, Village roads & Approach roads	Neem, Pongamia Pinnata, etc.,	1040
PROPOSAL – P3					
I	1620	80%	Safety barrier, Village roads & Approach roads	Neem, Pongamia Pinnata, etc.,	1296

TABLE: 4.11A PREPARATION OF GREEN BELT DETAILS

P1												
Activity	**Year**											
	I	II	III	IV	V	VI	VII	VIII	IX	X	**Cost** (Rs)	**Total Cost** (Rs)
Plantation in Nos inside of the site	450		-		-		-		-		@ 200 Rs/ Saplings	Rs. 90,000
Plantation in Nos outside of the site	750		-		-		-		-		@ 300 Rs/ Saplings	Rs. 2,25,000
Renovation of Wire Fencing (700 meters)	210000		-		-		-		-		@ Rs.300 per meter	Rs. 2,10,000
Renovation of Garland Drain (610 meters)	183000		-		-		-		-		@ Rs.300 per meter	Rs.1,83,000
Total												**Rs. 7,08,000**
PROPASAL- P2												
Activity	**Year**											
	I	II	III	IV	V	VI	VII	VIII	IX	X	**Cost** (Rs)	**Total Cost** (Rs)
Plantation in Nos inside of the site	470		-		-		-		-		@ 200 Rs/ Saplings	Rs. 94,000
Plantation in Nos outside of the site	830		-		-		-		-		@ 300 Rs/ Saplings	Rs. 2,49,000
Renovation of Wire Fencing (750 meters)	225000		-		-		-		-		@ Rs.300 per meter	Rs. 2,25,000
Renovation of Garland Drain (650 meters)	195000		-		-		-		-		@ Rs.300 per meter	Rs.1,95,000
Total												**Rs. 7,63,000**
PROPASAL- P3												
Activity	**Year**											
	I	II	III	IV	V	VI	VII	VIII	IX	X	**Cost** (Rs)	**Total Cost** (Rs)
Plantation in Nos inside of the site	550		-		-		-		-		@ 200 Rs/ Saplings	Rs. 1,10,000
Plantation in Nos outside of the site	1070		-		-		-		-		@ 300 Rs/ Saplings	Rs. 3,21,000
Renovation of Wire Fencing (860 meters)	258000		-		-		-		-		@ Rs.300 per meter	Rs. 2,58,000
Renovation of Garland Drain (800 meters)	240000		-		-		-		-		@ Rs.300 per meter	Rs.2,40,000
Total												**Rs. 9,29,000**

The objectives of the green belt cover will cover the following:

- Noise abatement
- Reuse of quarry pit water to the extent possible
- Ecological restoration
- Aesthetic, biological and visual improvement of area due to improved vegetative and plantations cover.

During plantation development, the following aspects will be considered:

A) Green belt in the safety barrier and un utilized area's.:

- Tall growing, closely spaced, evergreen trees.
- Easy, quick early growth and establishment.

- Uniform spreading of crown habit.
- Trees with high foliage density, with long canopy leaves
- Attractive appearance with both good flowering and fruit bearing.
- Bird and insect attracting species.
- Suitable green cover with minimal maintenance.

B) Avenue Trees (proposed to plant in the approach roads)

- Trees with conical canopy and with attractive flowering.
- Trees with medium spreading branches to avoid obstruction to the traffic.
- Trees with branching at 10 feet and above

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 300 m 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

- Mining in this cluster quarries area will give job opportunities to 42 Nos of the local people. Local people mainly depend upon agricultural and small cottage industries where the income is irregular and low. Jobs in the mines will increase their per capita income and improve the life style of the people.
- With the operation of proposed mining lease, various indirect employment opportunities will also be generated. Several persons of the neighbouring villages will be benefited with contract works, employment through contractors, running jeeps, trucks, tractors and buses on hire, running canteens, different kinds of shops and transport related business avenues.
- Local Villagers will be provided with either direct employment or indirect employment such as business, contract works and development work like roads etc. Villagers also get access to the other welfare amenities such as drinking water, foods and provisions, shed etc.,
- Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc.., from this project directly and indirectly.
- Proper arrangements will be made for safe and healthy conditions such as dust suppression during loading, unloading & transporting, etc. Development of allied business centres and other small-scale industries will help to improve social standards of the surrounding villagers
- Mine management will contribute for the upliftment of these villages by conducting regular medical camps, assistance in developing necessary infrastructure facilities like maintenance of schools, village roads, drinking water supply, etc.,

4.7 Occupational Health Risks

Occupational health and safety hazards 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

- 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
- 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)
- 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.

4.8 Mine Waste Management

As per approved mining plan there is practically no solid waste and overburden in present mining area. The mining area lies on plain terrain having rocky exposure and has no soil cover; therefore, storage of soil is not required. And the proposed recovery is 100% and there is no waste anticipated for storage or removal.

4.9 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. Therefore, progressive mine closure plan should be specifically dealt with in the mining plan and is to be reviewed every five years in the scheme of mining. As progressive mine closure is a continuous series of activities, it is obvious that the proposals of scientific mining have included most of the activities to be included in the closure plan. While formulating the closure objectives for the site, it is important to consider the existing or the pre-mining land use of the site; and how the operation will affect this activity.

The primary aim is to ensure that the following broad objectives along with the abandonment of the mine can be successfully achieved:

- 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.

4.9.1 Mine Closure criteria

The criteria involved in mine closure are discussed below:

4.9.1.1 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.

4.9.1.2 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.

4.9.1.3 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)

CHAPTER – 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.

5.2 Factors behind the Selection of Project Site

M.Ganesan Rough Stone and Gravel Quarry Project at Sirudhamur Village is a mining project for excavation of Rough stone and Gravel, which is site specific. The proposed mining lease area has following advantages: -

- The mineral deposit occurs in a non-forest area.
- There is no habitation within the project area; hence no R & R issues exist.
- There is no river, stream, nallah and water bodies in the applied mine lease area.
- Availability of skilled, semi-skilled and unskilled workers in this region.
- All the basic amenities such as medical, firefighting, education, transportation, communication and infrastructural facilities are well connected and accessible.
- The mining operations will not intersect the ground water level. Hence, no impact on ground water environment.
- Study area falls in seismic zone – III, there is no major history of landslides, earthquake, subsidence etc., recorded in the past history

5.3 Analysis of alternative site

No alternatives are suggested as the mine site is mineral specific

5.4 Factors Behind Selection of proposed Technology

Mechanized open cast mining operation with drilling and blasting method will be used to extract Rough Stone and Gravel in the area. The applied mining lease area has following advantages –

- As the mineral deposition is homogeneous and batholith formation, therefore opencast method of working out deposit is preferred over underground method
- The material will be loaded after sprinkling with water with the help of excavators into dumpers / trippers and transported to the needy customers.
- Blasting and availability of drills along with controlled blasting technology gives desired fragmentation so that the mineral is handled safely and used without secondary blasting.
- Semi-skilled labours fit for quarrying operations are easily available around the nearby villages

5.5 Analysis of Alternative Technology

Open cast mechanized method has been selected for this project. This technology is having least gestation period, economically viable, safest and less labour intensive. The method has inbuilt flexibility for increasing or decreasing the production as per market condition.

CHAPTER – 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.

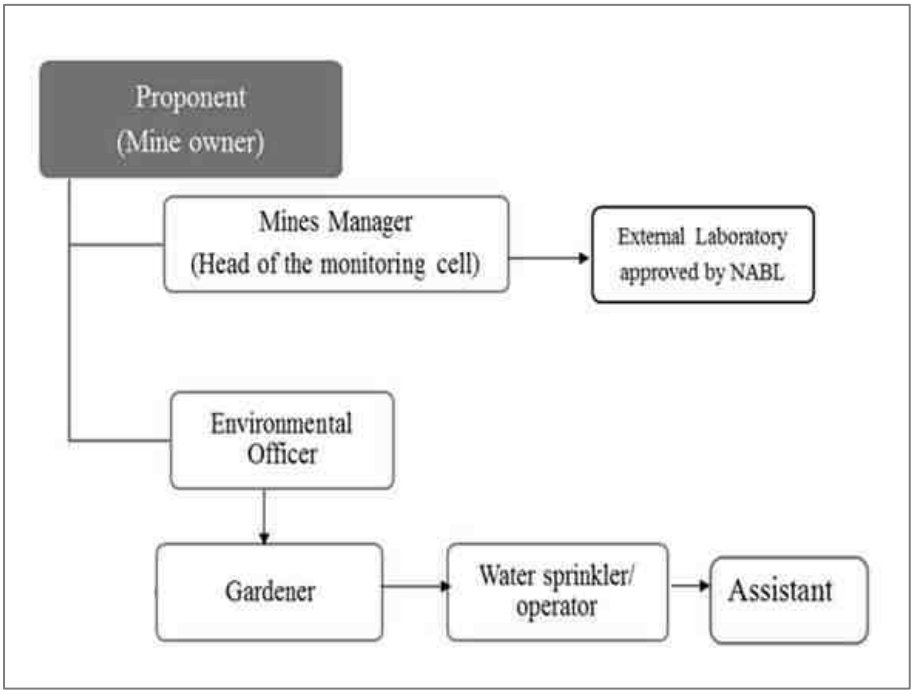
The main objective of environmental monitoring is to ensure that the obtained results in respect of environmental attributes and prevailing conditions during operation stage are in conformity with the prediction during the planning stage. In case of substantial deviation from the earlier prediction of 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 CTE/CTO.

6.1 Methodology of Monitoring Mechanism

Implementation of EMP and periodic monitoring will be carried out by the proponent. A comprehensive monitoring mechanism has been devised for monitoring of impacts due to proposed project; Mine Management Level environmental protection measures like dust suppression, treatment and recycling of waste water, control of noise due to blasting and Ground vibration, 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 proponent. On the other hand, implementation of area level protection measures like plantation and green belt development, environmental quality monitoring etc.,

An environment monitoring cell (EMC) will be constituted at the quarry consisting of following members to monitor the implementation of EMP and other environmental protection measures.

Figure 6.1 Hierarchy of Environmental Monitoring Cell



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.

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 monthly, half-yearly and yearly. The half-yearly reports will be 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

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

6.3 Monitoring Schedule and Frequency

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 are detailed in Table 6.2

TABLE 6.2: MONITORING SCHEDULE

S. No.	Environment Attributes		Monitoring		Parameters
			Duration	Duration	
1	Air Quality	9 locations (One station in the core zone and one in 500 m radius, two stations in the upwind, three stations on the downwind direction)	24 hours	Twice in a week for every 6 months	Fugitive Dust, $PM_{2.5}$, PM_{10}, SO_2 and NO_x.
2	Meteorology	At mine site before start of Air Quality Monitoring & IMD Secondary Data	Hourly / Daily	Continuous online monitoring	Wind speed, Wind direction, Temperature, Relative humidity and Rainfall
3	Water Quality Monitoring	Mine Pit Water, Nearby project area (Surface water and ground water)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1km at specific wells	-	Once in 6months	Depth in BGL
5	Noise	Near Mine Equipment / machineries, Mines Office, Operator Cabin, Surrounding Villages in Buffer Area	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	Core Zone and Buffer zone (Grab samples)	–	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 Environmental Monitoring Programme

The cost in respect of monitoring of environmental attributes, parameter to be monitored, sampling/monitoring locations with frequency and cost provision against each 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 (PROJECT AREA)

Parameter	Capital Cost
Air Quality Meteorology Water Quality Hydrology Soil Quality Noise Quality Vibration Study Greenbelt	Rs. 76,000/-
Total	**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 Coordinator 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 will be incorporated after Public Hearing.

- Public Consultation
- Risk Assessment
- Disaster Management Plan
- Cumulative Impact Study

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.

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 cluster 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 7.1.

TABLE 7.1 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, Metalliferrous 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's guidelines.
2	Drilling& Blasting	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, Drilling 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 as per operator manual. All drills unit shall be provided with wet drilling shall be maintained in efficient working in condition. Operator shall regularly use all the personal protective equipment.
3	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)
4	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. Unauthorized person will not be allowed to operate or ride on the vehicle Loading according to the vehicle capacity Periodical maintenance of vehicles as per operator manual
5	Natural calamities	Unexpected happenings	Escape Routes will be provided to prevent inundation of storm water Fire Extinguishers & Sand Buckets in the designated areas.
6	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

Natural disasters like Earthquake, Landslides have not been recorded in the past history as the terrain is categorized under seismic zone III. The area is far away from the sea hence the disaster due to heavy floods and tsunamis are not anticipated

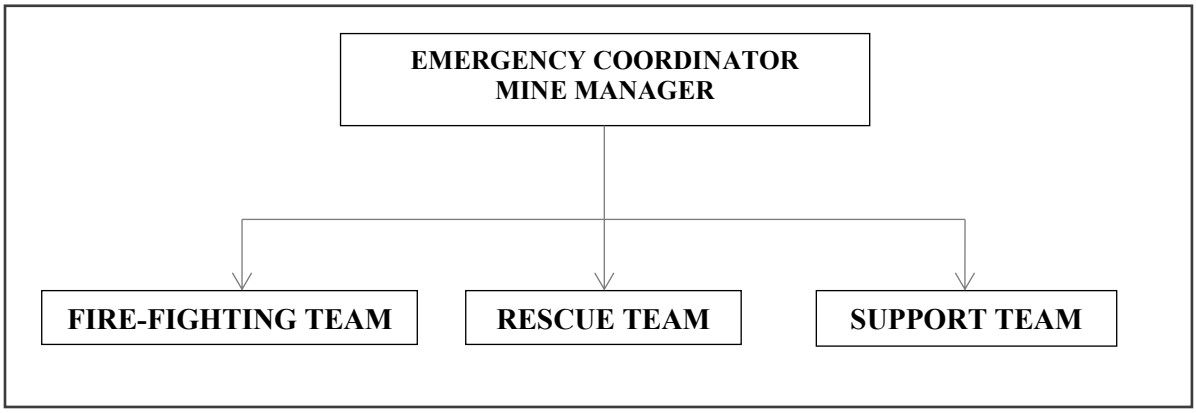
The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities.

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.

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 in Fig 7.1.

Figure 7.1 Disaster Management Plan



The emergency organization shall be headed by emergency coordinator who will be qualified competent 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 7.2.

TABLE 7.2: 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.

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 Roll Call 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 7.3: PROPOSED FIRE EXTINGUISHERS AT DIFFERENT LOCATIONS

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

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.
- Fire-fighting 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.
- 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 seven existing quarries and 3 proposed quarries within a radius of 500 meters from the proposed project area. The list of quarries is as below –

TABLE 7.4: LIST OF QUARRIES WITHIN 500 METER RADIUS FROM THIS PROPOSAL

PROPOSED QUARRIES					
Code	**Name and address of the proponent**	**Name of the Village, and Taluk, & S.F. Nos.**	**Extent in (ha)**	**Status**	**Remarks**
P1	**M.Ganesan,** S/o. Manivel, No.36/1, Mallampatti village, Kalamavur Post, Kulathur Taluk, Pudukkottai District.	Sirudhamur Village, Uthiramerur Taluk 320/1A, 1B,2	1.98.00	Obtained TOR Vide Lr.No.SEIAA-TN/F.No.8968/Tor-1254/2022 dated 19.09.2022	-
P2	**M.Ganesan,** S/o. Manivel, No.36/1, Mallampatti village, Kalamavur Post, Kulathur Taluk, Pudukkottai District.	Sirudhamur Village, Uthiramerur Taluk 323/1B, 2B, 2C, 3, 4, 5B,5C	2.13.00	Obtained TOR Vide Lr.No.SEIAA-TN/F.No.8978/Tor-1257/2022 dated 19.09.2022	-
P3	**M.Ganesan,** S/o. Manivel, No.36/1, Mallampatti village, Kalamavur Post, Kulathur Taluk, Pudukkottai District.	Sirudhamur Village, Uthiramerur Taluk 324/1A,1B1,1B2,2A, 2B, 2C1, 2C2, 3, 8A, 9A, 9B2	2.40.00	Obtained TOR Vide Lr.No.SEIAA-TN/F.No.8966/Tor-1255/2022 dated 19.09.2022	-
Total			**6.51.00**		
EXISTING QUARRIES					
SL.No.	**Name of the Lessee**	**Name of the Village, and Taluk, & S.F. Nos.**	**Extent in (ha)**	**Lease Period**	**Remarks**
E1	**D. Uma Sankar**	Sirudhamur Village, Uthiramerur Taluk 334/1B	2.72.00	31.01.2017 to 30.01.2022	-
E2	**S. Vaithialingam**	Sirudhamur Village, Uthiramerur Taluk 314/6B,314/7A,314/7B,314/8, 314/10	1.08.00	22.02.2018 to 21.02.2023	-
E3	**S.Murugesan,**	Sirudhamur Village, Uthiramerur Taluk 324/4A, 4B1, 4B2, 5, 6, 7A, 8B, 10A, 10C, 11, 327/2, 3A	3.11.0	09.05.2018 to 08.05.2023	-
E4	**N. Kanniyappan,**	Sirudhamur Village, Uthiramerur Taluk 320/3A, 3B, 4, 332/lA, 1B, 2	2.41.00	15.06.2018 to 14.06.2023	-
E5	**D. Sarathkumar,**	Sirudhamur Village, Uthiramerur Taluk 325/4, 109/1A1, 1A2	3.01.50	20.12.2018 to 19.12.2023	-
E6	**S. Kothandaraman,**	Sirudhamur Village, Uthiramerur Taluk 115/1A, 1B, 2A1, 2A2B, 2B1, 2C,2D1	2.69.06	07.08.2017 to 06.08.2022	
E7	**R. Selvendrakumar**	Sirudhamur Village, Uthiramerur Taluk 308/1,2,3A, 3B, 3C, 3D, 3E, 3F, 5, 6, 7A, 7B, 8, 9, 10A, 10B, 10C, 11	2.92.50	08.11.2018 to 07.11.2023	
		Total	**17.95.06**		

ABANDONED QUARRIES					
Sl.No.	**Name of the Lessee**	**Name of the Village, and Taluk, & S.F. Nos.**	**Extent (ha)**	**Lease Period**	**Remarks**
AB1	**S.Jayachandran,**	Sirudhamur Village, Uthiramerur Taluk 326(P)	2.00.00	16.02.2007 to 15.02.2012	Lease Expired
AB2	**PJR Sathishkumar**	Sirudhamur Village, Uthiramerur Taluk 334/1(P)	1.80.00	20.05.2010 To 19.05.2015	Lease Expired
AB3	**M/s.RCS Infrastructures Ltd,**	Sirudhamur Village, Uthiramerur Taluk 327/6	2.39.00	20.12.2011 To 19.12.2016	Lease Expired
AB4	**RCS Infrastructure Pvt Ltd,**	Sirudhamur Village, Uthiramerur Taluk 323/1A, 2A, 324/10B, 7B, 327/3B, 327/4	1.80.00	23.02.2015 to 22.02.2020	Lease Expired
AB5	**S.Kothandaraman,**	Sirudhamur Village, Uthiramerur Taluk 338(P) Q.No.1 (Govt. Land)	5.00.0	09.08.2005 To 08.08.2010	Lease Expired
AB6	**C. Ranganathan**	Sirudhamur Village, Uthiramerur Taluk338(P) Q.No.2 (Govt. Land)	5.00.0	04.10.2005 To 03.10.2010	Lease Expired
AB7	B.S.Mohan	Sirudhamur Village, Uthiramerur Taluk 107(P)	5.00.0	05.02.2007 to 04.02.2017	-
AB8	**Tvl.Annai Blue Metals**	Sirudhamur Village, Uthiramerur Taluk 109/D, 114/4, 5, 6, 7A, 7B, 113/2B, 3B	2.26.50	06.20.2014 to 05.02.2019	-
AB9	**Tvl.Arupadai Infrastructure Company,**	Sirudhamur Village, Uthiramerur Taluk 109/1B, 1F, 1G, 1H, 114/1, 2, 3	3.77.00	15.04.2015 to 14.04.2020	-
AB10	**S.Krishnakumar**	Sirudhamur Village, Uthiramerur Taluk338(P) 106	0.79.50	22.12.2011 To 21.12.2016	-
		Total	**17.99.00**		
		Total Cluster Extent	**24.46.06**		

Note: -

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

TABLE 7.5 SALIENT FEATURES OF PROPOSED SITE 'P1'

Name of the quarry	**Thiru. M. Ganesan Rough stone & Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43'14.06"N to 12°43'22.54"N	
Longitude	79°51'01.92"E to 79°51'06.63"E	
Highest elevation	52 m AMSL	
Proposed depth of mining	Five Years Plan Period	Ten Year Plan Period
	32m BGL (2 m Gravel +30 m rough stone	37m BGL (2 m Gravel +35 m rough stone
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	6,93,000	39,600
Minable reserves	1,64,165	22,338
First Five-year production	1,03,520	22,338
Next Five-Year Production	60,645	-
Existing pit dimension	It is New Quarry	
Ultimate pit dimension	I -V Year	180m (L) x 81 m (W) x 32m (D)
	IV-X Year	180m (L) x 81 m (W) x 37m (D)
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 52m maximum from the MSL. The area is sloping towards Southeastern side covered clayey soil with rough stone which does not sustain any type of vegetation.	
Machinery proposed	Jack hammer	2
	Compressor	1
	Excavator	1
	Tippers	1
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 52,18,000/-	
CER cost	Rs. 5,00,000/-	
Proposed water requirement	2.5 KLD	
Nearest habitation	720m Southeast	

TABLE 7.6 SALIENT FEATURES OF PROPOSED SITE 'P2'

Name of the quarry	**Thiru. M. Ganesan Rough Stone and Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43'22.38"N to 12°43'28.94"N	
Longitude	79°50'58.58"E to 79°51'05.50"E	
Highest elevation	56m AMSL	
Proposed depth of mining for ten years	47m BGL (2 m Gravel +45 m rough stone	
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	9,58,500	42,600
Minable reserves	2,59,485	27,790
First Five-year production	1,82,970	27,790
Next Five-Year Production	79,515	-
Existing pit dimension	It is New Quarry	
Ultimate pit dimension	149m (L) x 117m (W) x 47m (D)	
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	

Topography	The applied lease area is exhibits plain with altitude of 56m maximum from the MSL. The area is sloping towards Southeastern side covered clayey soil with rough stone which does not sustain any type of vegetation.	
Machinery proposed	Jack hammer	3
	Compressor	1
	Excavator	1
	Tippers	2
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 65,24,000/-	
CER cost	Rs. 5,00,000	
Proposed water requirement	2.5 KLD	
Nearest habitation	950m Southeast	

TABLE 7.7 SALIENT FEATURES OF PROPOSED SITE 'P3'

Name of the quarry	**Thiru. M. Ganesan Rough Stone and Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43'30.90"N to 12°43'37.05"N	
Longitude	79°51'00.54"E to 79°51'10.04"E	
Highest elevation	62m AMSL	
Proposed depth of mining for ten years	47m BGL (2 m Gravel +45 m rough stone)	
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	10,80,000	48,000
Minable reserves	2,82,475	33,312
First Five-year production	1,59,350	33,312
Next Five-Year Production	1,23,125	-
Existing pit dimension	It is New Quarry	
Ultimate pit dimension	167m (L) x 125m (W) x 47m (D)	
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 62m maximum from the MSL. The area is sloping towards Southeastern side covered clayey soil with rough stone which does not sustain any type of vegetation.	
Machinery proposed	Jack hammer	4
	Compressor	1
	Excavator	1
	Tippers	2
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 68,99,000/-	
CER cost @ 2% of project cost	Rs. 1,38,000/-	
Proposed water requirement	4.2 KLD	
Nearest habitation	950m Southeast	

TABLE 7.8 SALIENT FEATURES OF PROPOSED SITE 'E1'

Name of the quarry	**Thiru. D. Uma Sankar Rough Stone and Gravel Quarry**		
Toposheet No	57- P/14		
Latitude	12°43'58"N to 12°43'06"N		
Longitude	79°50'49"E to 79°50'55"E		
Highest elevation	96m AMSL		
Proposed depth of mining for ten years	40m BGL		
Geological resources	**Rough stone in m^3**	**Gravel m^3**	**Weathered rock m^3**
	9,28,620	26,532	1,06,128
Minable reserves	3,12,025	20,520	76,300
First Five-year production	3,12,025	20,520	76,300
Existing pit dimension	It is New Quarry		
Ultimate pit dimension	180m (L) x 114m (W) x 40m (D)		
Water level in the surrounding area	53-58 m BGL		
Method of mining	Opencast semi mechanized mining involving drilling and blasting		
Topography	The applied lease area is exhibits plain with altitude of 96m maximum from the MSL. The area is sloping towards Southeastern side covered clayey soil with rough stone which does not sustain any type of vegetation.		
Machinery proposed	Jack hammer	1	
	Compressor	1	
	Excavator	1	
	Tippers	4	
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.		
Project cost	Rs. 69,13,000/-		
CER cost @ 2% of project cost	Rs. 1,38,300/-		
Proposed water requirement	4.2 KLD		
Nearest habitation	930m Southeast		

TABLE 7.9 SALIENT FEATURES OF PROPOSED SITE 'E2'

Name of the quarry	**Thiru. S. Vaithiyalingam Rough Stone and Gravel Quarry**		
Toposheet No	57- P/14		
Latitude	12°43' 10.87"N to 12°43'15.63"N		
Longitude	79°51'18.21"E to 79°51'23.00"E		
Highest elevation	68m AMSL		
Proposed depth of mining for ten years	30m BGL		
Geological resources	**Rough stone in m^3**	**Gravel m^3**	**Weathered rock m^3**
	2,70,000	21,600	32,400
Minable reserves	34,000	10,452	13,578
First Five-year production	34,000	10,452	13,578
Existing pit dimension	It is New Quarry		
Ultimate pit dimension	78m (L) x 67m (W) x 30m (D)		
Water level in the surrounding area	53-58 m BGL		
Method of mining	Opencast semi mechanized mining involving drilling and blasting		
Topography	The applied lease area is exhibits plain with altitude of 68m maximum from the MSL. The area is sloping towards Eastern side covered clayey soil with rough stone which does not sustain any type of vegetation.		
Machinery proposed	Jack hammer	1	
	Compressor	1	
	Excavator	1	

	Tippers	4
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 33,54,000/-	
CER cost @ 2% of project cost	Rs. 67,100/-	
Proposed water requirement	4.2 KLD	
Nearest habitation	770m Southeast	

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 and Ground vibrations due to blasting.

TABLE 7.10 SALIENT FEATURES OF PROPOSED SITE 'E3'

Name of the quarry	**Thiru. S. Murugesan Rough Stone and Gravel Quarry**		
Toposheet No	57- P/14		
Latitude	12°43' 27.89"N to 12°43'34.23"N		
Longitude	79°50'54.94"E to 79°5108.09"E		
Highest elevation	92m AMSL		
Proposed depth of mining for ten years	42m BGL		
Geological resources	**Rough stone in m^3**	**Gravel m^3**	**Weathered rock m^3**
	2,70,000	21,600	32,400
Minable reserves	34,000	10,452	13,578
First Five-year production	34,000	10,452	13,578
Ultimate pit dimension	Block-1 :94m (L) x 40m (W) x 22m (D) Block-2 :234m (L) x 118m (W) x 42m (D)		
Water level in the surrounding area	53-58 m BGL		
Method of mining	Opencast semi mechanized mining involving drilling and blasting		
Topography	The applied lease area is exhibits plain with altitude of 92m maximum from the MSL. The area is sloping towards Eastern side covered clayey soil with rough stone which does not sustain any type of vegetation.		
Machinery proposed	Jack hammer	4	
	Compressor	1	
	Excavator	1	
	Tippers	2	
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.		
Project cost	Rs. 84,63,000/-		
CER cost @ 2% of project cost	Rs. 2,12,000/-		
Proposed water requirement	2.5 KLD		
Nearest habitation	920m Southeast		

TABLE 7.11 SALIENT FEATURES OF PROPOSED SITE 'E4'

Name of the quarry	**Thiru. N. Kanniappan Rough Stone and Gravel Quarry**		
Toposheet No	57- P/14		
Latitude	12°43' 07.15"N to 12°43'13.84"N		
Longitude	79°50'56.67"E to 79°51'02.21"E		
Highest elevation	88m AMSL		
Proposed depth of mining for ten years	35m BGL		
Geological resources	**Rough stone in m^3**	**Gravel m^3**	**Weathered rock m^3**

	1,65,000	21,600	32,400
Minable reserves	84,200	6,452	10,578
First Five-year production	84,200	6,452	10,578
Ultimate pit dimension	102m (L) x 47m (W) x 35m (D)		
Water level in the surrounding area	53-58 m BGL		
Method of mining	Opencast semi mechanized mining involving drilling and blasting		
Topography	The applied lease area is exhibits plain with altitude of 88m maximum from the MSL. The area is sloping towards Eastern side covered clayey soil with rough stone which does not sustain any type of vegetation.		
Machinery proposed	Jack hammer	5	
	Compressor	1	
	Excavator	2	
	Tippers	2	
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.		
Project cost	Rs. 90,45,000/-		
CER cost @ 2% of project cost	Rs. 1,80,900/-		
Proposed water requirement	3.0 KLD		
Nearest habitation	830m East		

TABLE 7.12 SALIENT FEATURES OF PROPOSED SITE 'E5'

Name of the quarry	**D. Sarathkumar Rough Stone and Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43' 34.00"N to 12°43'42.00"N	
Longitude	79°51'04.00"E to 79°51'11.00"E	
Highest elevation	96m AMSL	
Proposed depth of mining for ten years	62m BGL	
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	18,06,120	60,204
Minable reserves	7,21,040	50,172
First Five-year production	7,21,040	50,172
Ultimate pit dimension	188m (L) x 123m (W) x 62m (D)	
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 88m maximum from the MSL. The area is sloping towards Eastern side covered clayey soil with rough stone which does not sustain any type of vegetation.	
Machinery proposed	Jack hammer	7
	Compressor	2
	Excavator	4
	Tippers	5
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 80,56,000/-	
CER cost @ 2% of project cost	Rs. 1,61,120/-	
Proposed water requirement	3.5 KLD	
Nearest habitation	1000m Southeast	

TABLE 7.9 SALIENT FEATURES OF PROPOSED SITE 'E6'

Name of the quarry	**Thiru Selvendrakumar Rough Stone and Gravel Quarry**	
Toposheet No	57- P/14	
Latitude	12°43' 24.96"N to 12°43'32.20"N	
Longitude	79°51'24.90"E to 79°51'32.23"E	
Highest elevation	60m AMSL	
Proposed depth of mining for ten years	50m BGL	
Geological resources	**Rough stone in m^3**	**Gravel m^3**
	13,74,186	87,714
Minable reserves	5,71,358	68,499
First Five-year production	5,71,358	68,499
Ultimate pit dimension	201m (L) x 138m (W) x 50m (D)	
Water level in the surrounding area	53-58 m BGL	
Method of mining	Opencast semi mechanized mining involving drilling and blasting	
Topography	The applied lease area is exhibits plain with altitude of 60m maximum from the MSL. The area is sloping towards Eastern side covered clayey soil with rough stone which does not sustain any type of vegetation.	
Machinery proposed	Jack hammer	6
	Compressor	2
	Excavator	1
	Tippers	3
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 73,50,000/-	
Proposed water requirement	3.0 KLD	
Nearest habitation	950m Southeast	

TABLE 7.11 SALIENT FEATURES OF PROPOSED SITE 'E7'

Name of the quarry	**Thiru.S.Kothandamraman Rough Stone and Gravel Quarry**		
Toposheet No	57- P/14		
Latitude	12°43' 42.24"N to 12°43'48.14"N		
Longitude	79°51'00.361"E to 79°51'11.14"E		
Highest elevation	74m AMSL		
Proposed depth of mining for ten years	35m BGL		
Geological resources	**Rough stone in m^3**	**Gravel m^3**	**Weathered rock m^3**
	8,01,450	53,430	80,145
Minable reserves	3,42,920	41,296	56,760
First Five-year production	3,42,920	41,296	56,760
Existing pit dimension	It is New Quarry		
Ultimate pit dimension	179m (L) x 118m (W) x 35m (D)		
Water level in the surrounding area	53-58 m BGL		
Method of mining	Opencast semi mechanized mining involving drilling and blasting		
Topography	The applied lease area is exhibits plain with altitude of 74m maximum from the MSL. The area is sloping towards southren side covered clayey soil with rough stone which does not sustain any type of vegetation.		
Machinery proposed	Jack hammer	4	

	Compressor	1
	Excavator	1
	Tippers	2
Blasting method	Controlled blasting method by shot hole drilling and small dia. of 25 mm slurry explosives are proposed to be used for shattering and heaping effect for removal and winning of rough stone. No deep hole drilling is proposed.	
Project cost	Rs. 61,68,000/-	
Proposed water requirement	3.0 KLD	
Nearest habitation	900m Northeast	

TABLE 7.13: EMISSION ESTIMATION FROM CLUSTER

EMISSION ESTIMATION FOR QUARRY "P1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.049752694	g/s
	Blasting	Point Source	0.000073739	g/s
	Mineral Loading	Point Source	0.039574074	g/s
	Haul Road	Line Source	0.002487087	g/s
	Overall Mine	Area Source	0.050837587	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000297497	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000013233	g/s
EMISSION ESTIMATION FOR QUARRY "P2"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.051432293	g/s
	Blasting	Point Source	0.000087055	g/s
	Mineral Loading	Point Source	0.041435323	g/s
	Haul Road	Line Source	0.002489962	g/s/m
	Overall Mine	Area Source	0.052827769	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000462731	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000022113	g/s
EMISSION ESTIMATION FOR QUARRY "P3"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.056386302	g/s
	Blasting	Point Source	0.000137874	g/s
	Mineral Loading	Point Source	0.041151099	g/s
	Haul Road	Line Source	0.002489443	g/s/m
	Overall Mine	Area Source	0.055344257	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000446719	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000023749	g/s
EMISSION ESTIMATION FOR QUARRY "E1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.089824426	g/s
	Blasting	Point Source	0.001414447	g/s
	Mineral Loading	Point Source	0.043332304	g/s
	Haul Road	Line Source	0.002494367	g/s/m
	Overall Mine	Area Source	0.059436737	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000837451	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000050530	g/s
EMISSION ESTIMATION FOR QUARRY "E2"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.047217218	g/s
	Blasting	Point Source	0.000056770	g/s
	Mineral Loading	Point Source	0.036405551	g/s

	Haul Road	Line Source	0.002484298	g/s/m
	Overall Mine	Area Source	0.039532957	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000129627	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000003322	g/s
EMISSION ESTIMATION FOR QUARRY "E3"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.092819920	g/s
	Blasting	Point Source	0.001666558	g/s
	Mineral Loading	Point Source	0.044256457	g/s
	Haul Road	Line Source	0.002497235	g/s/m
	Overall Mine	Area Source	0.063316839	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.001024797	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000070203	g/s
EMISSION ESTIMATION FOR QUARRY "E4"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.060550372	g/s
	Blasting	Point Source	0.000196879	g/s
	Mineral Loading	Point Source	0.037799188	g/s
	Haul Road	Line Source	0.002485273	g/s/m
	Overall Mine	Area Source	0.054734076	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.0002177	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000011521	g/s
EMISSION ESTIMATION FOR QUARRY "E5"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.115736663	g/s
	Blasting	Point Source	0.005023070	g/s
	Mineral Loading	Point Source	0.047477507	g/s
	Haul Road	Line Source	0.002512596	g/s/m
	Overall Mine	Area Source	0.066024896	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.001999565	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000138105	g/s
EMISSION ESTIMATION FOR QUARRY "E6"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.100550372	g/s
	Blasting	Point Source	0.005196879	g/s
	Mineral Loading	Point Source	0.03799188	g/s
	Haul Road	Line Source	0.002485273	g/s/m
	Overall Mine	Area Source	0.054734076	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.0002177	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000011521	g/s
EMISSION ESTIMATION FOR QUARRY "E7"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.092562305	g/s
	Blasting	Point Source	0.001643559	g/s
	Mineral Loading	Point Source	0.043883189	g/s
	Haul Road	Line Source	0.002496011	g/s/m
	Overall Mine	Area Source	0.061845838	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000950531	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000062137	g/s

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 taking into account of all the machinery and activities used in the mining process.

TABLE 7.14: PREDICTED NOISE INCREMENTAL VALUES IN 500 M RADIUS QUARRIES

Location ID	Background Value (Day) dB(A)	Incremental Value dB(A)	Total Predicted dB(A)	Residential Area Standards dB(A)
Habitation Near P1	47	43.0	48.4	55
Habitation Near P2	48.2	40.5	48.9	
Habitation Near P3	48.7	40.5	49.3	
Habitation Near E1	40.2	40.0	43.1	
Habitation Near E2	41.3	52.1	52.5	
Habitation Near E3	40.5	40.8	43.7	
Habitation Near E4	40.9	41.6	44.3	
Habitation Near E5	42.1	39.1	43.9	
Habitation Near E6	40.9	41.6	44.3	
Habitation Near E7	41.2	38.3	43.0	

The total predicted noise level is found within the range of 43.1 – 52.5 dB (A) in Buffer 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 8 Mines within 500 meters radius from the proposed mines 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 7.9

TABLE 7.15: NEAREST HABITATION FROM EACH MINE

Location ID	Distance in Meters
Habitation Near P1	720m
Habitation Near P2	950m
Habitation Near P3	950m
Habitation Near E1	1100m
Habitation Near E2	310m
Habitation Near E3	920m
Habitation Near E4	820m
Habitation Near E5	1200m
Habitation Near E6	560m
Habitation Near E7	950m

Source: Approved Mining plan

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 7.16: GROUND VIBRATIONS AT 8 MINES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in mm/s
P1	55	720m	0.170
P2	86	950m	0.304
P3	41	950m	0.168
E1	69	930m	0.600
E2	21	770m	0.310
E3	97	1300m	0.202
E4	28	880m	0.032
E5	20	1200m	0.065
E6	28	880m	0.032
E7	99	950m	0.340

Source: Blasting Calculations

From the above table, the charge per blast in mines are 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 6 mines shall provide employment and revenue will be created to government

TABLE 7.17: SOCIO ECONOMIC BENEFITS FROM 3 MINES

Location ID	Employment in Nos	Project Cost	CER
P1	15	Rs. 52,18,000/-	Rs. 5,00,000/-
P2	18	Rs. 65,24,000/-	Rs. 5,00,000/-
P3	21	Rs. 68,99,000/-	Rs. 5,00,000/-
Total	**54**	**Rs 1,86,41,000/-**	**Rs 15,00,000/-**

A total of 54 people will get employment due to these 3 mines in cluster and 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

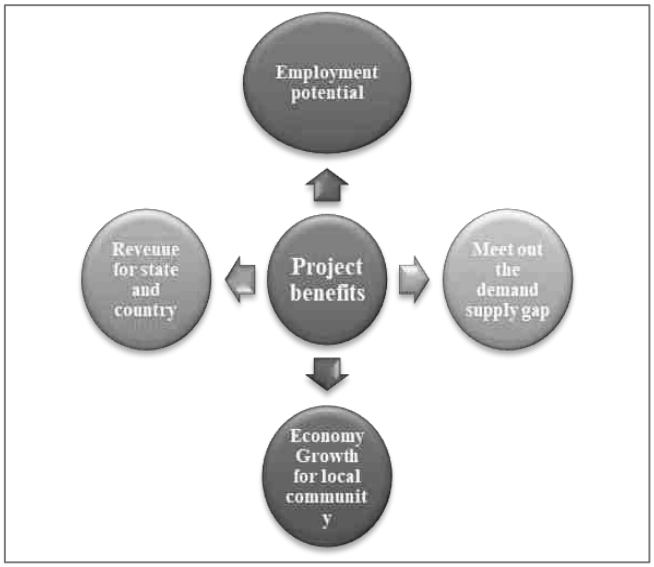
As per para 6 (II) of the office memorandum, all the mines being a green field project & Capital Investment is ≤ 100 crores, they shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC and the total CER amount is Rs 8,06,800/-.

CHAPTER – 8: PROJECT BENEFITS

8.0 General

The proposed quarry aims to produce totally 7,04,095m^3 of Rough stone and 77,010 m^3 of Gravel for the entire life of the mine. The quarrying operation in the area will create rural employment. It has been observed that conditions of the villages around quarry areas are better than that of distant villages. 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



8.1 Employment Potential

These proposed project will provide employment to about 54 persons. Preference will be given 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

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 project site is located in Sirudhamur Village, Uthiramerur Taluk and Kanchipuram 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 the cluster quarry projects.

- 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

The quarry project in the region will have positive impact on the social economic condition of the area by way of providing employment to the local peoples; due to this project will increase the per capita income, housing, education, medical and transportation facilities, economic status, health and agriculture.

- Social welfare program like Medical camps, Educational facilities to the poverty level students, providing water supply from the quarries during drought seasons will be taken from the project proponent's
- Supplementing Govt. efforts in health monitoring camps, social welfare and various awareness programs among the rural population

8.5 Other Tangible Benefits

The proposed quarry project 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 quarry site 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.,

CORPORATE SOCIAL RESPONSIBILITY

The Proponents will take responsibility to develop awareness among all levels of their staff about CSR activities and the integration of social processes with business processes.

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.

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

CSR Cost Estimation

- CSR activities will be taken up in the Sirudhamur 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.

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, the proposed project shall contribute 2% of capital investment towards CER as per directions of EAC/SEAC. However, the SEAC has suggested to allocate CER fund on the basis of the extent of the project. Therefore, Rs. 5,00,000 is allocated for CER. The proposed utilization of the budget of CER activities is given in Table 8.1.

TABLE 8.1: CER – ACTION PLAN

P1		
S. No.	**Activity**	**Budget (Rs.in Lakh)**
1	The applicant Indents to involve in corporate environment responsibilities (CER) activities such as renovation of existing toilet, plantation within the school premises, donating environment related books to the nearby school library, etc.	Rs.5,00,000
Total		**Rs.5, 00,000**
P2		
S. No.	**Activity**	**Budget (Rs.in Lakh)**
1	The applicant Indents to involve in corporate environment responsibilities (CER) activities such as renovation of existing toilet, plantation within the school premises, donating environment related books to the nearby school library, etc.	Rs.5,00,000
S. No.	**Activity**	**Budget (Rs.in Lakh)**
P3		
1	The applicant Indents to involve in corporate environment responsibilities (CER) activities such as renovation of existing toilet, plantation within the school premises, donating environment related books to the nearby school library, etc.	Rs.5,00,000
Total		**Rs.15, 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 shall be committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- 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
- Allocate necessary resources to ensure the implementation of the environmental policy
- 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

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.

The said team will be responsible for:

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

10.2 Land Environment Management –

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and contamination of soil affects the viability of the soil resource.

Soil contamination then has a number of flow-on effects like, Inhibition of plant growth, and death of existing plants in contaminated areas and contamination of soil also has potential to impact on a surface water quality and groundwater resources.

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
Re fuelling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
Greenbelt development 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 top benches.	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

Source: Proposed by FAE's & EIA Coordinator

10.3 Soil Management

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers for the filling and levelling of low-lying areas, this will be done only after obtaining permission and paying necessary seigniorage fees to the Government.

TABLE 10.2: PROPOSED CONTROLS FOR SOIL MANAGEMENT

CONTROL	RESPONSIBILITY
Garland drains are to be paved around the quarry pit area to arrest possible wash off in the rainy seasons	Mines Manager
Surface run-off from the surface water via garland drains will be diverted to the mine pits	Mine Foreman &Mining Mate
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
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

Source: Proposed by FAE's & EIA Coordinator

10.4 Water Management

In this proposed quarrying project, no process is involved for the effluent generation, only oil & grease from the machinery wash is anticipated and domestic sewage from mine office.

Maximum depth of the quarrying operation is 37 m below ground level, the water table in the area is 53-58m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

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 quarry areas	Environment Officer
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	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
Retention walls and garland drains will be constructed around periphery of the project site and quarry pit to prevent rain water entering into the quarry pit and to divert the water flow into the natural gradient	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 existing and proposed mining activities would result in the increase of particulate matter concentrations due to fugitive dust. Water sprinkling twice per day 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
While handling the material 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 and working face.	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 un broken area and top benches of the mined out area	Environment Officer
Temporary 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 Officer

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 other allied 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 un broken area's 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 cabins with AC attachments in 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 VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Allocate blasting time in different time schedules mutually agreed by the project proponent	Respective Mines Manager
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 proponent 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, 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 and will be the responsibility of the environment officer.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 1200 Nos of trees during the present plan period. Post plantation status should be regularly checked in every season.
- 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.

Green Belt Development Plan

About 1,200 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of the lease area. The proposed project with survival rate 80% and about 960 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES IN THE FIVE-YEAR PLAN PERIOD

Year	No. of tress proposed to be planted	Area	Name of the species	Survival rate expected in %	No. of trees expected to be grown
I	1200	Safety barrier, village roads	Neem, Pongamia Pinnata, etc.,	80	960

Source: Conceptual Plan of Approved Mining plan & proposed by FAE's & EIA Coordinator

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.

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 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
1.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2.	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
3.	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
4.	Achras sapota	Sapota	Edible fruits
5.	Ficus benghalensis	Alai	Shade and a source of food for birds
6.	Polyalthia longifolia	Nettilinkam	Tall and evergreen 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.

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 detailed 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.

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.

Figure 10.1: Personal Protective Equipment to the Mine Workers

10.9.1 Health and Safety Training Programme

The Proponent will 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 10.9: 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

Budgetary Provision for Environmental Management –

Adequate budgetary provision will be made by the Proponent for execution of Environmental Management Plan. The Table 10.10 give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures (including reclamation).

TABLE 10.10: EMP BUDGET

Activities	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	19800	19800
	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 - **2 Units**	50000	5000
	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 - **1 Units**	5000	250
	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	39600
	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 / Competent 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	426829
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	19800	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	396000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 120**0 Trees - (450 Inside Lease Area & 750 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)	90000	13500
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	225000	22500
	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	74700	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	968574	
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) - **15 Employees**	72000	18000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	18000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	3960
	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	99000	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	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			**3405174**	**1549439**

Year wise Break Up Cost

Year	Total Cost	Year	Total Cost
1st	**₹ 49,54,613**	**6th**	**₹ 36,80,107**
2nd	₹ 16,26,911	7th	₹ 21,61,526
3rd	₹ 17,08,256	8th	₹ 22,69,602
4th	₹ 17,93,669	9th	₹ 23,83,082
5th	₹ 18,83,353	10th	₹ 25,02,236

Cost inflation 5% per annum

Note: This Environmental Management plan cost will vary according to the public consultation comments

In order to implement the environmental protection measures, an amount of Rs.34.05 lakhs as capital cost and recurring cost as Rs. 15.49 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project

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 shall be committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- 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
- Allocate necessary resources to ensure the implementation of the environmental policy
- 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

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.

The said team will be responsible for:

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

10.2 Land Environment Management –

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and contamination of soil affects the viability of the soil resource.

Soil contamination then has a number of flow-on effects like, Inhibition of plant growth, and death of existing plants in contaminated areas and contamination of soil also has potential to impact on a surface water quality and groundwater resources.

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
Re fueling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
Greenbelt development 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 top benches.	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

Source: Proposed by FAE's & EIA Coordinator

10.3 Soil Management

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers for the filling and levelling of low-lying areas, this will be done only after obtaining permission and paying necessary seigniorage fees to the Government.

TABLE 10.2: PROPOSED CONTROLS FOR SOIL MANAGEMENT

CONTROL	RESPONSIBILITY
Garland drains are to be paved around the quarry pit area to arrest possible wash off in the rainy seasons	Mines Manager
Surface run-off from the surface water via garland drains will be diverted to the mine pits	Mine Foreman &Mining Mate
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
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

Source: Proposed by FAE's & EIA Coordinator

10.4 Water Management

In this proposed quarrying project, no process is involved for the effluent generation, only oil & grease from the machinery wash is anticipated and domestic sewage from mine office.

The quarrying operation is proposed upto a depth of 42m below ground level, the water table in the area is 53-58m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

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 quarry areas	Environment Officer
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	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
Retention walls and garland drains will be constructed around periphery of the project site and quarry pit to prevent rain water entering into the quarry pit and to divert the water flow into the natural gradient	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 existing and proposed mining activities would result in the increase of particulate matter concentrations due to fugitive dust. Water sprinkling twice per day 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
While handling the material 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 and working face.	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 un broken area and top benches of the mined out area	Environment Officer
Temporary 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 Officer

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 other allied 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 un broken area's 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 cabins with AC attachments in 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 VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Allocate blasting time in different time schedules mutually agreed by the project proponent	Respective Mines Manager
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 proponents 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, 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 and will be the responsibility of the environment officer.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.25.00 hectare during the present plan period. Post plantation status should be regularly checked in every season.
- 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.
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    - Type of plantation
    - Spacing between the plants
    - Type of manuring and fertilizers and its periods
    - Lopping period, interval of watering
    - Survival rate
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- 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.

Green Belt Development Plan

About 1300 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of the lease area. The proposed project with survival rate 80% and about 1296 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

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Year	No. of tress proposed to be planted	Area	Name of the species	Survival rate expected in %	No. of trees expected to be grown
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Source: Conceptual Plan of Approved Mining plan & proposed by FAE's & EIA Coordinator

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,
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- 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.

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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
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4	Achras sapota	Sapota	Edible fruits
5	Polyalthia longifolia	Nettilinkam	Tall and evergreen 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.

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 detailed 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.

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.

Figure 10.1: Personal Protective Equipment to the Mine Workers

10.10 Health and Safety Training Programme

The Proponent will 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 10.9: 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

Budgetary Provision for Environmental Management –Adequate budgetary provision will be made by the Proponent for execution of Environmental Management Plan. The Table 10.10 give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures (including reclamation).

TABLE 10.10: EMP BUDGET

Activities	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	21300	21300
	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 - **2 Units**	50000	5000
	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	42600
	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	669383
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	21300	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	426000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 130**0 Trees - (470 Inside Lease Area & 830 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)	94000	14100
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	249000	24900
	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	78000	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	1518985	
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) - **18 Employees**	72000	18000

	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	18000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	4260
	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	106500	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	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			**4029085**	**1800043**

Yearwise Break Up Cost

Year	Total Cost	Year	Total Cost
1st	**₹ 58,29,128**	**6th**	**₹ 43,11,904**
2nd	₹ 18,90,045	7th	₹ 25,12,957
3rd	₹ 19,84,547	8th	₹ 26,38,605
4th	₹ 20,83,775	9th	₹ 27,70,535
5th	₹ 21,7,964	10th	₹ 29,09,062

Cost inflation 5% per annum

Note: This Environmental Management plan cost will vary according to the public consultation comments

In order to implement the environmental protection measures, an amount of Rs.40.29 lakhs as capital cost and recurring cost as Rs. 18.00 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project

CHAPTER - 10: ENVIRONMENTAL MANAGEMENT PLAN - P3

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 shall be committed to conducting all its operations and activities in an environmentally responsible manner and to continually improve environmental performance.

The Proponent will –

- 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
- Allocate necessary resources to ensure the implementation of the environmental policy
- 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

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.

The said team will be responsible for:

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

10.1 Land Environment Management –

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and contamination of soil affects the viability of the soil resource.

Soil contamination then has a number of flow-on effects like, Inhibition of plant growth, and death of existing plants in contaminated areas and contamination of soil also has potential to impact on a surface water quality and groundwater resources.

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
Re fueling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
Greenbelt development 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 top benches.	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

Source: Proposed by FAE's & EIA Coordinator

10.2 Soil Management

Top Soil Management –

- There is no topsoil for this project site.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel formation, the Gravel will be directly loaded into tippers for the filling and levelling of low-lying areas, this will be done only after obtaining permission and paying necessary seigniorage fees to the Government.

TABLE 10.2: PROPOSED CONTROLS FOR SOIL MANAGEMENT

CONTROL	RESPONSIBILITY
Garland drains are to be paved around the quarry pit area to arrest possible wash off in the rainy seasons	Mines Manager
Surface run-off from the surface water via garland drains will be diverted to the mine pits	Mine Foreman &Mining Mate
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
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

Source: Proposed by FAE's & EIA Coordinator

10.3 Water Management

In this proposed quarrying project, no process is involved for the effluent generation, only oil & grease from the machinery wash is anticipated and domestic sewage from mine office.

The quarrying operation is proposed upto a depth of 47 m below ground level, the water table in the area is 53-58m below ground level, hence the proposed project will not intersect the Ground water table during entire quarry period.

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 quarry areas	Environment Officer
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	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
Retention walls and garland drains will be constructed around periphery of the project site and quarry pit to prevent rain water entering into the quarry pit and to divert the water flow into the natural gradient	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

10.4 Air Quality Management

The existing and proposed mining activities would result in the increase of particulate matter concentrations due to fugitive dust. Water sprinkling twice per day 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
While handling the material 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 and working face.	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 un broken area and top benches of the mined out area	Environment Officer
Temporary 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 Officer

Source: Proposed by FAE's & EIA Coordinator

10.5 Noise Management

There will be intermittent noise levels due to vehicular movement, trucks loading, drilling and blasting and other allied 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 un broken area's 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 cabins with AC attachments in 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

10.6 Ground Vibration and Fly Rock Control

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Allocate blasting time in different time schedules mutually agreed by the project proponent	Respective Mines Manager
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

10.7 Biological Environment Management

The proponents 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, 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 and will be the responsibility of the environment officer.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to plant around 0.25.00 hectare during the present plan period. Post plantation status should be regularly checked in every season.
- 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.

Green Belt Development Plan

About 1620 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of the lease area. The proposed project with survival rate 80% and about 1296 nos. of fruit bearing and avenue plants are proposed to be developed around the mines office. The greenbelt development plan has been prepared keeping in view the land use changes that will occur due to mining operation in the area.

TABLE 10.7 PROPOSED GREENBELT ACTIVITIES IN THE FIVE-YEAR PLAN PERIOD

Year	No. of tress proposed to be planted	Area	Name of the species	Survival rate expected in %	No. of trees expected to be grown
I	1620	Safety barrier, village roads	Neem, Pongamia Pinnata, etc.,	80	1296

Source: Conceptual Plan of Approved Mining plan & proposed by FAE's & EIA Coordinator

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.

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 10.8: RECOMMENDED SPECIES TO PLANT IN THE GREENBELT

S.No	Botanical Name	Local Name	Importance
1	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2	Millettia pinnata	Pungan	landscaping purposes as a windbreak or for shade
3	Tamarindusindica	Tamarind	Edible & Medicinal and other Uses
4	Achras sapota	Sapota	Edible fruits
5	Ficus benghalensis	Alai	Shade and a source of food for birds
6	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree

Source: Proposed by FAE's & EIA Coordinator

10.8 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.

Medical Surveillance and Examinations –

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- Evaluating the effect of noise on workers
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- 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.

Figure 10.1: Personal Protective Equipment to the Mine Workers

10.9 Health and Safety Training Programme

The Proponent will 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.

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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

Budgetary Provision for Environmental Management –

Adequate budgetary provision will be made by the Proponent for execution of Environmental Management Plan. The Table 10.10 give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures (including reclamation).

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	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	48000
	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 / Competent 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	734435
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 management	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	24000	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	480000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 162**0 Trees - (550 Inside Lease Area & 1070 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)	110000	16500
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	321000	32100
	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	88800	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	1666603	
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) - 21 **Employees**	84000	21000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	21000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	4800
	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	120000	10000
	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30000	5000
	Implementation as per Mining Plan and ensure safe quarry working	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			**4399603**	**1894335**

Yearwse Break Up Cost

Year	Total Cost	Year	Total Cost
1st	**₹ 62,93,938**	**6th**	**₹ 46,17,506**
2nd	₹ 19,89,052	7th	₹ 26,48,580
3rd	₹ 20,88,504	8th	₹ 27,81,009
4th	₹ 21,92,930	9th	₹ 29,20,060
5th	₹ 23,02,576	10th	₹ 30,66,063

Cost inflation 5% per annum

Note: This Environmental Management plan cost will vary according to the public consultation comments

In order to implement the environmental protection measures, an amount of Rs.43.99 lakhs as capital cost and recurring cost as Rs. 18.94 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project

10.10 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 a review of EMP and its implementation to ensure that the EMP remains effective and appropriate. Thus, the proper steps will be taken to accomplish all the goals mentioned in the EMP and the project will bring the positive impact in the study area.

CHAPTER – 11: SUMMARY AND CONCLUSIONS

Thiru.M.Ganesan Rough Stone and Gravel Cluster (**Extent :24.46.06ha)** consisting of 3 Proposed, 7 Existing Quarries 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.

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

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 months October to December 2022 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 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 Rough Stone as per market demand.

Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 54 people directly in the proposed projects and indirectly around 100 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 the Thiru.M.Ganesan Rough Stone Cluster Quarries **(Extent – 6.51.0 ha)**.

CHAPTER 12.0: DISCLOSURE OF CONSULTANTS

Thiru. M. Ganesan has 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 Thiru. M. Ganesan Rough Stone & Gravel Quarry in Sirudhamur Village of Uthiramerur Taluk, Kanchipuram 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: **August 2019 to till date**

Associated Team Member with EIA Coordinator:

1. **Mr. S. Nagamani**
2. **Mr. P. Viswanathan**
3. **Mr. M. Santhoshkumar**
4. **Mr. S. Ilavarasan**

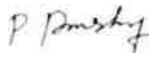
FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

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. ▪ Identification of species labelled as Rare, Endangered and threatened as per IUCN list.	Mrs. Amirtham	

		▪ 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. 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.P. 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. M. 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 Thiru.M.Ganesan Rough Stone & Gravel Quarry in Sirudhamur Village of Uthiramerur Taluk, Kanchipuram 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. Ifhikhar Ahmed**

Designation: **Managing Partner**

Name of the EIA Consultant Organization: **M/s. Geo Exploration and Mining Solutions**

NABET Certificate No & Issue Date: **NABET/EIA/1922/SA0139 Dated: 11-10-2021**

Valid Valid till 29.04.2023.