DRAFT ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENT MANAGEMENT PLAN

” B1” CATEGORY – MINOR MINERAL – CLUSTER – NON-FOREST LAND- GOVERNMENT LAND-EXISTING

THORAPALLI AGRAHARAM ROUGH STONE CLUSTER QUARRIES

At

Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri District, Tamil Nadu State

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

IN CLUSTER OVER AN EXTENT OF 26.97.5 Ha

NAME OF PROPOSED PROJECT PROPONENTS APPLYING IN CLUSTER

Code	Proponent Name	S.F.Nos	Extent (Ha)
P1	M/s. Thriveni Earth Movers Private Limited,	679/2(Part - 3)	5.00.0
P2	M/s. Thriveni Earth Movers Private Limited,	679/2(Part – 4)	5.00.0
P3	M/s. Sri Navaladiyan Engineers	679/2(Part – 2)	5.00.0
P4	Thiru. P. Balasubramanian	679/2(Part – 5)	5.00.0

Compiled as per Tor Obtained Vide

Lr No. SEIAA-TN/F.No.10193/SEAC/ToR-1550/2023 Dated:27.09.2023- P1
Lr No. SEIAA-TN/F.No.10188/SEAC/1(a)ToR-1574/2023 Dated: 27.09.2023-P2
Lr No. SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023-P3
Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023-P4

Environmental Consultant
GEO EXPLORATION AND MINING SOLUTIONS
Old No. 260-B, New No. 17,
Advaitha Ashram Road, Alagapuram,
Salem – 636 004, Tamil Nadu, India
Accredited for sector 1 Cat ‘A’, sector 31 & 38 Cat ‘B’
Certificate No : NABET/EIA/2225/RA 0276
Phone: 0427-2431989,
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Laboratory
EHS 360 LABS PRIVATE LIMITED,
10/2 Ground floor, 50th street, 7th Avenue,
Ashok Nagar, Chennai – 600 083.

Baseline Monitoring Period

Oct 2023-Dec 2023

MARCH 2024

For the easy representation the Proposed, Existing and abandoned Quarries are designated as below

PROPOSED QUARRIES					
CODE	**Name of the Proponent and Address**	**S.F. Nos, Village & Taluk**	**Extent in Ha**	**G.O. No & Date**	**Status**
P-1	M/s. Thriveni Earth Movers Private Limited, Part-3	679/2 (Part-3) Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.404/2009/Mines dated: 25.01.2018	**Lr No. SEIAA-TN/F.No.10193/SEAC/ToR-1550/2023 Dated:27.09.2023**
P-2	M/s. Thriveni Earth Movers Private Limited, Part-4	679/2 (Part-4) Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.403/2009/Mines dated: 25.01.2018	**Lr No. SEIAA-TN/F.No.10188/SEAC/1(a) ToR-1574/2023 Dated: 27.09.2023**
P-3	M/s. Sri Navaladiyan Engineers	679/2 (Part-2) Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.405/2009/Mines dated: 25.01.2018	**Lr No. SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023**
P-4	Thiru. P. Balasubramanian	679/2 (Part-5Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.407/2009/Mines dated: 25.01.2018	**Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023**
P-5	M/S.AVS Building Solutions India Private Limited	662(P) Thorapalli Agraharam Village, Hosur Taluk	2.20.0	Roc.217/2019/Mines dated: 13.06.2019	**EC granted**
		Total	**22.20.0 Ha**		
EXISTING QUARRY					
CODE	**Name of the Proponent and Address**	**S.F. Nos, Village & Taluk**	**Extent in Ha**	**G.O. No & Date**	**Lease Period**
E-1	M/S.AVS Building Solutions India Private Limited	663/1A (P), 663/1B1(P), 663/1B2(P), 663/1B3(P), 663/2 (P),679/1 Thorapalli Agraharam Village, Hosur Taluk	**4.77.5**	Roc.680/2016/Mines dated: 05.12.2019	**EC Granted** Lr. No.SEIAA-TN/F.No.6969/1(a)/EC.No: 4071/2019 datcd: 06.11.2019
		Total	**4.77.5 Ha**		
ABANDONED/EXPIRED QURRIES					
CODE	**Name of the Proponent and Address**	**S.F. Nos, Village & Taluk**	**Extent in Ha**	**G.O. No & Date**	**Lease Period**
A-1	**Thiru.B. Karthikeyan**	**675/1,2** Thorapalli Agraharam Village, Hosur Taluk	**3.53.5**	Roc.382/2016/Mines dated: 22.09.2005	22.09.2005to 21.09.2010
A-2	**M/s. Thriveni Earth Movers Private Limited,**	**676/2** Thorapalli Agraharam Village, Krishnagiri Taluk	**0.81.5**	Roc.623/2010/Mines-2 dated: 18.08.2011	19.09.2011 to 18.09.2016
A-3	**M/s. Thriveni Earth Movers Private Limited,**	**677 & 678** Thorapalli Agraharam Village, Hosur Taluk	**2.53.0**	Roc.624/2010/Mines-2 dated: 18.08.2011	19.09.2011 to 18.09.2016
		Total	**6.88.0Ha**		
TOTAL CLUSTER EXTENT			**26.97.5 Ha**		

Note: -

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

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

TERMS OF REFERENCE (ToR) COMPLIANCE

M/s. Thriveni Earth Movers Private Limited

ToR Obtained vide Lr No.SEIAA-TN/F.No.10193/SEAC/ToR-1550/2023 Dated:27.09.2023

ADDITIONAL CONDITIONS		
Sl. No.	**ToR Condition**	**Reply**
1	With reference to the notes above, the CLA's proceedings submitted by the PP has not thrown the required light on the subject. It is seen from the proceedings that the Thorapalli Agraharam Village was a 'inam' village and, in the settlement, the SF. No. in question was classified as government Poramboke kaadu. Subsequently, Government, the Principal Commissioner, Land Survey in his Proceedings in Na. Ka. (l.l)/2989/2016, dated 08.06.2016 had reclassified the subject lands comprised in S.F.No.679/2 from Kadu Poramboke to Kallankuthu Poramboke. In this context according to the para 2 of Forest (Conservation) Act,1980, any land classified as forest in any of the government records cannot be reclassified and used for non-forest purposes without the prior approval of Government of India. The CLA's proceedings changing the classification from 'kadu' should have been changed only with the prior approval of GoI as per the Forest Act. The information on the same, however, is not available in the proceedings. So, in this case the PP shall submit clarification from the CLA that proper procedures were followed in changing the clarification of the land in question.	Noted and agreed
2	The study shall include impact of the proposed mining on the Waterfalls and River Ponnaiyar flowing at a distance of 200m from the mine lease area and the proposed control /mitigation measures.	Detailed impact studies in Water environment chapter-4 and also mitigation measures
3	The Proponent shall justify the selection of the site for carrying out the stone quarrying with the total volume arrived for the excavation & production adequate details such as lithology of the deposit, reserve estimation, place for waste dump/mined mineral storage, end-use of mined materials, identified potential customers/end-users and travel path.	Submit annexure Revised approved mining plan
4	The proponent shall revise the mining plan indicating the bench height of 6m with width of not less than bench height, as per Reg.106 2(a) of Metalliferous Mines Regulations, 1961. In the context of I above, SEIAA may also get a clarilication from the Forest Department, whether the prescribed procedures were followed for changing the classification of the land in question.	Noted and agreed
ANNEXURE-1		
1	The PP shall fumish the letter obtained from the AD (Mines) indicating the existing pit dimensions and pit conditions showing the details on mine having worked during the earlier lease period.	It is an existing lease granted area, the company has not obtained transport permit so far since execution of lease deed i.e., 29.05.2008 (one year and one month and eight days). But there is a small pit situated on the southeast side in the lease area, which is excavated in the weathered top layer for constructing approach road to the adjacent quarry lease. It is government land

2	The PP shall furnish DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	DF No.610/86 date 29.11.2006
3	The PP shall provide individual notice regarding the Public Hearing to the nearby house owners tocated in the vicinity of the project site.	Noted and agreed
4	The Proponent shall justif, the selection of the site for carrying out the stone quarrying with the total volume arrived for the excavation & production adequate details such as lithology of the deposit, reserve estimation, place for waste dump/mined mineral storage, end-use of mined materials, identified potential customers/end'users and travel path.	Submit annexure Revised approved mining plan
5	The PP shall also justily the selection of mining methodology (conventional or nonconventional) adopting blasting techniques/non-explosive techniques with proper ground reality & laboratory testing.	Attached lab report in the Draft EIA report.
6	The proponent shall submit the "Blast Design Parameters for controlling the vibration and fly rock from the quarry blasting" considering the existence of sensitive structures including habitations within 500 m fiom the lease boundary.	Detailed in chapter-4 vibration studies.
7	The PP shall justify the estimation of HEMM population for excavation and transportation in the proposed quarries with proper calculation methodology adopted.	4.4 Noise environment in chapter-4 and 7, 10 given details of HEMM population for excavation and transportation in the proposed quarries.
8	The PP shall enumerate the environmental settings situated within a radial distance of 1km such rivers/water bodies/reserve forests/ grazing land/existence of the hospitals and educational institutions/structures.	Explained environmental settings in chapter-3 and 500 m radius showing structure details in the draft EIA report.
9	The PP shall provide the details of the anticipated impacts of the mining operations on the surrounding environment and the remedial measures for the same.	Detailed in chapter-4 anticipated impacts of the mining operations in the Draft EIA study.
10	The proponent is requested to carry out a survey and enumerate on the structures located within the radius i) 50m ii) 100m iii) 200m and iv) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, place of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building number of residents, their profession and income, etc.,	Chapter-3 Socio economic environment details in structure map 300m Radius with table showing structure details.
11	The PP shall submit a 'Slope Stability Action Plan' for the proposed quarry where the proposed depth exceeds 30 m and it shall cover the aspects of stability of quarry walls including the access ramp keeping the benches intact.	82m including 1m topsoil [58m AGL + 24m BGL] Slope Stability Action Plan to be submit final EIA/EMP report.
12	lf the blasting operation is to be carried out, the PP shall present a conceptual design for carrying out the NONEL initiation based controlled blasting operation including the lne drilling & muffle blasting techniques and a Simulation Model indicating the anticipated BIastinduced Ground Vibration levels in the proposed quarry as stipulated by the DGMS Circular No.7 of 1997, during the EIA Proposal.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 4

13	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, II/I Class mines manager appointed by the proponent.	The PP affirms that post execution of Quarry Lease Deed the application for Notice of Opening of the Mine along with Notice of Appointment of Competent Person shall be submitted to Director General Mines Safety, Chennai as per MMR, 1961. And ensure the quarry is operated under the Competent Person Employed.
14	The PP shall give an affidavit stating that no contractua! persons provided by the explosive suppliers will be employed for carrying out the blasting operations in the proposed quarries.	Noted and agreed
15	The PP shall also give an affidavit that no highly sensitive structure such as fire-cracker manufacturing units, Gas godown/explosive Magazine, LPG Bottling Units, etc are located within a radial distance of 300 m from the lease boundary ofthe proposed quarry.	Noted and agreed
16	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 20 m from the blast site.	The details of design for carrying out controlled blasting operation involving line drilling and muffle blasting to minimize blast-induced ground vibrations and controlled fly rock travel beyond 30 m from the blast site is detailed in Chapter 4.
17	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.	The PP has submitted self-declaration affidavit that there are no other quarries applied or existing in his name elsewhere in the state.
18	The PP shall provide the environmental mitigation measures implemented for the crusher(s) located within the mining lease.	Crusher operation time slot using this quarry. Daily sprinkling water use in the crushers
19	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, What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	It is an existing lease granted area, the company has not obtained transport permit so far since execution of lease deed i.e., 29.05.2008 (one year and one month and eight days). But there is a small pit situated on the southeast side in the lease area, which is excavated in the weathered top layer for constructing approach road to the adjacent quarry lease.
	Quantity of minerals mined out. c) Highest production achieved in any one year	Peak production 1,21,104 m^3
	d) Detail of approved depth of mining.	82m including 1m topsoil [58m AGL + 24m BGL]
	e) Actual depth of the mining achieved earlier.	-
	f) Name of the person already mined in that leases area.	M/s. Thriveni Earth Movers Private Limited, (SPR.Venkataachalam Authorized Signatory)
	g) If EC and CTO already obtained, the copy of the same shall be submitted. h) Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	It is an existing lease granted area, the company has not obtained transport permit so far since execution of lease deed i.e., 29.05.2008 (one year and one month and eight days). But there is a small pit situated on the southeast side in the lease area, which is excavated in the weathered top layer for constructing approach road to the adjacent quarry lease
0	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall fumish the detailed compliance to EC conditions.	It is an Existing quarry

21	All corner coordinates of the mine lease area, superimposed on a high-resolution Imagery/Toposheet, 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 area).	Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 2,
22	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project and enclosed as soft copy as CD.
23	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.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2,500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.
24	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, 196l for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	Details are given in the Chapter No.6 Organization chart indicating the appointment of various statutory officials.
25	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 l 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.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3.
26	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quantity, air quality, soil quality & flora/fauna including Traffic/vehicular movement study.	Baseline Data were collected for (Post Monsoon) Oct 2023 to Dec 2023. Details in Chapter No. 3. baseline data for the environment.
27	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 has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No.7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.
28	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
29	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary,	Land use and land cover of the study area is discussed in Chapter No. 3.

	national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 3, Table No 3.3
30	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
31	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.	The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
32	If the Village Road /State highway National highway are located within a radial distance of 500 m from the lease boundary ofthc quarry proposal, the PP shall carry out traffic studies to indicate impact on local transport infrastructure due to the Project and mitigation measures.	Transport density details in chapter-2
33	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.
34	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure plan is detailed in Chapter:4.
35	Public Hearing points raised and commitments ofthe Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC with regard to the Office Memorandum of MoEF& CC accordingly.	Noted and agreed
36	The Public hearing advertisement shalI be published in one major National daily and one most circulated vernacular daily.	Noted and agreed
37	The PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing in Tamil Language also.	Noted and agreed
38	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	Noted, the EB study has been conducted covering the local students and importance of flora and fauna was explained.
39	The purpose of green belt around the project is to capture the fugitive emissions. Carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of Small medium/tall trees alternating with shrubs should be planted io a mixed manner.	Noted & agreed. It is proposed to plant 2,500nos of trees in the 7.5m safety barrier and village roads.

40	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted as per the advice of local forest authorities / botanist / Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner.	It is an Existing Lease. trees within the project site. it is proposed to plant 2,500Nos of Trees in the safety barrier and Village roads.
41	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan is detailed in Chapter-7
42	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan Chapter- 7
43	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 are discussed in Chapter-10
44	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No Public Health Implications anticipated due to this project. Details of CER and CSR are discussed under Chapter 8.
45	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details are listed in Chapter:3.
46	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
47	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 benefit is given in the Chapter No.8.
48	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.	Not Applicable. The applied area is a new proposal for Environmental Clearance.
49	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	EMP for the entire life of mine details in chapter-10
50	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

TERMS OF REFERENCE (ToR) COMPLIANCE

M/s. Thriveni Earth Movers Private Limited -P2

ToR Obtained vide Lr No. SEIAA-TN/F.No.10188/SEAC/1(a)ToR-1574/2023 Dated: 27.09.2023

ADDITIONAL CONDITIONS		
Sl. No.	**ToR Condition**	**Reply**
1	With reference to the notes above, the CLA's proceedings submitted by the PP has not thrown the required light on the subject. It is seen from the proceedings that the Thorapalli Agraharam Village was a 'inam'village and, in the settlement, the SF. No. in question was classified as government Poramboke kaadu. Subsequently, Government, the Principal Commissioner, Land Survey in his Proceedings in Na. Ka. (l.l)12989/2016, dated 08.06.2016 had reclassified the subject lands comprised in S.F.No.679/2 from Kadu Poramboke to Kallankuthu Poramboke. In this context according to the para 2 of Forest (Conservation) Act,1980, any land classified as forest in any of the government records cannot be reclassified and used for non-forest purposes without the prior approval of Government of India. The CLA's proceedings changing the classification from 'kadu' should have been changed only with the prior approval of GoI as per the Forest Act. The information on the same, however, is not available in the proceedings. So, in this case the PP shall submit clarification from the CLA that proper procedures were followed in changing the classification of the land in question.	Noted and agreed
2	The study shall include impact of the proposed mining on the Waterfalls and River Ponnaiyar flowing at a distance of 200m from the mine lease area and the proposed control /mitigation measures.	Chapter-4 detailed mitigation measures including Water environment
3	The Proponent shall justify the selection of the site for carrying out the stone quarrying with the total volume arrived for the excavation & production adequate details such as lithology of the deposit, reserve estimation, place for waste dump/mined mineral storage, end-use of mined materials, identifi ed potential customers/end-users and travel path.	Submit annexure Revised approved mining plan in the Draft EIA report.
4	The proponent shall revise the mining plan indicating the bench height of 6 m with width of not less than bench height, as per Reg. 106 2(a) of Metalliferous Mines Regulations, 1961. In the context of I above, SEIAA may also get a clarilication from the Forest Department, whether the prescribed procedures were followed for changing the classilication ofthe land in question.	Submit annexure Revised approved mining plan in the Draft EIA report.
ANNEXURE-1		
1	ln the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated.	It is an existing lease granted area, the company had been allowed the quarry operation only for the period from 29.05.2008 to 06.07.2009 (one year one month and eight days) only instead of Ten years lease period from 29.05.2008 to 28.05.2018 due to forest objection. Ultimate Pit Dimension (L)604m x (W) 87m (D) 80m (Agl 48m+ Bgl 32m).

	(iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.	
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	VAO letter stating the details of habitations, temples etc., is encloses as Annexure
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories. sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.	Structure Map included in the Chapter-3 Socioeconomic environment Report.
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the Waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3 and 4
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Biodiversity study has been carried out by Functional Area Expert by the NABET accredited consultant. The detailed study is given in the Chapter No.3
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas. Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	Enclosed Annexure DFO Letter Noc. No 610/86 dated 29.12.2006
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the pp shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	Existing Lease, attached annexure Approved Revised mining plan.
8	However, in case of the fresh/virgin quarries, The Proponent shall submit a conceptual 'Slope Stability Assessment' for the proposed quarry during the appraisal while obtaining the EC, when the depth of	It is an existing lease granted area, the company had been allowed the quarry operation only for the period from 29.05.2008 to 06.07.2009 (one year one month and eight

	the proposed working is extended beyond 30 m below ground level.	days) only instead of Ten years lease period from 29.05.2008 to 28.05.2018 due to forest objection. For the first five years plan period the mining operation is proposed to carry out up to the depth of 80m including 1m topsoil – (48m AGL + 32m BGL) It is ensured that the slope stability will be carried out after 30m bgl.
9	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, II/I Class mines manager appointed by the proponent.	Proponent given affidavit stating that the blasting will be carried out under the supervision of Competent person in Chapter-6
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	The details of design for carrying out controlled blasting operation involving line drilling and muffle blasting to minimize blast-induced ground vibrations and controlled fly rock travel beyond 30 m from the blast site is detailed in Chapter 4.
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.	Noted and agreed. There are three quarries including this proposal in the cluster belongs to the Proponent M/s. Thriveni Earth Movers Pnvate Limited and M/s. Sri Navaladiyan Engineers (G.Sreenivasulu Authorized Signatory) and Thiru. P. Balasubramanian (Power of Attorney Thiru. SPR Venkataachalam)
12	lf 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	It is an existing lease granted area, the company had been allowed the quarry operation only for the period from 29.05.2008 to 06.07.2009 (one year one month and eight days) only instead of Ten years lease period from 29.05.2008 to 28.05.2018 due to forest objection.
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	
14	Quantify of minerals mined out A. Highest production achieved in any one year B. Detail of approved depth of mining. C. Actual depth of the mining achieved earlier. D. Name of the person already mined in that leases area. E. lf EC and CTO already obtained, the copy of the same shall be submitted. F. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	Mineable reserves ROM – 23,86,840m^3 Ultimate Depth (L)604m x (W) 87m (D) 80m (Agl 48m+ Bgl 32m) Year wise production for first five years ROM – 13,42,330 m^3 Peak Production – 2,79,552 m^3 Depth – 80m including 1m topsoil – (48m AGL + 32m BGL)
15	All corner coordinates of the mine lease area, superimposed on a high-resolution Imagery/Toposheet, 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 area).	Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 2,
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project and enclosed Final EIA report as soft copy as CD.

17	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.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.
18	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 1, Mineable reserves ROM – 23,86,840m^3 Ultimate Depth (L)604m x (W) 87m (D) 80m (Agl 48m+ Bgl 32m) Year wise production for first five years ROM – 13,42,330 m^3 Peak Production – 2,79,552 m^3 Depth– 80m including 1m topsoil – (48m AGL + 32m BGL)
19	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, 196l for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	The Organization chart indicating the appointment of various statutory officials Detailed under Chapter 6.
20	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 l 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.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 3.
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quantity, air quality, soil quality & flora/fauna including Traffic/vehicular movement study.	Baseline Data were collected for (Post Monsoon) Oct 2023 to Dec 2023. Details in Chapter No. 3. baseline data for the environment.
22	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 has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No.7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
24	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	Land use and land cover of the study area is discussed in Chapter No. 3.

	features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 3, Table No 3.3
25	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
26	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.
27	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.	The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
28	Impact on local transport infrastructure due to the Project should be indicated.	Transportation details mentioned in Chapter -2
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Mine closure plan is detailed in Chapter:4.
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	Noted, the EB study has been conducted covering the local students and importance of flora and fauna was explained.
32	The purpose of green belt around the project is to capture the fugitive emissions. Carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of Small medium/tall trees alternating with shrubs should be planted io a mixed manner.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2,500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.
33	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted 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.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2,500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.

34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan is detailed in Chapter-7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan Chapter- 7
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts are discussed in chapter- 10
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No Public Health Implications anticipated due to this project. Details of CER and CSR are discussed under Chapter 8.
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details are listed in Chapter:3. Socio-economic studies
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Project benefit is given in the Chapter No.8.
41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF & CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	Not Applicable. The applied area Environmental Clearance.
42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	EMP for the entire life of mine detailed in chapter-10
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

TERMS OF REFERENCE (ToR) COMPLIANCE

M/s. Sri Navaladiyan Engineers -P-3

ToR Obtained vide Lr No. SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023

ADDITIONAL CONDITIONS		
Sl. No.	**ToR Condition**	**Reply**
1	With reference to the notes above, the CLA's proceedings submitted by the PP has not thrown the required light on the subject. It is seen from the proceedings that the Thorapalli Agraharam Village was a 'inam'village and, in the settlement, the SF. No. in question was classified as government Poramboke kaadu. Subsequently, Government, the Principal Commissioner, Land Survey in his Proceedings in Na. Ka. (l.l)12989/2016, dated 08.06.2016 had reclassified the subject lands comprised in S.F.No.679/2 from Kadu Poramboke to Kallankuthu Poramboke. In this context according to the para 2 of Forest (Conservation) Act,1980, any land classified as forest in any of the government records cannot be reclassified and used for non-forest purposes without the prior approval of Government of India. The CLA's proceedings changing the classification from 'kadu' should have been changed only with the prior approval of GoI as per the Forest Act. The information on the same, however, is not available in the proceedings. So, in this case the PP shall submit clarification from the CLA that proper procedures were followed in changing the classification of the land in question.	Noted and agreed
2	The study shall include impact of the proposed mining on the Waterfalls and River Ponnaiyar flowing at a distance of 200m from the mine lease area and the proposed control /mitigation measures.	Chapter-4 detailed impact and mitigation measures including water environment
3	The Proponent shall justify the selection of the site for carrying out the stone quarrying with the total volume arrived for the excavation & production adequate details such as lithology of the deposit, reserve estimation, place for waste dump/mined mineral storage, end-use of mined materials, identifi ed potential customers/end-users and travel path.	**A**ttached Revised approved mining plan
4	The proponent shall revise the mining plan indicating the bench height of 6m with width of not less than bench height, as per Reg. 106 2(a) of Metalliferous Mines Regulations, 1961. In the context of I above, SEIAA may also get a clarification from the Forest Department, whether the prescribed procedures were followed for changing the clarification of the land in question.	Submit annexure Revised approved mining plan
ANNEXURE-1		
1	ln the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth	It is an existing lease granted area, but did not operate in the area so far. At present the area is virgin. Hence no existing pit. Ultimate Pit Dimension: (L)249m x (W) 175m (D)73m (Agl 47m + Bgl 26m) Mineable Reserves: Rough Stone quarry 10,16,034 m^3

	(v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.	Topsoil-43,575 m^3 Non-Illegal mines Non-Violation **A**ttached Revised approved mining plan
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	To be submit Final EIA/EMP report to SEIAA.
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories. sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc.	Structure Map included in the Chapter-3 Socioeconomic environment Report.
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the Waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 4 Waterbodies like lake, water tanks, etc are located within 1km of the proposed quarry in Chapter No-2
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Biodiversity study has been carried out by Functional Area Expert by the NABET accredited consultant. The detailed study is given in the Chapter No.3
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas. Sanctuaries, Tiger reserve etc., up to a radius of 25km from the proposed site.	Enclosed Annexure DFO Letter Noc. No 610/86 dated 29.12.2006
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the pp shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	It is an existing lease granted area, but did not operate in the area so far. At present the area is virgin. Hence no existing pit.
8	However, in case of the fresh/virgin quarries, The Proponent shall submit a conceptual 'Slope Stability Assessment' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the proposed working is extended beyond 30 m below ground level.	For the first five years plan period the mining operation is proposed to carry out up to the depth of 73m including 1m topsoil [47m AGL + 26m BGL]. It is ensured that the slope stability will be carried out after 30m bgl.

9	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, II/I Class mines manager appointed by the proponent.	Proponent given affidavit stating that the blasting will be carried out under the supervision of Competent person in chapter-6
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	The details of design for carrying out controlled blasting operation involving line drilling and muffle blasting to minimize blast-induced ground vibrations and controlled fly rock travel beyond 30 m from the blast site is detailed in Chapter 4.
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.	Noted and agreed. There are three quarries including this proposal in the cluster belongs to the Proponent M/s. Thriveni Earth Movers Pnvate Limited and Thiru. P. Balasubramanian
12	lf 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	It is an existing lease granted area, but did not operate in the area so far. At present the area is virgin. Hence no existing pit.
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	It is an existing lease granted area, but did not operate in the area so far. At present the area is virgin. Hence no existing pit.
14	Quantify of minerals mined out A. Highest production achieved in any one year B. Detail of approved depth of mining. C. Actual depth of the mining achieved earlier. D. Name of the person already mined in that leases area. E. lf EC and CTO already obtained, the copy of the same shall be submitted. F. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	Mineable reserves ROM 10,16,034 m^3 Ultimate Depth (L)249m x (W) 175m (D)73m (Agl 47m + Bgl 26m) Year wise production for first five years ROM –5,67,114m^3 Peak Production – 1,21,104 m^3 Depth – 73m including 1m topsoil [47m AGL + 26m BGL] It is an existing lease granted area, but did not operate in the area so far. At present the area is virgin. Hence no existing pit.
15	All corner coordinates of the mine lease area, super imposed on a high-resolution Imagery/Toposheet, 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 area).	Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 2,
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project and enclosed as soft copy as CD.
17	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.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.

18	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 1, Mineable reserves ROM 10,16,034 m^3 Ultimate Depth (L)249m x (W) 175m (D)73m (Agl 47m + Bgl 26m) Year wise production for first five years ROM – 5,67,114m^3 Peak Production – 1,21,104 m^3 Depth– 73m including 1m topsoil [47m AGL + 26m BGL]
19	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, 196l for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	The Organization chart indicating the appointment of various statutory officials and other competent persons Detailed under Chapter 6.
20	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 l 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.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details of open wells and borewells within 1km radius along with water level is given in the Chapter No.3.
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quantity, air quality, soil quality & flora/fauna including Traffic/vehicular movement study.	Baseline Data were collected for (Post Monsoon) Oct 2023 to Dec 2023. Details in Chapter No. 3. baseline data for the environment.
22	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 has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No.7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
24	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 3, Table No 3.3

25	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 are no wastages anticipated, the entire quarried out rough stone material will be utilized.
26	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.	The area is not declared as Critically polluted area, no court case pending against the project. Proponent obtained Precise area communication letter, Approval for the Revised Mining plan. The Details are enclosed as Annexure.
27	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.	The rain water collected in the pits after spell of rain will be used for greenbelt development and dust suppression.
28	Impact on local transport infrastructure due to the Project should be indicated.	Transportation details mentioned in Chapter -2
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	The mine closure plan is detailed in the Chapter No.4 Page No.49 The budget for the mine closure is included in the Environmental Management plan in Chapter No.10, Table:10.10
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	The Flora and Fauna study around the vicinity of the site is carried out by the Functional area experts along with Local School Students.
32	The purpose of green belt around the project is to capture the fugitive emissions. Carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of Small medium/tall trees alternating with shrubs should be planted to a mixed manner.	The plantation in the project site will be carried out using native and mixed plantation. The recommended species for the plantation is given in the Chapter No.4
33	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted 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.	Noted and agreed. The plantation in the project site will be carried out using native and mixed plantation. The recommended species for the plantation is given in the Chapter No.4
34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan is detailed in Chapter-7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan Chapter- 7
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures	Occupational Health impacts are discussed in chapter- 10

	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.	
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No Public Health Implications anticipated due to this project. Details of CER and CSR are discussed under Chapter 8.
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details are listed in Chapter:3.
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Project benefit is given in the Chapter No.8.
41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF & CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	Not Applicable. The applied area is an existing proposal for Environmental Clearance.
42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	Noted and agreed
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

TERMS OF REFERENCE (ToR) COMPLIANCE

Thiru. P. Balasubramanian -P-4

ToR Obtained vide Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023

ADDITIONAL CONDITIONS		
Sl. No.	**ToR Condition**	**Reply**
1	With reference to the notes above, the CLA's proceedings submitted by the PP has not thrown the required light on the subject. It is seen from the proceedings that the Thorapalli Agraharam Village was a 'inam'village and, in the settlement, the SF. No. in question was classified as government Poramboke kaadu. Subsequently, Government, the Principal	Noted and agreed

	Commissioner, Land Survey in his Proceedings in Na. Ka. (l.l)12989/2016, dated 08.06.2016 had reclassified the subject lands comprised in S.F.No.679/2 from Kadu Poramboke to Kallankuthu Poramboke. In this context according to the para 2 of Forest (Conservation) Act,1980, any land classified as forest in any of the government records cannot be reclassified and used for non-forest purposes without the prior approval of Government of India. The CLA's proceedings changing the classification from 'kadu' should have been changed only with the prior approval of GoI as per the Forest Act. The information on the same, however, is not available in the proceedings. So, in this case the PP shall submit clarification from the CLA that proper procedures were followed in changing the classification of the land in question.	
2	The study shall include impact of the proposed mining on the Waterfalls and River Ponnaiyar flowing at a distance of 200m from the mine lease area and the proposed control /mitigation measures.	Chapter-4 detailed mitigation measures including Water Envrionment and Hydrogeological report including proposed control and mitigation measures.
3	The Proponent shall justify the selection of the site for carrying out the stone quarrying with the total volume arrived for the excavation & production adequate details such as lithology of the deposit, reserve estimation, place for waste dump/mined mineral storage, end-use of mined materials, identifi ed potential customers/end-users and travel path.	Attached annexure revised approved mining plan
4	The proponent shall revise the mining plan indicating the bench height of 6m with width of not less than bench height, as per Reg.106 2(a) of Metalliferous Mines Regulations, 1961. In the context of I above, SEIAA may also get a clarification from the Forest Department whether the prescribed procedures were followed for changing the classification of the land in question.	Attached annexure revised approved mining plan Attached clarification from the DFO letter, Krishnagiri.
ANNEXURE-1		
1	ln the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6m height and ultimate depth of not exceeding 50m.	It is an existing lease granted area, but did not operate in the area so far. At present the area is virgin. Hence no existing pit. Ultimate Pit Dimension (L)633m x (W) 73m (D) 64m (AGL 46m + BGL 18m) Mineable Reserves: Rough Stone quarry 13,02,980m³ Non-Illegal mines Non-Violation Attached annexure revised approved mining plan
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	To be submit Final EIA/EMP report to SEIAA.
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as	Structure Map included in the Chapter-3 Socioeconomic environment Report.

	dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their professional and income, etc.	
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the Waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details are discussed under Chapter No. 4 Water bodies detailed in 1km radius details in Chapter no-3
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	Biodiversity study has been carried out by Functional Area Expert by the NABET accredited consultant. The detailed study is given in the Chapter No.3
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas. Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	Enclosed Annexure DFO Letter: 610/86 dated 29.12.2006
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the pp shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	It is an existing lease granted area, but did not operate in the area so far. At present the area is virgin. Hence no existing pit.
8	However, in case of the fresh/virgin quarries, The Proponent shall submit a conceptual 'Slope Stability Assessment' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the proposed working is extended beyond 30 m below ground level.	For the first five years plan period the mining operation is proposed to carry out up to the depth of 73m including 1m Topsoil. It is ensured that the slope stability will be carried out after 30m bgl.
9	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, II/I Class mines manager appointed by the proponent.	Proponent given affidavit stating that the blasting will be carried out under the supervision of Competent person in Chapter No- 6
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30m from the blast site.	Noted and agreed
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent	Noted and agreed.

	in the past, either in the same location or elsewhere in the State with video and photographic evidences.	There are three quarries including this proposal in the cluster belongs to the Proponent M/s. Thriveni Earth Movers Private Limited (Part3 and 4) and M/s. Sri Navaladiyan Engineers
12	lf 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	It is an existing lease granted area, the lessee had been allowed the quarry operation only for the period from 30.05.2008 to 06.07.2009 (one year one month and seven days) only instead of Ten years lease period from 30.05.2008 to 29.05.2018 due to forest objection.
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	It is an existing lease granted area, the lessee had been allowed the quarry operation only for the period from 30.05.2008 to 06.07.2009 (one year one month and seven days) only instead of Ten years lease period from 30.05.2008 to 29.05.2018 due to forest objection.
14	Quantify of minerals mined out A. Highest production achieved in any one year B. Detail of approved depth of mining. C. Actual depth of the mining achieved earlier. D. Name of the person already mined in that leases area. E. lf EC and CTO already obtained, the copy of the same shall be submitted. F. Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	Mineable reserves ROM – 13,02,980m³ Ultimate Depth (L)633m x (W) 73m (D) 64m (AGL 46m + BGL 18m) Year wise production for first five years ROM –7,46,132 m³ Peak Production – 1,56,972 m³ of ROM Depth - 64m (AGL 46m + BGL 18m)
15	All corner coordinates of the mine lease area, superimposed on a high-resolution Imagery/Toposheet, 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 area).	Satellite imagery of the project area along with boundary coordinates is given in the Chapter No 2,
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing etc.,	The Drone Video of the project site is taken covering the Greenbelt and Fencing around the Project and enclosed as soft copy as CD in the Final EIA/EMP report.
17	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.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads. As well the pp has provided wire fencing as recommended all along the boundary of the lease applied area.
18	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, Mineable reserves ROM – 13,02,980m³ Ultimate Depth (L)633m x (W) 73m (D) 64m (AGL 46m + BGL 18m) Year wise production for first five years ROM –7,46,132 m3 Peak Production – 1,56,972 m³ of ROM Depth - 64m (AGL 46m + BGL 18m)

19	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, 196l for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	The Organization chart indicating the appointment of various statutory officials Detailed under Chapter 6.
20	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 l 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.	The hydro-geological study was conducted to evaluate the possible impact on the ground water table. No significant impacts are anticipated on the water bodies around the project area. Details of open wells and borewells within 1km radius along with water level is given in the Chapter No.3
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quantity, air quality, soil quality & flora/fauna including Traffic/vehicular movement study.	Baseline Data were collected for (Post Monsoon) Oct 2023 to Dec 2023. Details in Chapter No.3. baseline data for the environment.
22	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 has been carried out covering proposed and existing quarries in the cluster and results related to air pollution, water pollution, & health impacts have been given in chapter No.7, Based on the results, environmental management plan has been prepared and given in Chapter No. 10.
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
24	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre operational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 3, Table No 3.3
25	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 are no wastages anticipated, the entire quarried out rough stone material will be utilized.
26	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	The area is not declared as Critically polluted area, no court case pending against the project. Proponent obtained Precise area communication letter, Approval for the Revised Mining plan. The Details are enclosed as Annexure.

	should be secured and furnished to the effect that the proposed mining activities could be considered.	
27	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.	The lower part of the mine pit will be utilized as rain water harvesting structure (Temporary) and the water will be used for the water sprinkling on haul roads and Greenbelt development purpose. Rainwater harvesting structure will be constructed near the mine office.
28	Impact on local transport infrastructure due to the Project should be indicated.	Transportation details mentioned in Chapter -2
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	The mine closure plan is detailed in the Chapter No.4 Page No.49 The budget for the mine closure is included in the Environmental Management plan in Chapter No.10 ,Table:10.10
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	To be furnish after public hearing to submit final EIA Report.
32	The purpose of green belt around the project is to capture the fugitive emissions. Carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of Small medium/tall trees alternating with shrubs should be planted io a mixed manner.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.
33	Taller/one year old Saplings raised in appropriate size of bags; preferably eco-friendly bags should be planted 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 3meters wide and in between blocks in an organized manner.	As per the recommendations during SEAC ToR Presentation of the proposal and commitment of PP a count of 2500 Nos of trees were planted as a part of greenbelt development programme all along the periphery of the lease applied area and approach roads and village roads.
34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan is detailed in Chapter-7
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report.	A Risk Assessment and management Plan Chapter- 7
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts are discussed in chapter- 10
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed	No Public Health Implications anticipated due to this project. Details of CER and CSR are discussed under Chapter No.8.

	remedial measures should be detailed along with budgetary allocations.	
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Details are listed in Chapter:3 Socio-economic studies.
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No Litigation is pending
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, Social, economic, employment potential, etc.	Project benefit is given in the Chapter No.8.
41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF & CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	Not applicable, the project is Existing proposal.
42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	The EMP has been prepared for the entire life of the mine in Chapter 10.
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Reference besides attracting penal provisions in the Environment (Protection) Act, 1986.	Noted and agreed

NORMAL CONDITIONS- Annexure-B		
Cluster Management committee		
1.	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	Cluster Management Committee has been constituted initially with 4quarries one and Existing quarries already EC granted in the cluster mines.
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling. tree plantation, blasting etc..	The information will be shared to the cluster management committee during the monthly meeting.
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
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	The risk management plan and disaster management plan will be followed as per this EIA report chapter No.7

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.	Environmental policy is described in the EIA report Chapter No. 6 and the same will be followed.
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 workers/staff involved in the mining as well as the health of the public.	The risk management plan and disaster management plan will be followed as per the EIA report.
10	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.
11	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	The fire safety and evacuation plan will be carried out by as per the respective quarry mines managers
Impact study of mining		
12	Detailed study shall be caried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise arca communication order issued from reputed research institutions on the following a) Soil health & bio-diversity, physical land chemical features. b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature' & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health' e) Agriculture, Forestry & Traditional practices. 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 steams.	Details of Soil health is given in Chapter No 3 and biodiversity is given in Chapter No 3. The project will not cause any significant changes in the climate Climatic changes and GHG are described in Chapter No 4. Details of water contamination and impact on aquatic ecosystem is given in Chapter No 4. Hydrothermal/ Geothermal effects due to destruction in the environment, Bio geochemical process and sediment geo chemistry given in the Chapter No 7.
Agriculture & Agro-Biodiversity		
13	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.
14	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. Impact soil and flora and vegetation details in chapter-4

15	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	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
16	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora. fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	Details are discussed in Chapter No.3
17	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	The Eco System of the area will be retained during the mining operation by the way of planting trees in the boundary barrier and un utilized areas. After completion of mining operation, the quarried-out pit will be facilitated to collect the rainwater to pit act as temporary reservoir
18	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands. Horticulture, Agriculture and livestock.	The project area is bounded by dry barren land on all the sides.
Forest		
19	The project proponent shall detail study on impact of mining on Reserve forests free ranging wildlife.	There is Reserve Forest within 1km radius from the project area (Sanamavu R.F-100m-NE)
20	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	Chapter 3 details of Ecology and Biodiversity, and 4 endemic vulnerable and endangered indigenous flora and fauna.
21	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	detailed in greenbelt plan chapter-4 and 10.
22	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	Anticipated Environment Impact and Mitigation measures are detailed in Chapter No.4
Water Environment		
23	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks. canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	Hydro-geological study considering the contour map of the water table detailing Chapter-3
24	Erosion Control measures.	Garland drainage structures will be constructed around the lease area to control the erosion, as discussed in Section 4.3 under Chapter 4.
25	Detailed study shalt be carried out in regard to impact of mining around the proposed mine lease area on the nearby villages, water-bodies/ Rivers. & any ecological fragile areas.	In the EIA report Chapter No. IV enumerate the anticipated impact due to the project and mitigation measures
26	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	Detailed under Chapter 3.
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment by the activities.	Details are given in the Chapter No 4.
28	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and	Detailed discussed in the chapter 4

	possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	
29	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil, physical, chemical components and microbial components.	Details of impact on soil environment is detailed in Chapter No.4.
30	The Environmental impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	The nearest water bodies from the project areas are an Ponnaiyar River- 200m – South Kuttai-610m-NW
Energy		
31	The measures taken to control Noise. Air, Water. Dust Control and steps adopted to efficiently utilize the Energy shall be furnished.	Details in Chapter 3 environmental monitoring details.
Climate Change		
32	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	Details of carbon emission and mitigation activities are given int the Chapter No.4
33	The Environmental impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The project will not cause significant impact on climatic change. Description about the project and climatic changes is described in Chapter No.4.
Mine Closure Plan		
34	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Details in Chapter No.2 mine closure plan
EMP		
35	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Details in EMP in chapter 10
36	The Environmental Impact Assessment should hold detailed study on EMP with budget for green belt development and mine closure plan including disaster management plan.	Detailed Environment Management Plan for the project to mitigate the anticipated impacts described under Chapter 4 is discussed under Chapter 10.
Disaster Management Plan		
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Disaster management Plan details in Chapter-7
Others		
39	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations. schools. Archaeological sites. Structures. railway lines, roads. Water bodies such as streams, odai, vaari, canal, channel. river, lake pond, tank etc.	it will be submit final EIA/EMP report.
40	As per the MoEF & CC office memorandum tr.No.22-65l201 7-lA.lll dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	Noted and agreed

41	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	Details of plastic management is in chapter 7

STANDARD TERMS OF REFERENCE		
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable. This is Not a violation category project. This proposal falls under B1 Category (Cluster Condition).
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The applied land for quarrying is a Government Land. Document is enclosed along with Approved Revised Mining Plan as Annexure Volume 1.
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Noted & agreed.
4	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Map showing – Project area is superimposed on Satellite imagery is enclosed in Figure No. 2.1 Project area boundary coordinates superimposed on Toposheet – Figure No. 1.3 Surface Features around the project area covering 10km radius – Figure No. 2.2 Geology map of the project area covering 10km radius - Figure No. 2.7. Geomorphology Map of the Study Area covering 10 km radius – Figure No. 2.8.
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams, rivers and soil characteristics.	Map showing – Geology map of the project area covering 10km radius - Figure No. 2.7. Geomorphology Map of the Study Area covering 10 km radius – Figure No. 2.8.
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should	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.

	have approval from State land use board or the concerned authority.	
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 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.	The proponent has framed their Environmental Policy and the same is discussed in the Chapter No 10.1.
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	It is an opencast quarrying operation proposed to operate in Mechanized method. The rough stone formation is a hard, compact and homogeneous body. The height and width of the bench will be maintained as 5m with 90^0 bench angles. Quarrying activities will be carried out under the supervision of Competent Persons like Mines Manager, Mines Foreman and Mining Mate. Necessary permissions will be obtained from DGMS after obtaining Environmental Clearance.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc., should be for the life of the mine / lease period.	Noted & agreed. The study area considered for this study is 10 km radius and all data contained in the EIA report such as waste generation etc., is for the Life of the Mine / lease period.
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use and land cover of the study area is discussed in Chapter No. 3. Land use plan of the project area showing pre-operational, operational and post-operational phases are discussed in Chapter No. 2, Table No 2.3.
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given	Not Applicable. There is no waste anticipated during this quarry operation. The entire quarried out rough stone will be transported to the needy customers.

		No Dumps is proposed outside the lease area.
12	Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Not Applicable. The proposed project area is a government land. Enclosed Annexure DFO Letter: 610/86 dated 29.12.2006 Approved Revised Mining Plan is enclosed as Annexure Volume 1.
13	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable. The proposed project area does not involve any Forest Land. Enclosed Annexure DFO Letter: 610/86 dated 29.12.2006
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable. The project doesn't attract Recognition of Forest Rights Act, 2006.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Sanamavu Ext II– 200 m– NE-P1 Sanamavu Ext II– 160 m– NE-P2 Sanamavu Ext II– 490 m– NE-P3 Sanamavu Ext II– 100 m– NE-P4
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Not Applicable. There are No National Parks, Biosphere Reserves, Wildlife Corridors, and Tiger/Elephant Reserves within 10 km Radius from the periphery of the project area. Cauvery North Wildlife Sanctuary-16km-S Cauvery South Wildlife Sanctuary-40km-S
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,	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. Sanamavu Ext II– 200m– NE-P1, 160m NE-P2, 490m-NE-P3, 100m-NE-P4.

	should be obtained from the Standing Committee of National Board of Wildlife and copy furnished	
18	A detailed biological study of the study area [core zone and buffer zone (10 KM radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] was carried out and discussed under Chapter No. 3. There is no schedule I species of animals observed within study area as per Wildlife Protection Act 1972 as well as no species is in vulnerable, endangered or threatened category as per IUCN. There is no endangered red list species found in the study area.
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable. Project area / Study area is not declared in 'Critically Polluted' Area and does not come under 'Aravalli Range.
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	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 programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to	Not Applicable. There are no approved habitations within a radius of 300 meters. Therefore, R&R Plan / Compensation details for the Project Affected People (PAP) is not anticipated and Not Applicable for this project.

	shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	Baseline Data were collected for One Season Oct – Dec 2023 as per CPCB Notification and MoEF & CC Guidelines. Details in Chapter No. 3.
23	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Air Quality Modelling for prediction of incremental GLC's of pollutant was carried out using AERMOD view Details in Chapter No. 4.
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Cumulatively total Water Requirement: 4.8 KLD(P1-P4) Discussed under Chapter 2, Table No 2.15.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not Applicable. Water for dust suppression, greenbelt development and domestic use will be sourced from accumulated rainwater/seepage water in mine pits and purchased from local water vendors through water tankers on daily requirement basis. Drinking water will be sourced from the approved water vendors.

26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Part of the working pit will be allowed to collect rain water during the spell of rain will be used for greenbelt development and dust suppression. The Mine Closure Plan is prepared for converting the excavated pit into rain water harvesting structure and serve as water reservoir for the project village during draught season.
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact Studies and Mitigation Measures of Water Environment including Surface Water and Ground Water are discussed in Chapter 4.
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	Not Applicable. The ground water table inferred 60-65m below ground level-P1,60-85m-P2, 60-85m-P3, 60-85m-P4 The ultimate depth of quarry is 82m (AGL 58m + BGL 24m)-P1 80m (Agl 48m+ Bgl 32m)-P2 73m (Agl 47m + Bgl 26m)-P3 64m (AGL 46m + BGL 18m)-P4 This proposal of 30m below ground level will not intersect the ground water table, which is inferred from the hydro-geological carried out at the project site. Discussed under Chapter 3.
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	There is stream, seasonal or other water bodies passing within the project area in chapter-3 and 4
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and Bgl. A schematic diagram may also be provided for the same.	The ground water table inferred 60-65m below ground level-P1,60-85m-P2, 60-85m-P3, 60-85m-P4 The ultimate depth of quarry is 82m (AGL 58m + BGL 24m)-P1 80m (Agl 48m+ Bgl 32m)-P2 73m (Agl 47m + Bgl 26m)-P3 64m (AGL 46m + BGL 18m)-P4
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under	Greenbelt Development Plan is discussed under Chapter 4.

	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.	
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Traffic density survey was carried out to analyse the impact of Transportation in the study area as per IRC guidelines 1961 and it is inferred that there is no significant impact due to the proposed transportation from the project area. Details in Chapter 2.
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure & other facilities will be provided to the Mine Workers after the grant of quarry lease and the same has been discussed in the Chapter No.2.
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Discussed under Chapter 2. Mine Closure Plan is a part of Approved Revised Mining Plan enclosed as Annexure Volume – 1.
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health Impacts of the project and preventive measures are detailed under Chapter 4,
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	No Public Health Implications anticipated due to this project. Details of CER and CSR are discussed under Chapter 8.
37	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	No Negative Impact on Socio Economic Environment on the Study Area is anticipated and this project shall benefit the Socio-Economic Environment by ways of employment for 138 people directly and 200 people indirectly. Details in Chapter 2.

38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Detailed Environment Management Plan for the project to mitigate the anticipated impacts described under Chapter 4 is discussed under Chapter 10.
39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The outcome of public hearing will be updated in the final EIA/AMP report.
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation is pending in any court against this project.
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Project Cost is each proposal Rs.3,55,44,000/--P1 Rs. 3,51,84,000/--P2 Rs.3,31,54,000/--P3 Rs.3,55,44,000/--P4 CER Cost is Rs 5,00,000/- Each proposal.
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Details in Chapter 7.
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Details in Chapter 8.
44	**Besides the above, the below mentioned general points are also to be followed: -**	
a	Executive Summary of the EIA/EMP Report	Enclosed as separate booklet.
b	All documents to be properly referenced with index and continuous page numbering.	All the documents are properly referenced with index and continuous page numbering.
c	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	List of Tables and source of the data collected are indicated.
d	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	Baseline monitoring reports are enclosed with This report in Chapter 3. Original Baseline monitoring reports will be submitted in the final EIA report during appraisal.

e	Where the documents provided are in a language other than English, an English translation should be provided.	Not Applicable.
f	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Will be enclosed along with Final EIA EMP Report.
g	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA. II(I) Dated: 4th August, 2009, which are available on the website of this Ministry, should be followed.	Noted & agreed. Instructions issued by MoEF & CC O.M. No. J-11013/41/2006-IA. II (I) Dated: 4th August, 2009 are followed.
h	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	Noted & agreed.
i	As per the circular no. J-11011/618/2010-IA. II(I) Dated: 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not Applicable.
j	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Detailed in surface plan and drainage, geological plan in chapter-2 clearly showing the sections and land features.

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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 quarry are the major requirements for construction industry. This EIA report is prepared by considering Cumulative load of all proposed & existing quarries of Thorapalli Agraharam Rough Stone Cluster Quarries consisting of thee Proposed quarries and one existing quarry with total extent of Cluster of 26.97.5Ha in Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri District, Tamil Nadu State, cluster area calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016.

This EIA Report is prepared in compliance with ToR obtained for the below proposals in Table 1.1 and the Baseline Monitoring study has been carried out during the period of **Oct 2023-Dec2023**

TABLE 1.1: ToR OBTAINED PROJECTS

CODE	Name of the proponent	S.F.Nos	Extent (Ha)	Terms of Reference (ToR)
P1	M/s. Thriveni Earth Movers Private Limited,	679/2(Part - 3)	**5.00.0**	**Lr No. SEIAA-TN/F.No.10193/SEAC/ToR-1550/2023 Dated:27.09.2023**
P2	M/s. Thriveni Earth Movers Private Limited,	679/2(Part – 4)	**5.00.0**	**Lr No. SEIAA-TN/F.No.10188/SEAC/1(a)ToR-1574/2023 Dated: 27.09.2023**
P3	M/s. Sri Navaladiyan Engineers	679/2(Part – 2)	**5.00.0**	**Lr No. SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023**
P4	Thiru. P. Balasubramanian	679/2(Part – 5)	**5.00.0**	**Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023**
	Total		**20.00.0Ha**	

Source: ToR Letter's of the respective project proponents

1.1 Purpose of the report

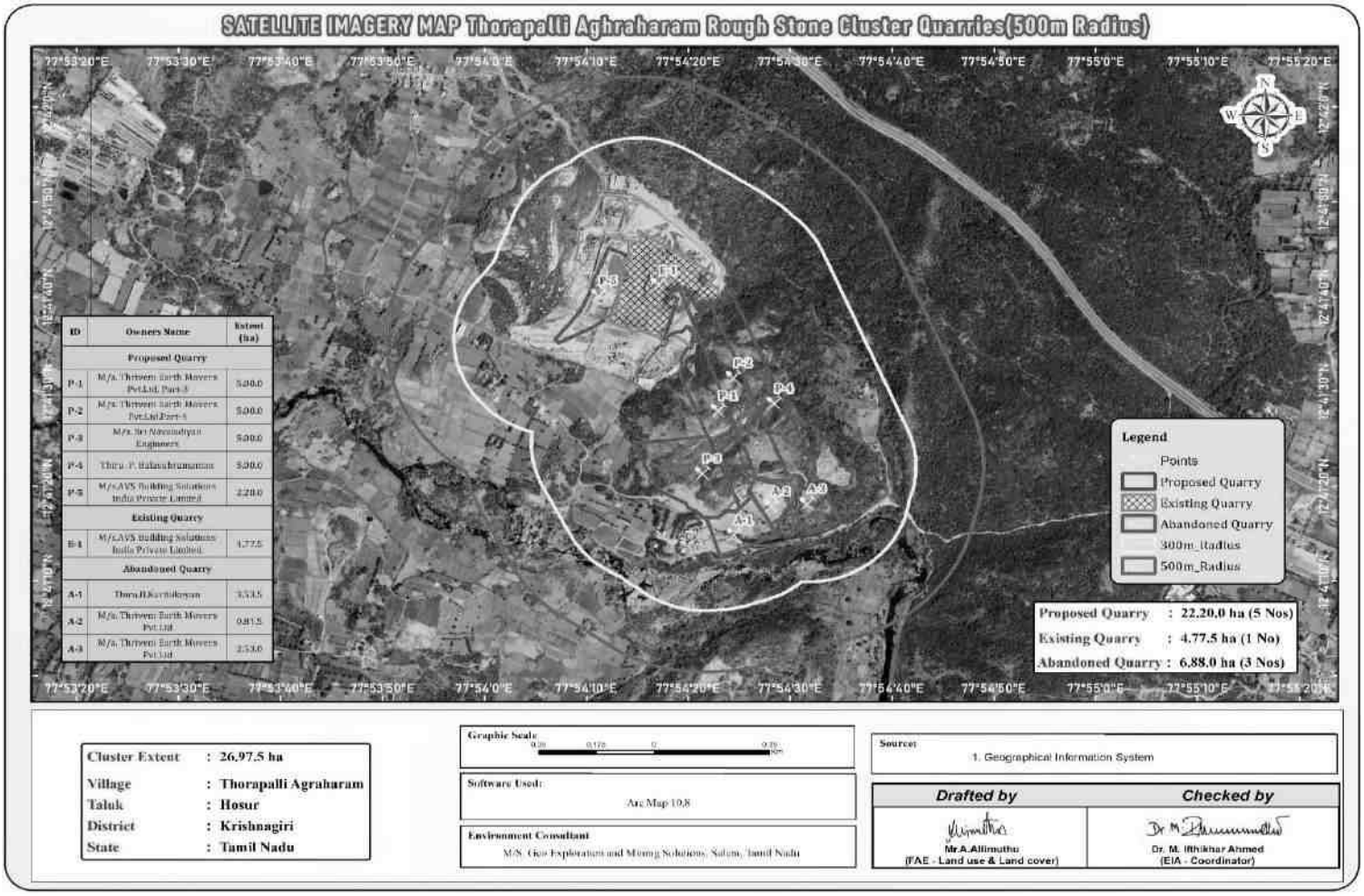
The Ministry of Environment and Forests, Govt. of India, through its EIA notification S.O. 1533(E) of 14th September 2006 and its subsequent amendments as per Gazette Notification S.O. 3977 (E) of 14thAugust 2018, Mining Projects are classified under two categories i.e. A (> 100 Ha) and B (≤ 100 Ha), 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 B1 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"

FIG.1.1 SATELLITE IMAGERY CLUSTER QUARRIES



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

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

1.2 Identification of Project and Project Proponent

1.2.1 Identification of Project

The project areas in the cluster are Patta Land., no forest land is involved

TABLE 1.2: PROPOSED PROJECTS IN THE CLUSTER

Description	P1	P2	P3	P4
Name of the Project	M/s. Thriveni Earth Movers Private Limited, Rough Stone quarry	M/s. Thriveni Earth Movers Private Limited, Rough Stone quarry	M/s. Sri Navaladiyan Engineers Rough Stone quarry	Thiru. P. Balasubramanian Rough Stone quarry
S.F. No.	679/2 (Part-3)	679/2 (Part-4)	679/2 (Part-2),	679/2 (Part-5)
Extent	**5.00.0 Ha**	**5.00.0 Ha**	**5.00.0**	**5.00.0**
Village Taluk and	Thorapalli Agraharam Village, Hosur Taluk			
District	Krishnagiri District			

Source: Approved Revised Mining Plan respective projects

1.2.2 Identification of Project Proponent

TABLE 1.3: DETAILS OF PROJECT PROPONENT

PROPOSAL – P1	
Name of the Company	M/s. Thriveni Earth Movers Private Limited, (SPR.Venkataachalam Authorized Signatory)
Address	Regd Office: 22/110, Greenways Road, Fairlands, Salem – 636 016
Mobile	9994443399
Status	Private Limited Company
PROPOSAL – P2	
Name of the Company	M/s. Thriveni Earth Movers Private Limited, (SPR.Venkataachalam Authorized Signatory)
Address	Regd Office: 22/110, Greenways Road, Fairlands, Salem – 636 016
Mobile	9994443399
Status	Private Limited Company
PROPOSAL – P3	
Name of the Company	M/s. Sri Navaladiyan Engineers (G. Sreenivasulu Authorized Signatory)
Address	22/110, Greenways Road, Fairlands, Salem – 636 016
Mobile	9597088699
Status	Partnership firm
PROPOSAL – P4	
Name of the Company	Thiru. P. Balasubramanian
Address	P. Balasubramanian, S/o. Palanivelu, Plot No. 65, D.No. 120/3, 1st Main Road, New Fairlands, Salem – 636016
Mobile	9597088699
Status	Individual

Source: Approved Revised Mining Plan respective projects

1.3 Brief description of the project

1.3.1 Nature and size of the Project

The quarrying operation is proposed to be carried out by Opencast Mechanized Mining method with 5.0m bench height and 5.0m bench width by deploying 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 1.4: SALIENT FEATURES OF THE PROPOSED PROJECTS IN CLUSTER

SALIENT FEATURES OF PROPOSAL "P1"		
Name of the Mine	M/s. Thriveni Earth Movers Private Limited, (SPR.Venkataachalam Authorized Signatory)	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2 (Part-3)	
Extent	**5.00.0 Ha**	
Depth of Mining	82m including 1m topsoil [58m AGL + 24m BGL]	
Geological Resources	Rough Stone quarry	Topsoil
	29,32,800m^3	49,916m^3
Mineable Reserves	Rough Stone quarry 14,46,978m^3	Topsoil 43,017 m^3
Proposed production for First Five years	Rough Stone quarry	Topsoil
	7,95,738 m^3	43,017m^3
	Rough Stone quarry	Topsoil
Proposed production for remaining three years ten months and twenty-two days	6,51,240 m^3	-
Peak Production for First Five years	1,68,288 m^3	22,500 m^3
Peak Production for remaining three years ten months and twenty two days	1,67,280 m^3	-
Revised Mining Plan Period	5 Years	
Lease Period	Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Ultimate Pit Dimension	(L)562m x (W) 86m (D) 82m (AGL 58m + BGL 24m)	
Toposheet No	57 -H/14	
Water table depth	60m-65m	
Water Requirements	2.0 KLD	
Latitude	12°41'17.65114"N to 12°41'41.13513"N	
Longitude	77°54'17.66222"E to 77°54'26.65791" E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 2.5 towards Southern side and altitude of the area varies between 830m to 772m above from MSL	
Machinery	Crawler mounted drill Machine	2 Nos
	Hand Jack hammer	2 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No
	Truck	4No
	Water Sprinkling Tanker	1Nos

Blasting	The blast design will be properly planned with ideal spacing and burden, ensuring appropriate stemming column with optimized explosive charge, so that ground vibratory effect, fly rocks etc., are properly regulated and controlled.
Manpower Deployment	36 Nos
Capital cost	Rs.3,48,60,000/-
Emp cost	Rs.6,84,000/-
Total Cost	Rs.3,55,44,000/-
CER Cost	Rs.5,00,000/-
Nearest Habitation	930m-NW
Nearest R.F	Sanamavu Ext II– 200 m– NE
Nearest Wildlife	Cauvery North Wildlife Sanctuary-16km-S Cauvery South Wildlife Sanctuary-40km-S

Source: Approved Revised Mining Plan of the respective proposals

SALIENT FEATURES OF PROPOSAL "P2"		
Name of the Mine	M/s. Thriveni Earth Movers Pnvate Limited (SPR.Venkataachalam Authorized Signatory)	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2 (Part-4)	
Extent	**5.00.0 Ha**	
Proposed Depth of Mining	80m including 1m topsoil – (48m AGL + 32m BGL)	
Geological Resources	Rough Stone quarry	Topsoil
	26,60,569 m^3	41,514 m^3
Mineable Reserves	Rough Stone quarry 23,86,840	Topsoil 39,175
Proposed production for First Five years	Rough Stone quarry	Topsoil
	13,42,330 m^3	39,175 m^3
Proposed production for remaining three years ten months and twenty-two days	10,44,510	-
Peak Production for First Five years	2,79,552	26,737
Peak Production for remaining three years ten months and twenty-two days	2,78,040	-
Revised Mining Plan Period	5 Years	
Lease Period	Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Ultimate Pit Dimension	(L)604m x (W) 87m (D) 80m (Agl 48m + Bgl 32m)	
Toposheet No	57 -H/14	
Water table depth	60m-85m	
Water Requirements	2.0 KLD	
Latitude	12°41'20.36281"N to 12°41'40.73244"N	
Longitude	77°54'19.18550"E to 77°54'29.97742"E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 2.5 towards Southern side and altitude of the area varies between 830m to 778m above from MSL	
Machinery	Crawler mounted drill machine	2 Nos
	Hand Jack hammer	2 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No
	Truck	4 Nos

	Water Sprinkling Tanker	1 Nos
Blasting	The blast design will be properly planned with ideal spacing and burden, ensuring appropriate stemming column with optimized explosive charge, so that ground vibratory effect, fly rocks etc., are properly regulated and controlled.	
Manpower Deployment	36 Nos	
A. Capital cost	3,45,00,000/-	
B. Emp Cost	6,84,000/-	
Total Cost	Rs. 3,51,84,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	940m-NW	
Nearest R.F	Sanamavu Ext II– 160m– NE	
Nearest Wildlife	Cauvery North Wildlife Sanctuary-16km-S Cauvery South Wildlife Sanctuary-40km-S	

SALIENT FEATURES OF PROPOSAL "P3"		
Name of the Mine	M/s. Sri Navaladiyan Engineers (G.Sreenivasulu Authorized Signatory)	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2 (Part-2)	
Extent	**5.00.0 Ha**	
Proposed Depth of Mining	73m including 1m topsoil [47m AGL + 26m BGL]	
Geological Resources	Rough Stone quarry	Topsoil
	18,02,418m³	49,848m³
Mineable Reserves	Rough Stone quarry	Topsoil
	10,16,034 m^3	43,575 m^3
Year wise development first five years production	Rough Stone quarry	Topsoil
	5,67,114m^3	43,575 m^3
Year wise development Next Four years production (Eight years Ten Months and Twenty-two days)	4,48,920 m^3	-
Peak Production first five years	1,21,104	31,675
Peak Production (Eight years Ten Months and Twenty-two days)	1,13,760	-
Revised Mining Plan Period /	5 Years	
Lease Period	Eight years ten months and twenty two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Ultimate Pit Dimension	(L)249m x (W) 175m (D)73m (Agl 47m + Bgl 26m)	
Toposheet No	57 -H/14	
Water table depth	60m-85m	
Water Requirements	2.0 KLD	
Latitude	12°41'16.56967"N to 12°41'25.20675"N	
Longitude	77°54'14.53917"E to 77°54'25.05381"E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 3.6 towards Southern side and altitude of the area varies between 822m to 774m above from MSL	
Machinery	Crawler mounted drill machine	1Nos
	Hand Jack hammer	2Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No

	Truck	4 No
	Water Sprinkling Tanker	1 Nos
Blasting	85mm diameter Slurry explosives are proposed to be used for shattering and heaving effect for removal and winning of Rough stone.	
Manpower Deployment	33Nos	
A.Capital Cost	Rs.3,24,70,000/-	
B.EMP cost	Rs.6,84,000/-	
Total Cost	Rs.3,31,54,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	1.2km-NW	
Nearest R.F	Sanamavu Ext II– 490m– NE	
Nearest Wildlife	Cauvery North Wildlife Sanctuary-15km-S Cauvery South Wildlife Sanctuary-39km-S	

Source: Approved Revised Mining Plan

SALIENT FEATURES OF PROPOSAL "P4"		
Name of the Mine	Thiru. P. Balasubramanian **(Power of Attorney Thiru. SPR Venkataachalam)**	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2(Part-5)	
Extent	**5.00.0 Ha**	
Proposed Depth of Mining	64m including 1m topsoil – (46m AGL + 18m BGL)	
Geological Resources	Rough Stone quarry	Topsoil
	29,11,783m³	47,466m³
Mineable Reserves	Rough Stone quarry	Topsoil
	13,02,980m³	39,183m³
Year wise development first five years production	Rough Stone quarry	Topsoil
	7,46,132 m^3	39,183 m^3
Year wise development Next Four years production	5,56,848m^3	-
Peak Production first five years	1,56,972	19,934
Peak Production (Eight years Ten Months and Twenty-three days)	1,55,562	-
Revised Mining Plan Period	5 Years	
Lease Period	Eight years ten months and twenty-three days (Total lease period 10 Years but, 1 year 1 month and 7 days already completed)	
Ultimate Pit Dimension	(L)633m x (W) 73m (D) 64m (AGL 46m + BGL 18m)	
Toposheet No	57 -H/14	
Water table depth	60m-85m	
Water Requirements	2.0 KLD	
Latitude	12°41'19.57130"N to 12°41'40.73408"N	
Longitude	77°54'22.23061"E to 77°54'32.42688" E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 3.6 towards Southern side and altitude of the area varies between 832m to 784m above from MSL	
Machinery	Crawler mounted drill machine	2Nos
	Hand Jack hammer	2Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No

	Truck	4 No
	Water Sprinkling Tanker	1 Nos
Blasting	85mm diameter Slurry explosives are proposed to be used for shattering and heaving effect for removal and winning of Rough stone.	
Manpower Deployment	36Nos	
A.Capital Cost	Rs.3,48,60,000	
B.EMP cost	Rs.6,84,000/-	
Total Cost	Rs.3,55,44,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	1.2km-NW	
Nearest R.F	Sanamavu Ext II– 490m– NE	
Nearest Wildlife	Cauvery North Wildlife Sanctuary-15km-S Cauvery South Wildlife Sanctuary-39km-S	

Source: Approved Revised Mining Plan

1.3.2 Location of the project-P1

- The Altitude of the area is 830m (max) Mean Sea level
- The area is mentioned in GSI Topo sheet No. **57 H/14**
- The Latitude between of **12°41'17.65114" N to 12°41'41.13513" N**
- The Longitude between of **77°54'17.66222''E to 77°54'26.65791" E on** WGS 1984 datum

1.3.3 Location of the project-P2

- The Altitude of the area is 830m (max) above Mean Sea level
- The area is mentioned in GSI Topo sheet No. **57 H/14**
- The Latitude between of **12°41'20.36281" N to 12°41'40.73244" N**
- The Longitude between of **77°54'19.18550''E to 77°54'29.97742" E** on WGS 1984 datum

1.3.4 Location of the project-P3

- The Altitude of the area is 822m (max) above Mean Sea level
- The area is mentioned in GSI Topo sheet No. **57 H/14**
- The Latitude between of **12°41'16.56967" N to 12°41'25.20675" N** The Longitude between of **77°54'14.53917''E to 77°54'25.05381" E** on WGS 1984 datum

1.3.5 Location of the project-P4

- The Altitude of the area is 832m (max) above Mean Sea level
- The area is mentioned in GSI Topo sheet No. **57 H/14**
- The Latitude between of **12°41'19.57130"N to 12°41'40.73408"N** The Longitude between of **77°54'22.23061''E to 77°54'32.42688" E** on WGS 1984 datum

FIG1.2 KEY MAP SHOWING THE LOCATION OF THE PROJECT SITE

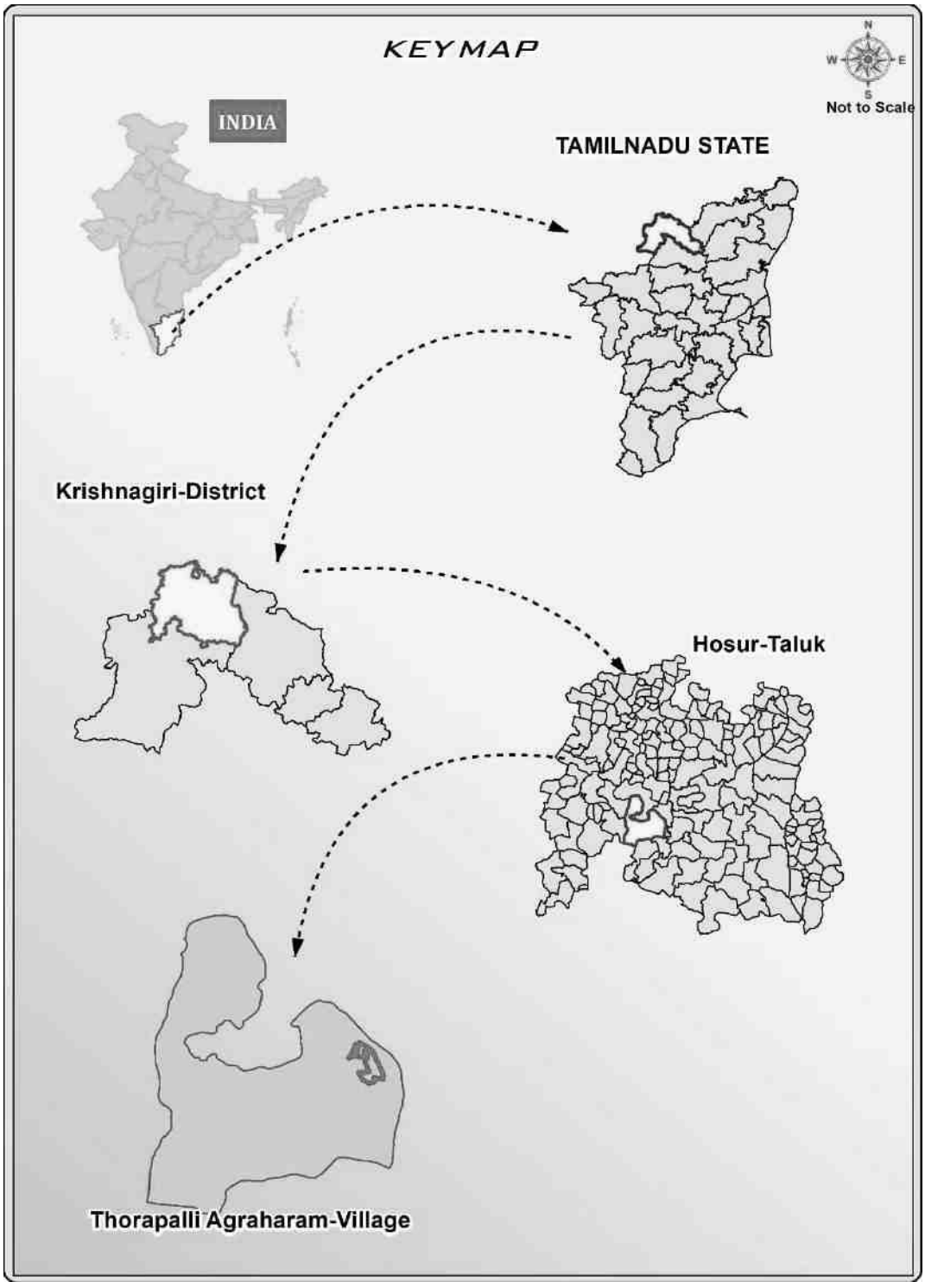


FIGURE 1.3: TOPOSHEET SHOWING LOCATION OF THE PROJECT SITE AROUND 10 KM RADIUS

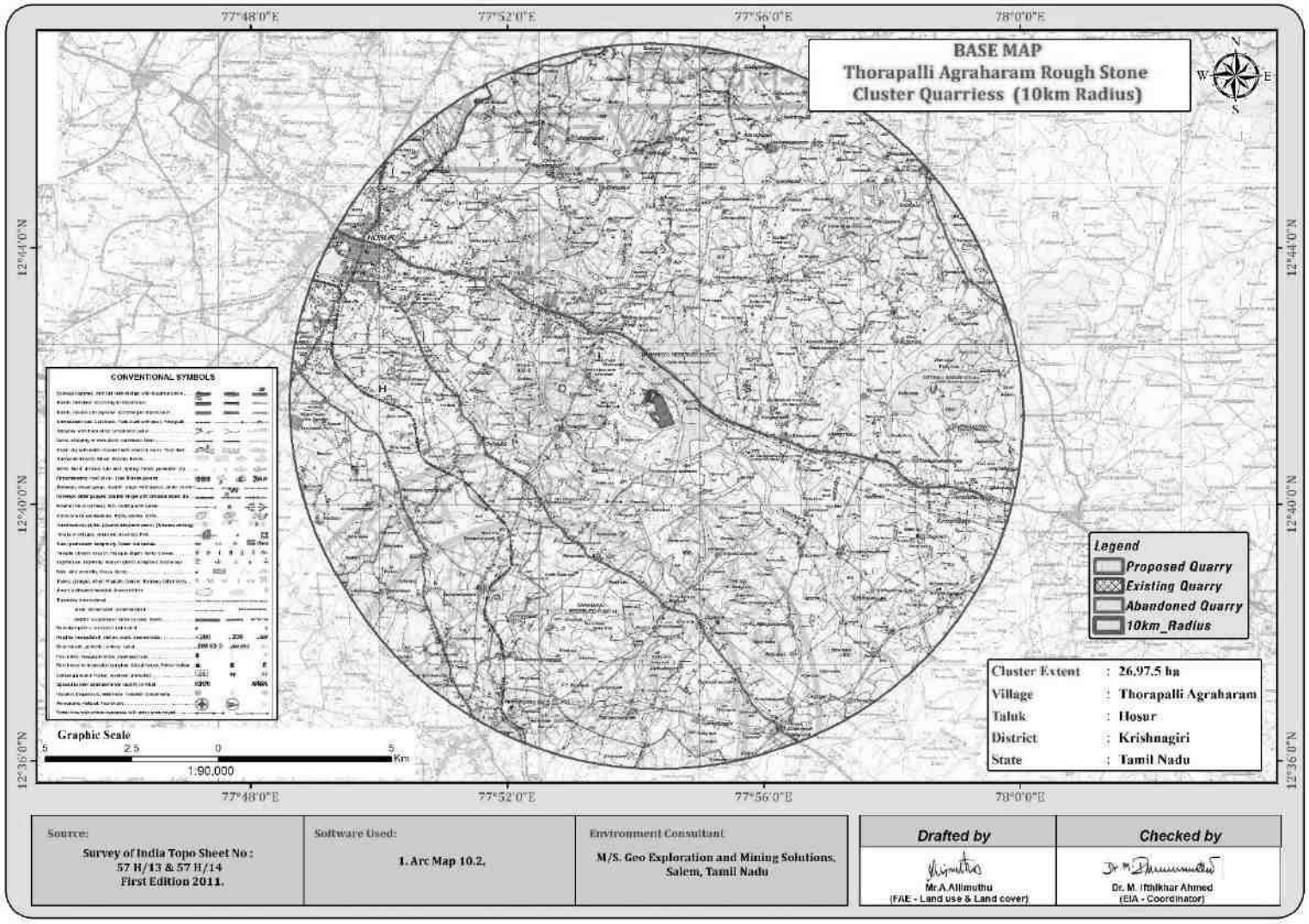
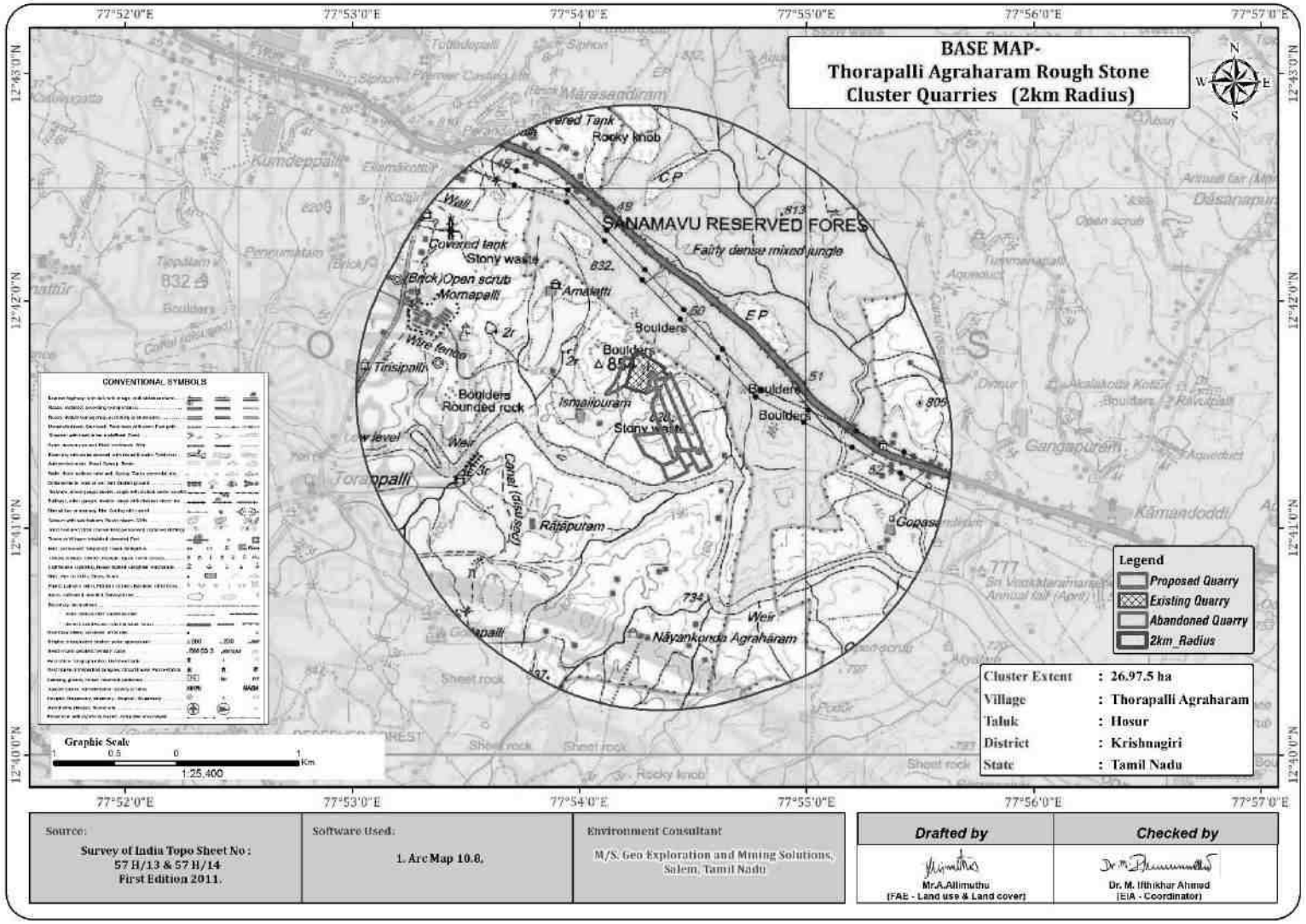


FIGURE 1.4: TOPOSHEET SHOWING LOCATION OF THE PROJECT SITE AROUND 2 KM RADIUS



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 –

Project – P1 –

- Collector Proceeding order to restore the lease period for the non operative period of 8 years 10 months and 22 Days vide letter no Roc. No. 403/2009/Mines -2 Dated 25.01.2018
- Mining plan approved by the Deputy Director, Department of Geology and Mining vide Rc. No 403/2009/Mines Dated 06.04.2018
- Mining plan Revalidate approved by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 404/2009/Mines-1 Dated 02.05.2023.
- As per G.O. (D) No. 143 Ind (MMC1) Department Dated 28.07.2017 lease period lease period for ten years from (29.05.2008 to 28.05.2018)
- Based on the 500m Radius Cluster Letter obtained from the Deputy Director, Department of Geology and Mining, Krishnagiri vide Letter No 403/2009/Mines-2 Dated 29.05.2023 the proposal falls under Cluster Category "B1"
- Proponent applied for ToR for Environmental Clearance vides online Proposal No. **SIA/TN/MIN/435561/2023, dated 04/07/2023.**

Project – P2

- Collector Proceeding order to restore the lease period for the non operative period of 8 years 10 months and 22 Days vide letter no Roc. No. 403/2009/Mines -2 Dated 25.01.2018
- Mining plan approved by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 403/2009/Mines-1 Dated 06.04.2018
- Mining plan Revalidate approved by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 403/2009/Mines-1 Dated 02.05.2023.
- Revised Mining plan approved Plan by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 403/2009/Mines-2 Dated 24.05.2024.
- As per G.O. (D) No.233 Ind (MMC-1) Department Dated 28.12.2017 lease period for ten years from (29.05.2008 to 28.05.2018)

- Based on the 500m Radius Cluster Letter obtained from the Deputy Director, Department of Geology and Mining, Krishnagiri vide Letter No 403/2009/Mines-2 Dated 29.05.2023 the proposal falls under Cluster Category "B1"
- Proponent applied for ToR for Environmental Clearance vides online Proposal No. **SIA/TN/MIN/435645/2023, Dated:05.07.2023.**

Project – P3

- Collector Proceeding order to restore the lease period for the non operative period of Eight years Ten Months and Twenty-two days vide letter no Roc. No. 405/2009/Mines -2 Dated 25.01.2018
- Mining plan approved by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 405/2009/Mines-1 Dated 06.04.2018
- Revised Mining plan approved by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 405/2009/Mines-2 Dated 24.05.2024
- As per G.O. (D) No.232 Ind (MMC-1) Department Dated 28.12.2017 lease period for ten years from (29.05.2008 to 28.05.2018)
- Based on the 500m Radius Cluster Letter obtained from the Deputy Director, Department of Geology and Mining, Krishnagiri vide Letter No 405/2009/Mines-1 Dated 29.05.2023 the proposal falls under Cluster Category "B1"
- Proponent applied for ToR for Environmental Clearance vides online Proposal No. **SIA/TN/MIN/435824/2023, Dated:06.07.2023.**

Project – P4

- Collector Proceeding order to restore the lease period for the non operative period of 8 years 10 months and 22 Days vide letter no Roc. No. 407/2009/Mines -2 Dated 25.01.2018
- Mining plan approved by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 407/2009/Mines-1 Dated 06.04.2018
- Revised Mining plan approved by the Deputy Director, Department of Geology and Mining, Krishnagiri vide Roc. No 407/2009/Mines-2 Dated 24.05.2024
- As per G.O. (D) No.234 Ind (MMC-1) Department Dated 28.12.2017 lease period for ten years from (30.05.2008 to 29.05.2018)
- Based on the 500m Radius Cluster Letter obtained from the Deputy Director, Department of Geology and Mining, Krishnagiri vide Letter No 407/2009/Mines-2 Dated 29.05.2023 the proposal falls under Cluster Category "B1"
- Proponent applied for ToR for Environmental Clearance vides online Proposal No. **SIA/TN/MIN/435486/2023, Dated:03.07.2023**

SCOPING

Project – P1

- The proposal was placed in 407th SEAC meeting held on 07.09.2023 the committee recommended for issue of ToR.

- The proposal was considered in 658th SEIAA meeting held on 26.09.2023-27-09-2023 and issued ToR vide **Lr No. SEIAA-TN/F.No.10193/SEAC/ToR- 1550/2023 Dated:27.09.2023.**

Project – P2

- The proposal was placed in 395th SEAC meeting held on 27.07.2023 Proponent reply that 28.08.2023 and 407th SEAC meeting held on 07.09.2023 the committee recommended for issue of ToR.
- The proposal was considered in 658th and SEIAA meeting held on 26.09.2023-27.09.2023 and issued ToR vide **Lr No. SEIAA-TN/F.No.10188/SEAC/1(a)ToR-1574/2023 Dated: 27.09.2023.**

Project – P3

- The proposal was placed in 395th SEAC meeting held on 27.07.2023 replied by the project proponent 407th SEAC meeting held on 07.09.2023 the committee recommended for issue of ToR.
- The proposal was considered in 658th SEIAA meeting held on 26.09.2023-27.09.2023 issued **ToR Lr.No. SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023**

Project – P4

- The proposal was placed in 407th SEAC meeting held on 07.09.2023 the committee recommended for issue of ToR.
- The proposal was considered in 658th SEIAA meeting held on 26.09.2023-27.09.2023 issued **ToR Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023**

Public Consultation

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

Appraisal

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

- Guidance Manual of Environmental Impact Assessment for Mining of Minerals, Ministry of Environment and Forests, 2010
- EIA Notification, 14th September, 2006
- ToR vide **Lr No.SEIAA-TN/F.No.10193/SEAC/ToR-1550/2023 Dated:27.09.2023**- P1
- ToR vide **Lr No. SEIAA-TN/F.No.10188/SEAC/1(a)ToR-1574/2023 Dated: 27.09.2023**- P2
- ToR vide **Lr No.SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023**- P3
- ToR vide **Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023**- P4

Approved Mining of P1 to P4 the Rough Stone quarry projects

1.5 Post Environment Clearance Monitoring

The Project Proponents in the Cluster 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. 1.5.

TABLE 1.5 – 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

12	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 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 Post monsoon season **(Oct2023 – Dec2023)** for various environmental components so as to assess the anticipated impacts of the cluster quarry projects on the environment and suggest suitable mitigation measures for likely adverse impacts due to the proposed project.

TABLE 1.6 – 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 7locations
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, Krishnagiri
3	Water quality	Physical, Chemical and Bacteriological parameters	Grab samples were collected at 4 ground water and 2 surface water locations once during study period.
4	Ecology	Existing terrestrial and aquatic flora and fauna within 10 km radius circle.	Limited primary survey and secondary data was collected from the Forest department.
5	Noise levels	Noise levels in dB(A)	At 7 locations data monitored once for 24 hours during EIA study.
6	Soil Characteristics	Physical and Chemical Parameters	Once at 6 locations during study period
7	Land use	Existing land use for different categories	Based on Survey of India topographical sheet and satellite imagery and primary survey.
8	Socio-Economic Aspects	Socio-economic and demographic characteristics, worker characteristics	Based on primary survey and secondary sources data like census of India 2011.
9	Hydrology	Drainage pattern of the area, nature of streams, aquifer characteristics, recharge and discharge areas	Based on data collected from secondary sources as well as hydro-geology study report prepared.
10	Risk assessment and Disaster Management Plan	Identify areas where disaster can occur by fires and explosions and release of toxic substances	Based on the findings of Risk 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 quarry has been approved under Rule 41 & 42 as amended of Tamil Nadu Minor Mineral Concession Rules, 1959
  - ToR vide **Lr No. SEIAA-TN/F.No.10193/SEAC/ToR-1550/2023 Dated:27.09.2023**- P1
  - ToR vide **Lr No. SEIAA-TN/F.No.10188/SEAC/1(a)ToR-1574/2023 Dated: 27.09.2023**- P2
  - ToR vide **Lr No. SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023**- P3
  - ToR vide **Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023**- P4

  Revised Approved Mining Plan of P1 to P4 the Rough Stone quarry projects.

CHAPTER – 2: PROJECT DESCRIPTION

2.0 General

The Proposed Rough Stone Quarries requires Environmental Clearance. There are four proposed quarries forming a cluster; calculated as per MoEF & CC Notification S.O. 2269(E) Dated 1st July 2016 and the total extent of cluster is 26.97.5ha.

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 proposed projects are site specific and there is no additional area required for this project. There is no effluent generation/discharge from the proposed quarries.

Method is mining is common for all the proposed quarries in the cluster. Rough Stone quarries are 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 quarry from pithead to the needy crushers and rock breakers to avoid secondary blasting.

2.2 Location of the Project

- The Cluster quarries are located in Thorapalli Agraharam village, Hosur taluk, Krishnagiri District, Tamil Nadu State.
- The project falls in Toposheet No: 57 H/14. The cluster areas fall in the Latitude between 12°41'17.17"N to 12°41'40.15"N and Longitude between 77°54'15.21"E to 77°54'33.08"E
- The projects under the cluster are classified as Poramboke land (Non-Forest Land) & does not fall within 10km radius of any Eco – sensitive zone, Wild life Sanctuary, National Park, Tiger Reserve, Elephant Corridor and Biosphere Reserves.

TABLE 2.1: SITE CONNECTIVITY TO THE CLUSTER QUARRIES

Nearest Roadway	NH44- Salem – Krishhnagiri-Bangaluru – 700m-NE SH844-Krishnagiri – Rayakottai Road –4.0km-SW
Nearest Village	Islampuram- 1km-NW
Nearest Town	Hosur– 9.5km –NW
Nearest Railway	Kelamangalam Railwaystation – 9.0km-SW
Nearest Airport	Bangalore HAL Airport – 38km - NW

Source: Google image, Survey of India Toposheet

The cluster quarries coners coordinates are given below.

TABLE 2.2 – BOUNDARY CO-ORDINATES OF PROPOSED PROJECTS

BOUNDARY CO-ORDINATES OF PROJECT – P1		
Corner Nos.	**Latitude**	**Longitude**
1	12° 41' 17.65114"N	77° 54' 25.05381"E
2	12° 41' 31.66973"N	77° 54' 19.13637"E
3	12° 41' 32.05555"N	77° 54' 19.34686"E
4	12° 41' 33.17898"N	77° 54' 19.30097"E
5	12° 41' 34.23732"N	77° 54' 19.79027"E

6	12° 41' 34.50412"N	77° 54' 20.36079"E
7	12° 41' 36.09660"N	77° 54' 20.42474"E
8	12° 41' 36.72936"N	77° 54' 19.85113"E
9	12° 41' 36.13168"N	77° 54' 19.43220"E
10	12° 41' 36.05118"N	77° 54' 18.68740"E
11	12° 41' 35.33474"N	77° 54' 17.66222"E
12	12° 41' 39.58195"N	77° 54' 18.93887"E
13	12° 41' 40.04919"N	77° 54' 18.21877"E
14	12° 41' 41.13513"N	77° 54' 18.95993"E
15	12° 41' 20.81312"N	77° 54' 26.65791"E
16	12° 41' 21.21735"N	77° 54' 25.57478"E
17	12° 41' 20.39644"N	77° 54' 25.42555"E
18	12° 41' 20.25108"N	77° 54' 26.23840"E
19	12° 41' 19.25881"N	77° 54' 25.86694"E
20	12° 41' 18.92380"N	77° 54' 26.31918"E
BOUNDARY CO-ORDINATES OF PROJECT – P2		
Corner Nos.	**Latitude**	**Longitude**
1	12° 41' 20.79587"	77° 54' 26.65791"E
2	12° 41' 40.52244"	77° 54' 19.18550"E
3	12° 41' 40.73244"	77° 54' 19.72928"E
4	12° 41' 38.99619"	77° 54' 20.6435"E
5	12° 41' 39.24270"	77° 54' 21.6488"E
6	12° 41' 38.99700"	77° 54' 22.23061"E
7	12° 41' 20.57739"	77° 54' 29.97742"E
8	12° 41' 20.36281"	77° 54' 28.08020"E
9	12° 41' 20.45430"	77° 54' 27.57311"E
BOUNDARY CO-ORDINATES OF PROJECT – P3		
Corner Nos.	**Latitude**	**Longitude**
1	12° 41' 19.37465"N	77° 54' 17.16738"E
2	12° 41' 24.32963"N	77° 54' 14.53917"E
3	12° 41' 25.20675"N	77° 54' 21.90116"E
4	12° 41' 17.73804"N	77° 54' 25.05381"E
5	12° 41' 17.27428"N	77° 54' 24.66363"E
6	12° 41' 17.40632"N	77° 54' 23.90205"E
7	12° 41' 16.70642"N	77° 54' 22.95516"E
8	12° 41' 16.65232"N	77° 54' 21.71732"E
9	12° 41' 16.56967"N	77° 54' 21.53644"E
10	12° 41' 17.28397"N	77° 54' 20.77412"E
11	12° 41' 17.61173"N	77° 54' 20.01305"E
12	12° 41' 18.15420"N	77° 54' 19.77843"E
13	12° 41' 18.45338"N	77° 54' 18.99789"E
BOUNDARY CO-ORDINATES OF PROJECT – P4		
Corner Nos.	**Latitude**	**Longitude**
1	12° 41' 20.54084"N	77° 54' 29.97742"E
2	12° 41' 38.96044"N	77° 54' 22.23061"E
3	12° 41' 39.52238"N	77° 54' 23.16792"E
4	12° 41' 40.73408"N	77° 54' 24.02856"E
5	12° 41' 21.98478"N	77° 54' 32.42688 E
6	12° 41' 20.62606"N	77° 54' 31.92092"E
7	12° 41' 19.57130"N	77° 54' 31.80250'E
8	12° 41' 19.79791"N	77° 54' 31.08620'E
9	12° 41' 20.35982"N	77° 54' 31.02583"E
10	12° 41' 21.09505"N	77° 54' 30.53371"E

Source: Revised of Mine Lease Plan Plate of the respective proposals

FIGURE 2.1: TOPOGRAPHICAL VIEW OF THE PROJECT SITE-P1

FIGURE 2.2: TOPOGRAPHICAL VIEW OF THE PROJECT SITE-P2

FIGURE 2.3: TOPOGRAPHICAL VIEW OF THE PROJECT SITE-P3

FIGURE 2.4: TOPOGRAPHICAL VIEW OF THE PROJECT SITE-P4

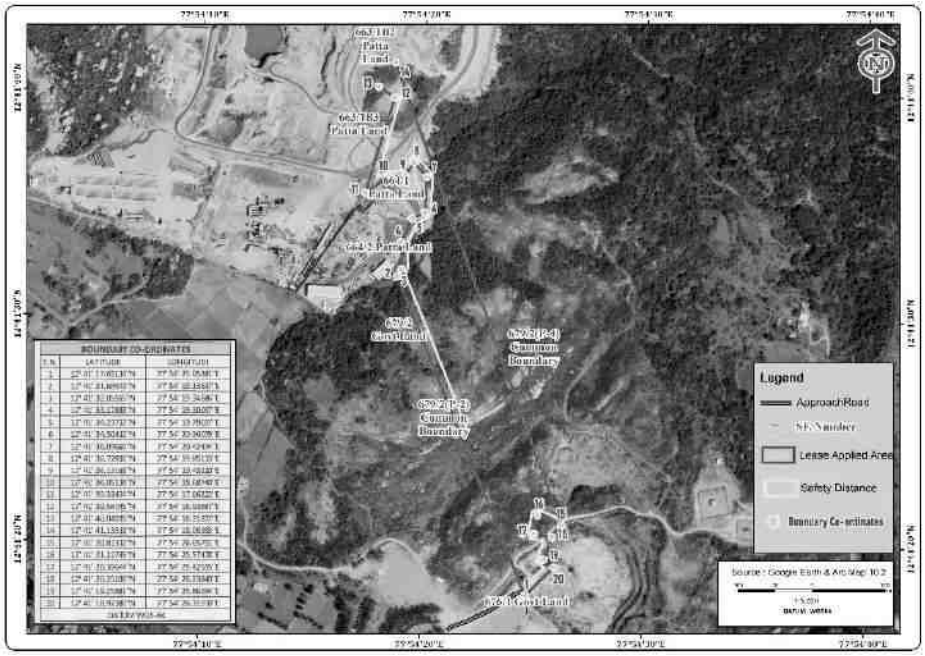
FIGURE 2.5: FENCING PHOTOGRAPHS OF THE PROJECT SITE-P1

FIGURE 2.6: FENCING PHOTOGRAPHS OF THE PROJECT SITE-P2

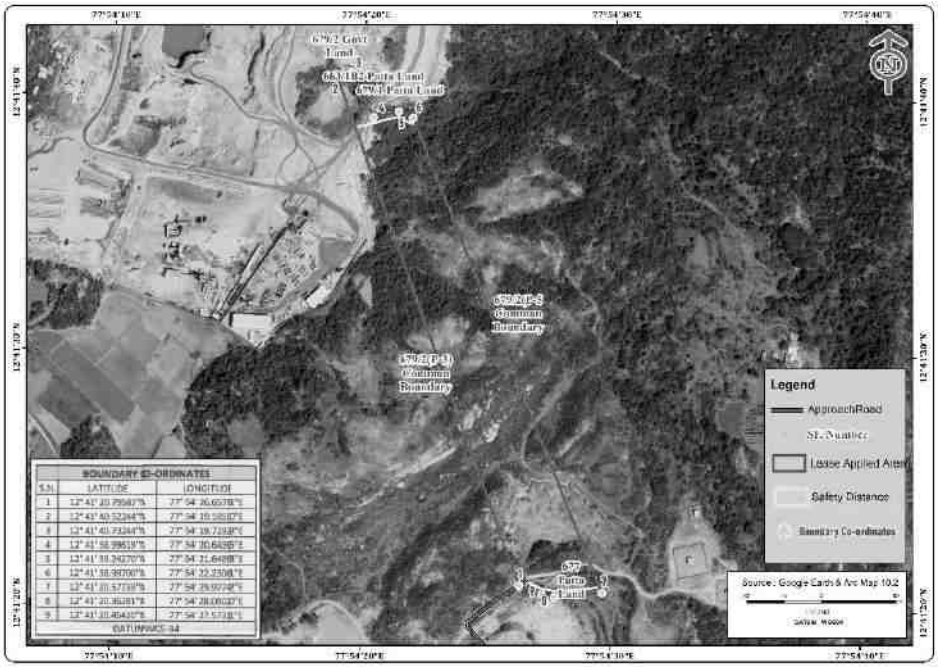
FIGURE 2.7: FENCING PHOTOGRAPHS OF THE PROJECT SITE-P3

FIGURE 2.8: FENCING PHOTOGRAPHS OF THE PROJECT SITE-P4

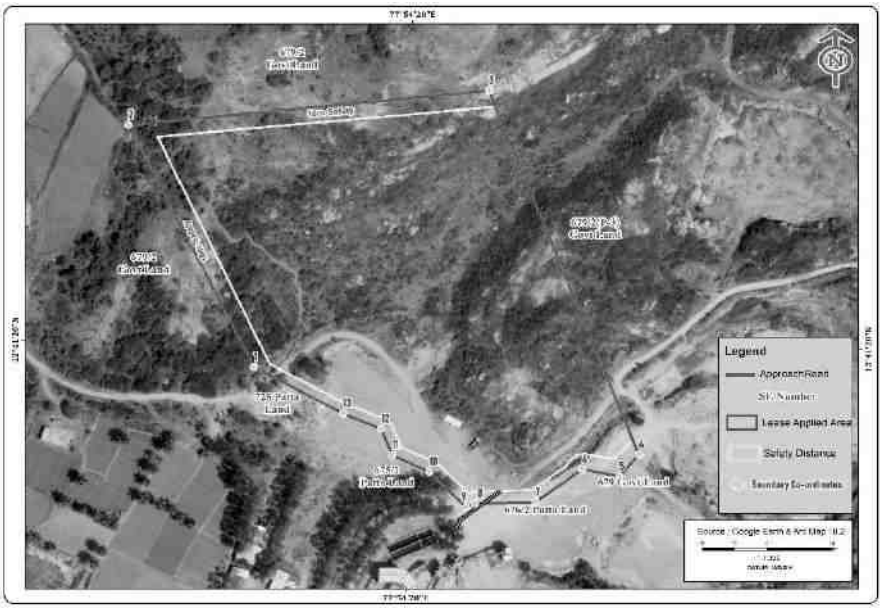
FIGURE 2.9: SHOWING GOOGLE IMAGE ROUGH STONE QUARRY PROJECT AREAS -P1 to P4



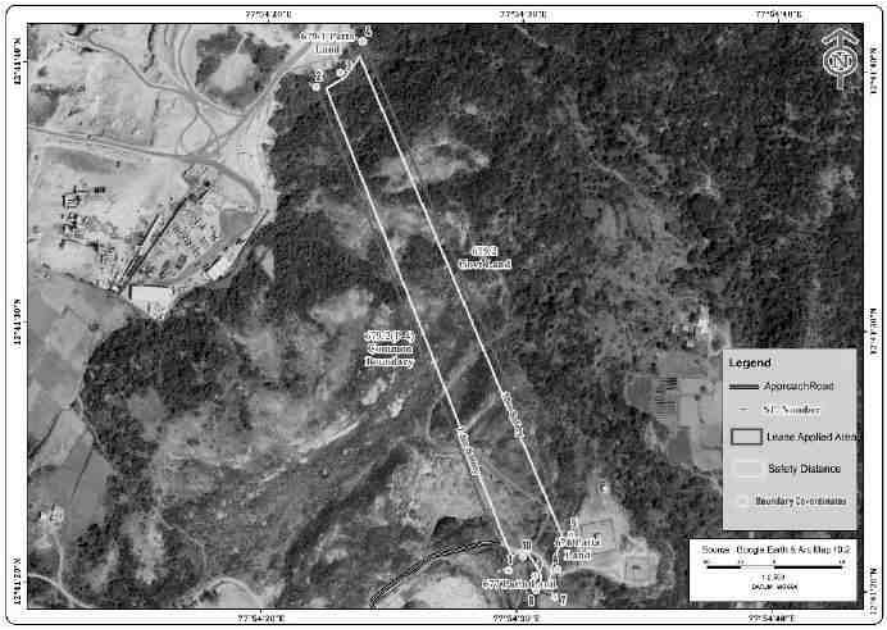
SATELLITE IMAGERY OF P1



SATELLITE IMAGERY OF P2



SATELLITE IMAGERY OF P3



SATELLITE IMAGERY OF P4

FIGURE 2.10: QUARRY LEASE PLAN-P1

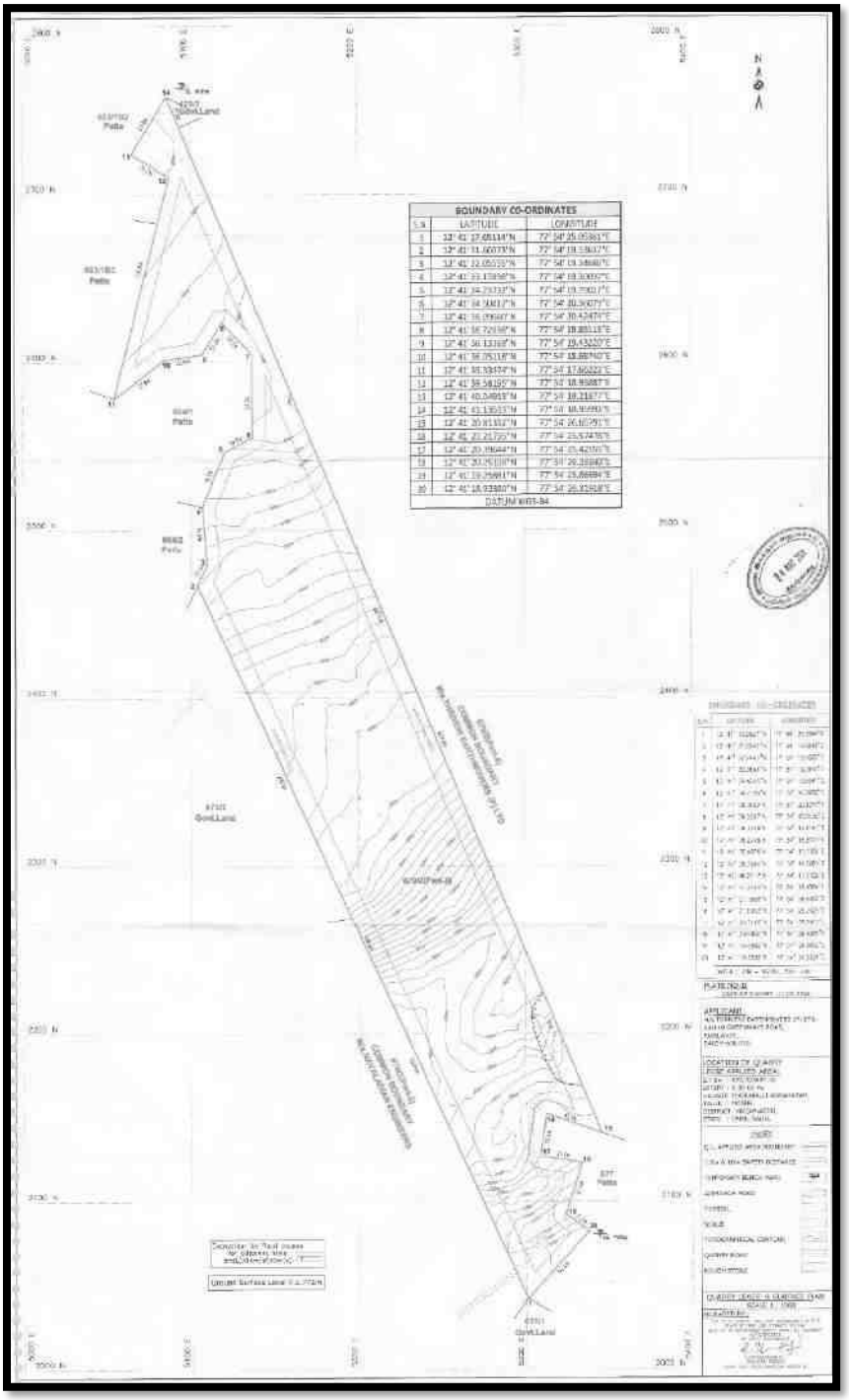


FIGURE 2.11: QUARRY LEASE PLAN-P2

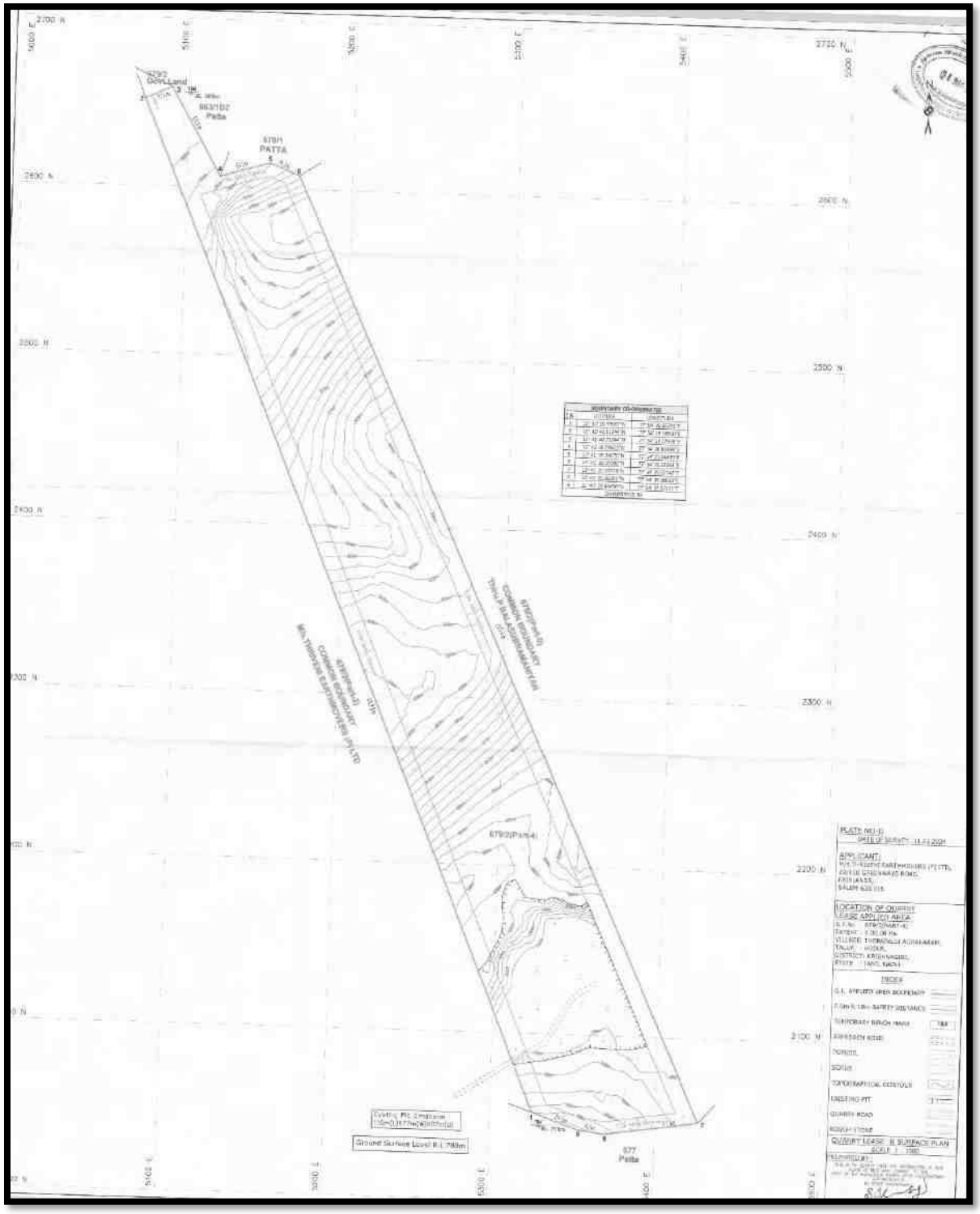


FIGURE 2.12: QUARRY LEASE & SURFACE PLAN -P3

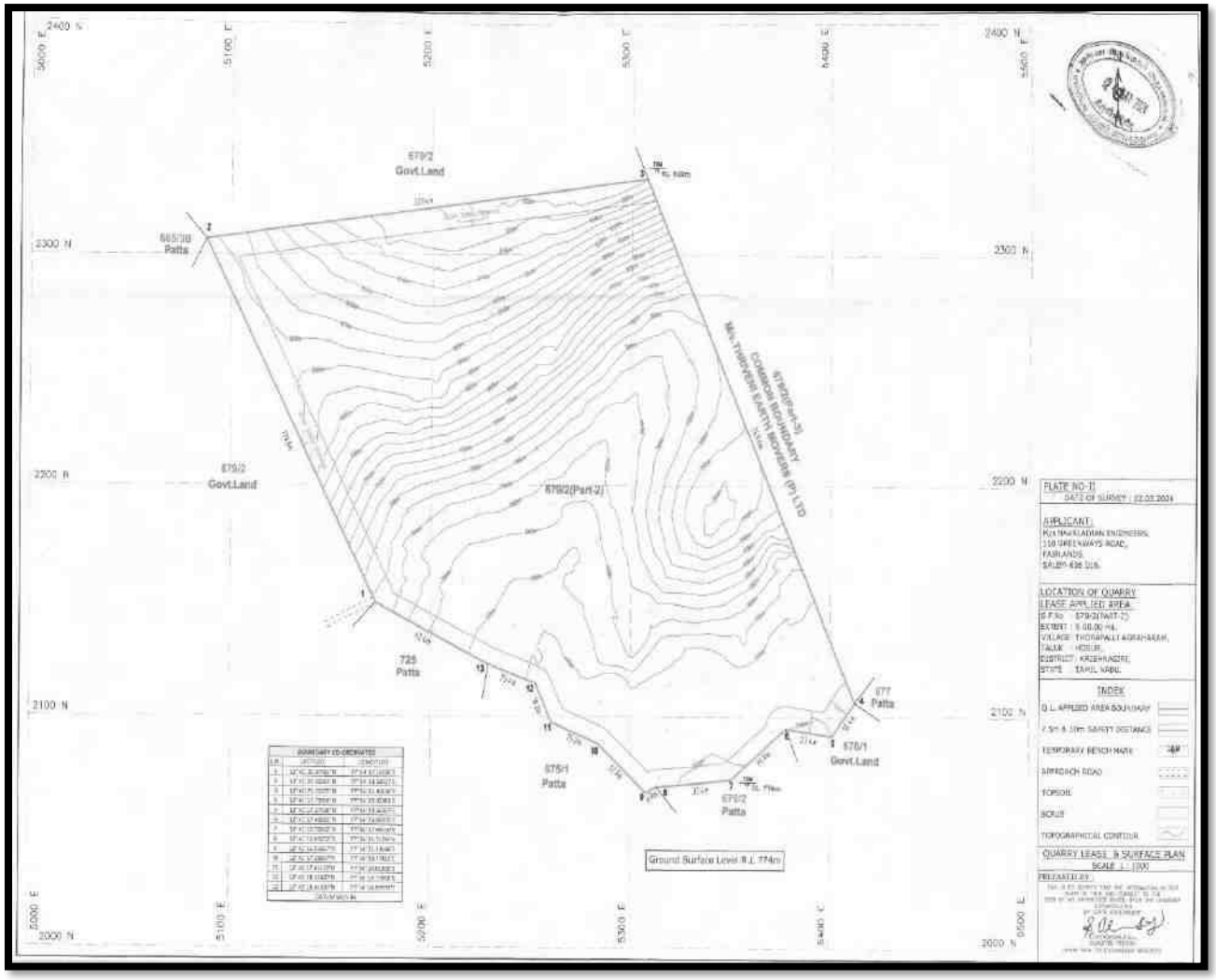


FIGURE 2.13: QUARRY LEASE & SURFACE PLAN -P4

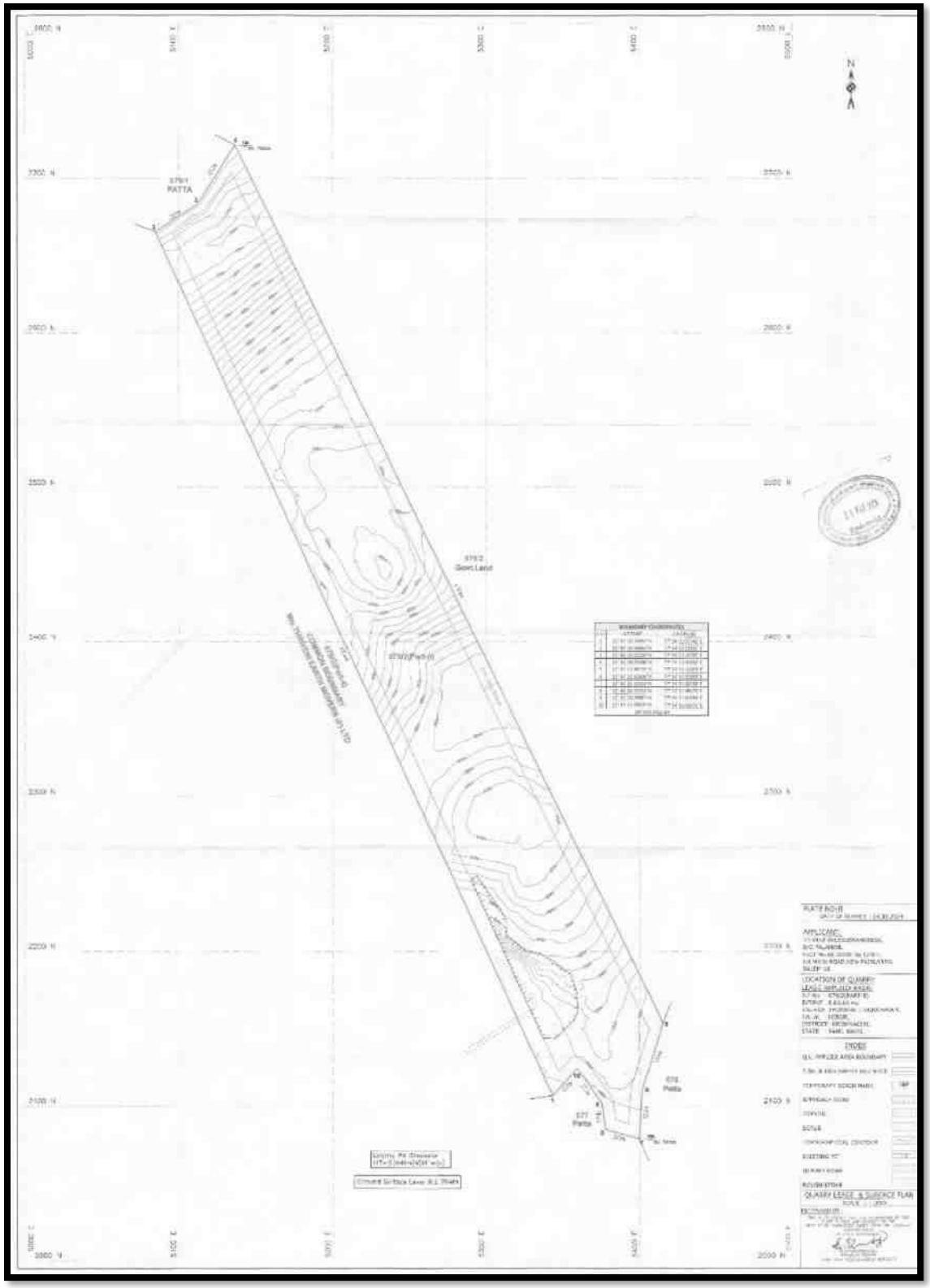


FIGURE 2.14: VILLAGE MAP SUPERIMPOSED ON GOOGLE EARTH IMAGE

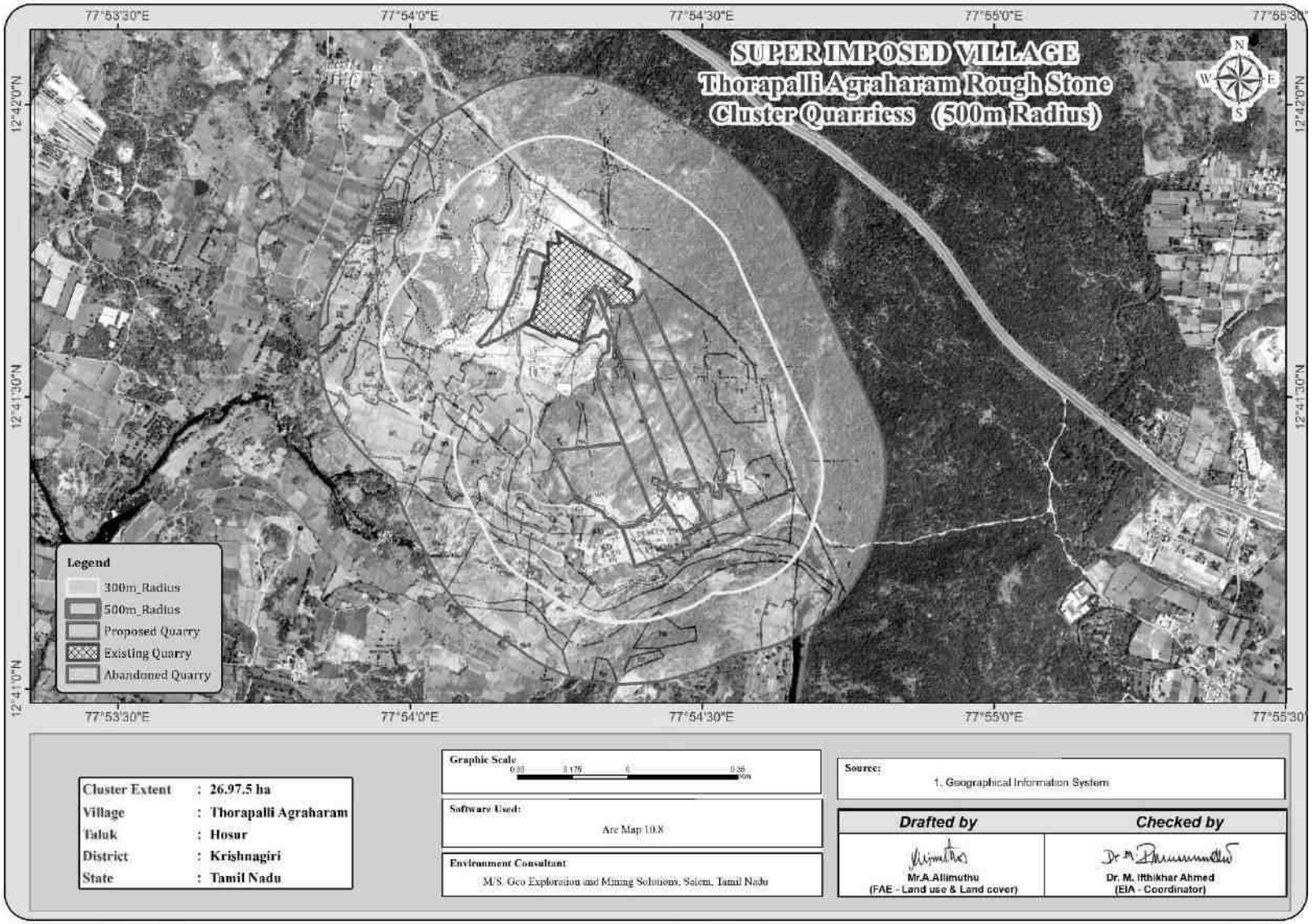


FIGURE 2.15: DIGITIZED MAP OF THE STUDY AREA (10 KM RADIUS FROM PROJECT SITE)

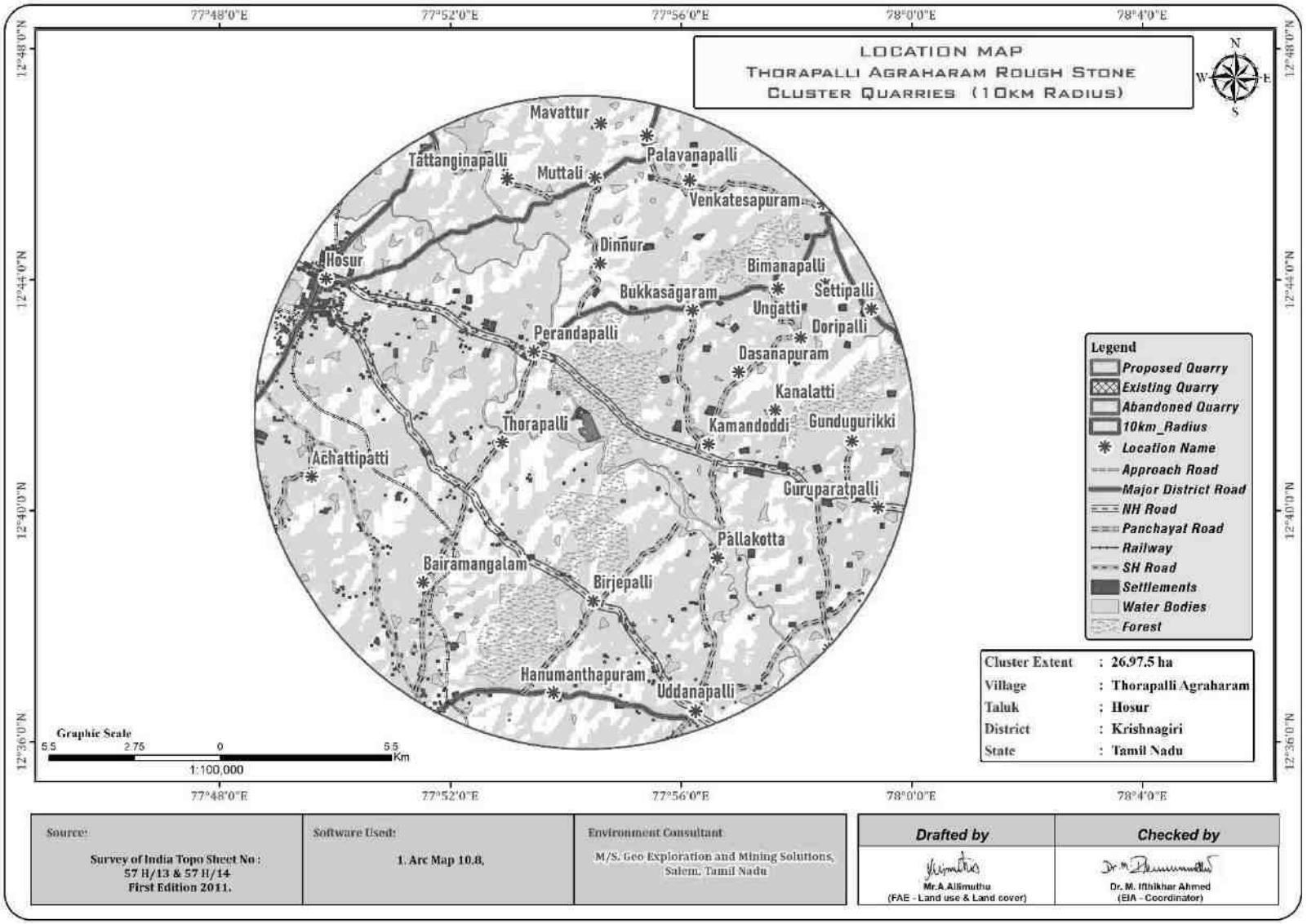


FIGURE 2.16: DIGITIZED MAP OF THE STUDY AREA (5 KM RADIUS FROM PROJECT SITE)

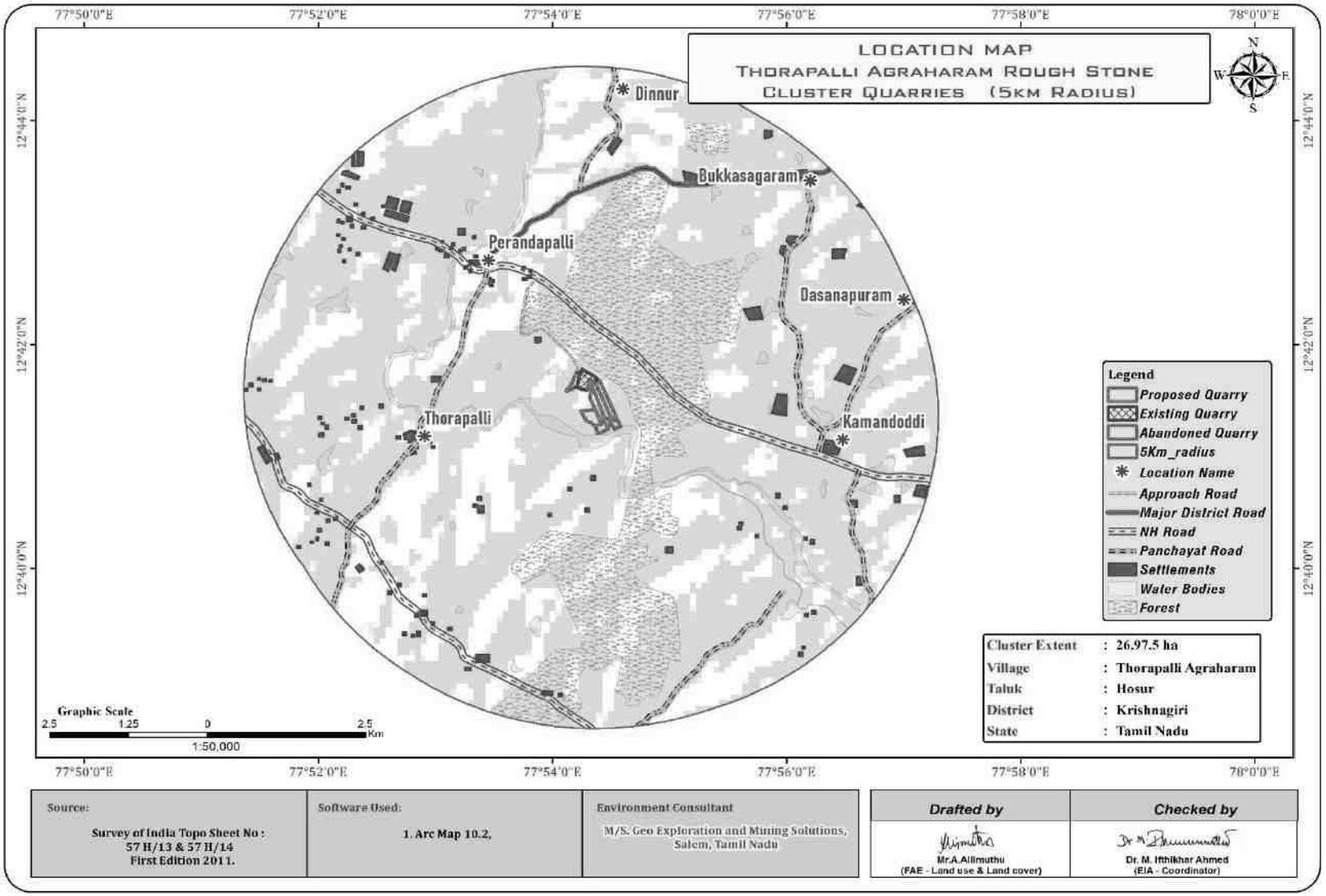
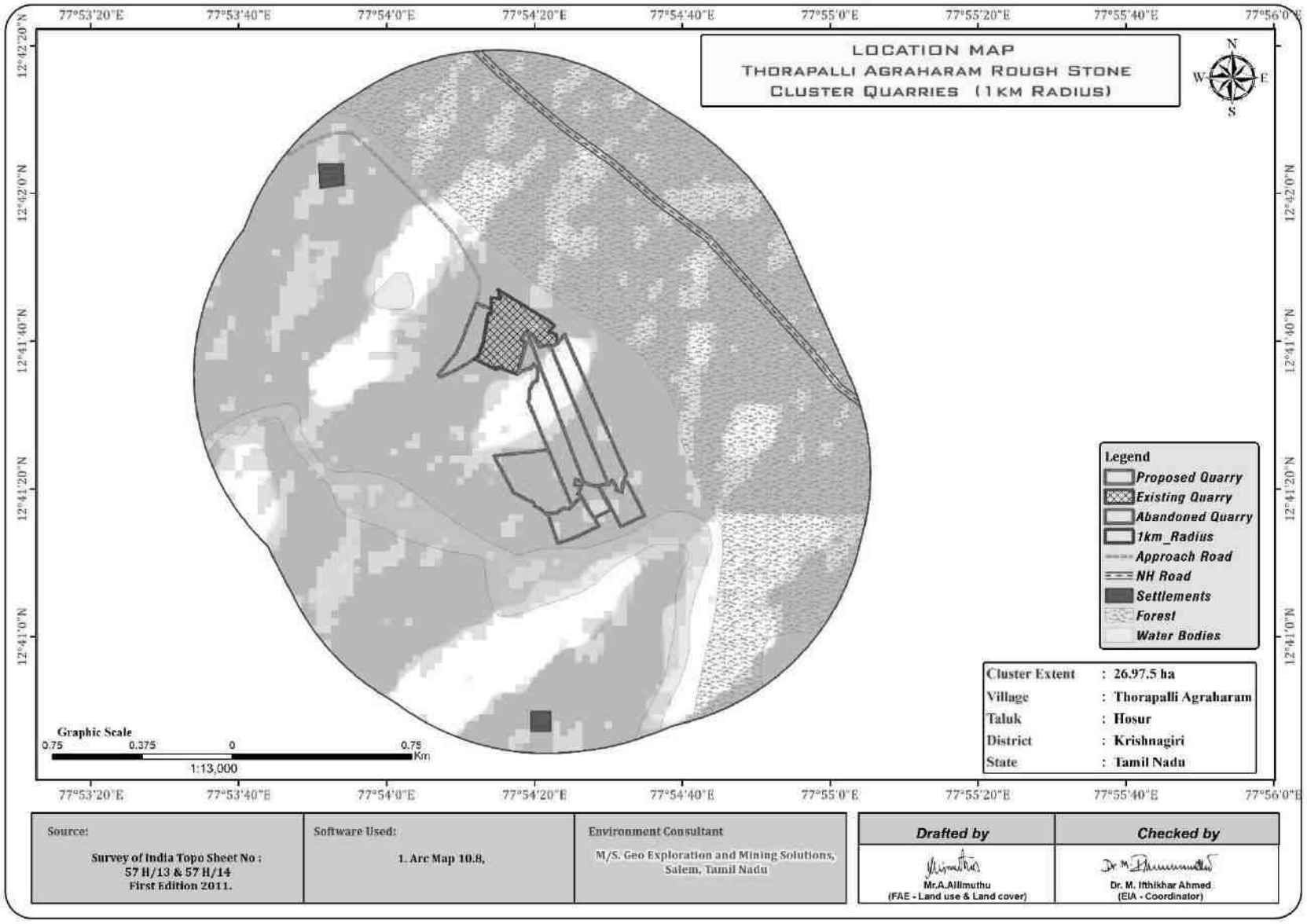


FIGURE 2.17: DIGITIZED MAP OF THE STUDY AREA (1 KM RADIUS FROM PROJECT SITE)



2.2.1 Project Area

(i) All the projects under cluster are site specific, 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 vegetation and trees.

TABLE 2.3 – LAND USE PATTERN OF THE PROPOSED PROJECTS (P1-P4)

P1			
Description	**Present area (Ha)**	**Area required during the first five year (Ha)**	**Area at the end of lease period (Ha)**
Area Under Quarry	0.07.20	3.99.93	3.99.93
Site Services	Nil	0.01.00	0.01.00
Roads	0.01.00	0.02.00	0.02.00
Green Belt	Nil	0.32.20	0.72.48
Unutilized Area	4.91.80	0.64.87	0.24.59
Grand Total	**5.00.00**	**5.00.00**	**5.00.00**

P2			
Description	**Present area (Ha)**	**Area required during the first five year (Ha)**	**Area at the end of lease period (Ha)**
Area Under Quarry	0.77.27	4.71.24	4.71.24
Site Services	Nil	0.01.00	0.01.00
Roads	0.01.00	0.02.00	0.02.00
Green Belt	Nil	0.11.31	0.25.76
Unutilized Area	4.21.73	0.14.45	Nil
Grand Total	**5.00.00**	**5.00.00**	**5.00.00**

P3			
Description	**Present area (Ha)**	**Area required during the first five year (Ha)**	**Area at the end of lease period (Ha)**
Area Under Quarry	Nil	4.40.00	4.40.00
Site Services	Nil	0.01.00	0.01.00
Roads	Nil	0.02.00	0.02.00
Green Belt	Nil	0.35.76	0.56.69
Unutilized Area	5.00.0	0.21.24	0.00.31
Grand Total	**5.00.0**	**5.00.00**	**5.00.00**

P4			
Description	**Present area (Ha)**	**Area required during the first five year (Ha)**	**Area at the end of lease period (Ha)**
Area Under Quarry	0.27.22	3.90.78	4.18.00
Site Services	Nil	0.01.00	0.01.00
Roads	0.01.00	0.02.00	0.02.00
Green Belt	Nil	0.50.00	0.79.00
Unutilized Area	4.71.78	0.28.00	Nil
Grand Total	**5.00.00**	**4.71.78**	**5.00.00**

Source: Revised Approved Mining Plan.

2.2.2 Size or Magnitude of Operation

TABLE 2.4: OPERATIONAL DETAILS FOR PROPOSED PROJECTS

OPERATIONAL DETAILS FOR PROJECT – P1		
PARTICULARS	**DETAILS**	
	Rough Stone quarry (m^3) (5 Years Plan period)	**Top Soil (m^3) (3 Years Plan period)**
Geological Resources	29,32,800m^3	49,916m^3
Mineable Reserves	14,46,978m^3	43,017 m^3
Production for five-year plan period	7,95,738 m^3	43,017m^3
Production for Next remaining three years ten months and twenty-two days	6,51,240 m^3	-
Revised Mining Plan Period / Lease Applied Period	5 Years , Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Number of Working Days	300 Days	
Production per day	530	48
No of Lorry loads (12m^3 per load)	44	4
Total Depth of Mining	82m including 1m topsoil [58m AGL + 24m BGL]	
OPERATIONAL DETAILS FOR PROJECT – P2		
PARTICULARS	**DETAILS**	
	Rough Stone quarry (m^3) (5 Year Plan period)	**Top Soil (m^3) (3 Years Plan period)**
Geological Resources	26,60,569 m^3	41,514 m^3
Mineable Reserves	23,86,840 m^3	39,175 m^3
Proposed production for First Five years	13,42,330 m^3	39,175 m^3
Production for Next remaining three years ten months and twenty-two days	10,44,510 m^3	-
Revised Mining Plan Period / Lease Applied Period	5 Years, Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Number of Working Days	300 Days	
Production per day	895	44
No of Lorry loads (12m^3 per load)	75	4
Total Depth of mining	80m including 1m topsoil – (48m AGL + 32m BGL)	
OPERATIONAL DETAILS FOR PROJECT – P3		
PARTICULARS	**DETAILS**	
	Rough Stone quarry (m^3) (5 Year Plan period)	**Top Soil (m^3) (3Years Plan period)**
Geological Resources	18,02,418m^3	49,848m^3
Mineable Reserves	10,16,034 m^3	43,575 m^3
Proposed production for First Five years	5,67,114m^3	43,575 m^3
Production for Next Next Four years production (Eight years Ten Months and Twenty-two days)	4,48,920 m^3	-
Revised Mining Plan Period / Lease Applied Period	5 Years, Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	

Number of Working Days	300 Days	
Production per day	378	48
No of Lorry loads (12m^3 per load)	32	4
Total Depth of Mining	73m including 1m topsoil [47m AGL + 26m BGL]	
OPERATIONAL DETAILS FOR PROJECT – P4		
PARTICULARS	**DETAILS**	
	Rough Stone quarry (m^3) (5 Year Plan period)	**Top Soil (m^3) (3 Years Plan period)**
Geological Resources	29,11,783m^3	47,466m^3
Mineable Reserves	13,02,980m^3	39,183m^3
Year wise development first five years production	7,46,132 m^3	39,183 m^3
Year wise development remaining three years ten months and twenty-three days	5,56,848m^3	-
Revised Mining Plan Period / Lease Applied Period	5 Years, Eight years ten months and twenty-three days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Number of Working Days	300 Days	
Production per day	497	44
No of Lorry loads (12m^3 per load)	41	4
Total Depth of mining	64m including 1m topsoil – (46m AGL + 18m BGL)	

Source: Approved Revised mining plan,
* Topsoil formation are proposed to excavate for three years only

2.3 GEOLOGY

2.3.1 Geology of the Area:

The lease area is slightly elevated topography, the area has been quarrying operation earlier Roughstone exposures are clearly visible in existing pit within the lease applied area. Gravel is noticed at the average thickness of 1m. the slope is gentle towards North Eastern side. The altitude of the area is above 830m from MSL.

Peninsular gneiss forms the oldest rock formations, in which the massive formation of charnockite lies over with rich accumulation of recent quaternary formations. On regional scale the charnockite body trends NE-SW with dipping towards SE70^0

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

AGE	FORMATION
Recent	- Quaternary formation (Gravel)
---------Unconformity----------	
Archaean	- Charnockite
	Peninsular Gneiss complex

2.3.3 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 65-70 m bgl, 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 60 m will not encounter any subsurface water.

In the geophysical study it has been clearly inferred that the depth of the quarrying operation will not intersect the ground water table.

TABLE 2.5: GROUND WATER LEVEL VARIATIONS OF KRISHNAGIRI DISTRICT

Jan 2017	May 2017	Jan 2018	May 2018	Jan 2019	May 2019	Jan 2020	May 2020	Jan 2021	May 2021	5 Years Pre-Monsoon Average	5Years Post Monsoon Average
12.1	14.9	6.3	8.1	11.0	12.7	8.9	11	8.4	10.6	9.5	7.9

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

FIGURE 2.18: REGIONAL GEOLOGY MAP

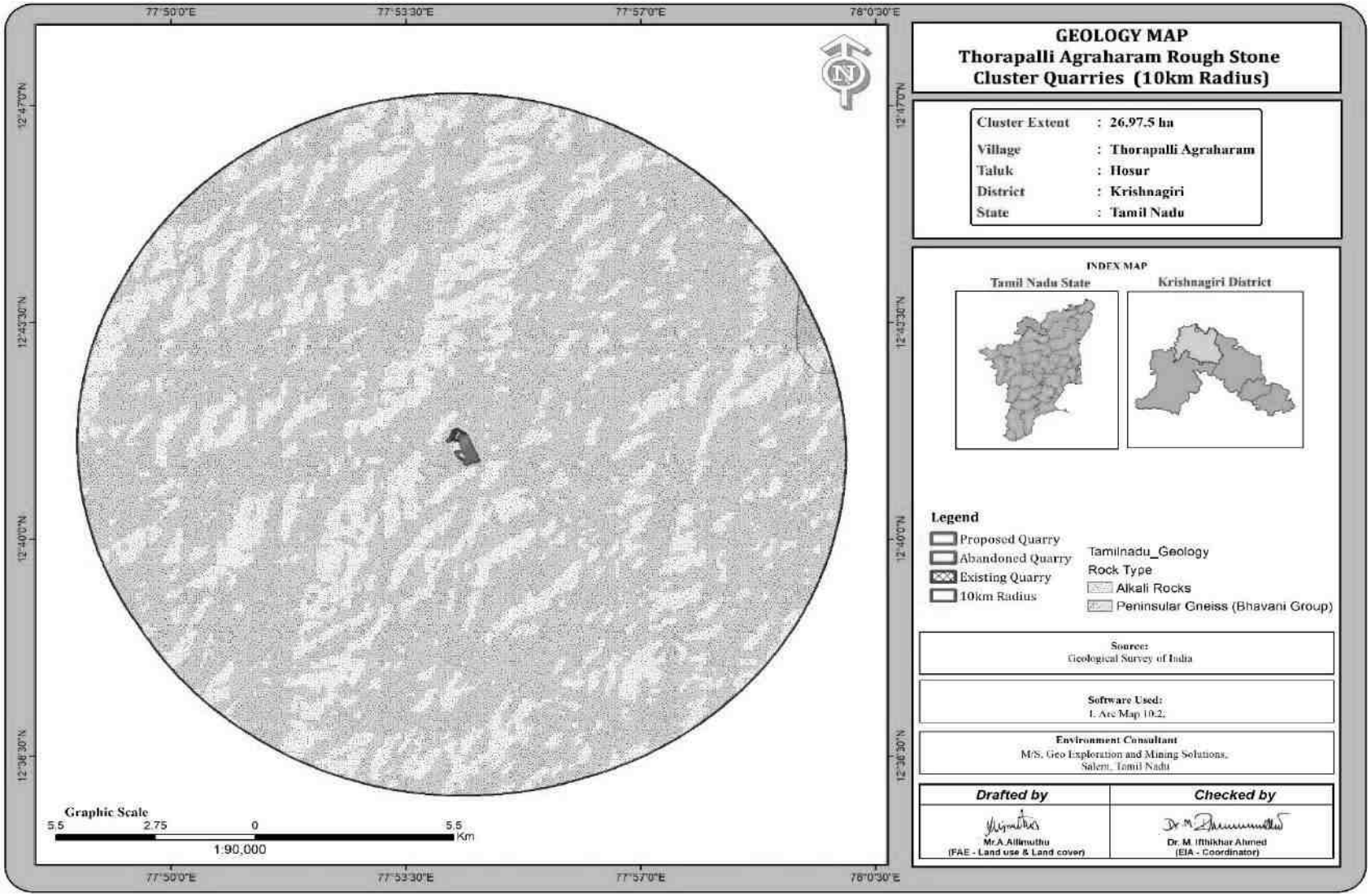


FIGURE 2.19: GEOMORPHOLOGY MAP

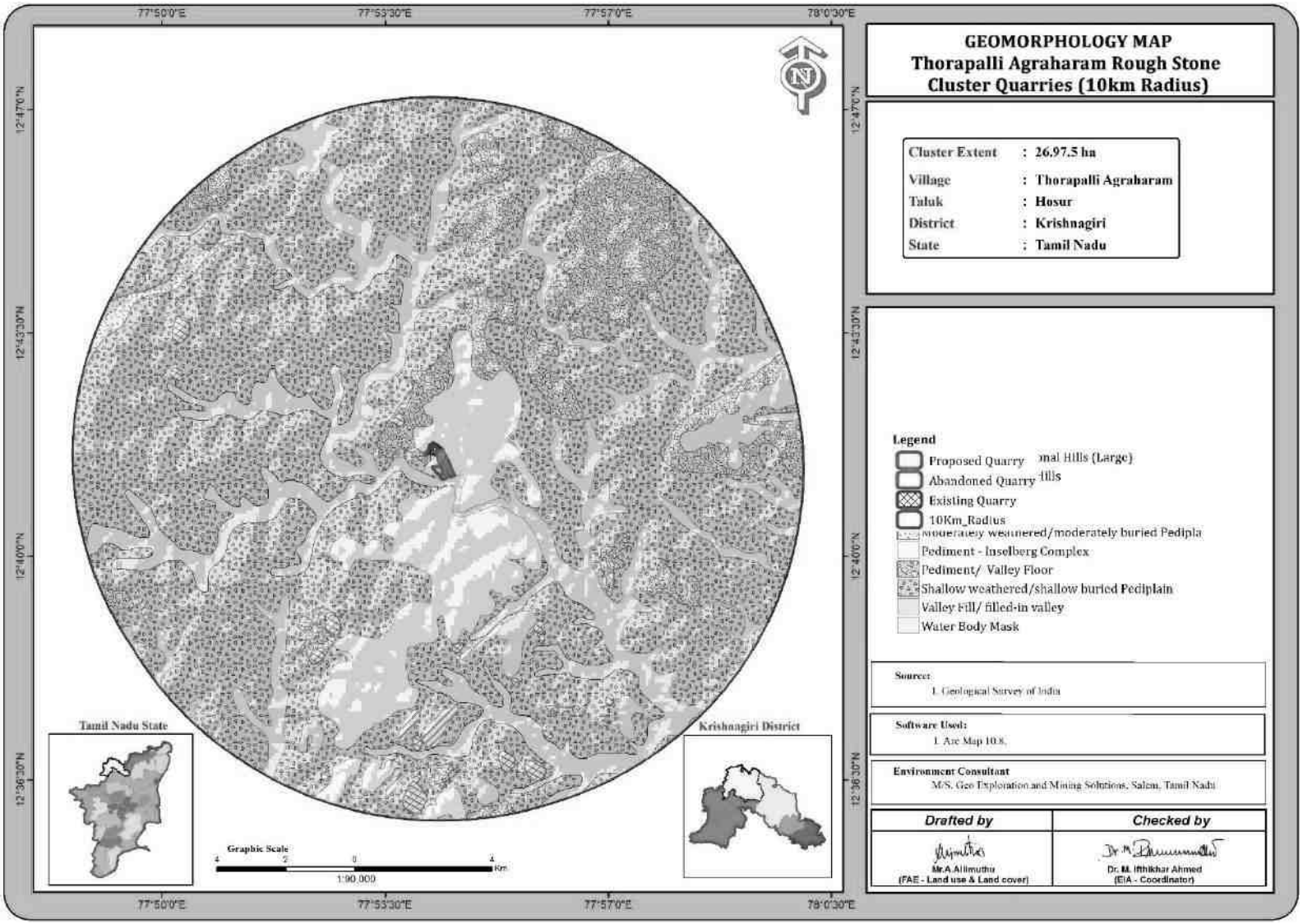


FIGURE 2.20: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS FIRST FIVE YEAR -P1

FIGURE 2.21: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS SECOND FIVE YEAR -P1

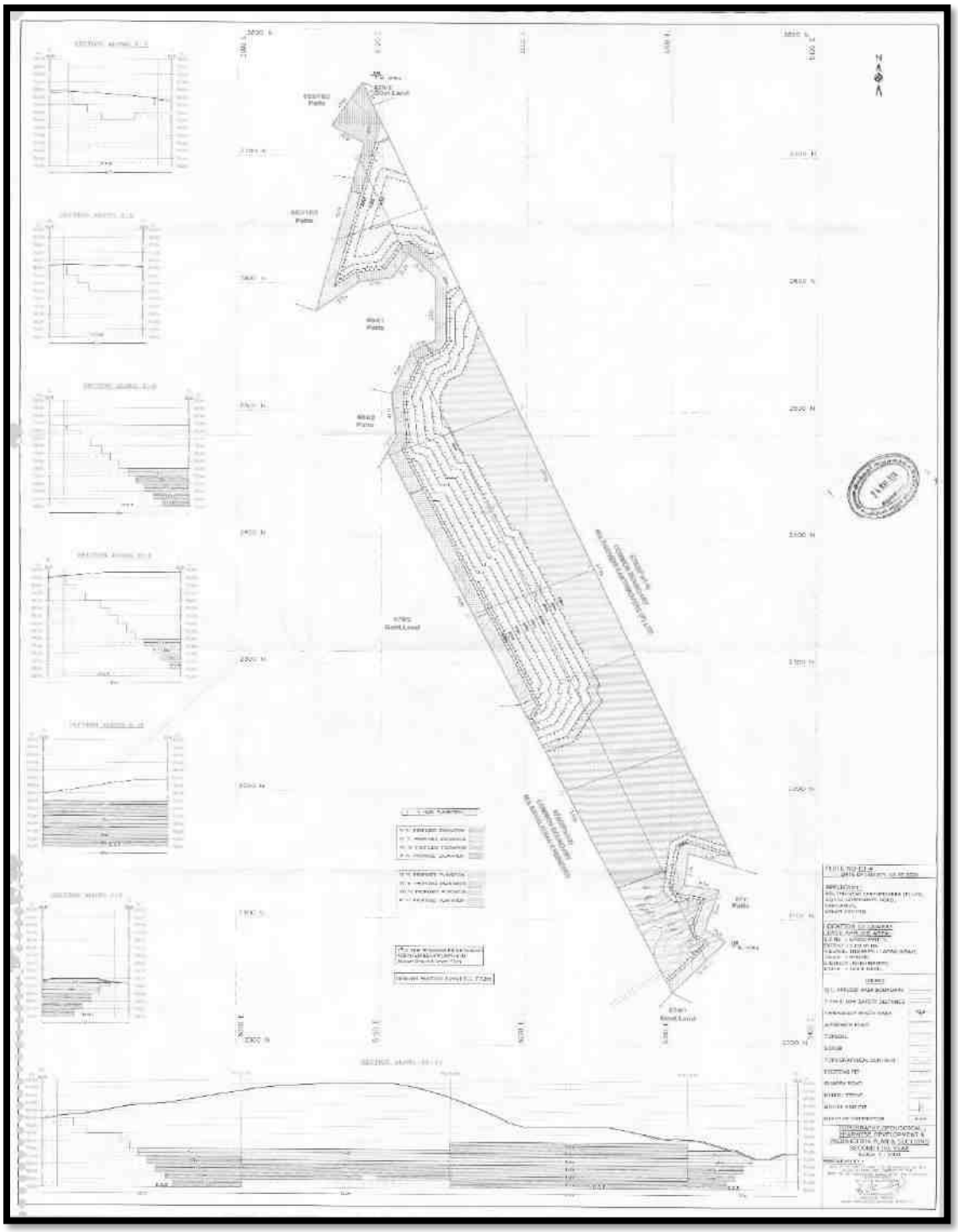


FIGURE 2.22: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS FIRST FIVE YEAR -P2

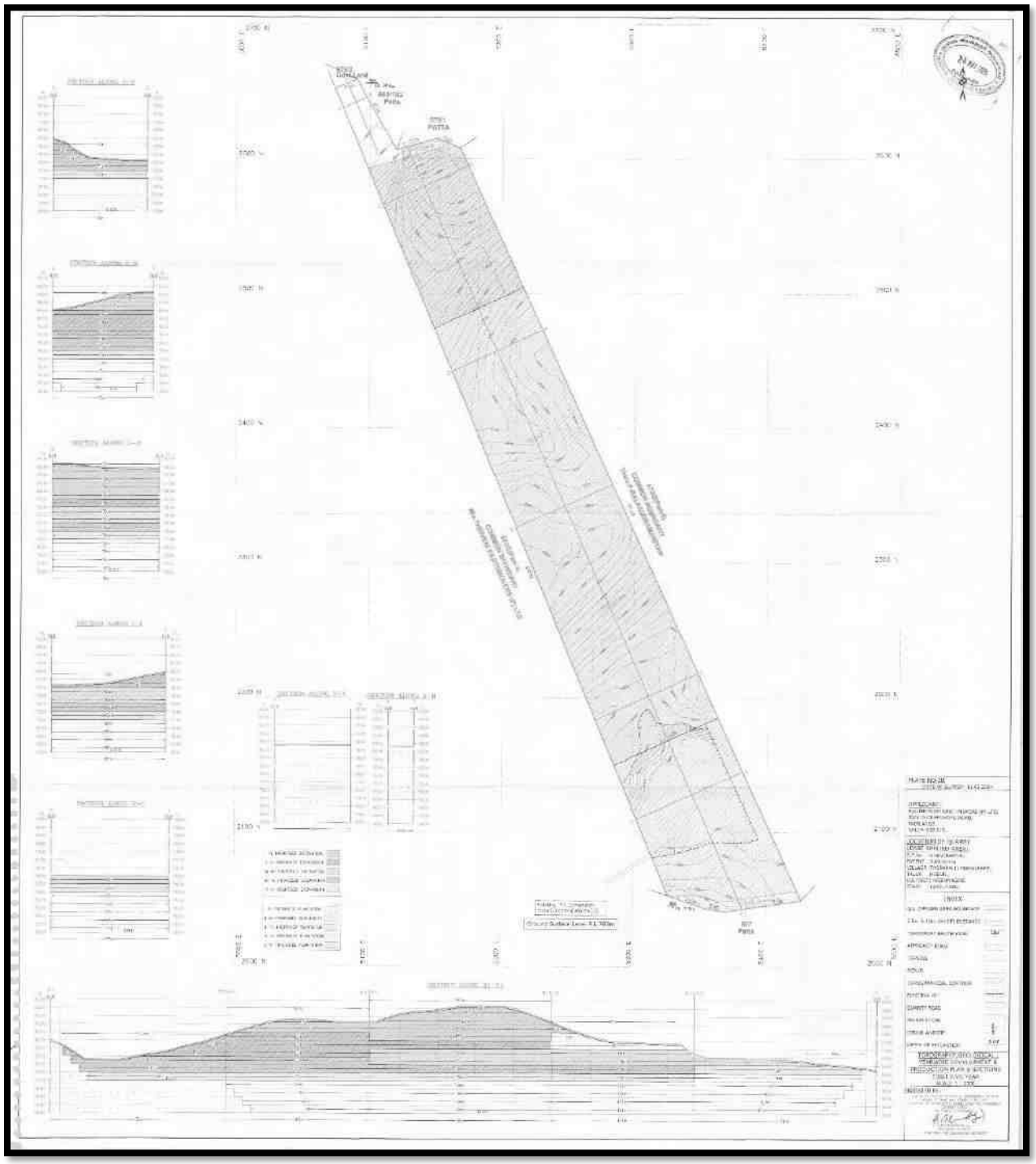


FIGURE 2.23: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS SECOND FIVE YEAR -P2

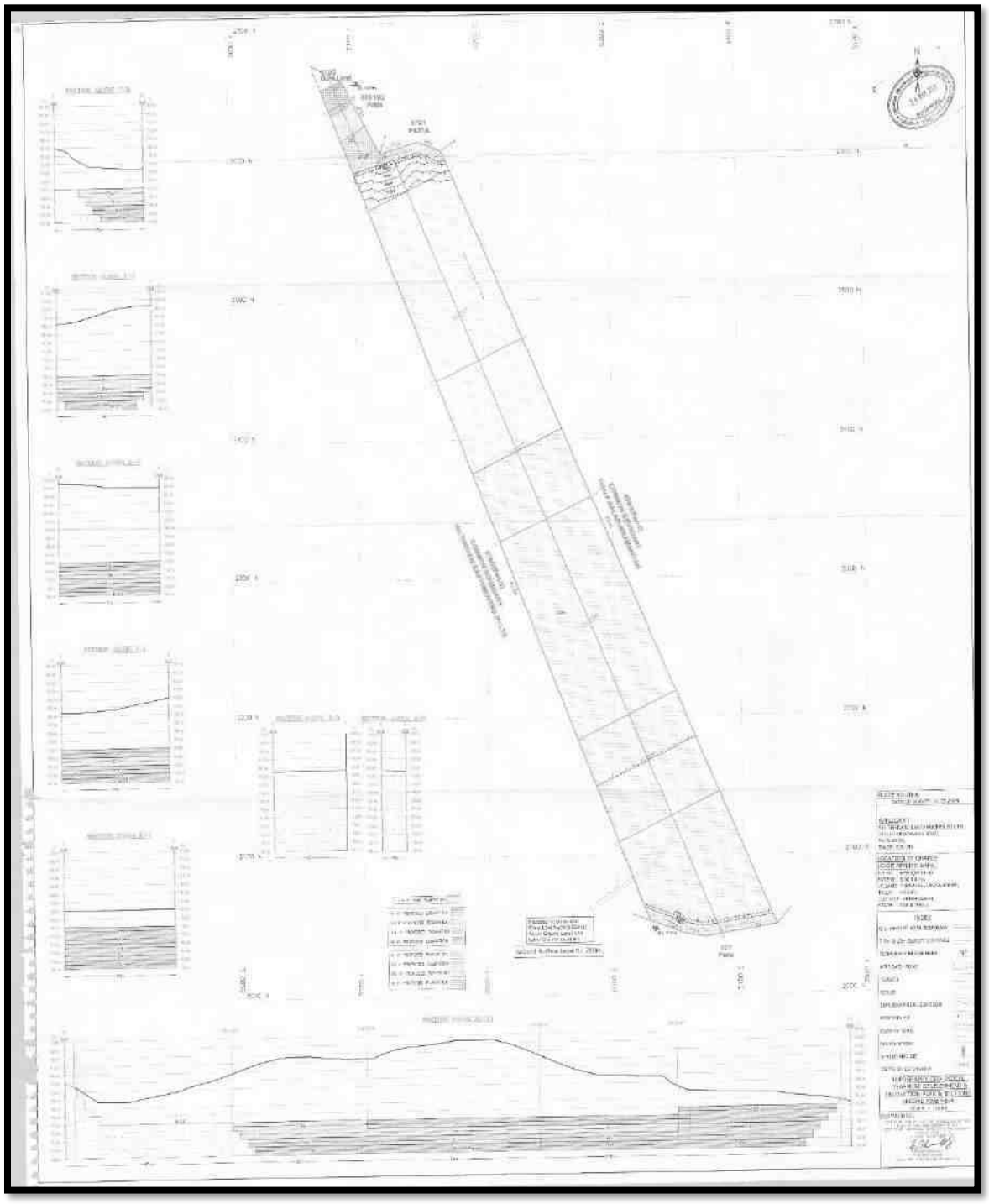


FIGURE 2.24: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS FIRST FIVE YEAR -P3

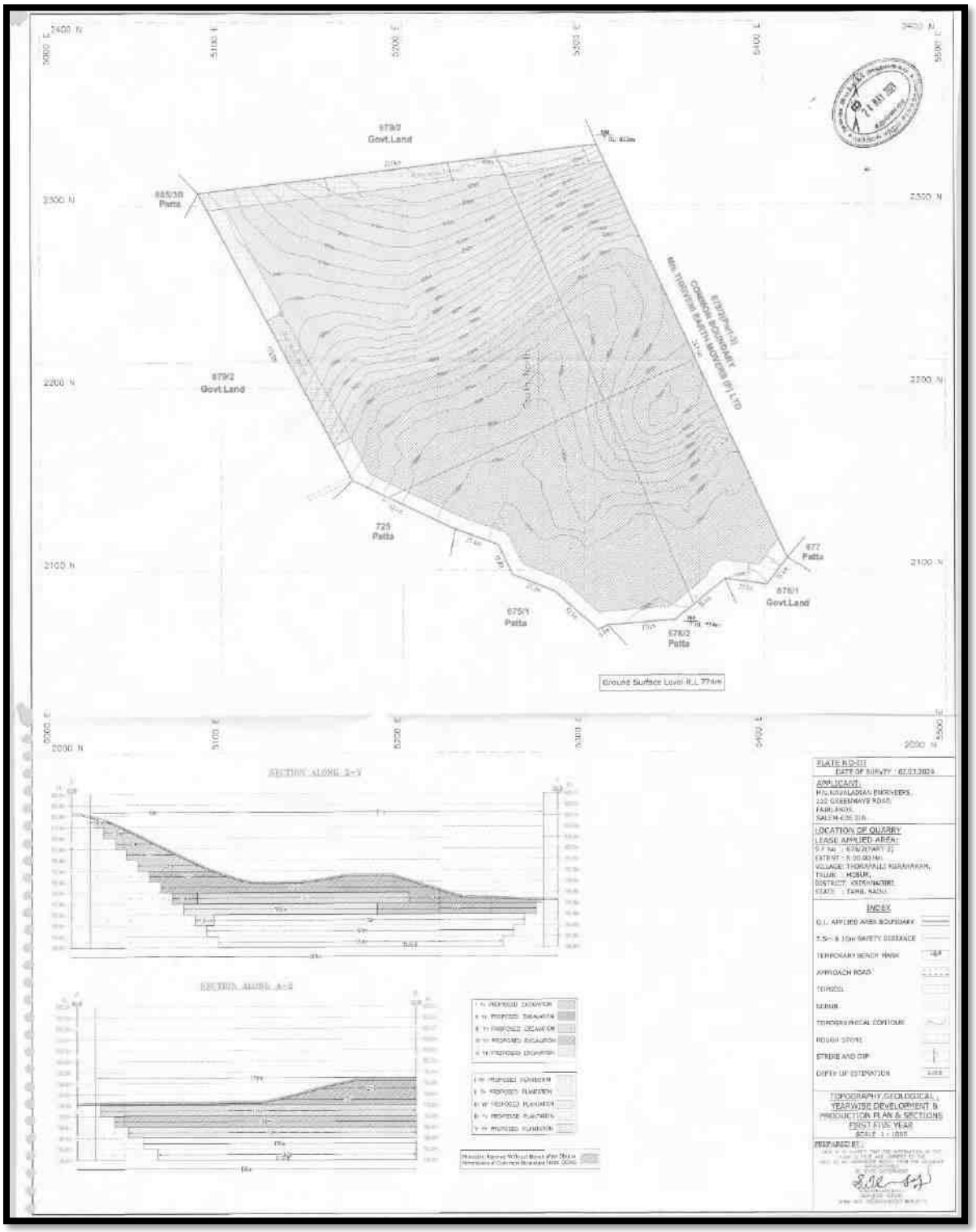


FIGURE 2.25: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS SECOND FIVE YEAR -P3

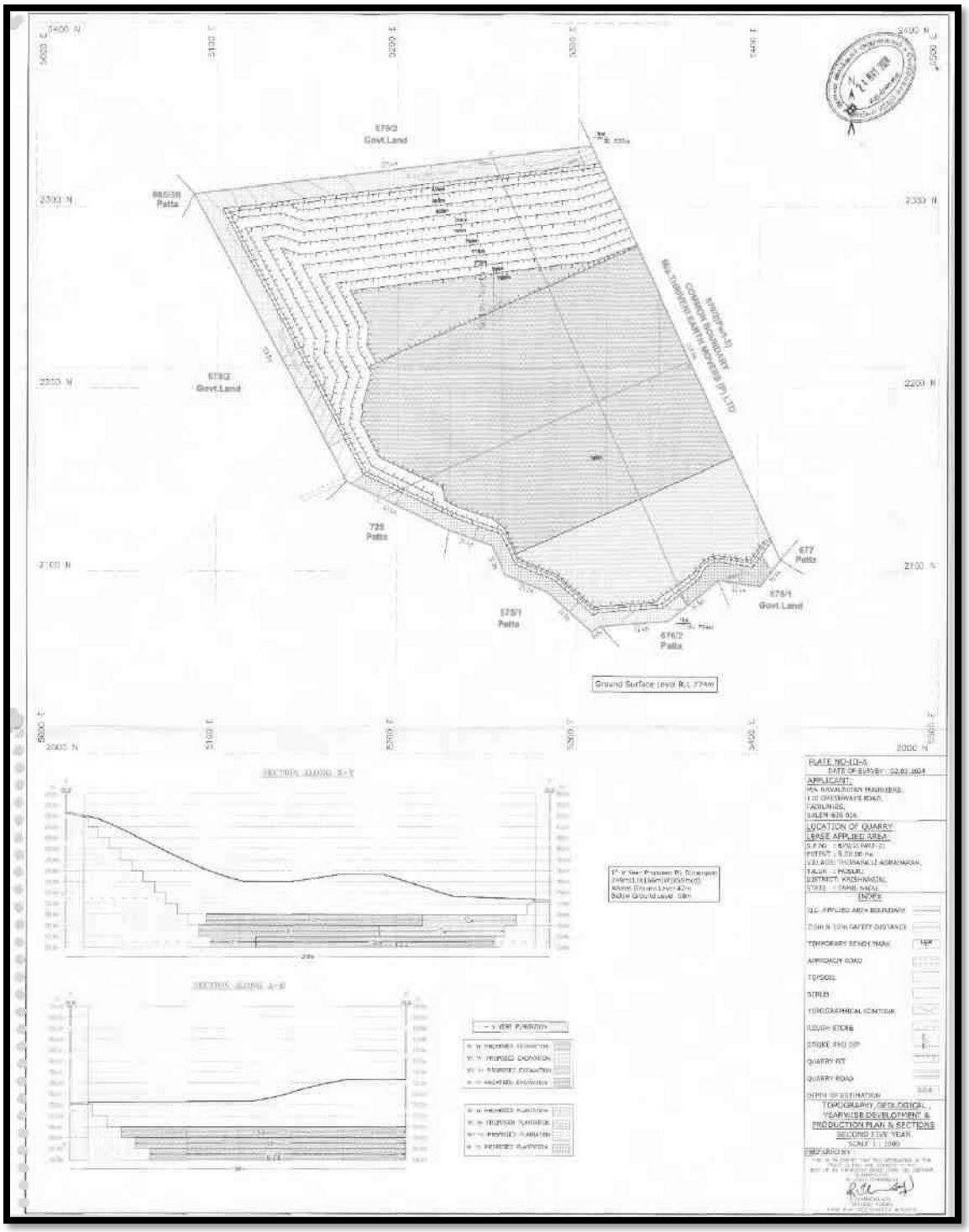


FIGURE 2.26: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS FIRST FIVE YEAR -P4

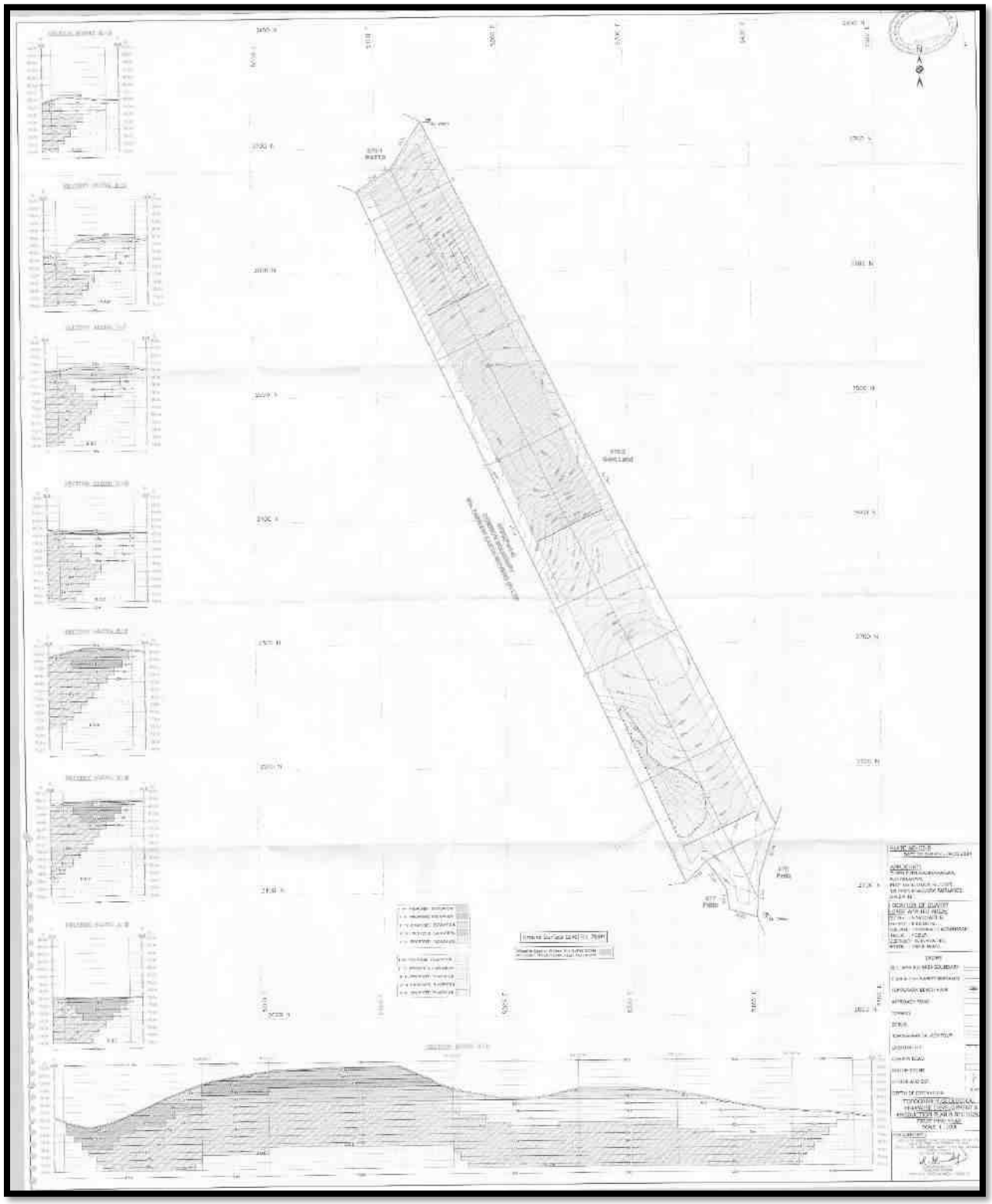
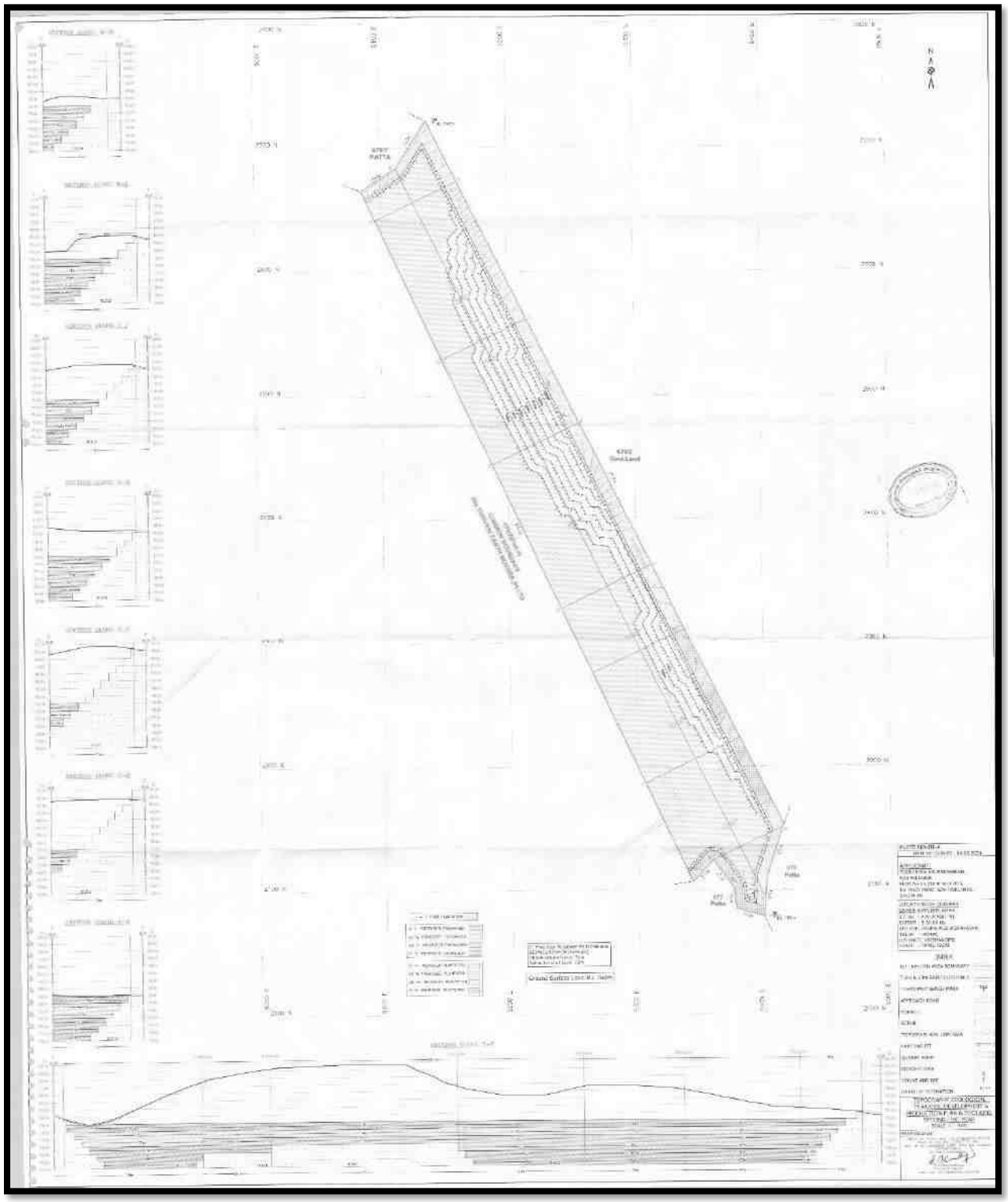


FIGURE 2.27: TOPOGRAPHY, GEOLOGICAL, YEARWISE DEVELOPMENT & PRODUCTION PLAN AND SECTIONS SECOND FIVE YEAR -P4



2.4 RESOURCES AND RESERVES

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

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 (Safety Barrier all around the applied area) and safety distance 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: AVAILABLE GEOLOGICAL RESOURCES OF PROPOSED PROJECTS- P1 & P4

Description	P1		P2		P3		P4	
	Rough Stone quarry	Topsoil	Rough Stone quarry	Topsoil	Rough Stone quarry	Topsoil	Rough Stone quarry	Topsoil
Geological Resource	29,32,800m^3	49,916m^3	26,60,569 m^3	41,514 m^3	18,02,418m^3	49,848m^3	29,11,783m^3	47,466m^3
Mineable Reserves	14,46,978m^3	43,017 m^3	23,86,840 m^3	39,175 m^3	10,16,034 m^3	43,575 m^3	13,02,980m^3	39,183m^3

Source: Revised Approved Mining Plan

TABLE 2.7: YEAR-WISE PROPOSAL FOR FIRST FIVE YEARS PRODUCTION PLAN-P1

YEAR	ROUGH STONE QUARRY (m^3)	TOPSOIL (m^3)
I	154482	22500
II	148176	13940
III	165576	3294
IV	168288	
V	159216	
FIRST FIVE YEARS TOTAL	**795738**	**43017**
VI	167280	-
VII	161922	-
VIII	167280	-
IX (10 month and 22 Days)	154758	-
SECOND FIVE YEARS TOTAL	**651240**	**-**

Source: Approved Mining Plan

TABLE 2.8: YEAR-WISE PROPOSAL FOR FIRST FIVE YEARS PRODUCTION PLAN-P2

YEAR	ROUGH STONE QUARRY (m^3)	TOPSOIL (m^3)
I	265896	26737
II	247423	8610
III	272433	3828
IV	279552	-
V	277026	-

FIRST FIVE YEARS TOTAL	**1342330**	**39175**
VI	246912	
VII	270528	-
VIII	278040	-
IX (10 month and 22 Days)	249030	-
SECOND FIVE YEARS TOTAL	**1044510**	

TABLE 2.9: YEAR-WISE PROPOSAL FOR FIRST FIVE YEARS PRODUCTION PLAN-P3

YEAR	ROUGH STONE QUARRY (m^3)	TOPSOIL (m^3)
I	118566	11900
II	110124	31675
III	121104	-
IV	102264	-
V	115056	-
FIRST FIVE YEARS TOTAL	**567114**	**43575**
VI	113760	
VII	112296	-
VIII	110400	-
IX (10 month and 22 Days)	112464	-
SECOND FIVE YEARS TOTAL	**448920**	**-**

TABLE 2.10: YEAR-WISE PROPOSAL FOR FIRST FIVE YEARS PRODUCTION PLAN-P4

YEAR	ROUGH STONE QUARRY (m^3)	TOPSOIL (m^3)
I	150510	19934
II	153038	16801
III	144366	-
IV	156972	-
V	141246	2448
FIRST FIVE YEARS TOTAL	**746132**	**39183**
VI	153006	
VII	155562	-
VIII	126288	-
IX (10 month and 23 Days)	121992	-
SECOND FIVE YEARS TOTAL	**556848**	

Source: Approved Revised Mining Plan

Disposal of Overburden/Waste -P1

Except topsoil, there is no waste anticipated during entire life of the quarry hence, disposal of waste does not arise. The overburden in the form of topsoil, the quarried-out topsoil will be preserved all along the safety barrier and utilized for construction of bund and greenbelt development purpose. The excavated rough stone (100%) will be directly loaded into Trucks to the needy customers.

Disposal of Overburden/Waste -P2

Except topsoil, there is no waste anticipated during entire life of the quarry hence, disposal of waste does not arise. The overburden in the form of topsoil, the quarried-out topsoil will be preserved all along the safety barrier and utilized for construction of bund and greenbelt development purpose. The excavated rough stone (100%) will be directly loaded into Trucks to the needy customers.

Disposal of Overburden/Waste -P3

Except topsoil, there is no waste anticipated during entire life of the quarry hence, disposal of waste does not arise. The overburden in the form of topsoil, the quarried-out topsoil will be preserved all along the safety barrier and utilized for construction of bund and greenbelt development purpose. The excavated rough stone (100%) will be directly loaded into Trucks to the needy customers.

Disposal of Overburden/Waste-P4

Except topsoil, there is no waste anticipated during entire life of the quarry hence, disposal of waste does not arise. The overburden in the form of topsoil, the quarried-out topsoil will be preserved all along the safety barrier and utilized for construction of bund and greenbelt development purpose. The excavated rough stone (100%) will be directly loaded into Trucks to the needy customers.

Conceptual Mining Plan/ Final Mine Closure Plan

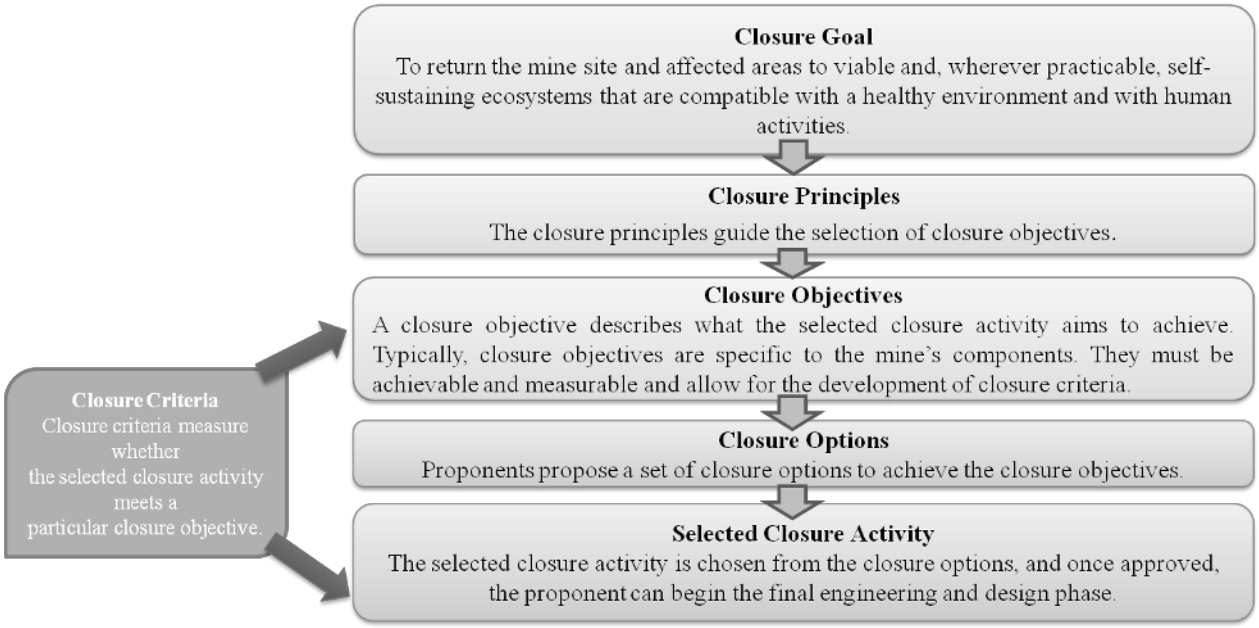
The ultimate pit size is designed based on certain practical parameters such as economical depth of mining, safety zones, permissible area, etc.

TABLE 2.11: ULTIMATE PIT DIMENSIONS- P1& P4

P1			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	562	86	82m (AGL 58m + BGL 24m)
P2			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	604	87	80m (Agl 48m + Bgl 32m)
P3			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	249	175	73m (Agl 47m + Bgl 26m)
P4			
Pit	**Length (Max) (m)**	**Width (Max) (m)**	**Depth (Max) (m)**
I	633	73	64m (AGL 46m + BGL 18m)

Source: Revised Approved Mining Plan

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

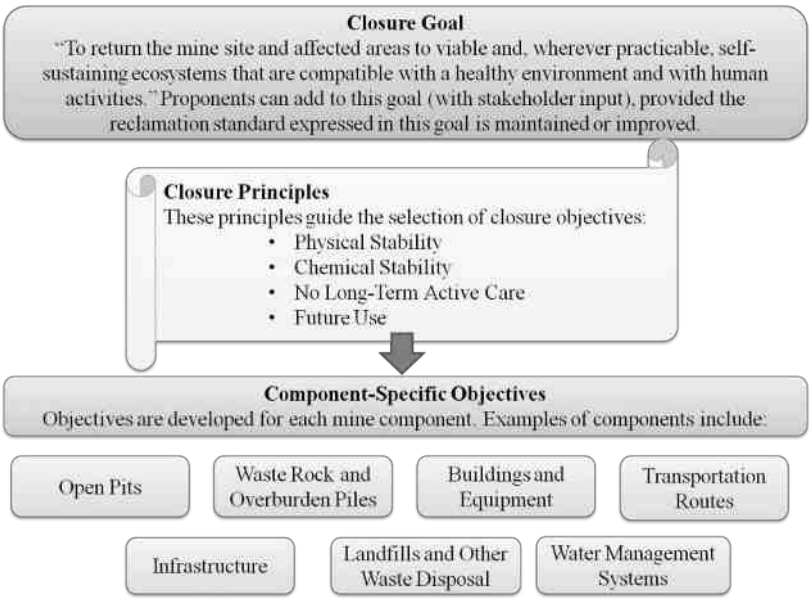


Closure Objectives

- Access to be limited, for the safety of humans and wildlife.
- The open pit mine workings and pit boundary are physically and geo-technically stable.
- Water quality in flooded pits is safe for humans, aquatic life, and wildlife.
- Discharge of contaminated drainage has been minimized and controlled.
- Original or desired new surface drainage patterns have been established.
- For flooded pits, in-pit aquatic habitat has been established where practical and feasible.
- Emergency access and escape routes from flooded pits for humans and wildlife are in place.
- Dust levels are safe for people, vegetation, aquatic life, and wildlife.

Closure Planning & Options Considerations in Mine Design –

- The closure of mine is well planned at the initial stage of planning & design consideration by the internal and external stake holders
- Construction of 2m height bund all along the mine pit boundary and ensure its stability all time & construction of garland drain along the natural slope to avoid sliding and collection of soil to the pit & surface runoff during rainfall
- After complete exploitation of mineral, the lowest bench foot wall side will be maintained as plain surface without any sump pits to avoid any accidents
- All the sharp edges will be dressed to smoother face before the closure of mine and ensure no loose debris on hanging wall side
- There is a river on southern side of the project area. The river will not be hindered by any of mine closure activities
- The project proponent as a part of social responsibilities assures to supply the stored mine pit water to the nearby villages after effective treatment process as per the standards of TNPCB & TWAD
- Native species will be planted in 3 row patterns on the boundary barriers and 1st bench, a full-time sentry will be appointed at the gate to prevent inherent entry of public & cattle.
- The access road to the quarry will be cut-off immediately after the closure
- The layout design shall be prepared and get approved from Department of Geology and Mining.
- The proponent is instructed to construct as per the layout approved
- Physical and chemical stability of structures left in place at the site, the natural rehabilitation of a biologically diverse, stable environment, the ultimate land use is optimized and is compatible with the surrounding area and the requirements of the local community, and taking the needs of the local community into account and minimizing the socio-economic impact of closure
- There will be a positive change in the environmental and ecology due to the mine closure



Post-Closure Monitoring –

The purpose of post-closure monitoring with respect to open pit mine workings is to ensure the attainment of closure objectives.

- Monitor physical and geotechnical stability of remnant pit walls.
- Monitor the ground regime in pit walls to confirm achievement of design objectives.
- Monitor water level in pit to confirm closure objectives regarding fish, fish habitat, and wildlife safety are being achieved.
- Sample water quality and quantity at controlled pit discharge points.
- Identify and test unanticipated areas where water management is an issue.
- Inspect integrity of barriers such as berms & fences.
- Monitor wildlife interactions with barriers to determine effectiveness.
- Inspect aquatic habitat in flooded pits where applicable.
- Monitor dust levels.

TABLE 2.12: MINE CLOSURE BUDGET-P1

ACTIVITY		YEAR									RATE	COST (Rs.)
		I	II	III	IV	V	VI	VII	VIII	IX		
Plantation under safety zone s	No. of sapling	120	120	120	120	120	225	225	225	225	Rs.200 Per sapling	3,00,000
	Cost	24000	24000	24000	24000	24000	45000	45000	45000	45000		
Plantation in Haul Road and quarried out top benches	Area	Haul Road		-	Top benches							
	No. of sapling	500	500	-	100	100	100	100	100	-		3,00,000
	Cost	100000	100000	-	20000	20000	20000	20000	20000	-		

Barbed Wire Fencing for 950m length	285000	-	-	-	-	-	-	-	-	Rs.300 Per Meter	2,85,000
Garland Drain with settling traps for 750 Mtrs length	225000	-	-	-	-	-	-	-	-	Rs.300 Per Meter	2,25,000
Total											**11,10,000**

TABLE 2.13: MINE CLOSURE BUDGET-P2

ACTIVITY		**YEAR**									**RATE**	**COST (Rs.)**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**		
Plantation under safety zone s	**No. of sapling**	**50**	**50**	**50**	**50**	**50**	**70**	**60**	**60**	**60**	**Rs.200 Per sapling**	**1,00,000**
	Cost	**10000**	**10000**	**10000**	**10000**	**10000**	**14000**	**12000**	**12000**	**12000**		
Plantation in Haul Road and quarried out top .	**Area**	**Haul Road**				**Top benches**						
	No. of sapling	**500**	**500**	**500**	**500**	**100**	**100**	**100**	**100**	**100**		**5,00,000**
	Cost	**100000**	**100000**	**100000**	**100000**	**20000**	**20000**	**20000**	**20000**	**20000**		
Barbed Wire Fencing for 300m length		**90000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**Rs.300 Per Meter**	**90,000**
Garland Drain with settling traps for 200m length		**60000**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**Rs.300 Per Meter**	**60,000**
Total												**7,50,000**

TABLE 2.14: MINE CLOSURE BUDGET-P3

ACTIVITY		**YEAR**									**RATE**	**COST (Rs.)**
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**		
Plantation under safety	**No. of sapling**	**120**	**120**	**120**	**120**	**120**	**100**	**100**	**100**	**100**	**Rs.200 Per sapling**	**2,00,000**

	Cost	24000	24000	24000	24000	24000	20000	20000	20000	20000		
Plantation in Haul road and	Area	Haul Road		-	Top benches							
	No. of sapling	500	500	-	100	100	100	100	100	-		3,00,000
	Cost	100000	100000	-	20000	20000	20000	20000	20000	-		
Barbed Wire Fencing for 700m length		210000	-	-	-	-	-	-	-	-	Rs.300 Per Meter	2,10,000
Garland Drain with settling traps for 650 Mtrs length		1950000	-	-	-	-	-	-	-	-	Rs.300 Per Meter	1,95,000
Total												9,05,000

TABLE 2.15: MINE CLOSURE BUDGET-P4

ACTIVITY		YEAR									RATE	COST (Rs.)
		I	II	III	IV	V	VI	VII	VIII	IX		
Plantation under safety zone s	No. of sapling	120	120	120	120	120	100	100	100	100	Rs.200 Per sapling	2,00,000
	Cost	24000	24000	24000	24000	24000	20000	20000	20000	20000		
Plantation in Haul Road and quarried out top	Area	Haul Road				Top benches						
	No. of sapling	500	500	500	-	100	100	100	100	100		4,00,000
	Cost	100000	100000	100000	-	20000	20000	20000	20000	20000		
Barbed Wire Fencing for 900m length		2,70,000	-	-	-	-	-	-	-	-	Rs.300 Per Meter	2,70,000
Garland Drain with settling traps for 800m length		2,40,000	-	-	-	-	-	-	-	-	Rs.300 Per Meter	2,40,000

Total	**11,10,000**

Source: Proposed by FAE's

2.5 Method of Mining

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

The top layer of overburden (Gravel) will be Excavate directly by Hydraulic Excavators and loaded into tippers directly and sold to needy customers. The Rough Stone quarry 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 quarry into the tippers and then the stone is transported from pithead to the nearby crushers.

2.5.1 Drilling

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

Spacing – 1.2m, Burden –1.0, Depth of hole - 1.5m

2.5.2 Blasting

Blasting will be done as per details below: -

- Controlled blasting parameter: -

  Spacing – 1.2m

  Burden – 1.0 m

  Depth of hole – 1.5m

  Charge per hole – 50grams

  Powder factor – 6.0 tonnes/kg

  Dia of hole – 30-32 mm

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

Volume of Rough Stone quarry will be excavated from one hole = 3 Tonnes

Total Volume from four proposed quarries = **34,51,314**m^3

(First Five years Period)

= **34,51,314**/5

= **6,90,263**/300

= 2,301* 2.6

= 5,982 Tonnes per day

Therefore, Number of Holes per day = 5,982 /3

= 1,994 Holes per day (for 4 Quarries)

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.

2.5.3 Extent of Mechanization

TABLE 2.16 PROPOSED MACHINERY DEPLOYMENT P1

DRILLING MACHINE: P1

S. No.	Type	Nos.	Dia Hole mm	Size Capacity	Motive power
1	Crawler mounted drill Machine	2	114	3m to 9m	Diesel Drive
2	Hand Jack hammer	2	32	1.2m to 2.0m	Air Compression
3	Compressor	1	-	165HP/450 psi	Diesel Drive

EXCAVATION & LOADING EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power
1	Excavator with Bucket and Rock Breaker	2	20T Class	Diesel Drive

HAULAGE WITHIN THE MINE & TRANSPORT EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power
1	Truck	4	30 tonnes	Diesel Drive
2	Water Sprinkling Tanker	1	10,000 litres	Diesel Drive

TABLE 2.17 PROPOSED MACHINERY DEPLOYMENT P2

DRILLING MACHINE:

S. No.	Type	Nos.	Dia Hole mm	Size Capacity	Motive power
1	Crawler mounted drill Machine	2	114	3m to 9m	Diesel Drive
2	Hand Jack hammer	2	32	1.2m to 2.0m	Air Compression
3	Compressor	1	-	165HP/450 psi	Diesel Drive

EXCAVATION & LOADING EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power
1	Excavator with Bucket and Rock Breaker	2	20T Class	Diesel Drive

HAULAGE WITHIN THE MINE & TRANSPORT EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power
1	Truck	4	30 tonnes	Diesel Drive
2	Water Sprinkling Tanker	1	10,000 litres	Diesel Drive

TABLE 2.18 PROPOSED MACHINERY DEPLOYMENT P3

DRILLING MACHINE:

S. No.	Type	Nos.	Dia Hole mm	Size Capacity	Motive power
1	Crawler mounted drill Machine	1	114	3m to 9m	Diesel Drive
2	Hand Jack hammer	2	32	1.2m to 2.0m	Air Compression
3	Compressor	1	-	165HP/450 psi	Diesel Drive

EXCAVATION & LOADING EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power

1	Excavator with Bucket and Rock Breaker	2	20T Class	Diesel Drive

HAULAGE WITHIN THE MINE & TRANSPORT EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power
1	Truck	4	30 tonnes	Diesel Drive
2	Water Sprinkling Tanker	1	10,000 litres	Diesel Drive

TABLE 2.19 PROPOSED MACHINERY DEPLOYMENT P4

DRILLING MACHINE:

S. No.	Type	Nos.	Dia Hole mm	Size Capacity	Motive power
1	Crawler mounted drill Machine	2	114	3m to 9m	Diesel Drive
2	Hand Jack hammer	2	32	1.2m to 2.0m	Air Compression
3	Compressor	1	-	165HP/450 psi	Diesel Drive

EXCAVATION & LOADING EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power
1	Excavator with Bucket and Rock Breaker	2	20T Class	Diesel Drive

HAULAGE WITHIN THE MINE & TRANSPORT EQUIPMENT:

S. No.	Type	Nos.	Capacity	Motive Power
1	Truck	4	30 tonnes	Diesel Drive
2	Water Sprinkling Tanker	1	10,000 litres	Diesel Drive

Source: Approved Revised Mining Plan of the respective projects.

2.6 General Features

2.6.1 Existing Infrastructures

Infrastructures like Mine office, Temporary Rest shelters for workers, Latrine and Urinal Facilities are available in the Existing quarries and the same infrastructure as per the Mine Rule will be arranged after the grant of quarry lease in the proposed quarries.

2.6.1 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.

2.6.2 Traffic Density

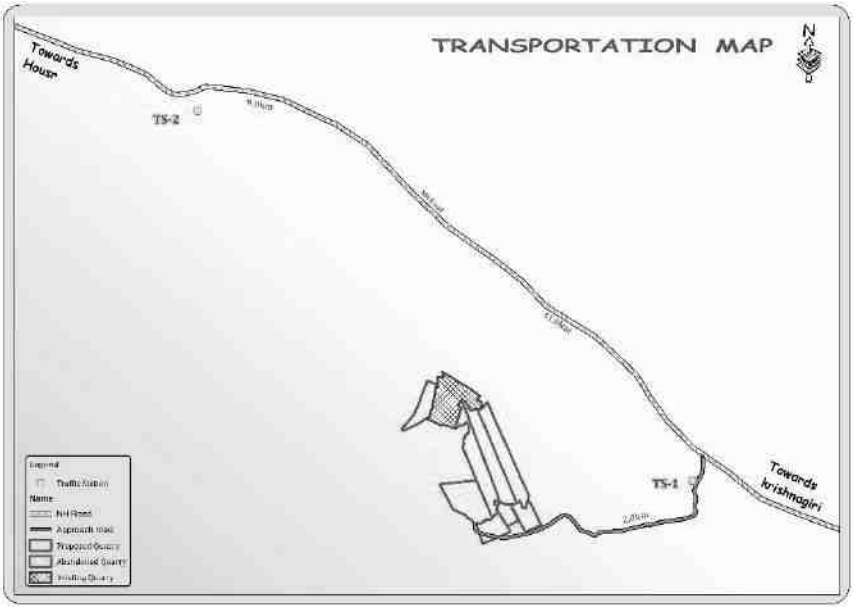
Traffic density measurements were performed as per IRC 1960 Guidelines at three locations based on the transportation route. Traffic density measurement were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., heavy motor vehicles, light motor vehicles 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 2.20 – TRAFFIC SURVEY LOCATION'S

Station code	Station location	Distance and Direction	Type of Road
TS1	_Approach Road	1.5km-NE	Approach Road
TS2	Srinagar-Kanniyakumari NH Road	2.3km-NW	NH Road

Source: On-site monitoring by GEMS FAE & TM

FIGURE 2.28: TRAFFIC SURVEY LOCATIONS & TRANSPORTATION ROUTE MAP



Source: Survey of India Toposheet

TABLE 2.21 – EXISTING TRAFFIC VOLUME

Station code	HMV (Hourly Average)		LMV hourly average		2/3 Hourly average		Total PCU per hour
	No	PCU	No	PCU	No	PCU	
TS1	45	135	15	45	40	20	200
TS2	125	375	150	450	150	75	900

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)

TABLE 2.22 – ANTICIPATED TRAFFIC DUE TO THIS PROPOSED PROJECT

Transportation of Rough Stone quarry per day		
Capacity of trucks	Cumulative Trips	Volume in PCU
10/20 tonnes	192Trips	576

Source: Anticipated based on Approved Mining Plan Production

TABLE 2.23– SUMMARY OF TRAFFIC VOLUME

Route	Existing traffic value in PCU	Incremental traffic from the quarry in PCU	Total traffic volume	Hourly Capacity in PCU as per IRC guidelines
_Approach Road	200	576	776	1200
Srinagar-Kanniyakumari NH Road	900	576	1476	1500

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

2.6.3 Mineral Beneficiation and Processing

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

2.6.4 Existing Infrastructure

It is an existing quarry, no infrastructural facility available within the project area. The infrastructural facilities to be made after the start of the quarrying operations will be prepared outside limit as per the rules and safe distance to be adopted.

2.6.2 Drainage Pattern

The drainage pattern of the area is dendritic – sub dendritic.

2.7 Project Requirement

2.7.1 Water Source & Requirement

Detail of Total water requirements in KLD as given below:

TABLE 2.24 – WATER REQUIREMENT FOR THE CLUSTER PROJECT -P1- P4

PROPOSAL – P1		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5LD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0 KLD**	
PROPOSAL – P2		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0KLD**	
PROPOSAL – P3		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0KLD**	
PROPOSAL – P4		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0 KLD**	

Source: Prefeasibility Report

About 50% water will be required for the suspension of the dust, Water shall be obtained from accumulated rainwater/seepage water in quarry pits. Packaged Drinking Water is available from the nearby approved water vendors.

2.7.2 Power and Other Infrastructure Requirement

The project's does not require power supply for the quarry operation. The quarrying activity is proposed during day time only (General Shift 8 AM – 5 PM, Lunch Break 1 PM – 2 PM). Electricity for use in office and other internal infrastructure will be obtained from TNEB. For the quarrying operation like compressor for drilling Diesel will be utilized.

The temporary infrastructures such as Mine Office, First Aid Room, Rest Shelter etc., will be constructed within the project area before commencing the quarry operation. No workshops are proposed inside the project area hence there will not be any process effluent generation from the 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.

2.7.3 Fuel Requirement -P1-P4

Fuel is to be used inform of diesel for quarrying operations, compressors and running of tippers and other transportation vehicles. Quantity for fuel will depend upon the usage of transportation vehicle and other machineries and level of achievement of estimated production. Diesel will be out sourced from nearby diesel pumps.

Fuel Requirement -P1

Top soil:

Per hour Excavator will consume = 10 liters / hour
Per hour Excavator will excavate = 60$m^3$of Top soil
Top soil quantity = 43,017/60 = 717hours
Diesel consume = 717hours x 10 liters
Total diesel consumption = 7,170Liters of HSD will be utilized for Top soil

Rough stone:

Per hour Excavator will consume = 16 liters / hour
Per hour Excavator will excavate = 20$m^3$of Rough stone
Rough stone quantity = 7,95,738/20 = 48,253hours
Diesel consume = 39,787hours x 16 liters
Total diesel consumption = **6,36,590**Liters of HSD will be utilized for Rough stone
Total diesel consumption = **6,43,760**Liters of HSD will be utilized for five years.

Fuel Requirement -P2

Top soil:

Per hour Excavator will consume = 10 liters / hour
Per hour Excavator will excavate = 60$m^3$of Top soil
Top soil quantity = 39,175/60 = 653hours
Diesel consume = 653hours x 10 liters
Total diesel consumption = 6,529Liters of HSD will be utilized for Top soil

Rough stone:

Per hour Excavator will consume = 16 liters / hour
Per hour Excavator will excavate = 20$m^3$of Rough stone
Rough stone quantity = 13,42,330 /20 = 67,117hours
Diesel consume = 67,117hours x 16 liters
Total diesel consumption = 1,073,864Liters of HSD will be utilized for Rough stone
Total diesel consumption = 1,080,393 Liters of HSD will be utilized for five years.

Fuel Requirement -P3

Top soil:

Per hour Excavator will consume = 10 liters / hour
Per hour Excavator will excavate = 60$m^3$of Top soil
Top soil quantity = 43,575/60 = 726hours
Diesel consume = 726.25hours x 10 liters
Total diesel consumption = 7,263Liters of HSD will be utilized for Top soil

Rough stone:

Per hour Excavator will consume = 16 liters / hour
Per hour Excavator will excavate = 20$m^3$of Rough stone
Rough stone quantity = 5,67,114/20 = 28,356hours
Diesel consume = 28,356hours x 16 liters
Total diesel consumption = **4,53,691**Liters of HSD will be utilized for Rough stone
Total diesel consumption = **4,60,954**Liters of HSD will be utilized for five years.

Fuel Requirement -P4

Top soil:

Per hour Excavator will consume = 10 liters / hour
Per hour Excavator will excavate = 60$m^3$of Top soil
Top soil quantity = 39,183/60 = 653hours
Diesel consume = 653hours x 10 liters
Total diesel consumption = 6,531Liters of HSD will be utilized for Top soil

Rough stone:

Per hour Excavator will consume = 16 liters / hour
Per hour Excavator will excavate = 20$m^3$of Rough stone
Rough stone quantity = 7,46,132 /20 = 37,307hours
Diesel consume = 37,307hours x 16 liters
Total diesel consumption = 5**,96,906**Liters of HSD will be utilized for rough stone
Total diesel consumption = 6,**03,437**Liters of HSD will be utilized for first five years.

.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 2.25: EMPLOYMENT POTENTIAL FOR PROPOSED QUARRIES P1-P4

Identification code	Employment in Nos
P1	36
P2	36
P3	33
P4	36
Total	**141**

A total of 141 people will get employment due to these 4 quarries in the cluster quarries.

2.7.5 Project Cost

TABLE 2.26 – PROJECT COST OF PROPOSED PROJECTS P1- P4

Identification code	Project Cost
P1	Rs.3,55,44,000/-
P2	Rs. 3,51,84,000/-
P3	Rs.3,31,54,000/-
P4	Rs.3,55,44,000/-
Total	**Rs. 13,94,26,000/-**

Source: Approved Review of Mining Plan

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 2.27 – EXPECTED TIME SCHEDULE FOR THE PROPOSED QUARRIES

S. No	Particulars lease execution	Time schedule (in month)					Remarks if any
		1st	2nd	3rd	4th	5th	
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 covering Oct 2023 – Dec 2023 with CPCB guidelines. Environmental data has been collected with reference to cluster quarries by EHS 360 Labs Private Limited, – An accredited by ISO/IEC 17025:2017 (NABL) Laboratory for the below attributes- for the below attributes -

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

Study Area

An area of 10 km radius (aerial distance) from the periphery of the cluster is considered for EIA study. The data collection has been used to understand the existing environment scenario around the cluster quarries 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 season i.e., Oct 2023-Dec 2023

Methodology

Baseline data was generated for various environmental parameters including Land, Soil, Water (surface and groundwater), Air, Noise, Ecology & Biodiversity and Socio-economic status to determine the quality of the prevailing environmental settings. A MoEF accredited Laboratory was used for generating the baseline data.

1. The project area (Core zone) was surveyed in detail with the help of Total Station survey instrument and the boundary pillars were picked up with the help of handheld GPS. The boundary coordinates were superimposed on the satellite imagery to understand the relief of the area, besides Land use pattern of the area was studied through the Bhuvan (ISRO).
2. Soil samples were collected and analysed for relevant physico-chemical characteristics, exchangeable cations, nutrients & micro nutrients etc., in order to assess the impact of mining activities and proposed greenbelt development.

3. Ground water samples were collected during the study period from the open wells and bore wells, while surface water was collected from river and lake in the buffer zone. The samples were analysed for parameters necessary to determine water quality (based on IS: 10500:2012 criteria) and those which are relevant from the point of view of environmental impact of the proposed quarries.
4. A meteorological station was setup in pachapalayam village. Wind speed, Wind direction, Dry and wet bulb temperature, Relative humidity, Rainfall with cloud cover and general weather conditions were recorded throughout the study period.
5. In order to assess the Ambient Air Quality (AAQ), samples of Ambient Air were collected by installation of Respiratory Dust Samplers (RDS) for Fugitive dust, PM_{10} and SO_2, NO_X with gaseous attachments & Fine Dust Samplers (FDS) for $PM_{2.5}$ and other parameters as per NAAQ norms and analysed for primary air pollutants to work out the existing status of air quality.
6. The noise level measurements were also made at various locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.
7. Baseline biological studies were carried out to assess the ecology of the study area to study the existing flora and fauna pattern of the area.
8. Socio-Economic survey was conducted at village and household level in the study area to understand the present socio-economic conditions and assess the extent of impact due to the proposed mining project.

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

TABLE 3.1 – 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	Physio-Chemical Characteristics	Once during the study period	6 (2 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	PM_{10} $PM_{2.5}$ SO_2 NO_X Fugitive Dust	24 hourly twice a week (October – December 2023)	7 (2 core &5 buffer)	IS 5182 Part 1-23 National Ambient Air Quality Standards, CPCB

*Noise Levels	Ambient Noise	Hourly observation for 24 Hours per location	7 (2core & 5 buffer zone)	IS 9989 As per CPCB Guidelines
Ecology	Existing Flora and Fauna	Through field visit during the study period	Study Area	Primary Survey by Quadrate & Transect Study Secondary Data – Forest Working Plan
Socio Economic Aspects	Socio–Economic Characteristics, Population Statistics and Existing Infrastructure in the study area	Site Visit & Census Handbook, 2011	Study Area	Primary Survey, census handbook & need based assessments.

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

* All monitoring and testing are been carried out as per the Guidelines of CPCB and MoEF & CC.

3.1 LAND ENVIRONMENT

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

3.1.1 LAND USE/ LAND COVER

To study the land use pattern of the core as well as a buffer zone, land use/land cover details have been identified/ maps have been prepared in accordance with the **Standard ToR point no. 4 & 10 Stating**:

Point No. 4 All comer coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ topo sheet. topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features ofthe study area (core and buffer zone).

Point No. 10. Lard use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary. national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted.

Current vintage data of Indian Remote Sensing Satellite ResourceSat-2A L-III (False Color Composite) has been used for Land Use / Land Cover study. Satellite image has been procured from National Remote Sensing Centre, Hyderabad.

3.1.2 OBJECTIVE

The objectives of the LULC study are as follow:

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

Technical specification of Satellite imagery Data Used:

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

- Satellite Image - Resourcesat1-LISSIII, 23.5m Resolution
- Satellite Data Source - NRSC, Hyderabad
- Satellite Vintage - 14th Sept 2022, Swath 141km wide.
- SOI Toposheet No - 57 H/14
- Software Used - ArcGIS 10.8

The satellite image (FCC color 3,2,1) of the buffer zone is given in 3.1

The spatial resolution and the spectral bands in which the sensor collects the remotely sensed data are two important parameters for any land use survey. Resourcesat1-LISSIII, 23m Resolution of 23.5m and a 141 km wide swath of the earth in 23.5m resolution covering wide areas the data is collected in 4 visible bands namely band number and Resolution.

TABLE 3.2: Resourcesat1-LISSIII SENSOR characteristics

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

Source: NRSC, Hyderabad

3.1.3 METHODOLOGY

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

- Preliminary/primary data collection of the study area
- Satellite data procurement from NRSC
- Secondary data collection from authorized bodies
- Survey of India Toposheet (SOI)

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

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

Land Use Pattern of the Buffer Zone (Study area)

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

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

S.No	CLASSIFICATION	AREA_HA	AREA_%
	BUILTUP		
1	RURAL	349.80	1.03
2	URBAN	1466.71	4.31
3	MINING	672.22	1.97
	AGRICULTURAL LAND		
4	CROP LAND	20499.21	60.20
5	PLANTATION	2282.37	6.70
6	FALLOW LAND	3129.16	9.19
	FOREST		
7	FOREST	1809.16	5.31
	BARREN/WASTE LANDS		
8	SCRUB LAND	2872.78	8.44
	WETLANDS/ WATER BODIES		
9	WATER BODIES/LAKE	971.36	2.85
TOTAL		34052.76	100.00

Source: Bhuvan, NRSC.

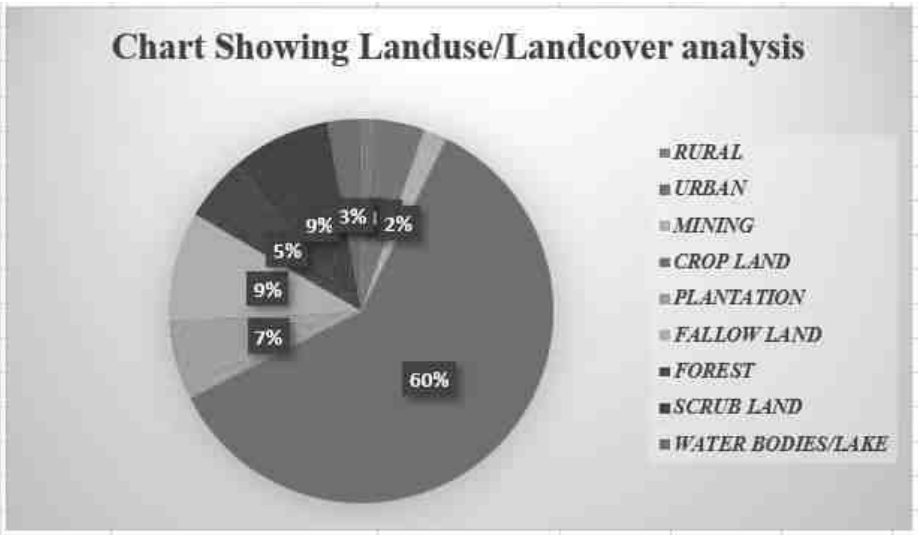


FIGURE 3.1: CHART SHOWING LANDUSE/LANDCOVER ANALYSIS USING LISS III Data

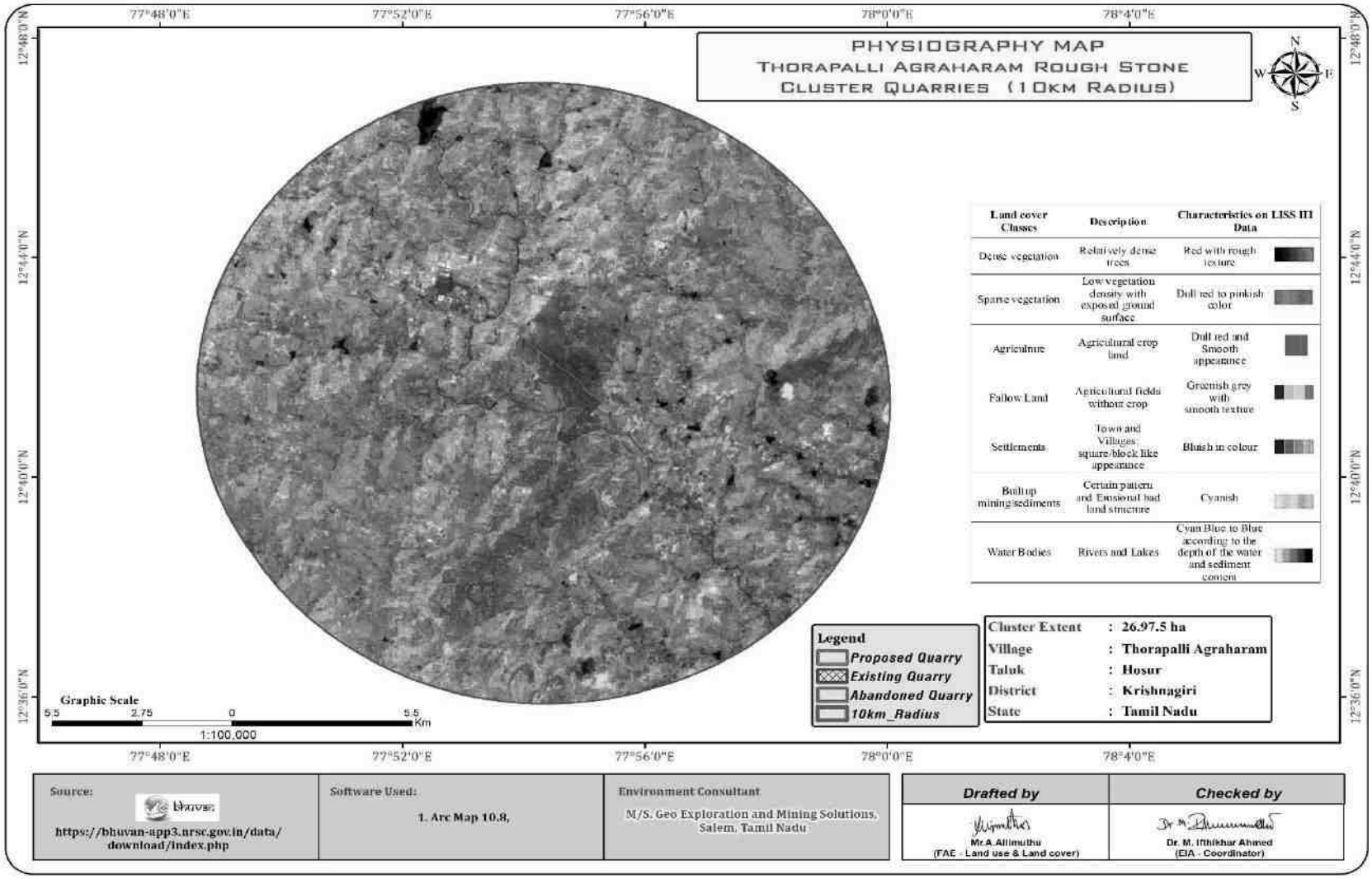


FIGURE 3.2: MAP SHOWING FALSE COLOR COMPOSITE (3,2,1) SATELLITE IMAGERY OF THE STUDY AREA

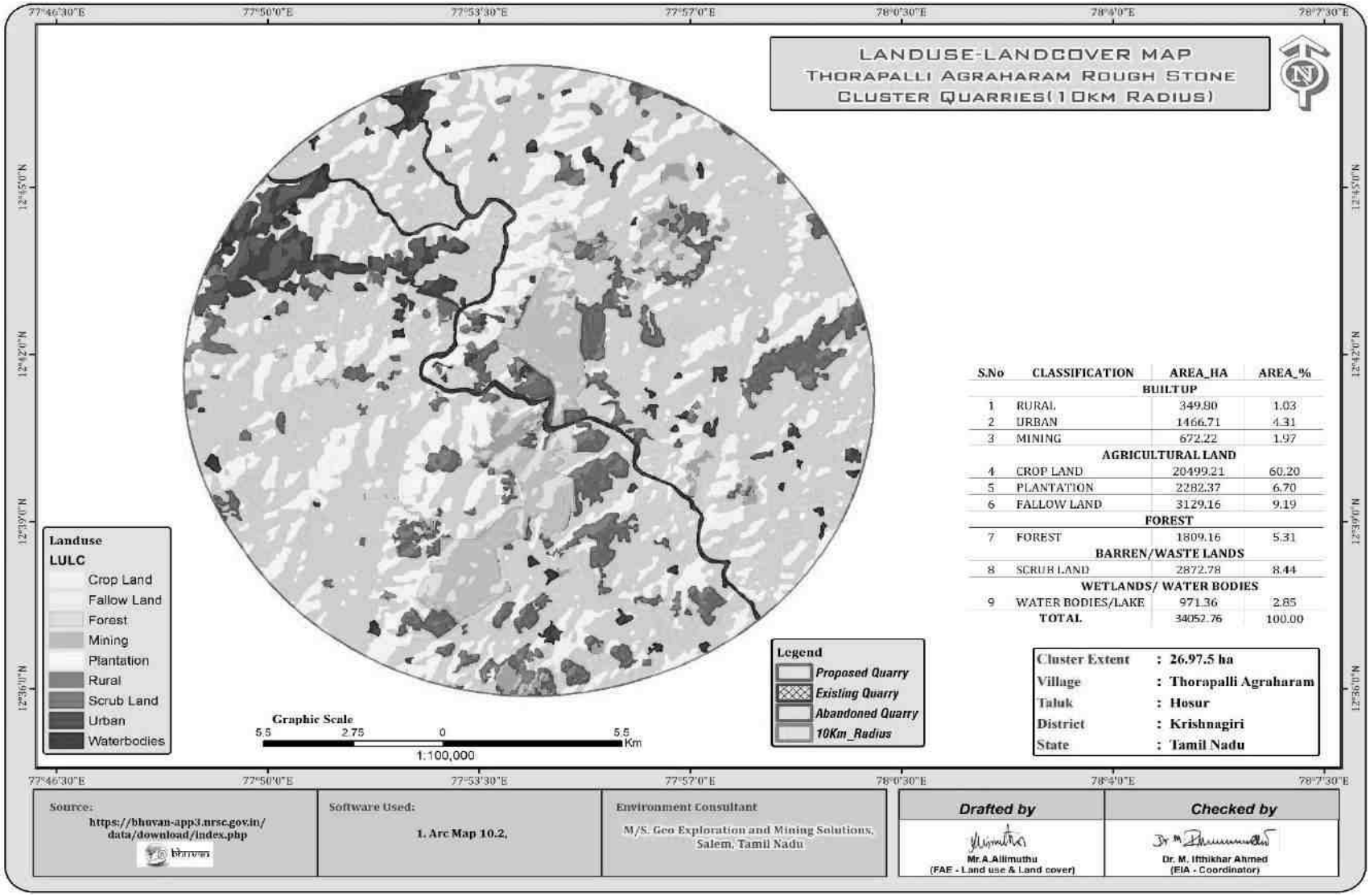


FIGURE 3.3: LAND USE LAND COVER MAP 10KM RADIUS

3.1.4 Interpretation

- The 10 km radius study area mainly comprises of crop land & Plantation crop accounting of 60.20% & 6.70% of the total study area. The study area also consists of fallow land of 9.19%.
- The buffer zone studied has no ecological sensitive area (National Park, Wildlife Sanctuary, Biosphere Reserve/ etc.).
- Water Bodies such as Rivers, Ponds/ lakes comprises of 2.85% of the total buffer area. The two seasonal rivers such as Ponnaiyar River 160m-S, Tippalam Lake 3.8km NW direction of the total study area.
- The Scrub land accounts of 8.44%. As per the primary survey, it was observed the scrub land is mainly occupied by the stony waste and left-over domestic waste generated by the nearby areas.
- The Sanamavu R.F, Perandapalli Forest direction in 5.31% covered in buffer zone.
- 1.97% of the total study area has occupied by the mine industries. The area occupied by Mainly Roughstone of the total buffer area. As also observed within the primary survey, the 10 km buffer area is also occupied by the medium scaled granite and small Brick kiln industries also located in the study area.
- 5.34% of the area is covered under the Builtup Land. The nearest village within the 3 km radius from the project site boundary is observed to be villages Thorapalli Agraharam, Kamandoddi, Gangapuram, Islampuram Villages etc.,

3.1.5 Cropping Pattern of the Buffer Zone

Krishnagiri district is one of the potential districts for cultivation of agricultural and horticultural crops. total cultivated area of 224767 Hectares, out of which 180902 Ha Net cultivated area against the 5,14,325 Ha. of total geographical area.

It is one of the potential districts for agricultural and horticultural crop production. The major agricultural crops in the district are grown Paddy, Ragi, Redgram, Cowpea, Maize, Cumbu, Groundnut, Horsegram and minor millets. The major cultivated area of agricultural crops occupied by rainfed agriculture. The major horticultural crops grown in the district are fruit crops like Mango, Banana and Guava, Vegetable like eggplant, okra, capsicum, onion and chilli, spices like Turmeric, Black pepper and flower crops like Rose, Gerbera and Carnations.

Source: https://www.agrifarming.in/district-wise-crop-production-in-tamil-nadu#krishnagiri

3.1.6 Interpretation and Conclusion

- Thorapalli Agraharam village Roughstone cluster quarries has proposed Project. It is a government land.
- Total project area is 34053 ha around 10km radius.
- Existing/ Proposed mine is coming in the area, percentage of human settlement will be increased in surrounding of project site and Infrastructure facilities also will be developed on the basis of requirement.
- The 10 km study area mostly covers of crop land 60.20%. As per current study area is occupied by scrub land 8.44%, Fallow land 9.19% and Forest land is 5.31%, Water bodies 2.85% in 10 km radius from the study area land use into quarrie purpose for this proposed project.
- The project site falls under the Roughstone region. Therefore, the area is appropriate for developing Road development and building etc., it shows that the region has good prospects in the future. Due to proposed Roughstone

in this region, economic condition of locals is expected to be improved directly & indirectly. Hence project will prove to be the best economic proposal for the coming times.

3.1.7 Topography

The project area is slightly elevated topography, surrounded by quarries and Crushing units. Altitude of the area is 537m AMSL there are no hilly regions in and around the area.

3.1.8 Drainage Pattern of the Area

There are no developed surface drainage channels in the study area. Ponnaiyar River a perennial pass 7.2km-South West from the project site. The area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. The area is mostly dry in all seasons except rainy seasons.

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 run off flows in N to SW direction. The drainage pattern of the study area is given in Fig. 3.5. The quarrying activity will not hinder the natural flow of rainwater.

3.1.9 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.

3.1.10 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.

TABLE 3.4 – DETAILS OF ENVIRONMENT SENSITIVITY AROUND THE PROJECT AREA

Sl. No	Sensitive Ecological Features	Name	Arial Distance in km from Mine Lease Boundary
1	National Park / Wild life Sanctuaries	Cauvery North Wildlife Sanctuary Cauvery South Wildlife Sanctuary	16km-S 40km-S
2	Reserve Forest	Sanamavu Ext II–	160m– NE
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	None	Nil within 10Km Radius
8	Defence Installation	None	Nil within 10Km Radius

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

FIGURE 3.4: LAND USE LAND COVER MAP 500M RADIUS

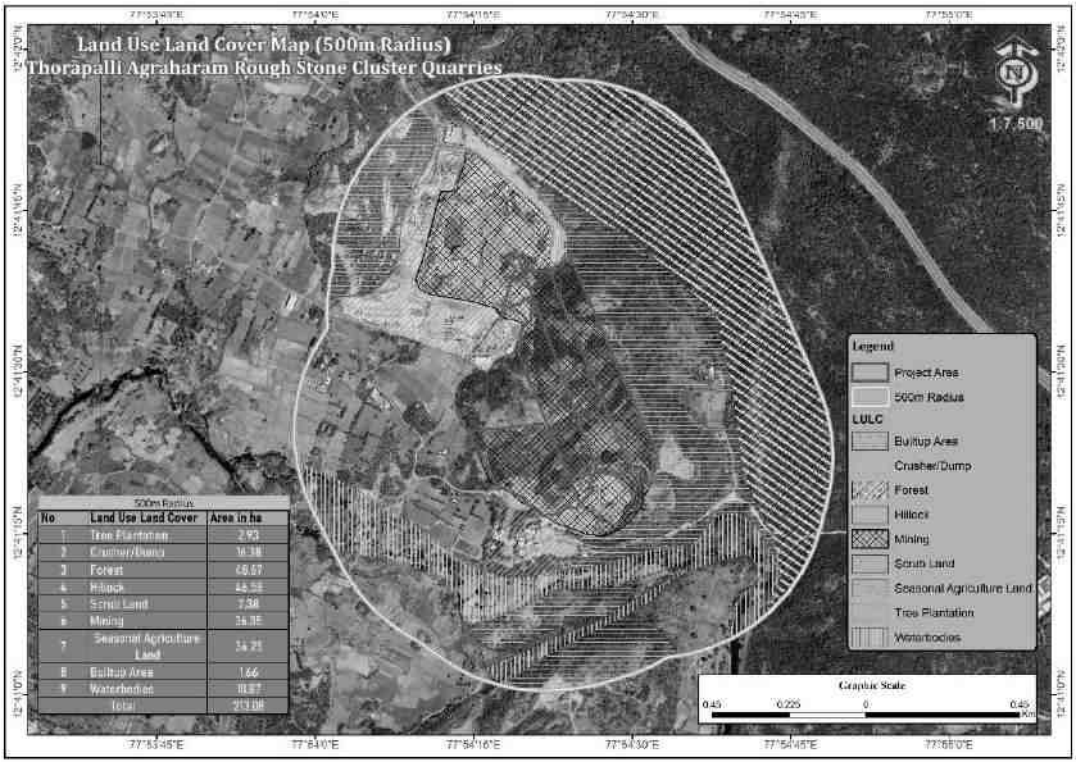


Table 3.5: LAND USE LAND COVER MAP 500M RADIUS

S. No	CLASSIFICATION	AREA_HA
1	Tree Plantation	2.93
2	Crusher/Dump	16.38
3	Forest	48.67
4	Hillock	46.58
5	Scrub Land	7.38
6	Mining	36.35
7	Seasonal Agriculture Land	34.25
8	Builtup Area	1.66
9	Waterbodies	18.87
TOTAL		213.08

Interpretation

Land use Landcover of the area within 500m radius were studied in detailed that the majority of the land within 500m is forest land (48.67Ha) followed by Mining area (36.35ha), Seasonal Agriculture Land (34.25ha) Tree Plantation (2.93ha) are contributing majority of the land use.

3.1.11 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 3.6.

TABLE 3.6 – SOIL SAMPLING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	S-1	Core Zone	Project Area	12°41'25.94"N 77°54'26.46"E
2	S-2	Core Zone	Project Area	12°41'23.85"N 77°54'23.43"E
3	S-3	Thorapalli Agraharam	2km SW	12°41'10.65"N 77°53'1.09"E
4	S-4	Bukkasagaram	4.5km NE	12°43'27.28"N 77°56'10.94"E
5	S-5	Pathakotta	5km SE	12°39'22.95"N 77°56'35.95"E
6	S-6	Komudepalli	3.5km NW	12°42'38.91"N 77°52'30.55"E

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

FIGURE 3.6: SITE PHOTOGRAPHS OF SOIL SAMPLING LOCATIONS

The objective of the soil sampling is -

1. To determine the baseline soil characteristics of the study area;
2. To determine the impact of proposed activity on soil characteristics and;

To determine the impact on soil more importantly agriculture production point of view.

Methodology –

For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the proposed quarry site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. six (6) locations were selected for soil sampling on the basis of soil types,

vegetative cover, industrial & residential activities including infrastructure facilities, which would accord an overall idea of the soil characteristics. The samples were analysed for physical and chemical characteristics. The 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 3.7.

TABLE 3.7 – METHODOLOGY OF SAMPLING COLLECTION

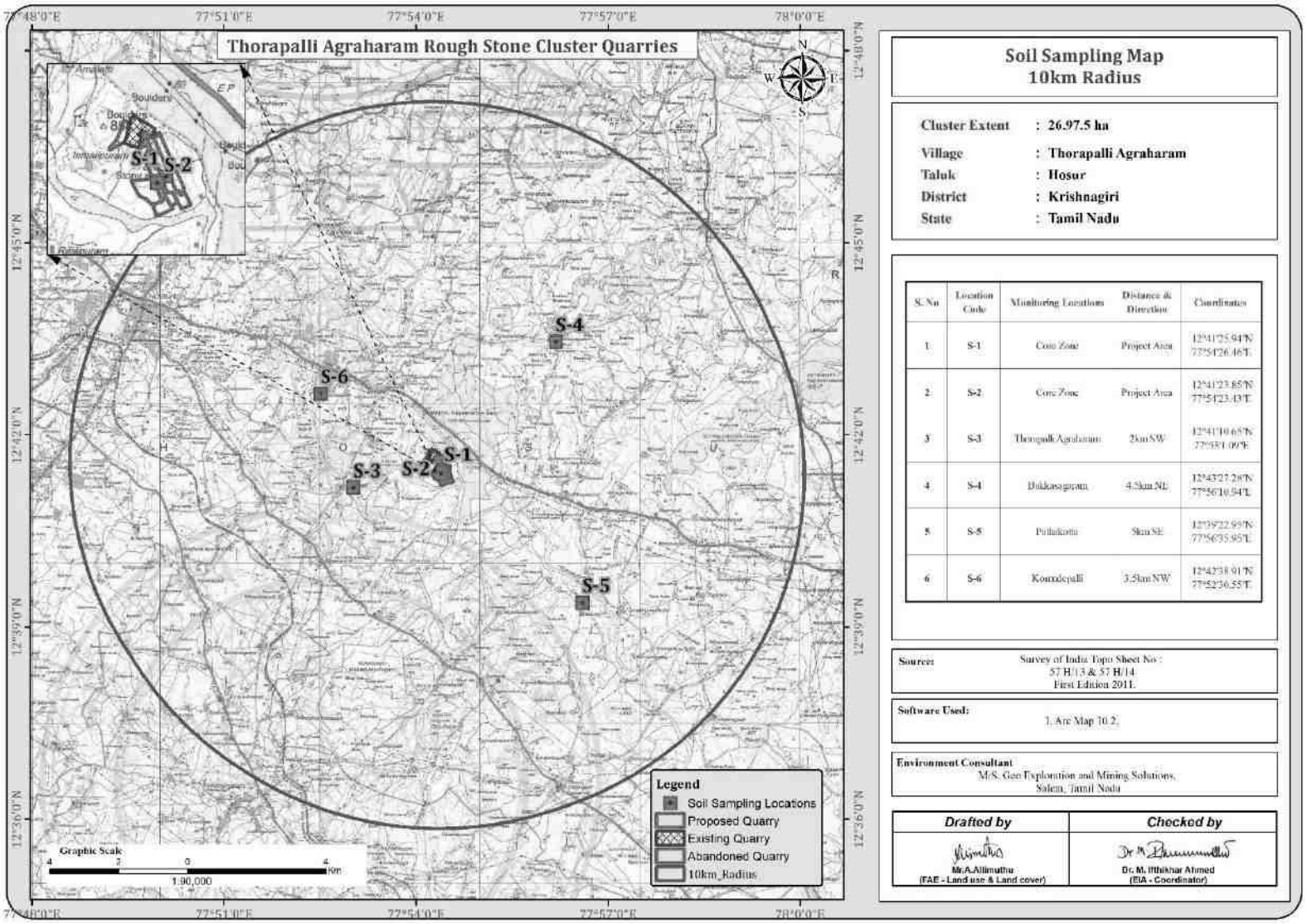
Particulars	Details
Frequency	One grab sample from each station-once during the study period
Methodology	Composite grab samples of the topsoil were collected from 3 depths, and mixed to provide a representative sample for analysis. They were stored in airtight Polythene bags and analysed at the laboratory.

Source: On-site monitoring/sampling by EHS 360 Labs Private Limited

Soil Testing Result –

The samples were analysed as per the standard methods prescribed in "Soil Chemical Analysis (M.L. Jackson, 1967) & Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India". The important properties analysed for soil are bulk density, porosity, infiltration rate, pH and Organic matter, kjeldahi Nitrogen, Phosphorous and Potassium. The standard classification of soil and physico-chemical characteristics of the soils are presented below in Table 3.7 & Test Results in Table 3.8.

FIGURE 3.7: SOIL SAMPLING LOCATIONS AROUND 10 KM RADIUS



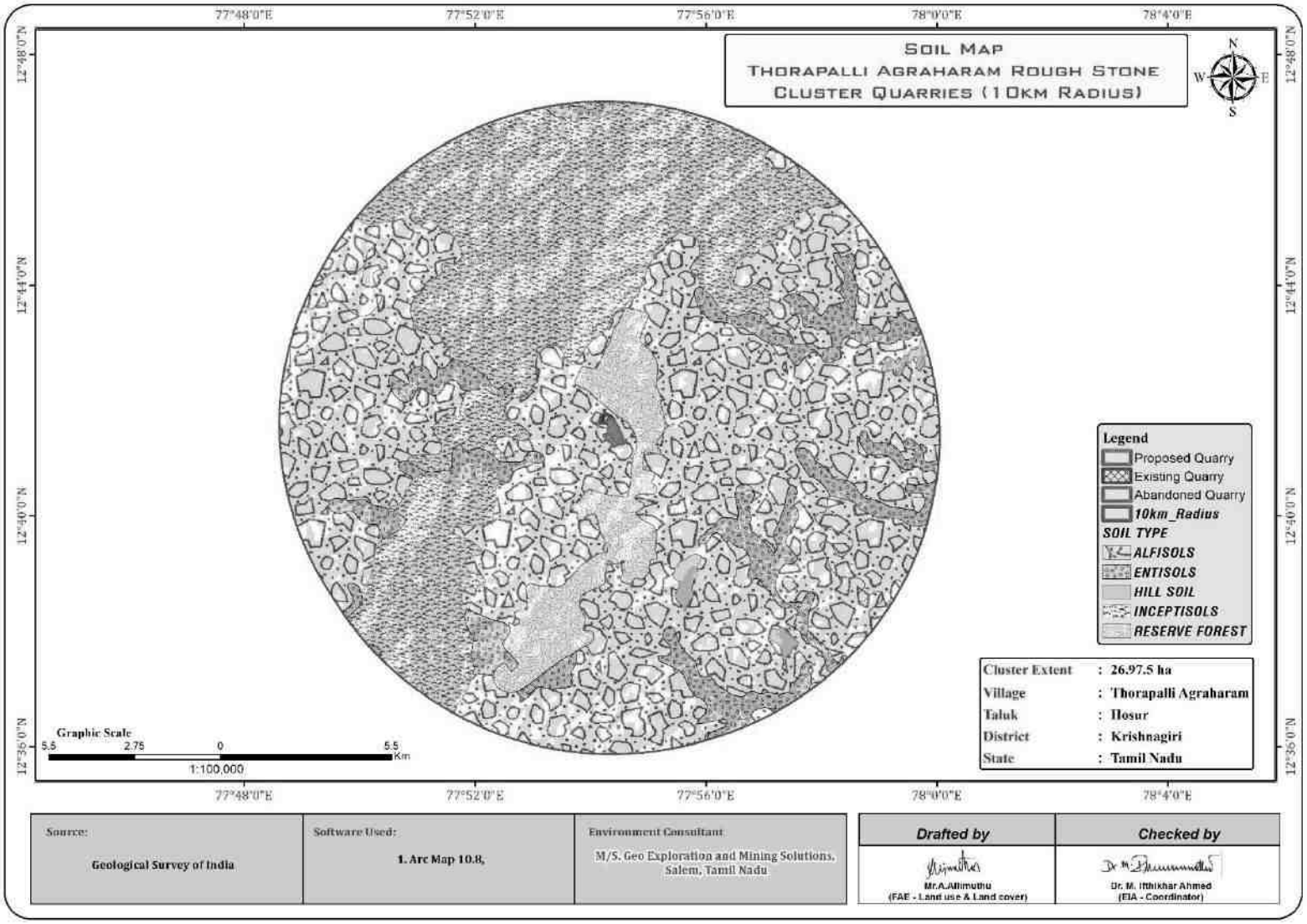


FIGURE 3.8: SOIL MAP

TABLE 3.8 – SOIL QUALITY MONITORING DATA

S.No	Test Parameters	Protocols	S1-Core Zone	S2- Core Zone	S3- Thorapalli Agraharam	S4- Bukkasagaram	S5- Pathakotta	S6- Komudepalli
1	pH @ 25°C	IS 2720 Part 26 - 1987 (Reaff:2016)	8.31	8.19	8.42	8.98	8.06	8.63
2	Conductivity @ 25°C	IS 14767 - 2000 (Reaff : 2016)	423 µmhos/cm	400 µmhos/cm	355 µmhos/cm	405 µmhos/cm	406 µmhos/cm	559 µmhos/cm
3	Water Holding Capacity	By Gravimetric Method	42.3 %	47.9 %	45.4 %	46.8. %	47.1 %	44.9 %
4	Bulk Density	By Cylindrical Method	1.03 g/cm3	1.17 g/cm3	1.10 g/cm3	1.04 g/cm3	1.05 g/cm3	1.05 g/cm3
5	Porosity	By Gravimetric Method	46.6 %	46.4 %	46.6 %	47.8 %	45.9 %	47.5 %
6	Calcium as Ca	Food and Agriculture organization of the united Nation Rome 2007 : 2018	31.2 mg/kg	42 mg/kg	32.5 mg/kg	51.3 mg/kg	61.5 mg/kg	49 mg/kg
7	Magnesium as Mg		28 mg/kg	40.5 mg/kg	27.1 mg/kg	44.1 mg/kg	31 mg/kg	20.4 mg/kg
8	Chloride as Cl	APHA 23rd Edn 2019 4500 Cl B	38.4 mg/kg	20.16 mg/kg	23.3 mg/kg	20.5 mg/kg	32.7 mg/kg	66.6 mg/kg
9	Soluble Sulphate as SO_4	IS 2720 Part 27 : 1977 (Reaff:2015)	0.0012 %	0.0024 %	0.0021 %	0.0021 %	0.0015 %	0.0019 %
10	Total Phosphorus as P	IS 10158 : 1982 (Reaff: 2019)	3.21 mg/kg	2.10 mg/kg	3.15 mg/kg	5.16 mg/kg	3.64 mg/kg	6.23 mg/kg
11	Total Nitrogen as N	IS 14684 : 1999 (Reaff:2019)	395.5 mg/kg	505.2 mg/kg	477.3 mg/kg	413.3 mg/kg	421.05 mg/kg	470.7 mg/kg
12	Organic Matter	IS : 2720 Part 22: 1972 (Reaff: 2015)	1.6 %	1.91 %	2.40 %	1.95 %	1.98 %	2.12 %
13	Organic Carbon	IS : 2720 Part 22: 1972 (Reaff: 2015)	0.98 %	1.11 %	1.39 %	1.13 %	1.15 %	1.23 %
14	Texture :							
	Clay	Gravimetric Method	31.6 %	30.5 %	33.3 %	30.6 %	31.4 %	30.8 %
	Sand		29.4 %	30.6 %	28.6 %	31.5 %	31.3 %	32.5 %
	Silt		39.0 %	38.9 %	38.1 %	37.9 %	37.3 %	36.7 %
15	Manganese as Mn	USEPA 3050 B – 1996 &	11.2 mg/kg	10 mg/kg	7.10 mg/kg	8.1 mg/kg	18.5 mg/kg	22.3 mg/kg
16	Zinc as Zn	USEPA 6010 C - 2000	3.1 mg/kg	5.56 mg/kg	3.45 mg/kg	12.5 mg/kg	3.10 mg/kg	4.3 mg/kg
17	Boron as B		2.23 mg/kg	2.06 mg/kg	4.65 mg/kg	1.11 mg/kg	5.3 mg/kg	1.26 mg/kg
18	Potassium as K		20 mg/kg	51.5 mg/kg	35.4 mg/kg	31.5 mg/kg	25 mg/kg	32 mg/kg
19	Cadmium as Cd		BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
20	Total Chromium as Cr		2.51	2.06	2.61	4.15	4.14	1.55
21	Copper as Cu		BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)	BDL (DL : 1.0 mg/kg)
22	Lead as Pb		1.0 mg/kg	1.10 mg/kg	1.51 mg/kg	2.04 mg/kg	2.05 mg/kg	1.16 mg/kg
23	Iron as Fe		7.16 mg/kg	4.05 mg/kg	1.10 mg/kg	5.3 mg/kg	8.3 mg/kg	3.16 mg/kg
24	Cation Exchange Capacity	USEPA 9080 – 1986	41.5 meq/100g of soil	35.5 meq/100g of soil	45.3 meq/100g of soil	42.0 meq/100g of soil	49.1 meq/100g of soil	37.5 meq/100g of soil

Source: Sampling Results by EHS 360 Labs 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 to Sandy Soil and Bulk Density of Soils in the study area varied between 1.03– 1.17 g/cm^3. The Water Holding Capacity (42.3-47.9%) and Porosity of the soil samples is found to be medium i.e., ranging from 45.9– 47.8%.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline in nature with pH range 8.06 to 8.98
- The available Nitrogen content range between 395.5 mg/kg to 505.2 mg/kg
- The available Phosphorus content range between 2.10 mg/kg to 6.23 mg/kg
- The available Potassium range between 20 mg/kg to 51.5 mg/kg

Whereas, the micronutrient as zinc (Zn), iron (Fe) and copper (Cu) were found in the range of 3.1 to 5.56 mg/kg; 1.10 to 7.16mg/kg.

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

3.2 Water Environment

The water resources, both surface and groundwater play a significant role in the development of the area. The purpose of this study is to assess the water quality characteristics for critical parameters and evaluate the impacts on agricultural productivity, domestic community usage, recreational resources and aesthetics in the vicinity. The water samples were collected and transported as per the norms in pre-treated sampling cans to laboratory for analysis.

3.2.1 Surface Water Resources:

The study area is studded with few tanks that serve as the source of drinking water and also their surplus feeds adjoining tanks. The rainfall over the area is moderate, the rainwater storage in open wells and trenches are in practice over the area and the stored water acts as source of freshwater for couple of months after rainy season.

TABLE 3.9 – WATER BODIES WITHIN THE CLUSTER FROM PROPOSED QUARRIES P1 to P4

P-1

S. No	NAME	DISTANCE & DIRECTION	Habitation
1	Kuttai	610m NW	930m NW
2	Ponnaiyar River	200m South	
3	Tippalam Lake	3.8km NW	
4	Kamandoddi Lake	4.1km SE	
5	Kelavarapalli Dam	8.7km NW	

P-2

S.No	NAME	DISTANCE & DIRECTION	Habitation
1	Kuttai	640m NW	940m NW

2	Ponnaiyar River	240m South	
3	Tippalam Lake	3.9km NW	
4	Kamandoddi Lake	4km SE	
5	Kelavarapalli Dam	8.7km NW	

P-3

S.No	NAME	DISTANCE & DIRECTION	Habitation
1	Kuttai	840m NW	1.2km NW
2	Ponnaiyar River	160m South	
3	Tippalam Lake	3.9km NW	
4	Kamandoddi Lake	4.1km SE	
5	Kelavarapalli Dam	9.2km NW	

P-4

S.No	NAME	DISTANCE & DIRECTION	Habitation
1	Kuttai	740m NW	1.km NW
2	Ponnaiyar River	200m South	
3	Tippalam Lake	4km NW	
4	Kamandoddi Lake	4km SE	
5	Kelavarapalli Dam	8.8km NW	

Source: Village Cadastral Map and Field Survey, PFR Report

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 3.10 and shown as Figure 3.10

TABLE 3.10 – WATER SAMPLING LOCATIONS

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	SW-1	Ponnaiyar River	250m SE	12°41'12.98"N 77°54'31.58"E
2	SW-2	karapalli Lake	5.8km NW	12°42'29.69"N 77°51'3.10"E
3	WW-1	Near Project Area	370m West	12°41'40.01"N 77°53'55.54"E
4	WW-2	Agaram	6km SE	12°38'2.39"N 77°55'6.88"E
5	BW-1	Near Project Area	200m South	12°41'13.33"N 77°54'16.88"E
6	BW-2	Bukkasagaram	4.5km NE	12°43'32.85"N 77°56'17.47"E

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

Note: SW- Surface water, WW – Well Water, BW – Bore well

FIGURE 3.9: SITE PHOTOGRAPHS OF WATER SAMPLING LOCATIONS

TABLE 3.11 – SURFACE WATER ANALYSIS RESULTS

SNO	TEST	PROTOCOL	Surface Water (SW-1) - Ponnaiyar River	Surface Water (SW-2) – karapalli Lake
1	Colour	IS 3025 Part 4:1983 (Reaff:2017)	10 Hazen	5 Hazen
2	Odour	IS 3025 Part 5:2018	Agreeable	Agreeable
3	pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.43	7.31
4	Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	877 µmhos/cm	714 µmhos/cm
5	Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	6.3 NTU	6.2 NTU
6	Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	517 mg/l	421 mg/l
7	Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	195.63 mg/l	182.87 mg/l
8	Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	35.4 mg/l	32.1 mg/l
9	Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	26.1 mg/l	25 mg/l
10	Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	175 mg/l	135 mg/l
11	Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	110 mg/l	70 mg/l
12	Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	51.1 mg/l	35.5 mg/l
13	Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.22 mg/l	0.16 mg/l
14	Residual Free Chlorine	IS 3025 Part 26:1986 (Reaff:2019)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)
15	Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.16 mg/l	0.21 mg/l
16	Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	10.5 mg/l	7.5 mg/l
17	Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
18	Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
19	Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
20	Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)
21	Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
22	Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
23	Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
24	Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
25	Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)
26	Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
27	Mineral Oil	IS 3025 Part 39-1991 (Reaff. 2019)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)
28	Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
29	Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
30	Cyanide as CN	IS 3025 Part 27-1986 (Reaff. 2019)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
31	BOD @ 27°C for 3 days	IS 3025 Part 44:1993 (Reaff:2019)	9.8 mg/l	6.4 mg/l
32	Chemical Oxygen Demand	IS 3025 Part 58:2006 (Reaff:2017)	50 mg/l	30 mg/l
33	Dissolved Oxygen	IS 3025 Part 38:1989 (Reaff:2019)	5.6 mg/l	5.4 mg/l
34	Barium as Ba	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)
35	Ammonia (as total ammonia-N)	IS 3025 Part 34-1988 (Reaff. 2019)	1.1 mg/l	1.9 mg/l
36	Sulphide as H_2S	IS 3025 Part 29-1986 (Reaff: 2019)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
37	Molybdenum as Mo	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
38	Total Arsenic as As	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
39	Total Suspended Solids	IS 3025 Part 17 -1984 (Reaff:2017)	18.8 mg/l	15.5 mg/l
40	**Total Coliform**	**APHA 23rd Edn. 2017:9221B**	510 MPN/100ml	710 MPN/100ml
41	***Escherichia coli***	**APHA 23rd Edn. 2017:9221F**	140 MPN/100ml	160 MPN/100ml
Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number				

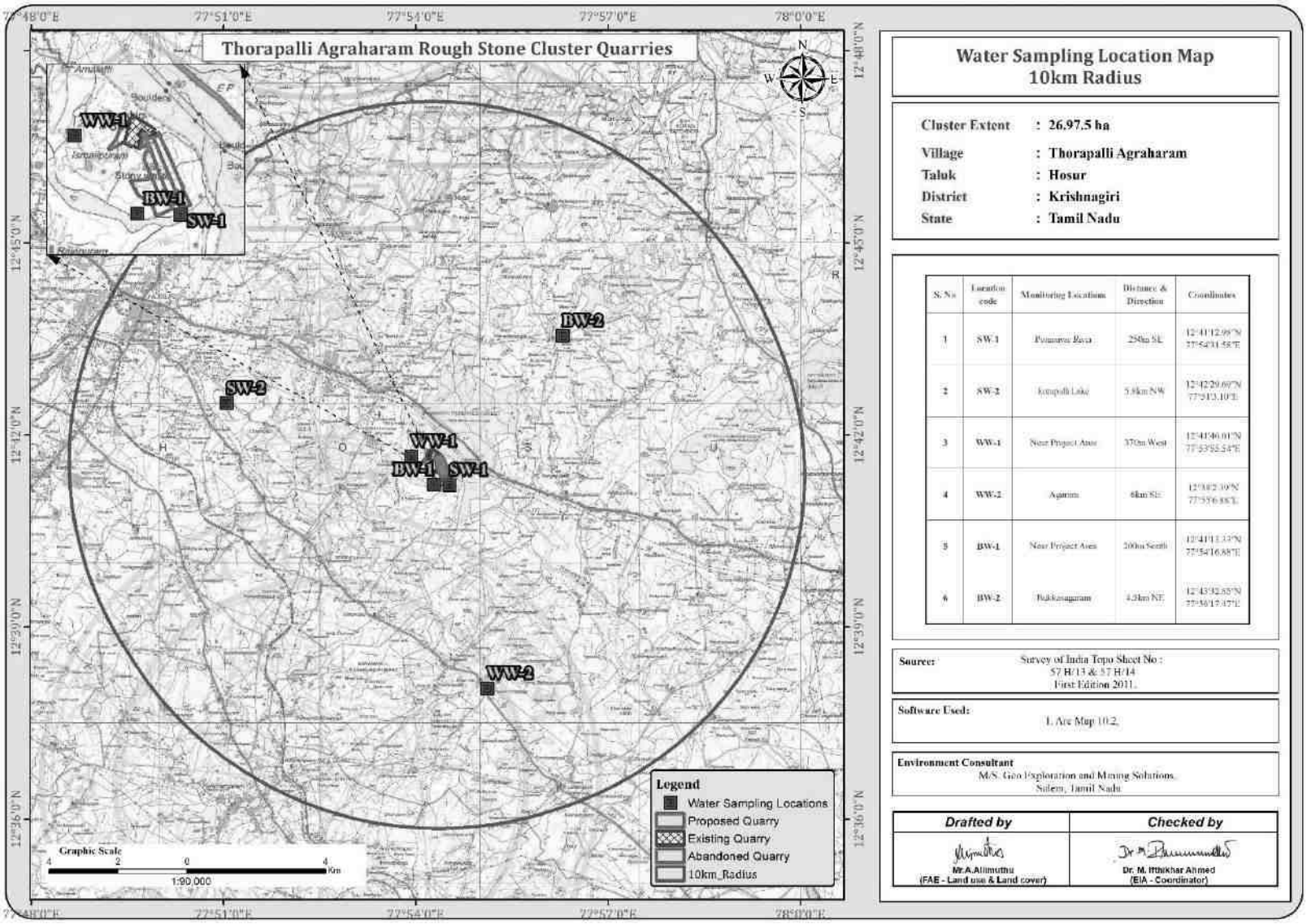
TABLE 3.12 – GROUND WATER ANALYSIS RESULTS

Sno	Test	Protocol	Ground Water (WW1) – Near Project Area	Ground Water (WW-2) – Agaram	Ground Water (BW-1) – Near Project Area	Ground Water (BW2) – Bukkasagaram
1	Colour	IS 3025 Part 4:1983 (Reaff:2017)	5	5	5	5
2	Odour	IS 3025 Part 5:2018	Agreeable	Agreeable	Agreeable	Agreeable
3	pH at 25°C	IS 3025 Part 11:1983 (Reaff:2017)	7.46	7.10	7.91	7.06
4	Conductivity @ 25°C	IS 3025 Part 14:2013 (Reaff:2019)	606 µmhos/cm	902 µmhos/cm	827 µmhos/cm	1022 µmhos/cm
5	Turbidity	IS 3025 Part 10:1984 (Reaff:2017)	1.0 NTU	1.1 NTU	1.0 NTU	1.0 NTU
6	Total Dissolved Solids	IS 3025 Part 16:1984 (Reaff:2017)	357 mg/l	532 mg/l	488 mg/l	603 mg/l
7	Total Hardness as $CaCO_3$	IS 3025 Part 21:2009 (Reaff:2019)	196.64 mg/l	184.46 mg/l	197.61 mg/l	236.92 mg/l
8	Calcium as Ca	IS 3025 Part 40:1991 (Reaff:2019)	38.6 mg/l	30.1 mg/l	32.4 mg/l	41.4 mg/l
9	Magnesium as Mg	IS 3025 Part 46:1994 (Reaff:2019)	24.4 mg/l	26.6 mg/l	28.4 mg/l	32.5 mg/l
10	Total Alkalinity as $CaCO_3$	IS 3025 Part 23:1986 (Reaff:2019)	202 mg/l	190 mg/l	150 mg/l	210 mg/l
11	Chloride as Cl	IS 3025 Part 32:1988 (Reaff:2019)	115.5 mg/l	106 mg/l	81 mg/l	126 mg/l
12	Sulphate as SO_4	IS 3025 Part 24:1986 (Reaff:2019)	52 mg/l	59.7 mg/l	70.5 mg/l	74 mg/l
13	Iron as Fe	IS 3025 Part 53:2003 (Reaff:2019)	0.39 mg/l	0.21 mg/l	0.21 mg/l	0.20 mg/l
14	Residual Free Chlorine	IS 3025 Part 26:1986 (Reaff:2019)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)	BDL (DL:0.1 mg/l)
15	Fluoride as F	APHA 23rd Edn. 2017:4500 F,D	0.20 mg/l	0.12 mg/l	0.36 mg/l	0.16 mg/l
16	Nitrate as NO_3	IS 3025 Part 34:1988 (Reaff:2019)	8.1 mg/l	8.88 mg/l	5.1 mg/l	6.4 mg/l
17	Copper as Cu	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
18	Manganese as Mn	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
19	Mercury as Hg	USEPA 200.8	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
20	Cadmium as Cd	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)	BDL (DL:0.001 mg/l)
21	Selenium as Se	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
22	Aluminium as Al	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
23	Lead as Pb	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
24	Zinc as Zn	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
25	Total Chromium as Cr	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)	BDL(DL : 0.02 mg/l)
26	Boron as B	IS 3025 Part 65:2014 (Reaff:2019)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)	BDL(DL : 0.05 mg/l)
27	Mineral Oil	IS 3025 Part 39-1991 (Reaff. 2019)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)	BDL(DL : 0.01 mg/l)
28	Phenolic compounds as C_6H_5OH	IS 3025 Part 43-1992(Reaff: 2019)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)	BDL (DL:0.0005 mg/l)
29	Anionic Detergents (as MBAS)	IS 13428 – 2005 (Reaff:2019) (Annex K)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
30	Barium as Ba	IS 3025 Part 27-1986 (Reaff. 2019)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)	BDL(DL:0.05 mg/l)
31	Ammonia (as total ammonia-N)	IS 3025 Part 44:1993 (Reaff:2019)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
32	Sulphide as H_2S	IS 3025 Part 58:2006 (Reaff:2017)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)	BDL (DL:0.01 mg/l)
33	Molybdenum as Mo	IS 3025 Part 38:1989 (Reaff:2019)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)	BDL (DL:0.02 mg/l)
34	Total Arsenic as As	IS 3025 Part 65:2014 (Reaff:2019)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)	BDL (DL:0.005 mg/l)
35	Total Suspended Solids	IS 3025 Part 17 -1984 (Reaff:2017)	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)	BDL (DL:1.0 mg/l)	BDL (DL:0.005 mg/l)
36	**Total Coliform**	APHA 23rd Edn. 2017:9221B	155 MPN/100ml	170 MPN/100ml	100 MPN/100ml	190 MPN/100ml
37	***Escherichia coli***	APHA 23rd Edn. 2017:9221F	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml	< 1.8 MPN/100ml
	Note : APHA – American Public Health Association, BDL – Below Detection Limit, DL – Detection Limit, MPN – Most Probable Number					

* 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.

Source: Sampling Results by EHS 360 Labs Private Limited.

FIGURE 3.10: WATER SAMPLING LOCATIONS AROUND 10 KM RADIUS



3.2.4 Interpretation& Conclusion

Surface Water

The pH of surface 7.31-7.43 while turbidity found within the standards. Total Dissolved Solids 421-517mg/l and Chloride 70.0-110mg/l. Nitrates 7.5-10.5 mg/l, while sulphates 35.5-51.1mg/l.

Ground Water

The pH of the water samples collected ranged from 7.06 to 7.91and within the acceptable limit of 6.5 to 8.5. pH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. on Turbidity, the water samples meet the requirement. Total Dissolved Solids were found in the range of 357– 603mg/l in all samples. The Total hardness varied between 184.46 – 236.92 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 hard rock formation Fissured and Fractured crystalline rocks constitute the important aquifer systems in the district. Geophysical prospecting was carried out in that area by SSRMP-ATS Instrument by qualified Geo physicist with the help of IGIS software and it was inferred that the low resistance encountered at the depth between 60-65m Bgl. the quarrying operations is restricted upto 45m hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area. There is no necessity of stream, channel diversion due to this upcoming project.

During the rainy season there is a possibility of collection of seepage water from the subsurface levels this is due to the high intensity of fracture and weathered portion upto a depth of 60-65m thus the collected seepage water will be stored in the mine sump pits and will be used for dust suppression and greenbelt development and during the end of the life of the mine this collected water will be as a temporary reservoir in that area.

3.2.6 Ground Water Resources:

Krishnagiri district is underlain entirely by Archaean Crystalline formations with Recent alluvial deposits occurring along the river and streams courses and colluvium of valley-fills. The important aquifer systems in the district are constituted by weathered, fissured and fractured crystalline rocks and the recent alluvial deposits.

Ground water occurs under phreatic conditions. The maximum saturated thickness of these aquifers is upto 5 m depending upon the topographic conditions. The study area falls in the Thorapalli Agraharam which is categorized as Safe (< 70%) as per G.O (MS) No 113 dated 09.06.2016.

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

TABLE 3.13: POST MONSOON WATER LEVEL OF OPEN WELLS 1 KM RADIUS

S.No	Name	LONGITUDE	LATITUDE	Oct-23	Nov-23	Dec-23
1	OW1	77° 54' 03.3216" E	12° 41' 27.9099" N	12.4	12.9	13.5
2	OW2	77° 53' 55.3780" E	12° 41' 40.0278" N	11.7	12.2	12.8
3	OW3	77° 53' 59.9949" E	12° 41' 52.8865" N	12.1	12.6	13.2
4	OW4	77° 54' 13.5800" E	12° 41' 29.8500" N	12	12.5	13.1
5	OW5	77° 53' 50.5969" E	12° 42' 02.3540" N	12.4	12.9	13.5
6	OW6	77° 53' 57.5142" E	12° 41' 06.4148" N	11.9	12.4	13
7	OW7	77° 53' 39.9801" E	12° 41' 02.3275" N	11.8	12.3	12.9
8	OW8	77° 55' 27.8997" E	12° 41' 46.7906" N	11.6	12.1	12.7

FIGURE 3.11: CONTOUR MAP OF OPEN WELL WATER LEVEL

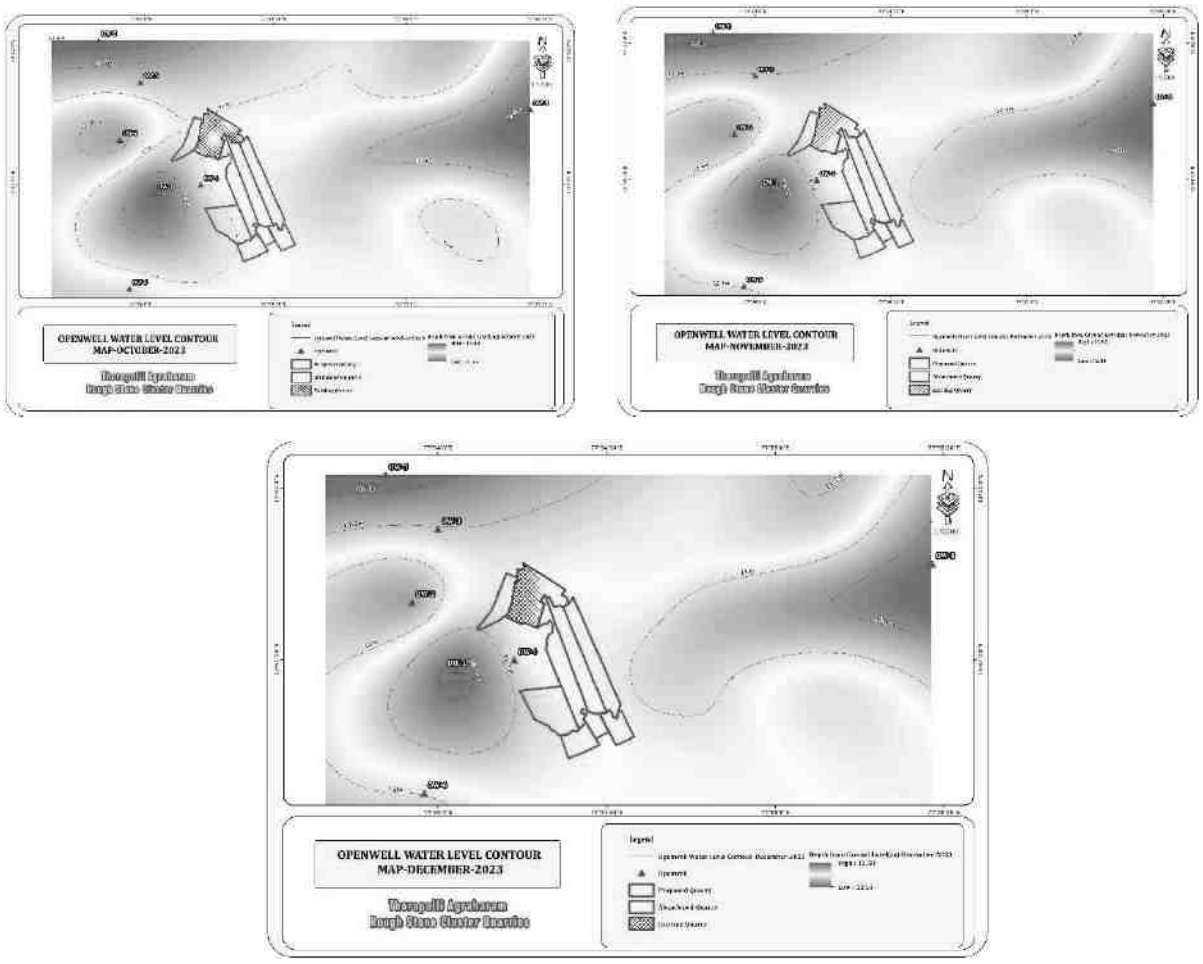


TABLE 3.14: POST MONSOON WATER LEVEL OF BOREWELLS 1 KM RADIUS

S.No	LABEL	LONGITUDE	LATITUDE	Oct-23	Nov-23	Dec-23
1	BW1	77° 54' 01.1111" E	12° 41' 31.5759" N	62.4	62.9	63.5
2	BW2	77° 53' 53.8003" E	12° 42' 01.5386" N	61.7	62.2	62.8
3	BW3	77° 54' 14.1895" E	12° 41' 31.2703" N	62	62.5	63.1
4	BW4	77° 54' 16.8098" E	12° 41' 13.4233" N	61.8	62.3	62.9
5	BW5	77° 53' 48.2745" E	12° 41' 00.7489" N	62.3	62.8	63.4
6	BW6	77° 54' 37.0567" E	12° 41' 29.7191" N	62.4	62.9	63.5
7	BW7	77° 55' 26.9513" E	12° 41' 51.3960" N	62.5	63	63.6

FIGURE 3.12: CONTOUR MAP OF BORE WELL WATER LEVEL

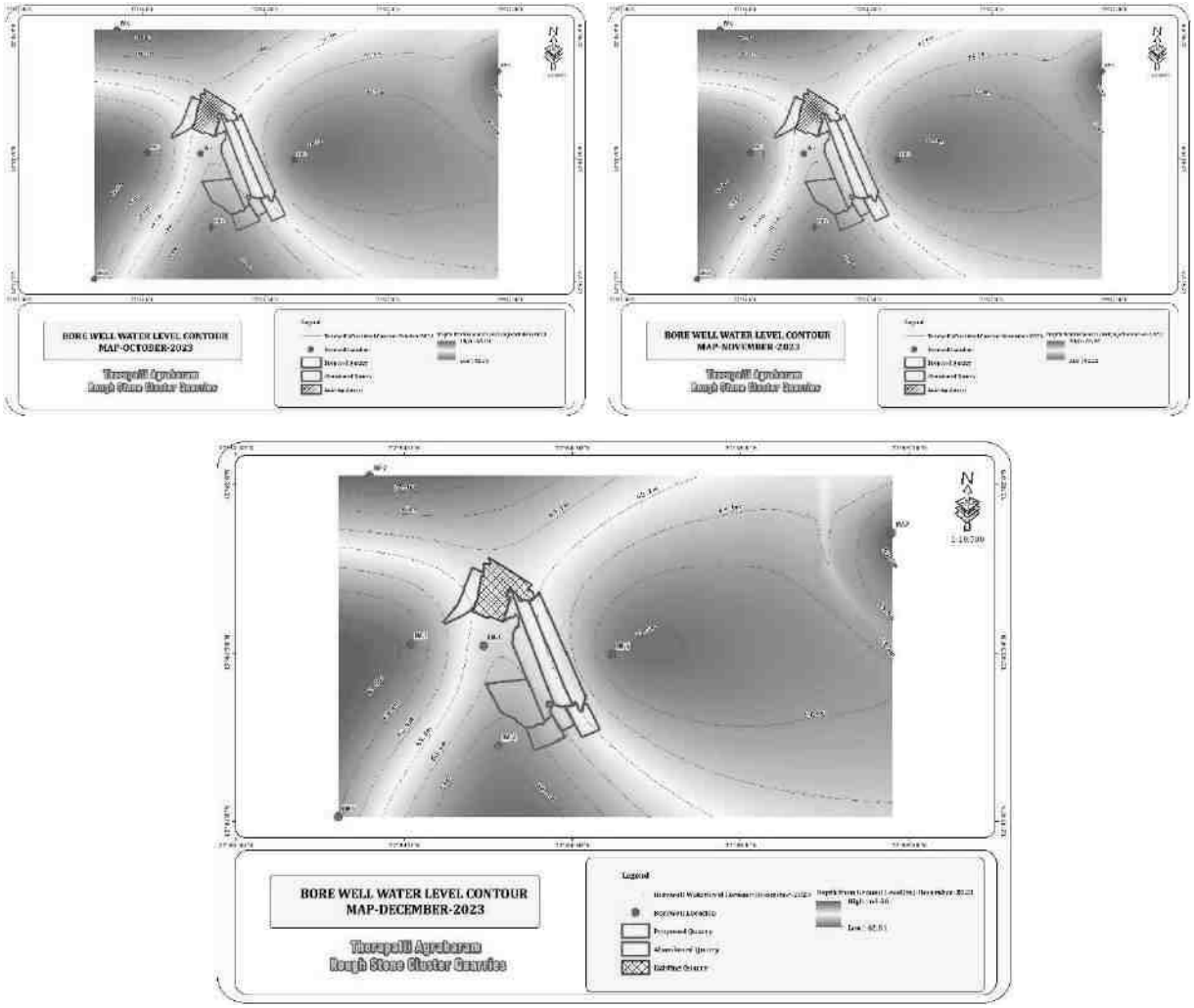


FIGURE 3.13: DRAINAGE MAP AROUND 10 KM RADIUS FROM PROJECT SITE

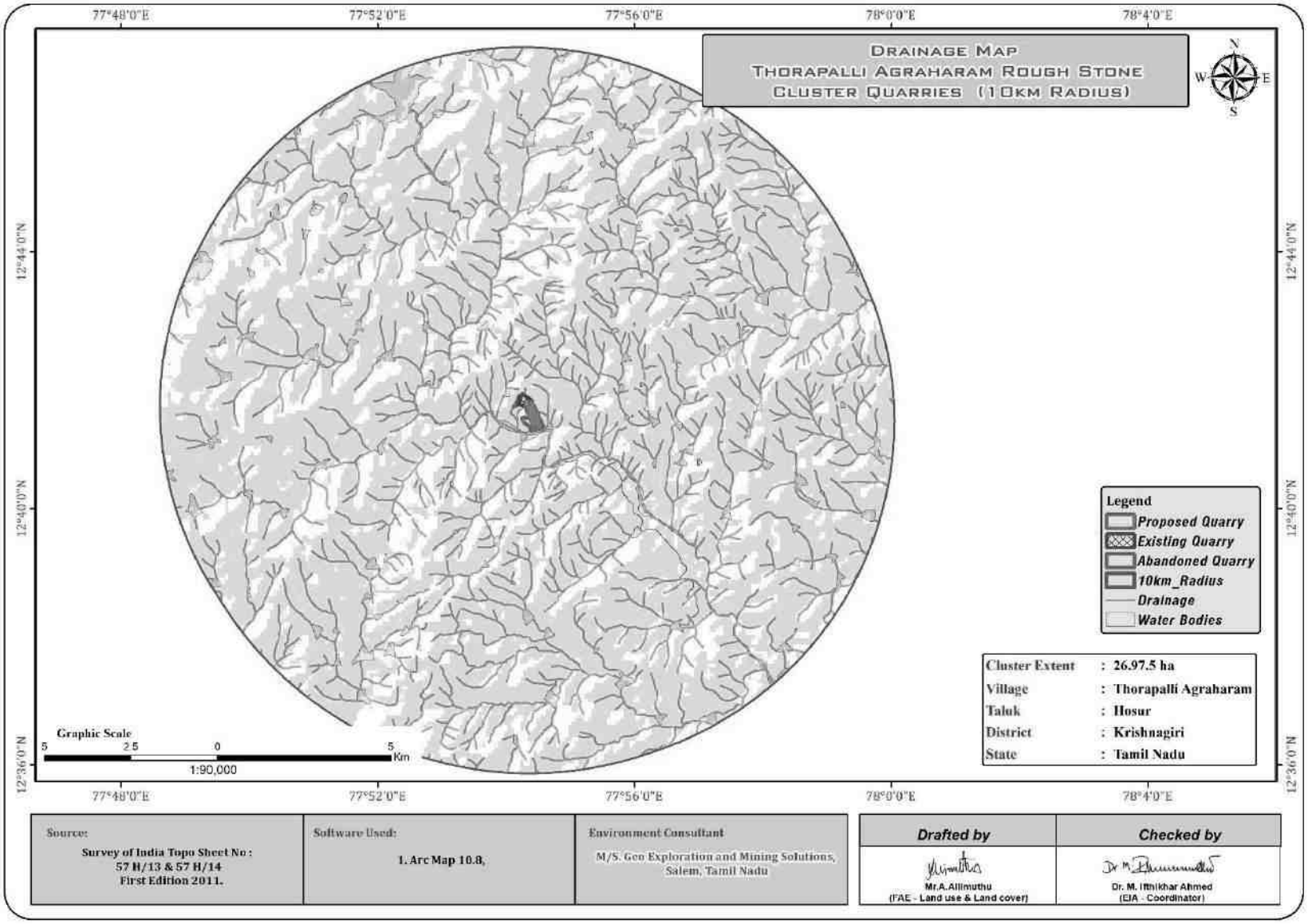
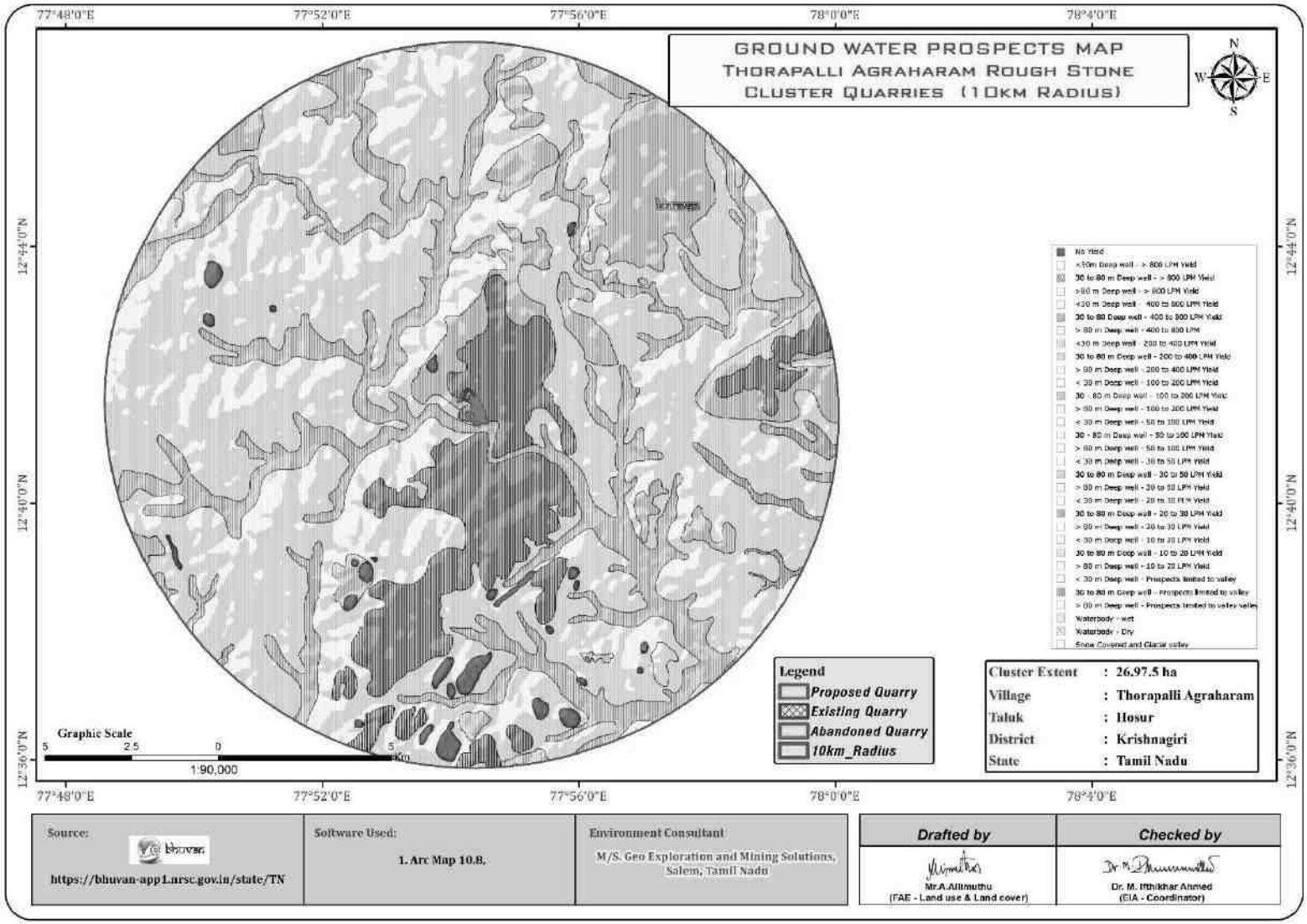


FIGURE 3.14: GROUND WATER PROSPECTS MAP



Source : Bhuvan

3.2.6 Methodology and Data Acquisition

Electric Resistivity Method is well established for delineating lateral as well vertical discontinuities in the resistive structure of the Earth's subsurface. The present study makes use of vertical electric sounding (VES) to delineate the Vertical Resistivity structure at depth. Schlumberger electrode set up was employed for making sounding measurements. Since it is least influenced by lateral in homogeneities and is capable of providing higher depth of investigation. This is four electrodes collinear set up where in the outer electrodes send current into the ground and the inner electrodes measure the potential difference.

The present study utilizes maximum current electrode separation AB/2. The data from this survey are commonly arranged and contoured in the farm of Pseudo-section that gives an approximate of the subsurface resistivity. This technique is used for the inversion of Schlumberger VES data to predict the layer parameter namely layer resistivity and Geo electric layer thickness. The main goal of the present study is to search the vertical in homogeneities that is consistent with the measured data.

For a Schlumberger among the Apparent resistivity can be calculated as follows

$$\rho_a = G\frac{\Delta V}{I}$$

ΔV = potential difference between receiving electrodes

G = Geometric Factor.

Rocks show wide variation in resistivity ranging from 10-8 more than 10+14 ohmmeter. On a broad classification, one can group the rocks falling in the range of 10-8 to 1 ohmmeter as good conductors. 1 to 106 ohmmeter as intermediate conductors and 106 to 1012 ohmmeter as more as poor conductor. The resistivity of rocks and subsurface lithology, which is mostly dependent on its porosity and the pore fluid resistivity is defined by Archie's Law,

$$\rho_r = F\rho_w = a\,\emptyset^m\rho_w$$

ρr = Resistivity of Rocks

ρw = Resistivity of water in pores of rock

F = Formation Factor

$\emptyset$ = Fractional pore volume

A = Constants with values ranging from 0.5 to 2.5

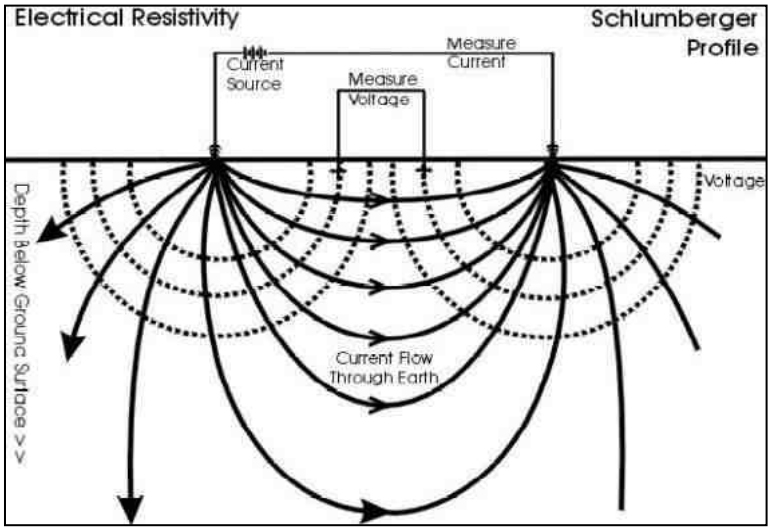
3.2.7 Survey Layout

The layout for a resistivity survey depends on the choice of the current and potential electrode arrangement, which is called electrode array. Here the present study is considered with Schlumberger array. In which the distance may be used for current electrode separation while potential electrode separation is kept on third to one fifth of the same. One interesting aspect in VES is the principle of reciprocity, which permits interchange of the potential and current electrode without any effect on the measured apparent resistivity.

The field equipment deployed for the study is in a deep resistivity meter with a model of SSRMP ATS this Signal stacking Resistivity meter is a high-quality data acquisition system incorporating several innovation features for Earth resistivity. In the presence of random earth Noises the signal to nose ration can be enhanced by $\sqrt{N}$ where N

is the number of stacked readings. This SSR meter in which running averages of measurements [1, (1+2)/2, (1+2+3)/3 … (1+2...+16/16)] up to the chosen stacks are displayed and the final average is stored automatically, in memory utilizing the principles of stacking to achieve the benefit of high signals to noise ratio. Based on these above significations the signal stacking resistivity meter was used for (VES) Vertical Electric Resistivity Sounding.

RESISTIVITY SURVEY PROFILE



Measurements of ground Resistivity is essentially done by sending a current through two electrodes called current electrodes (C_1& $C_{2)}$ and measuring the resulting potential by two other electrodes called potential electrode (P_1& P_2). The amount of current required to be sent into the ground depends on the contact resistance at the current electrode, the ground resistivity and the depth of interest.

3.2.8 Data Presentation

It was inferred that the low resistance encountered at the depth between 60-85Bgl. The maximum depth proposed out of proposed projects is 70-65m BGL. Hence there is no possibilities of water table intersection during the entire mine life period besides it is also inferred topographically that there are no major water bodies intersecting the project area.

3.2.9 Geophysical Data Interpretation

The geophysical data was obtained to study the lateral variations, vertical in homogeneities in the sub – surface with respect to the availability of groundwater. From the interpreted data, it has inferred that the area has moderate groundwater potential in the investigated area. This small quarrying operation will not have any significant impact on the natural water bodies.

3.3 Air Environment

The ambient air quality with respect to the study area of 10km radius including the cluster quarries forms the baseline information. The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality during the operations

The existing ambient air quality of the area is important for evaluating the impact of mining activities on the ambient air quality. These will also be useful for assessing the conformity to standards of the ambient air quality during the proposed quarries within the radius of 500m.

The sources of air pollution in the region are mostly due to vehicular traffic, dust arising from unpaved village road and domestic & agricultural activities. This section describes the identification of sampling locations, methodology adopted during the monitoring period and sampling frequency.

The baseline status of the ambient air quality has been assessed through scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions.
- Topography of the study area.
- Likely impact area.

3.3.1 Meteorology & Climate

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

A temporary meteorological station was installed at project site. The station was installed at a height of 4m above the ground level in such a way that there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature are recorded on hourly basis.

Climate

- The climate is tropical in Krishnagiri. In Krishnagiri, the quantity of rainfall during summers surpasses that of winters. This climate is considered to be Aw according to the Köppen-Geiger climate classification. The temperature here averages 25.5 °C | 77.9 °F. The annual precipitation in this location is approximately 773 mm | 30.4 inch.
- Krishnagiri are in the middle of our planet and the summers are not easy to define. The optimal period to plan a visit would be during the months of January, February, March, April, May, June, July, August, September, October, November.
- The driest month is February. There is 6 mm | 0.2 inch of precipitation in February. On average, the highest amount of rainfall occurs during October with a mean value of 144 mm | 5.7 inch.
- With an average of 29.0 °C | 84.2 °F, April is the warmest month. On average, the month of December is considered to be the coldest time of year with temperatures averaging at around 21.9 °C | 71.4 °F. https://en.climate-data.org/asia/india/tamil-nadu/krishnagiri-34157

Rainfall

The average annual rainfall and the 5 years rainfall is as follows:

TABLE 3.15 – RAINFALL DATA

Actual Rainfall in mm					Normal Rainfall in mm
2017	2018	2019	2020	2021	
1145.6	510.4	730.0	798.6	985.4	985

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

TABLE 3.16 – METEOROLOGICAL DATA RECORDED AT SITE

S.No	Parameters		Oct–2023	Nov–2023	Dec-2023
1	Temperature (^{0}C)	Max	26.4	25.34	25.63
		Min	22.88	22.07	19.88
		Avg	24.64	23.70	22.75
2	Relative Humidity (%)	Avg	75.78	80.59	76.15
3	Wind Speed (m/s)	Max	4.73	4.69	5.29
		Min	0.95	1.26	1.88
		Avg	2.84	2.97	3.58
4	Cloud Cover (OKTAS)		0-8	0-8	0-8
5	Wind Direction		E, ENE	ENE,E	ENE,NE

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

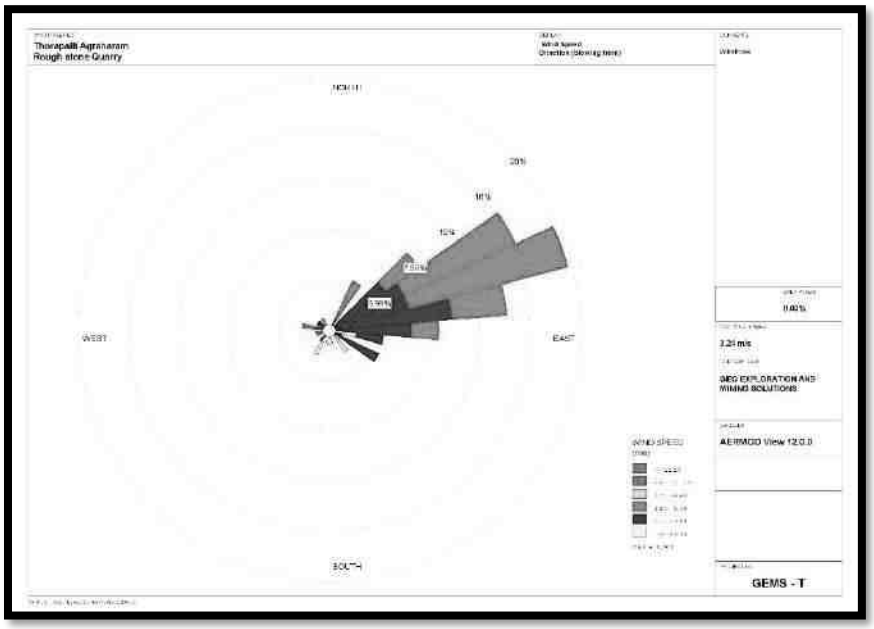
3.3.2 Correlation between Secondary and Primary Data

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

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

Windrose diagram of the study site is depicted in Figure. 3.8. Predominant downwind direction of the area during study season is North East to South West.

FIGURE 3.15: WINDROSE DIAGRAM



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 E, ENE,

2.Wind velocity readings were recorded between 0.50 to 5.70 km / hour

3.Calm conditions prevail of about 0.00% of the monitoring period

4.Temperature readings ranging from 19.48 to 26.4^{0}C

5.Relative humidity ranging from 75.78 to 85.87%

6.The monitoring was carried out continuously for three months

3.3.3 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

3.3.4 Sampling and Analytical Techniques

TABLE 3.17 – 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 withgaseous attachment
NO_x	IS-5182 Part II (Jacob & Hochheiser modifiedmethod)	Respirable Dust Sampler with gaseous attachment
Free Silica	NIOSH – 7601	Visible Spectrophotometry

Source: Sampling Methodology followed by EHS 360 Labs Private Limited & CPCB Notification

TABLE 3.18 – 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.

3.3.5 Frequency & Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two samples per week at Eight (8) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period Mar2023-May2023. The baseline data of ambient air has been generated for PM_{10}, $PM_{2.5}$, Sulphur Dioxide (SO_2) & Nitrogen Dioxide (NO_2).

3.3.6 Ambient Air Quality Monitoring Stations

Seven (7) monitoring stations were set up in the study area as depicted in Figure 3.17 for assessment of the Proposed ambient air quality. Details of the sampling locations are as per given below.

TABLE 3.19 – AMBIENT AIR QUALITY (AAQ) MONITORING LOCATIONS

S. No	Location Code	Monitoring Locations	Distance & Direction	Coordinates
1	AAQ-1	Core Zone	Project Area	12°41'27.77"N 77°54'27.66"E
2	AAQ-2	Core Zone	Project Area	12°41'23.74"N 77°54'23.25"E
3	AAQ-3	Thorapalli Agraharam	2km SW	12°41'10.24"N 77°53'1.93"E
4	AAQ-4	Bukkasagaram	4.5km NE	12°43'28.40"N 77°56'10.20"E
5	AAQ-5	Angondapalli	7km SW	12°39'42.41"N 77°50'46.83"E
6	AAQ-6	Pathakotta	5km SE	12°39'22.18"N 77°56'33.99"E
7	AAQ-7	Komudepalli	3.5km NW	12°42'39.58"N 77°52'30.48"E

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

FIGURE 3.16: SITE PHOTOGRAPHS OF AMBIENT AIR MONITORING

Source: Monitoring photographs from the Lab tean with site engineer

FIGURE 3.17 AMBIENT AIR QUALITY LOCATIONS AROUND 10 KM RADIUS

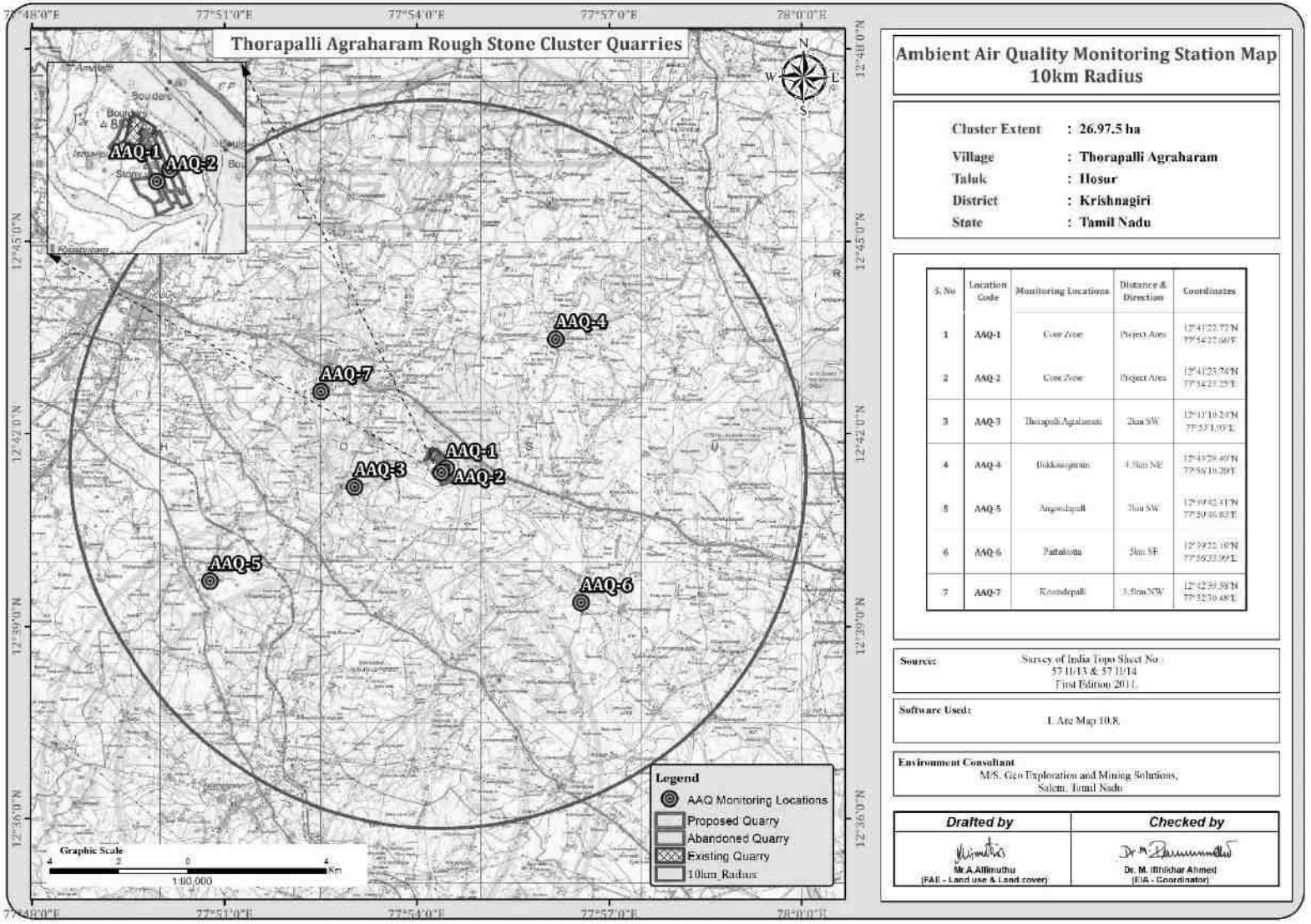


TABLE 3.20: SUMMARY OF AAQ1-AAQ7

PM10	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	46.0	43.4	43.1	42.2	43.5	43.5	43.0
Minimum	45.0	41.0	40.1	40.1	41.1	42.5	41.3
Maximum	47.7	45.3	45.2	45.5	45.8	48.6	45.5
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PM2.5	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	21.5	21.5	21.7	21.6	43.5	45.2	22.4
Minimum	20.1	20.2	20.2	20.1	20.4	17.5	21.0
Maximum	22.9	22.6	22.6	23.1	23.3	22.6	24.3
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0
SO2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	8.1	6.1	6.3	8.0	6.7	7.5	6.9
Minimum	6.2	4.3	5.1	7.2	5.0	6.2	5.2
Maximum	9.9	7.6	7.6	9.0	8.2	9.2	8.9
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0
NO2	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	23.9	20.4	22.2	21.7	21.2	23.9	22.9
Minimum	21.5	18.3	18.2	18.9	18.6	23.0	20.1
Maximum	27.6	23.4	24.5	25.7	23.4	25.3	25.3
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0

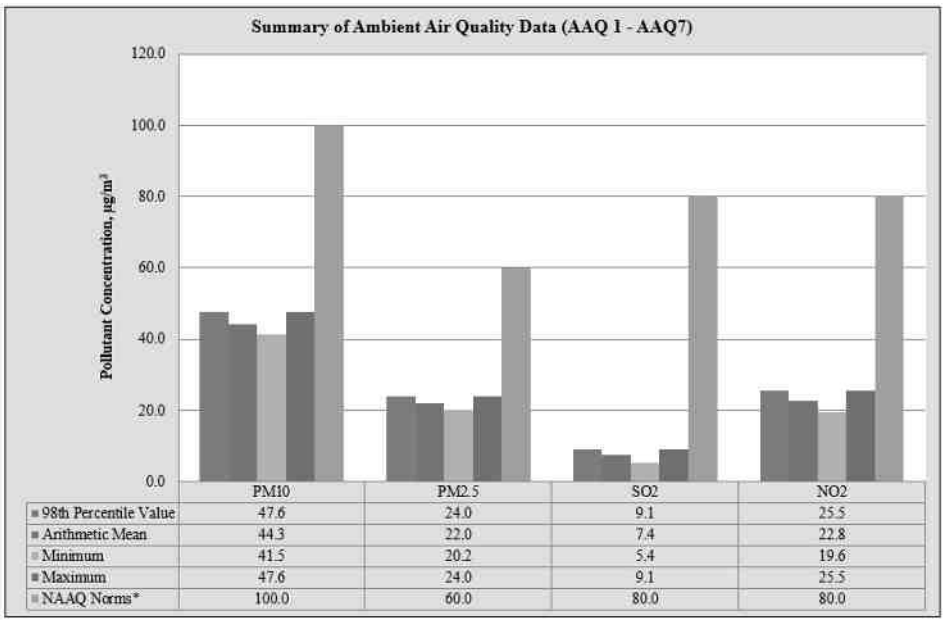
TABLE 3.21 – ABSTRACT OF AMBIENT AIR QUALITY DATA

1	**Parameter**	**PM10**	**PM2.5**	**SO_2**	**NO_2**
2	98^{th} Percentile Value	47.6	24.0	9.1	25.5
3	Arithmetic Mean	44.3	22.0	7.4	22.8
4	Geometric Mean	44.3	22.0	7.3	22.7
5	Standard Deviation	1.9	1.1	1.2	1.8
6	Minimum	41.5	20.2	5.4	19.6
7	Maximum	47.6	24.0	9.1	25.5
8	**NAAQ Norms***	100.0	60.0	80.0	80.0
	% Values exceeding Norms*	0.0	0.0	0.0	0.0

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

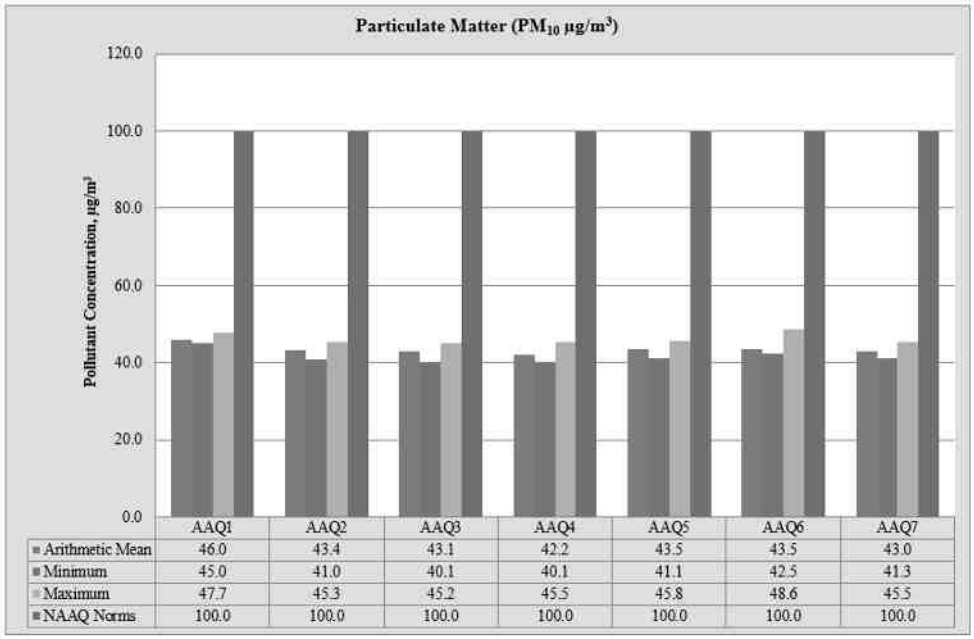
* NAAQ Norms-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Area.

FIGURE 3.18: BAR DIAGRAM OF SUMMARY OF AAQ 1 – AAQ 7



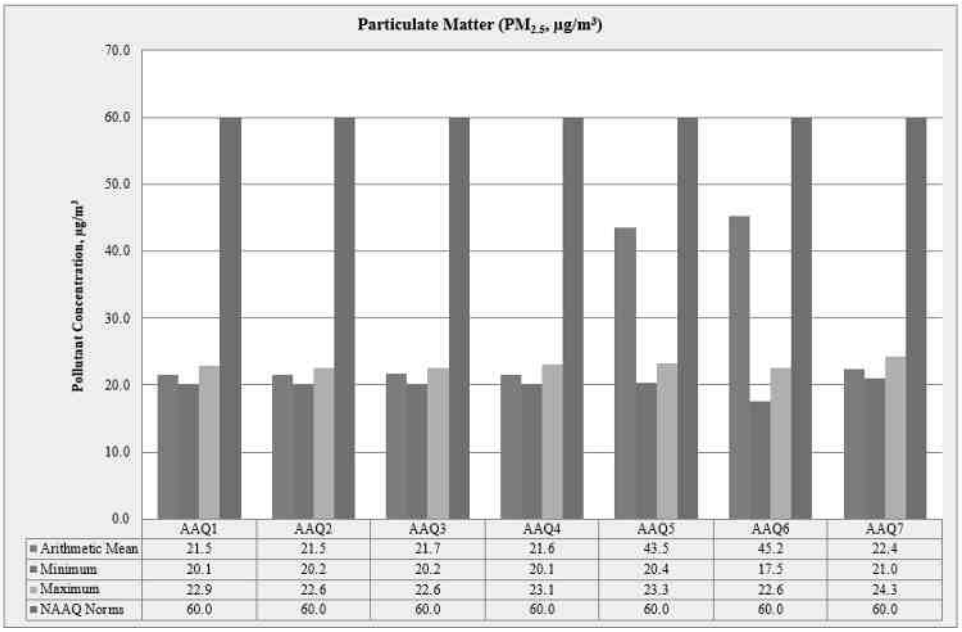
	PM10	PM2.5	SO2	NO2
98th Percentile Value	47.6	24.0	9.1	25.5
Arithmetic Mean	44.3	22.0	7.4	22.8
Minimum	41.5	20.2	5.4	19.6
Maximum	47.6	24.0	9.1	25.5
NAAQ Norms*	100.0	60.0	80.0	80.0

FIGURE 3.19 : BAR DIAGRAM OF PARTICULATE MATTER (PM_{10})



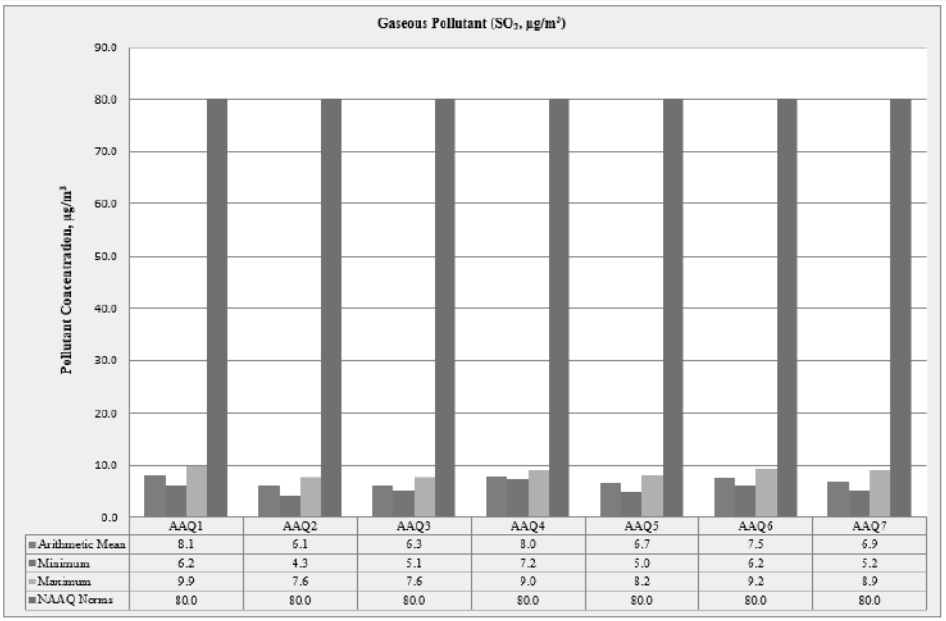
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	46.0	43.4	43.1	42.2	43.5	43.5	43.0
Minimum	45.0	41.0	40.1	40.1	41.1	42.5	41.3
Maximum	47.7	45.3	45.2	45.5	45.8	48.6	45.5
NAAQ Norms	100.0	100.0	100.0	100.0	100.0	100.0	100.0

FIGURE 3.20 : BAR DIAGRAM OF PARTICULATE MATTER (PM2.5)



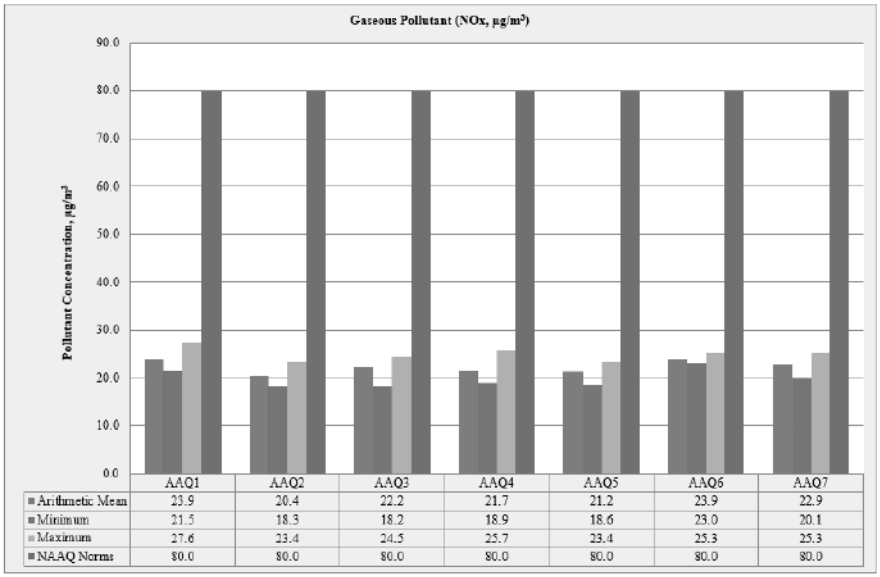
	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	21.5	21.5	21.7	21.6	43.5	45.2	22.4
Minimum	20.1	20.2	20.2	20.1	20.4	17.5	21.0
Maximum	22.9	22.6	22.6	23.1	23.3	22.6	24.3
NAAQ Norms	60.0	60.0	60.0	60.0	60.0	60.0	60.0

FIGURE 3.21: BAR DIAGRAM OF PARTICULATE MATTER (SO_2)



	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Arithmetic Mean	8.1	6.1	6.3	8.0	6.7	7.5	6.9
Minimum	6.2	4.3	5.1	7.2	5.0	6.2	5.2
Maximum	9.9	7.6	7.6	9.0	8.2	9.2	8.9
NAAQ Norms	80.0	80.0	80.0	80.0	80.0	80.0	80.0

FIGURE 3.22: BAR DIAGRAM OF PARTICULATE MATTER (NO_2)



3.3.6 Interpretations & Conclusion

As per monitoring data, PM_{10} ranges from 40.1µg/m^3 to 48.6 µg/m^3, $PM_{2.5}$ data ranges from 17.5µg/m^3 to 24.3 µg/m^3, SO_2 ranges from 4.3µg/m^3 to 9.9µg/m^3 and NO_2 data ranges from 18.2 µg/m^3 to 27.6µg/m^3. The concentration levels of the above criteria pollutants were observed to be well within the limits of NAAQS prescribed by CPCB.

The minimum & maximum concentrations of PM_{10} were found to be 40.1 µg/m^3 in Thorapalli Agraharam,Bukkasagaram and Angondapalli & 48.6 µg/m^3 in Pathakotta Village respectively. The minimum & maximum concentrations of $PM_{2.5}$ were found to be 17.5 µg/m^3 in Pathakotta Village & 24.3 µg/m^3 in Komudepalli Village. The maximum concentration in the core and buffer zone is due to the cluster of quarries situated within 500m radius.

3.3.7 FUGITIVE DUST EMISSION

Fugitive dust was recorded at 7AAQ monitoring stations for 30 days average during the study period.

TABLE 3.22– AVERAGE FUGITIVE DUST SAMPLE VALUES IN µg/m^3

AAQ Locations	Avg SPM (µg/m^3)
AAQ 1	64.15
AAQ 2	64.28
AAQ 3	63.66
AAQ 4	67.67
AAQ 5	65.87
AAQ 6	68.34
AAQ 7	67.61

Source: Line Diagram of Table 3.29

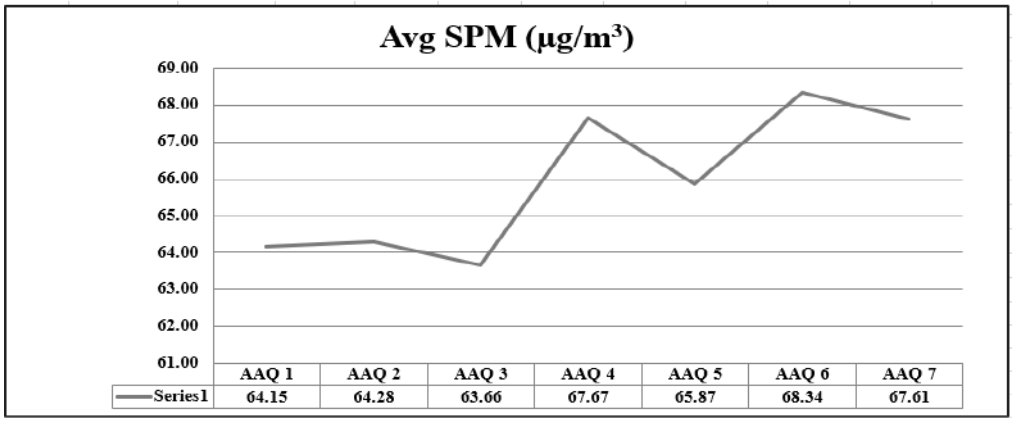
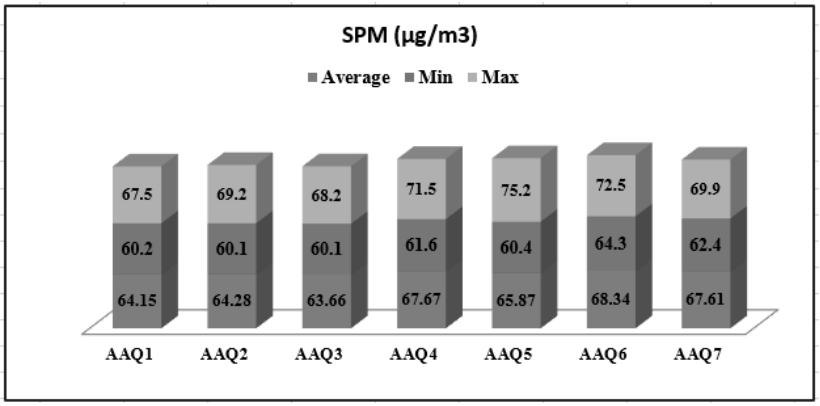


TABLE 3.23– FUGITIVE DUST SAMPLE VALUES IN µg/m³

SPM (µg/m³)	AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7
Average	64.15	64.28	63.66	67.67	65.87	68.34	67.61
Min	60.2	60.1	60.1	61.6	60.4	64.3	62.4
Max	67.5	69.2	68.2	71.5	75.2	72.5	69.9

Source: Calculations from Lab Analysis Reports



Source: Bar Diagram of table 3.30

3.4 Noise Environment

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

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

3.4.1 Identification of Sampling Locations

In order to assess the ambient noise levels within the study area, noise monitoring was carried out at seven (7) 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 3.24 – DETAILS OF SURFACE NOISE MONITORING LOCATIONS

S. No	Location code	Monitoring Locations	Distance & Direction	Coordinates
1	N-1	Core Zone	Project Area	12°41'25.09"N 77°54'28.87"E
2	N-2	Core Zone	Project Area	12°41'23.58"N 77°54'22.77"E
3	N-3	Thorapalli Agraharam	2km SW	12°41'10.22"N 77°53'1.11"E
4	N-4	Bukkasagaram	4.5km NE	12°43'27.77"N 77°56'10.42"E
5	N-5	Angondapalli	7km SW	12°39'42.39"N 77°50'47.10"E
6	N-6	Pathakotta	5km SE	12°39'21.85"N 77°56'33.88"E
7	N-7	Komudepalli	3.5km NW	12°42'39.28"N 77°52'30.45"E

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

FIGURE 3.23: SITE PHOTOGRAPHS OF NOISE MONITORING IN CLUSTER

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.

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 3.6

Day time : 6:00 hours to 22.00 hours.

Night time : 22:00 hours to 6.00 hours

TABLE 3.25 – 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	44.0	35.0	**Industrial Day Time- 75 dB (A) Night Time- 70 dB (A)**
2	Core Zone	38.9	34.0	
3	Thorapalli Agraharam	36.3	34.3	
4	Bukkasagaram	39.8	36.0	
5	Angondapalli	39.7	36.5	**Residential Day Time– 55 dB (A) Night Time- 45 dB (A)**
6	Pathakotta	36.0	34.8	
7	Komudepalli	37.2	35.2	

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

FIGURE 3.24: NOISE MONITORING STATIONS AROUND 10 KM RADIUS

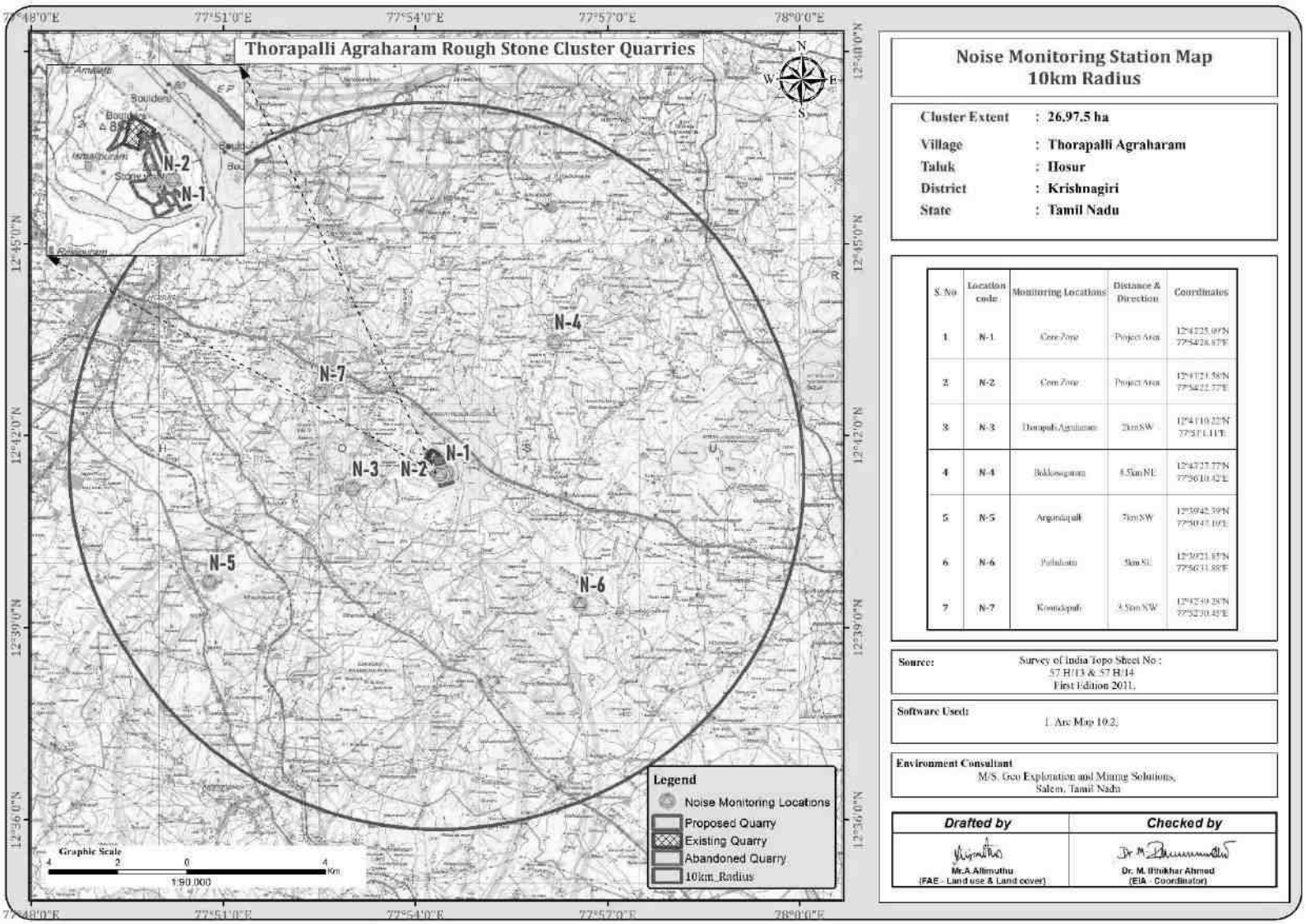
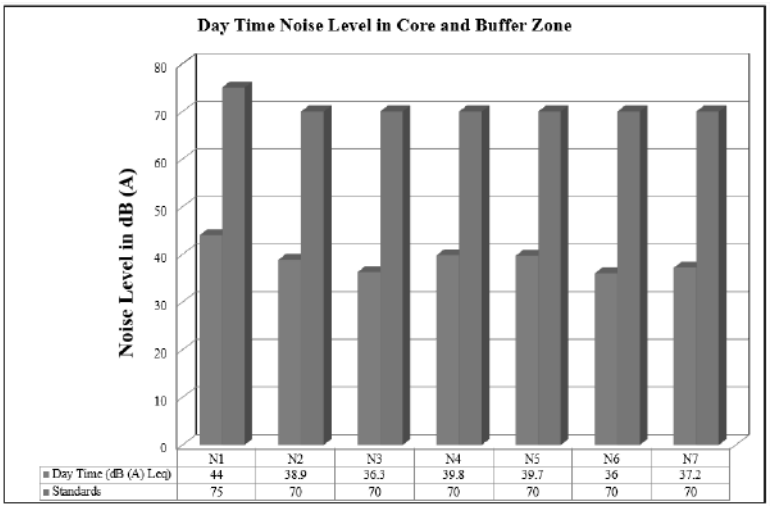
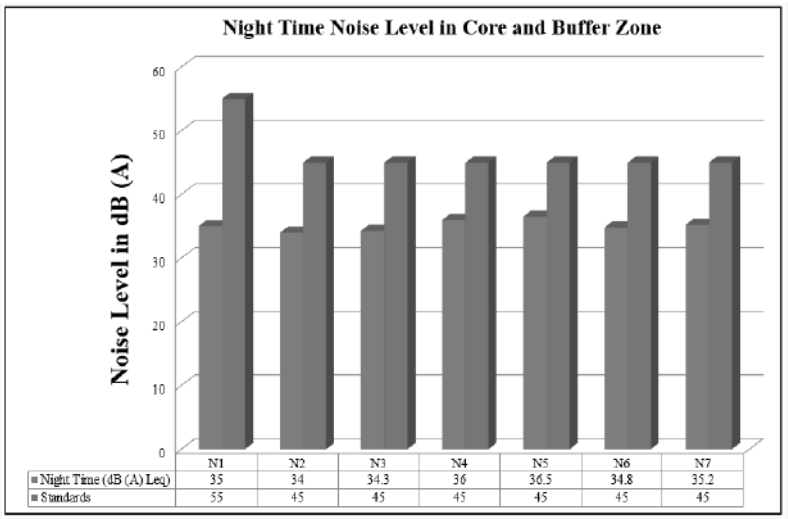


FIGURE 3.25: DAY & NIGHT TIME NOISE LEVELS IN CORE AND BUFFER ZONE





3.4.4 Interpretation & Conclusion:

Ambient noise levels were measured at 7 (Seven) locations around the project area considering cluster quarries. Noise levels recorded in core zone during day time were from 38.9-44 dB (A) Leq and during night time were from 34-35 (A) Leq. Noise levels recorded in buffer zone during day time were from 36 – 39.8 dB (A) Leq and during night time were from 34.3– 36.5 dB (A) Leq.

The values of noise observed in some of the areas are primarily owing to quarrying activities due to cluster of quarries within 500m radius, movement of vehicles and other anthropogenic activities. Noise monitoring results reveal that the maximum & minimum noise levels at day time were recorded in the range of 44 dB(A) in Core area and 36.0dB(A) in Pathakotta Village in Minimum noise levels. 36.5 dB (A) Angondapalli Village and 34.8 dB (A) Pathakotta Village respectively in night time noise levels. Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

3.5 BIOLOGICAL ENVIRONMENT

3.5.1. Study area Ecology

In this project, the total area of the Cluster with in 10km radius from the periphery of this quarry is reported as 20.00.0Ha with 4 No. of quarries. In such Cluster situation, a common Ecology and Biodiversity study

for the entire cluster of quarries is enough to capture all the possible externalities. The common EIA/EMP data can be used for all quarries fall under this cluster but the present work was carried out on detailed study of the impacts Thorapalli Agraharam Rough stone quarry on the ecology and biodiversity of the core lease area with the proper mitigation and sustainable management plan. The proposed area exhibits almost flat terrain. The following methods were applied during the baseline study of flora, fauna and diversity assessment.

The present study was carried out in two separate headings for floral and faunal community. The aspects to be covered in the study for the project are given in Table No 3.53.

Table No: 3.26: Aspect to be covered in the study area

Aspect of Environment	Impacts
A. Terrestrial Ecology	Impacts on terrestrial flora and fauna
	Impacts on Rare-Endangered-Threatened (RET) wildlife
B. Aquatic Ecology	Impacts on aquatic fauna/flora

3.5.2. Objectives of Biological Studies

a) Undertake an intensive field survey to assess the status of floral & faunal component in different habitats in the core and buffer areas of the project site.
b) Identification and listing of flora and fauna which are important as per the Wildlife (Protection) Act 1972.
c) Suggest Wildlife conservation (species specific/habitat specific) and management plan for the threatened (critically endangered & endangered species - schedule I) faunal species if any reported within the study area.
d) To identify the impacts of mining on agricultural lands and how it affects.
e) Proper collection of information about wildlife Sanctuaries/ national parks/ biosphere reserves of the project area.
f) Devise management & conservation measures for biodiversity.

3.5.2.1. Field surveys

The field visit was carried out to understand and assess the impacts of mining activities on flora & and fauna and natural habitats and prediction after the enhancement of the production capacity of the mine. We evaluated the distribution and abundance of flora and fauna in the study area through primary and secondary data sources.

3.5.2.2. Floral Study

- The floral survey of the project area is based on field survey of the area.
- The local flora was identified by their morphological observation, such as the size, age and shape of the leaf, flowers, fruits, and their bark features of the stem, and also documented their habitat viz. Trees, Shrubs, Herbs, Grasses, Climbers etc.
- After surveying the core and the buffer areas, a detailed floral inventory has been compiled. A list of all plants from the study area was prepared and their habitats were recorded.
- Selection of sampling locations was made with reference to topography, land use, vegetation pattern, wind pattern, etc. The observations were taken on natural vegetation, roadside plantations, and non-forest areas (agricultural fields, in plain areas, village wasteland, etc.) for quantitative representation of different species.

3.5.3. Methodology of Sampling

Primary survey was conducted with established and accepted ecological methods in different habitats of study area. The field data collection mainly included biodiversity status assessment of different life forms habit of flora elements such as Trees, Shrubs, Climbers Herbs and Grass. Faunal diversity was assessed by inventorying the taxonomical groups like Mammals, Herpetofauna, birds and butterflies.

Nocturnal faunal species were searched by locating their calls during night time and by searching along the forest shrubs areas, dense dry bushes, below the stones, water bodies. During the study, to know more about the seasonal presence of flora and faunal species, information was obtained from local people and forest department.

Identification of vegetation in relation to the natural flora and crops was conducted through reconnaissance field surveys and onsite observations in core and buffer zone. The plant species identification was done based on the reference materials and also by examining the morphological characteristics and reproductive materials i.e. flowers, fruits and seeds. Land use pattern in relation to agriculture crop varieties were identified through physical verification of land and interaction with local villagers.

Plot method is used in the floral documentation in the core and buffer zone. For trees (10x10-m), shrubs (5x5-m) and herbs (1x1-m) plots were taken. Birds and butterflies were mainly focused during faunal assessment, transect method was employed for birds and butterflies. Transect is a path along which one counts and records the occurrence of an individual for study. A straight-line walk covering desired distance, within a time span of one hour to 30 minutes was carried out in the proposed region. Bird species were recorded during the hours of peak activity. 0700 to 1100 Hrs and 1430 to 1730 Hrs (Bibby et al. 2000).

Direct observations and bird calls were used for bird documentation. Same transects were used for counting butterflies. Opportunistic observations were made for Amphibians, reptiles and ordinates. Presence of mammals was recorded by direct and indirect signs. All possible transects were taken for birds and butterflies. Birds and butterflies were classified into species level. Recorded bird species were identified to species level using standard books (Ali & Ripley 1987, Grimmett et al., 2016).

The secondary baseline data of flora and fauna has been complied through the following data sources:

1. Forest working plan
2. Schedule I to V: Indian Wildlife (Protection) Act, 1972
3. Vivek Menon, Indian Mammals: A Field Guide. Hachette Book publishing India Pvt.Ltd., India.
4. Daniel J.C. The Book of Indian Reptiles and Amphibians, Bombay Natural History Society., India.
5. Ali, S and Ripley. handbook of the Birds of India and Pakistan together with those of Nepal, Sikkim and Bhutan, Oxford University Press, Bombay.
6. ENVIS Centre on Wildlife and Protected Area.
7. Birds Life Data Zone
8. Ebird.org
9. Global Biodiversity Information Facility

3.5.3.1. Sampling

A stratified simple random sampling procedure was employed to obtain a sample from study area. The study area was further stratified in different land use/ecosystems.

3.5.3.2. Sampling Size

Keeping in mind both random sampling technique and covering all land use patterns for the study following sampling locations were chosen depending up on the area of the proposed site.

3.5.3.3. Timing of Study

The study was carried out during morning and evening hours, to cover the different activity phases for important species such as time resting, feeding, hunting, and daily movements.

3.5.3.4. Observations from Sampling

The various observations relating to flora and fauna species are discussed in detail below, in separate sections.

3.5.3.5. Field Equipment's/ References

Following tools/equipment were used for conducting phytosociological study.

- Ballpoint pen, Field bags, Field notebooks, field shoes, gloves, GPS, Measuring tapes and scales, Plant cutters, packet lens, ropes etc.
- Canon Mark III Camera with 50-500mm lens– Snap shots taken
- Leica Binoculars (8x 20) to spot/identify species
- IUCN Red Data Book – https://www.iucnredlist.org/species

Ornithological/Entomological/Herpetological/Mammalian catalogues and pictorial descriptions from various authors and websites are followed for species identification.

3.5.4. Part I Field Sampling Techniques (Fauna Sampling)

3.5.4.1. Transect walk – Birds

Eight no transect lines with varying length (100m-300m) and fixed width (2m) were laid which cuts through the core and buffer areas of proposed site. The transect surveys were conducted from 0700 to 1100Hrs and 1430 to 1730Hrs (Bibby et al. 2000). All avifauna found along these transects were recorded for analysing the data. Counts were conducted while there is no heavy rain, mist or strong wind.

3.5.4.2. Modified Pollard Walk – for Butterflies

The Modified Pollard Walk (Pollard 1977, 1993, Walpole 1999) using fixed width transect walk method were employed to investigate butterfly spatial distribution, diversity and abundance at the different survey sites.

3.5.4.3. Visual Encounter Survey (VES) - reptiles and Amphibians

VES is a time-constrained sampling technique (Campbell and Christman, 1982; Corn and Bury, 1990). It needs a systematic search through an area or habitat for a prescribed time period (Campbell and Christman, 1982). The result of VES is measured against the time spent on search. VES technique is one of the simplest methods, and an appropriate technique for both inventory and monitoring Herpetofauna (Heyer et al. 1994).

3.5.4.4. Observational methods- Mammals

For the purpose of recording mammals, we used two different observational techniques: (1) direct observations, and (2) recording of occurrences like holes, markings, scats, hairs, and spines (Menon 2003). For identification confirmations, photographs with a scale reference were used, and locations were recorded using a portable GPS device. Indigenous knowledge particularly that of the locals, was occasionally employed to compile a preliminary list of species and/or aid in the recognition of indicators.

3.5.5. Flora Composition in the Core Zone (Primary Survey)

Core zone flora sampling was conducted between 8.00 am to 10.00 am in three locations. The lease area is having moderately sloping hillocks. we used with transect sampling methods. Taxonomically a total of 26

species belonging to 14 families have been recorded from the core mining lease area. Based on the habitat classification of the enumerated plants the majority of species were Herbs 10 followed by Shrubs 6, Trees 5, grasses 3 and climbers 2. Details of flora with the scientific name were mentioned in Table No. 3.27. The result of the core zone of flora studies shows that Fabaceae and Lamiaceae are the main dominating species in the study area mentioned in Table No.3.27. No species found as threatened category.

Table No: 3.27. Flora in the Core zone of Thorapalli Agraharam Village Cluster area, (Primary Survey)

SI. No	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Mesquite	Mullu maram	*Prosopis juliflora*	Fabaceae
2.	Pala indigo	Pala maram	*Wrightia tinctoria*	Apocynaeceae
3.	White Bark Acacia	Vela maram	*Vachellia leucophloea*	Fabaceae
4.	Gum arabic tree	Karuvelam	*Acacia nilotica*	Fabaceae
5.	Neem	Vembu	*Azadirachta indica*	Meliaceae
Shrubs				
1.	Lantana	Unni chedi	*Lantana camara*	Verbenaceae
2.	Giant Aloe vera	Kattu katrazhai	*Aloe vera*	Asphodelaceae
3.	Indian fig opuntia	Sapathikalli	*Opuntia ficus-indica*	Cactaceae
4.	Milk Weed	Erukku	*Calotropis gigantea*	Apocynaceae
5.	Coromandel Boxwood	Karai	*Canthium coromandelicum*	Rubiaceae
6.	Triangular spruge	Chaturakalli	*Euphorbia antiquorum*	Euphorbiaceae
Herbs				
1.	Common leucas	Thumbai	*Leucas aspera*	Lamiaceae
2.	Carrot grass	Parttiniyam	*Parthenium hysterophorus*	Asteraceae
3.	Chritsmas Bush	Poom pul	*Chromolaena odorata*	Asteraceae
4.	Fish poison	Kolinchi	*Tephrosia purpurea*	Fabaceae
5.	Flannel Weed	Sida mutti	*Sida cordifolia*	Malvaceae
6.	Pignut	Nattapoochedi	*Hyptis suaveolens*	Lamiaceae
7.	Coat buttons	Thatha poo	*Tridax procumbens*	Asteraceae
8.	Bindii	Nerunji mullu	*Tribulus terrestris*	Zygophyllaceae
9.	Holy basil	Thulasi	*Ocimum tenuiflorum*	Lamiaceae
10.	Prickly chaff flower	Nayuruvi	*Achyranthes aspera*	Amaranthaceae
Grass				
1.	Eragrostis	Pullu	*Eragrostis ferruginea*	Poaceae
2.	Great brome	Thodappam	*Bromus diandrus*	Poaceae
3.	Nut grass	Korai	*Cyperus rotandus*	Poaceae
Climber/ Creepers				
1.	Stemmed vine	Perandai	*Cissus quadrangularis*	Vitaceae
2.	Stinking passionflower	Poonai puduku chedi	*Passiflora foetida*	Passifloraceae

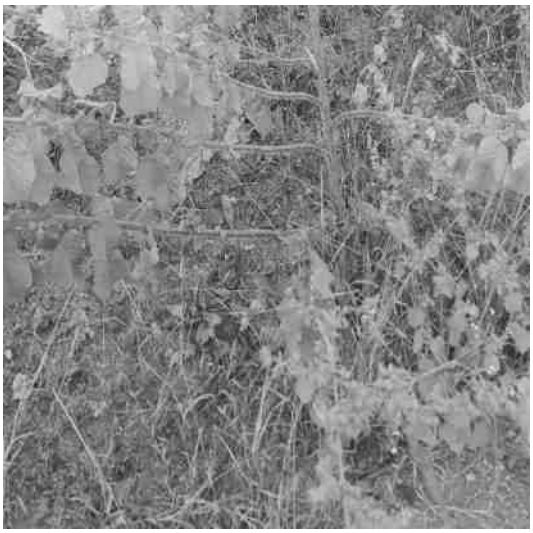
(**Sources**: Species observation in the field study)

A. Prosopis juliflora

B. Lantana camara

C. Calotropis gigantea

D. Chromolaena odorata



E. Hyptis suaveolens

F. Parthenium hysterophorus

G. Euphorbia antiquorum H. Azadirachta indica

I.Wrightia tinctoria J. Cissus quadrangularis

Fig No: 3.26. Flora species observation in the Buffer zone area

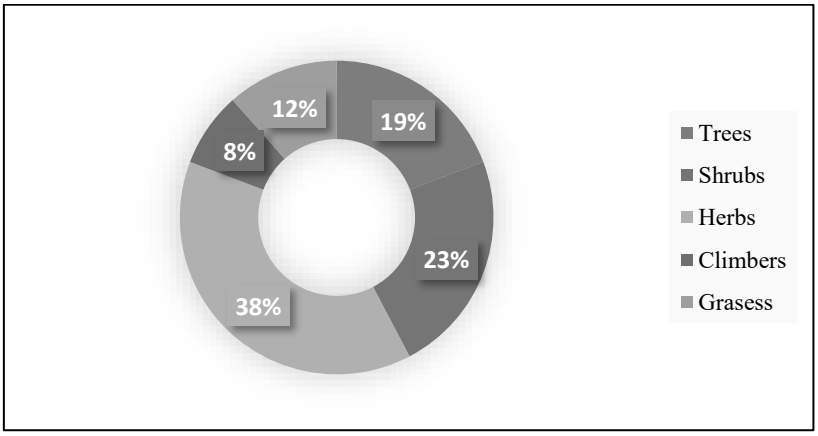


Fig No. 3.27: Graph Showing % Distribution of Floral Life Forms (Core zone)

The trees surveys were conducted around 300m radius from the proposed project site. This is the standard scientific method followed by various workers in respect of phytosociological studies (Cottom and Curtis 1956; Ralhan et al. 1982; Saxena and Sing 1982; Nayak et al. 2000; Lu et al. 2004; Nautiyal 2008). While sampling, circumference at breast Height (CBH) of tree species was measured at 1.37m from ground level, along with the name of the species, phenology (flowering, fruiting, and flushes), and uses. After surveying areas, a detailed trees inventory has been compiled. A list of all plants from the study area was prepared and their habitats were recorded. The species of trees were documented during this base line survey. The dominant plant species growing in this area were Azadirachta indica Prosopis juliflora, etc. Please refer the Table No.3.28.

Table No: 3.28. Tree survey around 300m radius from the proposed project site.

S.No	English Name	Vernacular Name	Scientific Name	No of trees
Trees				
1.	Acacia Nilotica	Karuvelammaram	Vachellianilotica	7
2.	Coconut	Thennai maram	Cocos nucifera	11
3.	Mesquite	Mullumaram	Prosopis juliflora	33
4.	Neem	Vembu	Azadirachta indica	23
5.	Asian Palmyra palm	Panai maram	Borassus flabellifer	15
6.	Bitter Albizia	Arappu Tree	Albizia amara	22

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

Table No: 3.29. Flora in Buffer Zone of Thorapalli Agraharam Village Cluster area, rough stone quarry Primary data & Secondary data

S.No.	English Name	Vernacular Name	Scientific Name	Family Name
Trees				
1.	Bitter Albizia	Arappu Tree	Albizia amara	Fabaceae
2.	White Bark Acacia	Vela maram	Vachellia leucophloea	Fabaceae
3.	Wild Date Palm	Icham	Phoenix sylvestris	Arecaceae
4.	Blue gum	Thayala maram	Eucalyptus	Myrtaceae
5.	Banana tree	Vazhaimaram	Musa acuminata	Musaceae
6.	Neem	Vembu	Azadirachta indica	Meliaceae
7.	Tamarind	Puliyamaram	Tamarindus indica	Legumes
8.	Mesquite	Mullu maram	Prosopis juliflora	Fabaceae
9.	Mesquite	Mullu maram	Prosopis juliflora	Fabaceae
10.	Coral Tree	Kalyana murungai	Erythrina variegata	Papilionoide
11.	Bamboo	Moonghil	Bambusa bambo	Poaceae
12.	Yellow flame tree	Perunkondrai	Peltophorum pterocarpum	Fabaceae
13.	Indian almond	Padam maram	Terminalia catappa	Combretaceae
14.	Asian Palmyra palm	Panai maram	Borassus flabellifer	Arecaceae
15.	Indian ash tree	Odiya maram	**Lannea coromandelica**	Anacardiaceae
16.	Curry leaves	Karuveppali	Murraya koenigii	Rutaceae
17.	Lemon	Ezhumuchaipalam	Citrus lemon	Rutaceae
18.	Bidi leaf tree	Thiruvathi Plant	Bauhinia racemosa	Fabaceae
19.	Rusty Acacia	Parambai	Acacia ferruginea	Mimosaceae
20.	Mango	Manga	Mangifera indica	Anacardiaceae
21.	Peepal	Arasanmaram	Ficus religiosa	Moraceae
22.	Indian ash tree	Odiya maram	Lannea coromandelica	Anacardiaceae
23.	Custard apple	Seethapazham	Annona reticulata	Annonaceae
24.	Flamboyant	Cemmayir-konrai	Delonix regia	Fabaceae
25.	Chinaberry	Malai vembu	Melia azedarach L.	Meliaceae
26.	Monkey pod tree	Thungumoonchi	Samanea saman	Fabaceae
27.	Yellow Flame	Iyalvagai	Peltophorumpterocarpum	Fabaceae
28.	Teak	Thekku	Tectona grandis	Verbenaceae

29.	Indian gooseberry	Nelli	Emblica officinalis	Phyllanthaceae
30.	Henna	Marudaani	Lawsonia inermis	Lythraceae
31.	Black Siris	Karuvagai	Albizia odoratissima	Mimosaceae
32.	Madras thorn	Kudukapuli	Pithecellobium dulce	Fabaceae
33.	Malayan Cherry	Ten Pazham	Muntingia calabura	Muntingiaceae
34.	Pomegranate	Mathulai	Punica granatum	Lythraceae
35.	Jamun Fruit Plant	Naval maram	Syzygium cumini	Myrtaceae
36.	Banyan tree	Alamaram	Ficus benghalensis	Moraceae
37.	Chinese chaste tree	Nochi	Vitex negundo	Verbenaceae
38.	Ceylon satinwood	Porasu	Chloroxylon swietenia	Rutaceae
39.	Indian Jujube	Ilanthai	Ziziphus jujuba	Rhamnaceae
40.	Millettia pinnata	Pongam oiltree	Pongamia pinnata	Fabaceae
41.	Coconut	Thennai maram	Cocos nucifera	Arecaceae
42.	Guava	Koyya	Psidium guajava	Myrtaceae
43.	Notched Leaf Soapnut	Poovankottai	Sapindus emarginata	Sapindaceae
44.	Pala indigo	Pala maram	Wrightia tinctoria	Apocynaeceae
45.	River tamarind	Savundal maram	leucaena leucocephala	Fabaceae
46.	Portia tree	Poovarasan	Thespesia populnea	Malvaceae
47.	Drumstick tree	Murunga maram	Moringa oleifera	Moringaceae
48.	Sacred Tree	Porasu	Butea monosperma	Fabaceae
49.	Papaya	Pappali maram	Carica papaya L	Caricaceae
50.	Jackfruit	Palamaram	Artocarpus heterophyllus	Moraceae
Shrubs				
1.	Tanner's cassia	Avaram	Senna auriculata	Fabaceae
2.	Castor oil plant	Amanakku	Ricinus communis	Euphorbiaceae
3.	Milk Weed	Erukku	Calotropis gigantea	Apocynaceae
4.	Indian Oleander	Arali	Nerium indicum	Apocynaceae
5.	Triangular spruge	Chaturakalli	Euphorbia antiquorum	Euphorbiaceae
6.	Night shade plan	Sundaika	Solanum torvum	Solanaceae
7.	-	Odankodi	Hippocratea indica	Odankodi
8.	Broom creeper	Kattukodi	Cocculus hirsutus	Menispermaceae
9.	Solanum pubescens	Malaisundai	Solanum pubescens Willd	Solanaceae

10.	Thorn apple	Oomathai	Datura stramonium	Solanaceae
11.	Shoe flower	Chemparuthi	Hibiscu rosa-sinensis	Malvaceae
12.	Puriging nut	Kattamanakku	Jatropha curcas	Euphorbiaceae
13.	Touch-me-not	Thottalchinungi	Mimosa pudica	Mimosaceae
14.	Chinese chastetree	Nalla nochi	Vitex negundo L	Verbinaceae
15.	Jackal jujube	Suraimullu	Ziziphus oenoplia	Rhamnaceae
16.	Malabar catmint	Pei veratti	Anisomeles malabarica	Lamiaceae
17.	Indian mallow	Thuthi	Abutilon indicum	Meliaceae
18.	Bush Morning Glory	Neiveli Kattamani	Ipomoea carnea	Convolvulaceae
19.	Carray Cheddle	Kaarai	Canthiumparviflorum	Rubiaceae
20.	Lantana	Unni chedi	Lantana camara	Verbenaceae
21.	Flame of the Woods	Idlipoo	Xoracoc cinea	Rubiaceae
22.	Triangular spruge	Chaturakalli	Euphorbia antiquorum	Euphorbiaceae
Herbs				
1.	Coat buttons	Thatha poo	*Tridax procumbens*	Asteraceae
2.	Eggplant	Kathrikkai	*Solanum melongena*	Solanaceae
3.	Chritsmas Bush	Poom pul	*Chromolaena odorata*	Asteraceae
4.	Aloe barbadensis	Katrazhai	*Aloe vera*	Asphodelaceae
5.	Mountain knotgrass	Thengaipoo kirai	*Aerva lanata*	Amaranthaceae
6.	Prickly chaff flower	Nayuruv	*Achyranthes aspera*	Amaranthaceae
7.	Bindii	Nerunchi	*Tribulus terrestris*	Zygophyllaceae
8.	Fish poison	Kolinchi	*Tephrosia purpurea*	Fabaceae
9.	Ban Tulsi	Melakai poondu	*Croton bonplandianus*	Euphorbiaceae
10.	Commelina benghalensis	Kanavazha	*Commelina benghalensis*	Commelinaceae
11.	Asthma-plant	Amman pacharisi	*Euphorbia hirta*	Euphorbiaceae
12.	Indian doab	Arugampul	*Cynodon dactylon*	Poaceae
13.	Spiny amaranth	Mullu keerai	*Amaranthus spinosus*	Amaranthaceae
14.	Chilli	Milakai	*Capsicum annuum*	Solanaceae
15.	Arrowleaf sida	Jelly Leaf	*Sida rhombifolia*	Malvaceae
16.	Cracker plant	Tapas kaaya	*Ruellia tuberosa*	Acanthaceae
17.	Flannel Weed	Sida mutti	*Sida cordifolia*	Malvaceae
18.	Indian Copperleaf	Kuppaimeni	*Acalypha indica*	Euphorbiaceae

19.	Madagascar Periwinkle	Nithykalyani Podi	*Catharanthus roseus*	Apocynaceae
20.	Marsh barbel	Neermulli	*Hygrophila auriculata*	Acanthaceae
21.	Yellow-fruit nightshade	Kandakathirika	*Solanum surattense*	Solanales
22.	Asian spiderflower	Naaikaduku	*Cleome viscosa L*	Cleomaceae
23.	Chay root	Chaaya ver	*Oldenlandia umbellata*	Rubiaceae
24.	Ash Fleabane	Puvangkuruntal	*Vernonia cinerea*	Asteraceae
25.	Tomato	Thakkali	*Solanum lycopersicum*	Solanaceae
26.	White dammar	Mookutipoondu	*Vicoa indica*	Asteraceae
27.	Cleome viscosa	Nai kadugu	*Celome viscosa*	Capparidaceae
28.	Bindii	Nerunji mullu	*Tribulus terrestris*	Zygophyllaceae
29.	Bara Gokhru	Yanainerunjil	*Pedalium murex*	Pedaliaceae
30.	Digeria muricata	Thoiya keerai	*Digeria muricata*	Amaranthaceae
31.	False daisy	Karisalankanni	*Eclipta alba*	Asteraceae
32.	Sessile Joyweed	Ponnakanni	*Alternanthera sessilis*	Amaranthaceae
33.	Pignut	Nattapoochedi	*Hyptis suaveolens*	Lamiaceae
34.	Field beans	Avarai	*Hyacinth Beans*	Fabaceae
35.	Common leucas	Thumbai	*Leucas aspera*	Lamiaceae
36.	Holy basil	Thulasi	*Ocimum tenuiflorum*	Lamiaceae
37.	Malabar catmint	Pei veratti	*Anisomeles malabarica*	Lamiaceae
38.	Coat buttons	Thatha poo	*Tridax procumbens*	Asteraceae
39.	Indian mint	Karpura valli	*Coleus amboinicus*	Lamiaceae
40.	Aloe barbadensis	Katrazhai	*Aloe vera*	Asphodelaceae
41.	Europeanblack nightshade	Manathakkali	*Solanumnigrum*	Solanaceae
42.	Bright eyes	Nithiyakalyani	*Catharanthus roseus*	Apocynaceae
43.	Carrot grass	Parttiniyam	*Parthenium hysterophorus*	Asteraceae
44.	Red Spiderling	Mukirattai	*Boerhavia diffusa*	Nyctaginaceae
Climbers/ Creepers				
1.	Stemmed vine	Perandai	Cissus quadrangularis	Vitaceae
2.	Rosary Pea	Gundumani	Abrus precatorius	Fabaceae
3.	Ivy gourd	Kovai	Coccinia grandis	Cucurbitaceae
4.	Balloon plant	Mudakrttan	Cardiospermum halicacabum	Sapindaceae
5.	Bitter apple	Peikkumatti	Citrullus colocynthis	Cucurbitaceae

6.	Butterfly pea	Sangu poo	Clitoria ternatea	Fabaceae
7.	Betel	Vetrilai	Piper betle	Piperaceae
8.	Pointed gourd	Kovakkai	Trichosanthes dioica	Cucurbitaceae
9.	Wild bitter	Pavarkai	Momordica charantia	Cucurbitaceae
10.	Bottle Guard	Sorakkai	Lagenaria siceraria	Cucurbitaceae
11.	White pumpkin	Poosanaikkaai	Cucurbitaceae	Cucurbitaceae
12.	Wild jasmine	Malli	Jasminum augustifolium	Oleaceae
13.	Nut grass	Korai	Cyperus rotandus	Poaceae
14.	Cucumis maderaspatanus	Musumusukkai	Mukia maderaspatana	Cucurbitaceae
Grasses				
1.	Windmill grass	Chevvarakupul	Chloris barbata	Poaceae
2.	Jungle rice	Kuthirai vaalKattu arusi	Echinochloa colona	Poaceae
3.	Swollen Windmill Grass	Kondai Pul	Chloris barbata	Poaceae
4.	Needle Grass	Thodappam	Aristida adscensionis	Poaceae
5.	Eragrostis	Pullu	Eragrostis ferruginea	Poaceae
6.	Needle Grass	-	Aristida funiculata	Poaceae
7.	Mauritian Grass	Moongil pul	Apluda mutica	Amaranthaceae

(Sources:

Species observation in the field study

https://www.jetir.org/papers/JETIR2204752.pdf

Global Biodiversity Information Facility

https://indiaflora-ces.iisc.ac.in/advsrh.php

Tamil Nadu state Forest department working plan

https://en.wikipedia.org

https://indiaflora-ces.iisc.ac.in

https://indiaflora-ces.iisc.ac.in/states.php?id=A-Z&cat=13&state=tamilnadu

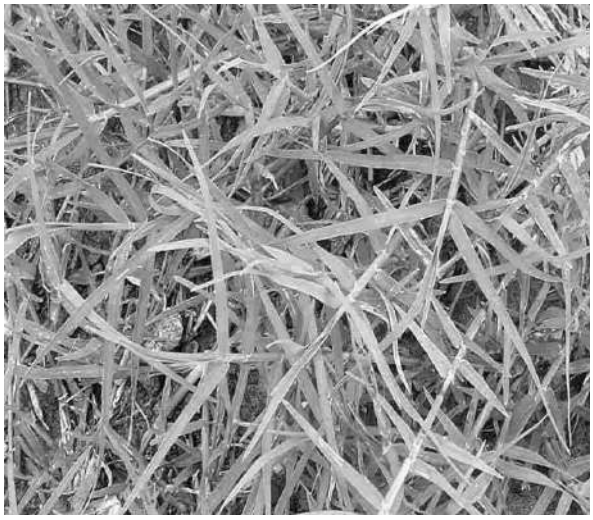
Ethno botanical Survey of Medicinal Plants used by Traditional Healers in Krishnagiri District of Tamil Nadu.

a. Azadirachta indica

b. Citrus lemon

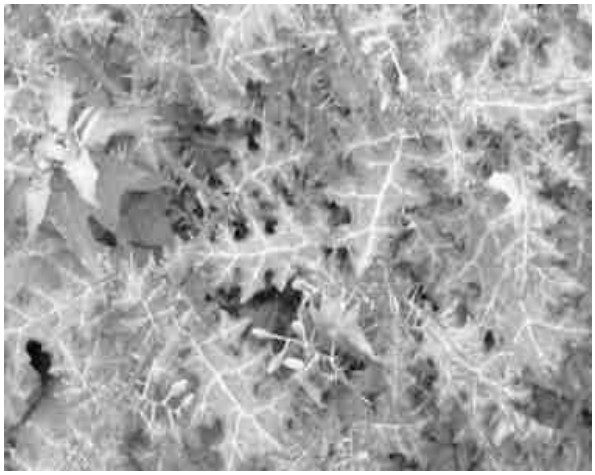
c.Coccinia grandis

d. Musa paradisiaca



e. Cynodon dactylon

f. Tridax daisy



g. Solanum virginianum

h. Mangifera indica

i.Abutilon indicum

j. Coccus nucifera

k. Lagenaria siceraria

l. Cissus quadrangularis

m. Solanumnigrum

n. Parthenium hysterophorus

o. Psidium guajava

p. Prospis juliflora

Fig No: 3.28. Flora species observation in the Buffer zone area

3.5.5.2. Economically important Flora of the study area

The major irrigated crops in the district are paddy, ragi, turmeric, sugarcane, banana, tomato, groundnut, cotton, coconut and flowers. The irrigated area under vegetables, fruit and flowers. Farmers have adopted to cultivation methods through judicious use of water with modern water management techniques and technology.

3.5.5.3. Major Crops in the District

Owing to the climate and soil conditions Krishnagiri District suits to diverse type of cultivation. There are about 26 types of crops grown in the district including medicinal plants. Important crops grown in the district are Paddy, Ragi, Cholam, Red gram, Black gram, Horse Gram, Mango, Coconut, Cabbage, Banana, Tomato, Califlower etc., and the major cash crops are groundnut, flowers and cotton.

Source: DDS – Krishnagiri, 2019

3.6. Flora Composition in the Buffer Zone

Buffer zone flora sampling was conducted between 10.00 am to 4.00 pm in eight different locations in 10 km radius as per the ToR. The most important and widely used methods for a general assessment is belt transect methods. The study area was divided according to habitat types followed the random sampling methods in the

selected area. The lease area is having moderately sloping hillocks. The transect methods was followed, and accordingly, transect or straight lines were marked starting from the base of the study area to the end of the vegetation zone in each selected site. Similar habitats may be found in the buffer area as well, although there is a wider variety of plants there than in the core zone area. Cauvery Wildlife Sanctuary is situated about 16.14km on the south. The Sanamavu Reserve Forest situated about 475m on the east side and Settipalli R.F situated about 6.2km on the east side and there are 137 species in the buffer zone study area in total, based on records. The floral (137) varieties among them Trees 50, Herbs 44, Shrubs 22, Climbers/Creepers 14, and Grasses 7 were identified. The result of the buffer zone of flora studies shows that Fabaceae and Cucurbitaceous, Euphorbiaceous is the main dominating species in the study area mentioned in Table No.3.30. There are no impacts due to this mining activity. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. Apart from the proposed project area, there is agricultural land. Horticulture and agricultural land are untouched. There are no Rare, Endangered, and Threatened Flora species in the mining area and their surrounding study area. A list of floral species has been prepared based on primary survey (site observations) and discussion with local people. The total number of different plant life forms under trees, shrubs, herbs, and climbers is shown in Table 3.30 and their % distribution is shown in Figure No 3.29.

Table 3.30: Number of floral life forms in the Study Area

S. No	Plant Life Form	Number of Species
1	Trees	50
2	Shrubs	22
3	Herbs	44
4	Climber/Creepers	14
6	Grasses	7
Total No. of Species		**137**

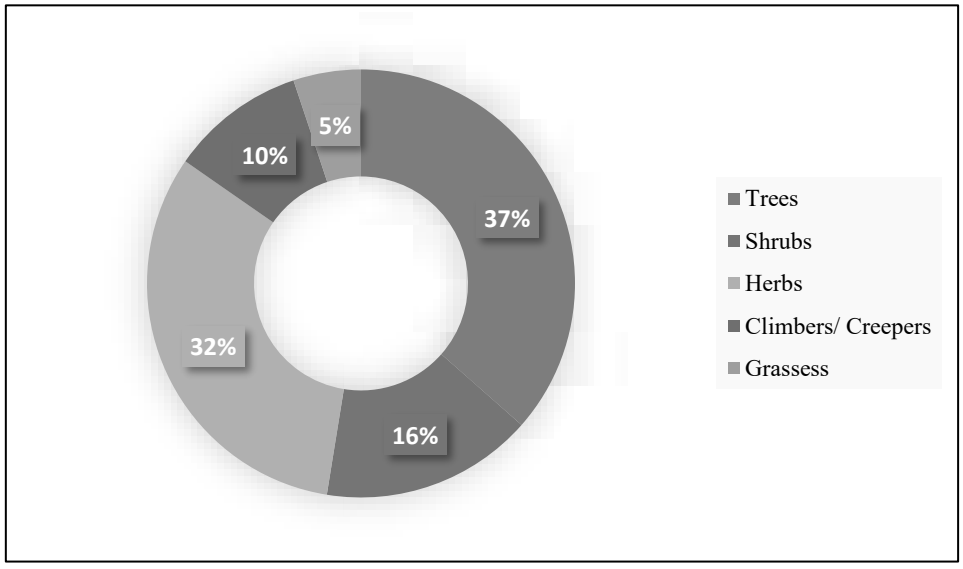


Fig No. 3.29: Graph Showing % Distribution Of Floral Life Forms (Buffer Zone)

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

There are no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar sites, Tiger/Elephant Reserves (existing as well as proposed) within 10 km of the mine lease area. Cauvery Wildlife Sanctuary is situated about 16.14 km on the south. The Sanamavu Reserve forest is situated about 475m on the east side and Settipalli R.F situated about 6.2km on the east side. There are no protected forests within the project area. Hence submission of clearance from the National Board of Wildlife does not arise. No Biosphere Reserves, Wildlife corridors, or, Tiger / Elephant reserves within 10 km of the project area. No protected (PF) forests either in the mine lease area or in the buffer zone. Thus, no forest land is involved in any manner.

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

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

3.6. Fauna

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

3.6.1. Fauna Composition in the Core Zone

Core zone fauna samplings were conducted between 6.00 am to 8.00 am in three locations. A total of 10 varieties of species were observed in the Core zone of Thorapalli Agraharam village, rough stone quarry (Table No.3.31) among them numbers of Insects/ Butterflies 7, Reptiles 5, Mammals 3, and Avian 9. A total of 24 species have been recorded from the core mining lease area. None of these species are threatened or endemic in the study area and surroundings. There is no Schedule I species and 16 species are under Schedule IV according to the Indian Wildlife Act 1972. A total of 9 species of bird were sighted in the mining lease area. There are no critically endangered, endangered, vulnerable, and endemic species were observed. Details of fauna in the core zone with the scientific name were mentioned in Table No. 3.31.

Table No: 3.31. Fauna in the Core Thorapalli Agraharam Village Cluster area, Rough stone quarry Primary data

SI. No	Common name	Family Name	Scientific Name	Schedule list WPA 1972
Insects/Butterflies				
1.	Common Tiger	Nymphalidae	*Danaus genutia*	Schedule IV
2.	Red-veined darter	Libellulidae	*Sympetrum fonscolombii*	NL
3.	Grey pansy	Nymphalidae	*Junonia atlites*	Schedule IV
4.	Danaid egg fly	Nymphalidae	*Hypolimnasmisippus*	Schedule IV

5.	Grasshopper	Acrididae	*Hieroglyphus sp*	NL
6.	Common Tiger	Nymphalidae	*Danaus genutia*	NL
7.	Striped tiger	Nymphalidae	*Danaus plexippus*	Schedule IV
Reptiles				
1.	Garden lizard	Agamidae	*Calotes versicolor*	NL
2.	Common skink	Scincidae	*Mabuya carinatus*	NL
3.	Rat snake	Colubridae	*Ptyas mucosa*	Sch II (Part II)
4.	Common krait	Elapidae	*Bungarus caeruleus*	Schedule IV
5.	Green vine snake	Colubridae	*Ahaetulla nasuta*	Schedule IV
Mammals				
1.	Indian Field Mouse	Muridae	*Mus booduga*	Schedule IV
2.	Asian Small Mongoose	Herpestidae	*Herpestidae*	Schedule (Part II)
3.	Common rat	Muridae	*Rattus rattus*	Schedule IV
Aves				
1.	Koel	Cucalidae	*Eudynamys*	Schedule IV
2.	Common myna	Sturnidae	*Acridotheres tristis*	Schedule IV
3.	Black drongo	Dicruridae	*Dicrurus macrocercus*	Schedule IV
4.	Shikra	Laniidae	*Laniusexcubitor*	Schedule IV
5.	Rose-ringed parkeet	Psittaculidae	*Psittacula krameri*	Schedule IV
6.	Asian green bee-eater	Meropidae	*Meropsorientalis*	Schedule IV
7.	Common quail	Phasianidae	*Coturnix coturnix*	Schedule IV
8.	House crow	Corvidae	*Corvussplendens*	Schedule V
9.	Cattle egret	Ardeidae	*Bubulcus ibis*	Schedule IV

(Sources: Species observation in the field study)

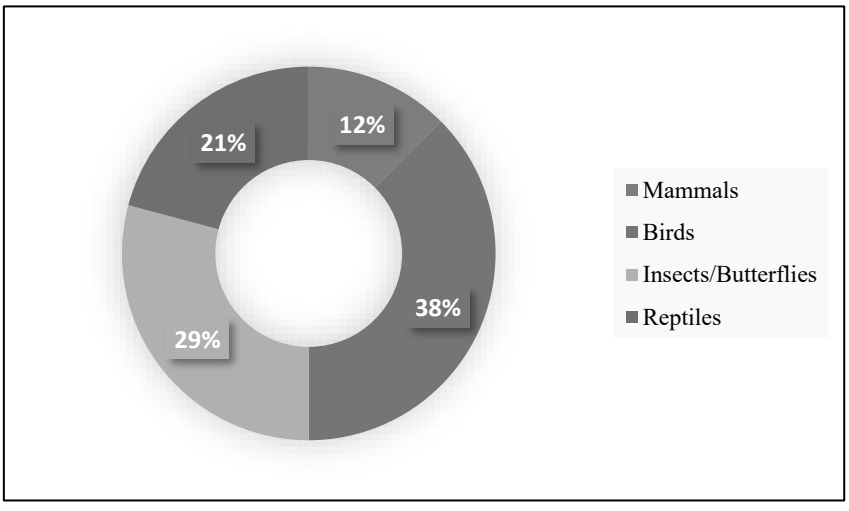


Fig No:3.30. Distribution Of Faunal Communities (Core Zone)

3.6.2. Fauna Composition in the Buffer Zone

The Buffer zone fauna samplings were conducted between 6.00 am to 8.00 am and 2.30 pm to 6.30 pm in different locations. As animals, especially vertebrates move from place to place in search of food, shelter, mate or other biological needs, separate lists for core and buffer areas are not feasible however, a separate list of fauna pertaining to core and buffer zone are listed separately. Cauvery Wildlife Sanctuary is situated about 16.14 km on the south. The Sanamavu Reserve Forest is situated about 475m on the east side and Settipalli R.F situated about 6.2km on the east side. As such there are no chances of occurrence of any rare or endangered or endemic or threatened (REET) species within the core or buffer area.

There are no Sanctuaries, National Parks, Tiger Reserve or Biosphere reserves or Elephant Corridor or other protected areas within 10 km radius of from the core area. It is evident from the available records, reports, and circumstantial evidence that the entire study area including the core and buffer areas were free from any endangered animals. There were no resident birds other than common bird species such as Red-whiskered Bulbul, Asian Koel, House crow, Black drangos, Crows, Pond heron etc.

The list of Mammals (*directly sighted animals & Secondary data) is given in table No.3.32. The list of bird species recorded during the field survey and literature from the study area are given in Table No 3.33. The list of reptilian species recorded during the field survey and literature from the study area is given in Table No 3.34. The list of insect species recorded during the field survey and literature from the study area are given in Table No 3.35. The list of Butterflies species recorded during the field survey and literature from the study area are given in Table No 3.36. It is apparent from the list that none of the species either spotted or reported is included in Schedule I of the Wildlife Protection Act. Similarly, none of them comes under the REET category.

Taxonomically a total of 74 species recorded were from the buffer zone area. Based on habitat classification the majority of species were birds 32, followed by Butterflies 15, Reptiles 10, Insects 5, Mammals 8, and Amphibians 4. There are four Schedule II species, two species are under the schedule III and forty-one species are under Schedule IV according to the Indian Wildlife Act 1972. A total of 32 species of bird were sighted in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed. There are no impacts on nearby fauna species.

Dominant species are mostly birds, butterflies, and insects, and four amphibians was observed during the extensive field visit Sphaerotheca crevice's, Euphlyctis hexadactylus, Bufomelanostictus, etc. There is no Schedule I Species in the study area. There are no critically endangered, endangered, vulnerable, and endemic species were observed.

Table No. 3.32. List of Fauna & Their Conservation Status, Mammals: (*directly sighted animals & Secondary data)

SI. No	Scientific Name	Common Name/English Name	Schedule list WPA 1972
1.	Herpestes edwardsi	Indian Grey Mongoose	Schedule II
2.	Mus booduga	Little Indian field mouse	Schedule IV
3.	Bandicota bengalensis	Indian mole-rat	Schedule IV
4.	Mus musculus	House mouse	Schedule IV
5.	Funambulus palmarum	Common Palm Squirrel	Schedule IV

6.	Rattus rattus	Black rat	Schedule IV
7.	Bandicota indica	Rat	Schedule IV
8.	Lepus nigricollis	Indian Hare	Schedule IV

Table 3.33 Listed birds (Primary data and Secondary data)

SI. No	Scientific Name	Common Name	Schedule list WPA 1972
1.	Alcedo atthis	Common Kingfisher	Schedule IV
2.	Copsychus fulicatus	Indian robin	Schedule IV
3.	Dicrurus paradiseus	Racket tailed drongo	Schedule IV
4.	Corvus splendens	House crow	Schedule V
5.	Dicrurus macrocercus	Black Drongo	Schedule IV
6.	Halcyon smyrnensis	White-breasted kingfisher	Schedule IV
7.	Bubulcus ibis	Cattle Egret	Schedule IV
8.	Pelargopsis capensis	Storkbilled kingfisher	Schedule IV
9.	Hypsipetes madagascariensis	Black bulbul	Schedule IV
10.	Columba livia	Rock pigeon	Schedule IV
11.	Turdoides caudatus	Common Babbler	Schedule IV
12.	Acridotheres tristis	Common myna	Schedule IV
13.	Psittacula krameri	Rose ringed parakeet	Schedule IV
14.	Coturnix coturnix	Grey quail	Schedule IV
15.	Passer domesticus	House Sparrow	Schedule IV
16.	Pycnonotus cafer	Red vented Bulbul	Schedule IV
17.	Accipiter badius	Shikra	Schedule IV
18.	Megalaima viridis	Small green barbet	Schedule IV
19.	Cuculus canorus	Cuckoo	Schedule IV
20.	Calidris minuta	Little stint	Schedule IV
21.	Merops orientalis	Small green bee eater	Schedule IV
22.	Nectarinia minima	Small sunbird	Schedule IV
23.	Ardeola grayii	Pond Heron	Schedule IV
24.	Spilopelia chinensis	Spotted dove	Schedule IV
25.	Milvus migrans	Common Kite	Schedule IV
26.	Phalacrocorax niger	Little cormorant	Schedule IV
27.	Egretta garzetta	Little Egret	Schedule IV
28.	Apus apus	Common swift	Schedule IV
29.	Ardea cinerea	Grey heron	Schedule IV
30.	Megalaima zeylanica	Brown-headed barbet	Schedule IV
31.	Eudynamys scolopacea	Koel	Schedule IV
32.	Coracias benghalensis	Indian roller	Schedule IV

Table No. 3.34 List of Reptiles either spotted or reported from the study area.
(*indicates direct observations & Secondary data)

SI. No	Scientific Name	Common Name/English Name	Schedule list WPA 1972
1.	Calotes versicolor	Oriental garden lizard	NL
2.	Hemidactylus flaviviridis	House lizards	Schedule IV
3.	Naja naja	Indian cobra	Sch II (Part II)
4.	Ahaetulla nasuta	Green vine snake	Schedule IV
5.	Ptyas mucosa	Rat snake	Sch IV (Part II)
6.	Bungarus caeruleus	Common krait	Schedule IV
7.	Mabuya carinatus	Common skink	NL
8.	Vipera russseli	Russell's viper	Sch II (Part II)
9.	Nerodia piscator	Fresh water snake	Sch III (Part II)
10.	Groemyda bijuga	Fresh water tortoise	Sch III (Part II)

Table No. 3.35 List of insects either spotted or reported from the study area

SI. No	Scientific Name	Common Name	Schedule list WPA 1972
1.	Apis cerana	Indian honey bee	-
2.	Hamitermes silvestri	Termite	NE
3.	Hieroglyphus sp	Grasshopper	NL
4.	Camponotus Vicinus	Ant	NL
5.	Ceratogomphus pictus	Dragonfly	-

Table No.3.36 List of Butterflies reported from the study area and Secondary data

SI. No	Scientific Name	Common Name	Schedule
1.	Papilio clytia	Common mime	-
2.	Euploea core	Euploea core	-
3.	Pachliopta aristolochiae	Common rose	-
4.	Papilio polytes	Common mormon	-
5.	Spialia galba	Indian Skipper	-
6.	Danaus genutia	Common tiger	-
7.	Pachliopta hector	Crimson rose	-
8.	Eurema brigitta	Eurema brigitta	-
9.	Hypolimnas bolina	Hypolimnas bolina	-
10.	Castalius rosimon	Common Pierrot	-
11.	Curetis thetis	Indian Sunbeam	-
12.	Troides minos	Southern birdwing	-
13.	Papilio demoleus	Lime Butterfly	-
14.	Ariadne merione	Common Castor	-

15.	Neptis hylas	Neptis hylas	-

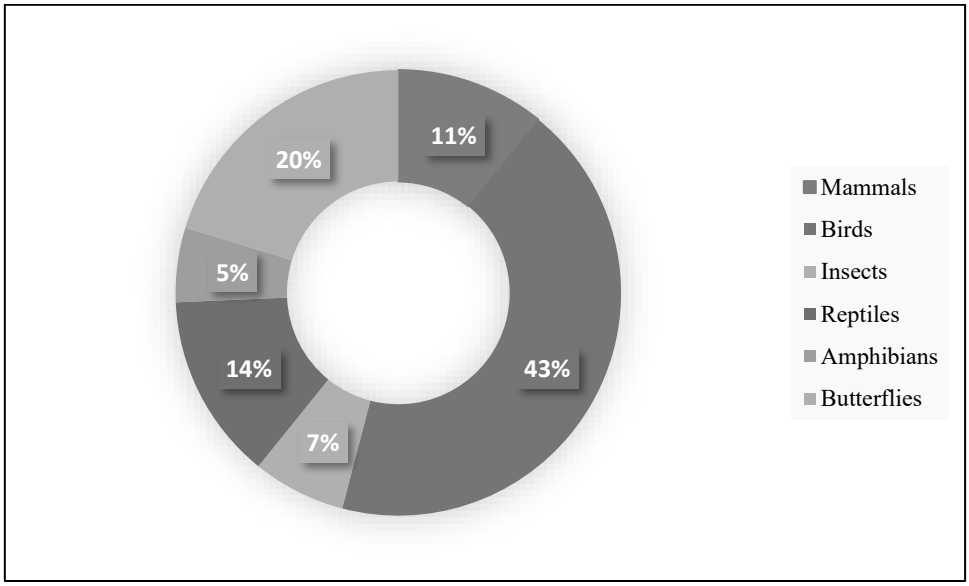


Fig No:3.31. Distribution Of Faunal Communities (Buffer Zone)

Livestock like cattle, buffalo, goat, poultry, duck and pig are reared for dairy products, meat, and egg and for agriculture purpose. Majority of cattle and buffalo are of local variety. Backyard poultry farms are mostly common in this area; however, some commercial poultry farms are also recorded in the study area.

The study area is marked with moderate population of flora and fauna. With reference to the Wildlife Protection Act 1972 total number of wildlife tabulated in this study can be characterized as given in the Table No.3.37.

Table No: 3.37Characterization of Fauna in the Study Area (As Per W.P Act, 1972)

S.No	Schedule of Wildlife Protection Act 1972	No. of species	Remark
1.	Schedule I	0	-
2.	Schedule II	4	-
3.	Schedule III	2	-
4.	Schedule IV	41	-
5.	Schedule V	1	-
6.	Schedule VI	0	-

Fig No: 3.32. Schedule Of Wildlife Protection Act 1972

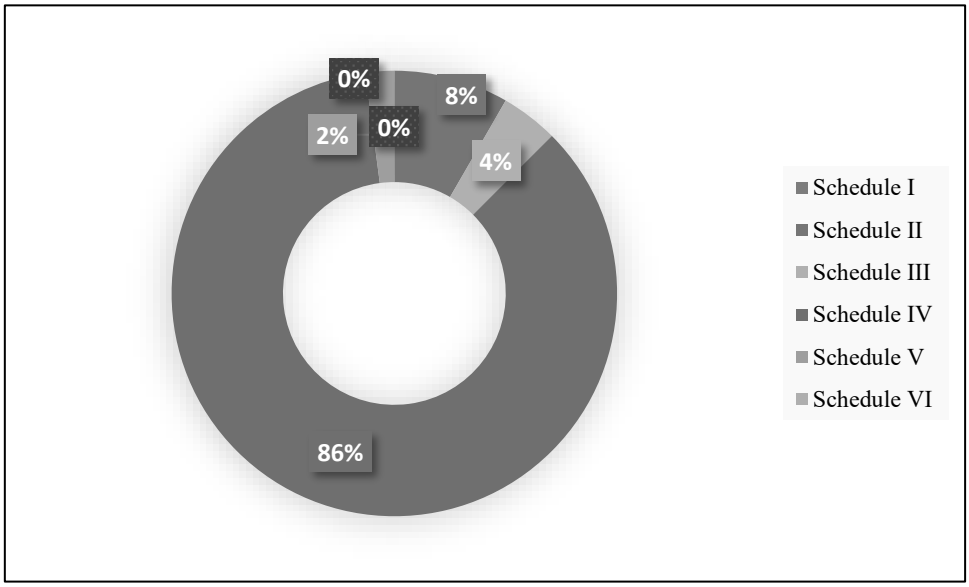


Table No. 3.38: Description of Flora & Fauna

S. No	Type of Species	Name	Local Name
Flora			
1.	Endangered species	None	None
2.	Threatened species	None	None
3.	Near Threatened species	None	None
4.	Vulnerable species	None	None
Fauna			
5.	Endangered species	None	None
6.	Threatened species	None	None
7.	Near Threatened species	None	None
8.	Vulnerable species	None	None
9.	Migratory Corridors & Flight Paths	No corridors & flight paths	-
10.	Breeding & Spawning grounds	None	-
11.	Invasive Alien species	None	None

a. Acridotheres tristis

b. Amaurornis phoenicurus

c. Danaus chrysippus

d. Calotes versicolor

e. Sitana ponticeriana

f. Corvus splendens

g. Sympetrum fonscolombii

h. Orthetrum sabina

i. Psittacula krameri

j. Danaus plexippus

Fig No: 3.34. List Fauna in Buffer Zone of Mine area

A comprehensive Central Legislation Namely Wild Life (Protection) Act was enforced in 1972 to provide protection to wild animals. Schedule-I of this act contains the list of rare and endangered species, which are completely protected throughout the country. The list of wild animals and their conservation status as per Wild Life Act (1972) presented in Table 3.38 are the species recorded/reported from the study area, out of which 4 species belongs to schedule-II, 2 species belong to schedule-III, 1 species belongs to Schedule-V and rest of the species belongs to schedule-IV of Wildlife Protection Act, 1972. And there is no Invasive alien species (IAP) in the study area.

The few water bodies (River and Lake) are located in the study area on the east and south. A number of samples were investigated for enumeration of aquatic fauna. In order to study aquatic flora and faunal life one-time survey was conducted during the summer season. Major component of the aquatic life under the study area are listed below

- Phytoplankton
- Zooplankton

- Aquatic vertebrates like fish, amphibians etc.

To assess the planktonic profile of Phytoplankton and Zooplankton, few water samples from nearby seasonal water bodies etc. of the project side were collected at sub-surface level. The aquatic ecological study was conducted in different water bodies of the study area and the flora and fauna was recorded**.**

3.6.3. Aquatic Flora

While considering assessment of aquatic pollution and its implications, it must be realized that, despite many changes in the physico-chemical properties of the water body and sediment, the ultimate consequences of pollutants may be reflected inevitably on the biological system. Hence, the investigations of an ecosystem and particularly of its communities constitute an integral part of any ecological assessment. This can be achieved by selecting a few reliable parameters from a complex community structure. The parameters considered have phytoplankton (cell count, and generic diversity), zooplankton (standing stock i.e., biomass and faunal groups), fishery and mammals as well as birds. The first two reflects the productivity of a water column at the primary and secondary levels, respectively. Benthic organisms being sedentary animals associated with the seabed, provide information regarding the integrated effects of stress, if any, and hence serve as good indicators of early warnings of potential damages.

3.6.3.1. Significance of Plankton

Planktons can be broadly grouped into two categories those with plant origin are called 'Phytoplankton' and those with animal origin are called 'Zooplankton'**.**

3.6.3.2. Significance of Phytoplankton

In aquatic environments, phytoplankton are the main primary producers of organic matter, particularly in seas where they account for 90% of the production. When taken as a whole, they either directly or indirectly sustain all animal populations. In the spring, phytoplankton are exposed to more intense light from the upper sun when the water column becomes shallow. One of the main abiotic elements that promotes phytoplankton growth is light. The enormous accumulation of phytoplankton in the spring directly supplies fresh organic carbon to nourish the zooplankton, which supports fish, crabs, mollusks, and avian species—larger aquatic animals.

Phytoplankton group reported from the study area were Basillariophyceae, Chlorophyceae, and Myxophyceae and Euglenophyceae members. About 4 species of phytoplankton were reported from all the locations. Dominance of Bacillariophyceae members followed by Myxophyceae was observed in studies samples.

Table No: 3.39. Phytoplankton species

S.No	Name of species	Name of Family
1.	Achnanthes affinis	Achnanthaceae
2.	Spirulina sp., Oscillatoria sp.	Myxophyceae
3.	Ankistrodesmus falcatus, Pediastrum boryanum, Scenedesmus bijuga	Chlorophyceae
4.	Synedra balthica	Fragilariaceae

3.6.3.3. Significance of Zooplankton:

Because they help move biological production from phytoplankton to larger species in the food web, zooplanktons are important. Numerous types of phytoplankton are fed on by tiny copepods, tunicates, protozoans,

and other crustaceans. These then feed other animals, creating a further link in the food chain. As a result, fluctuations in plankton production would have an impact on the survival of juvenile fish that depend on them.

Table No: 3.40 Zooplankton Species

S.No	Name of species	Name of Family
1.	Mesocyclops leuckarti, Mesocyclops hyalinus	Cyclopidae
2.	Penilia avirostris, Evadna tergestina, Daphnia sp.	Cladocera
3.	Filinia sp., Asplanchana sp.	Rotifera
4.	Keratella monospina, Brachionus caudatus	Brachionidae

3.6.3.4. Aquatic Fish Fauna

Among all the aquatic life in the study area the fish fauna occupies an important place. The fish fauna of the area includes: Major carps includes Catla, Rahu, Mirgal, Exotic carps includes silver carp, Grass carp, Minor carps etc.

3.6.3.3. Aquatic Faunal Diversity

Amphibian species like the common Indian Burrowing frog, and green pond frog, and etc. were sighted near the water bodies located in the study area.

Table No. 3.41 Amphibians Observed/Recorded from the Study Area

SI. No	Scientific Name	Common Name/English Name	Schedule list wildlife Protection act 1972
1.	Sphaerotheca breviceps	Indian Burrowing frog	Schedule IV
2.	Euphlyctis hexadactylus	Green pond frog	Schedule IV
3.	Bufomelanostictus	Indian Toad	Schedule IV
4.	Euphlyctiscynophlyctis	Skipper	Schedule IV

3.6.3.4. Aquatic Vegetation

Aquatic weeds are found to be growing everywhere in 10 km radius area, in every water bog, pond, etc. Typha angustata can be found growing all along the drains of villages, small water-logged depressions, and agricultural fields lacking water but containing enough moisture to support its growth. And where water is present, Eichhornia crassipes has taken its roots and covers the entire water surface by its sprawl and invasion. All the aquatic plant species listed in Table 3.42.

Table No: 3.42. List of aquatic plants observed in the study area

S.No	Scientific Name	Common Name	Type
1.	Typha angustifolia	Lesser Bulrush	Emergent hydrophytes
2.	Ipomea aquatica	Water Morning Glory	Marshy amphibious hydrophytes
3.	Hydrilla verticillata	Hydrilla	Submerged hydrophytes
4.	Pistia stratiotes	Water lettuce	Free floating hydrophytes
5.	Cyperus articulates	Jointed flatsedge	Emergent Hydrophytes
6.	Eichhornia crassipes	Common water hyacinth	Free floating hydrophytes

Sources:

Invasive Alien Species | IUCN

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3.10. Findings/Results

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

S.No	Ecological sensitive habitat	Direction and Distance from the project site
1.	National Parks/ Wildlife Sanctuary/ Biosphere reserves/ Elephant Reserve/ Any Other Reserve	Cauvery Wildlife Sanctuary is situated about 16.14 km on the south.
2.	Reserved Forests	The Sanamavu Reserve Forest is situated about 475m on the east side and Settipalli R.F situated about 6.2km on the east side
3.	Wildlife Corridors & Routes	No notified wildlife corridors are present in 10 km vicinity.
4.	Wetlands / Water bodies	-
5.	Ramsar Site	Nil
6.	Important Bird Habitats	Nil
7.	Breeding/nesting areas of endangered species	Not present
8.	Mangroves	None

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.

3.8. Conclusion

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

3.6 SOCIO ECONOMIC ENVIRONMENT

The major developmental activities in mining sector are required for economic development as well as creation of employment opportunities (direct and indirect) and to meet the basic/modern needs of the society, which ultimately results in overall improvement of the quality of life through upliftment of social, economic, health, education and nutritional status in the project region, state as well as the country. In this manner all developmental projects have direct as well as indirect relationships with socioeconomic aspects, which also include public acceptability for new developmental projects. Thus, the study of socioeconomic component incorporating various facets related to prevailing social and cultural conditions and economic status of the rough stone quarry project region is an important part of EIA study. The study of these parameters helps in identification, prediction and evaluation of the likely impacts on the socio economics and parameters of human interest due to the project.

3.6.1 Objectives of the Study

The objectives of the socio-economic impact assessment are as follows:

a) To study the socio-economic status of the people living in the study area of the project region.

b) To identify the basic needs of the nearby villages within the study area.

c) To assess the impact on socio-economic environment due to the project.

d) To provide the employment and improved living standards.

f) To analysis of impact of socio economic and Environmental Infrastructure facilities and road accessibility.

3.6.2 Scope of Work

- To study the Socio-economic Environment of area from the secondary sources
- Data Collection and Analysis
- Identification of impacts due to the mining projects
- Mitigation Measures

3.6.3 Methodology

The methodology adopted for the socio-economic impact assessment is as follows:

a) The details of the activities and population structure have been obtained from Census 2001 and 2011 and analysed.

b) Based on the above data, impacts due to plant operation on the community have been assessed and recommendations for further improvement have been made.

3.6.4 Sources of Information and Data Base

To achieve the above objectives, the information has been collected from both primary and secondary sources. Both primary data and secondary data have been analyzed by means of suitable statistical techniques for the purpose of verifying the above selected hypotheses concerned with the surrounding area.

3.6.5 Primary Survey

The primary data collection includes the collection of data through a structured interview schedule by direct observation method. The questionnaire survey includes both open and closed methods. The sample size is limited respondents, who were selected on the basis of simple random sampling from Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri District, Tamil Nadu State. in the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and tertiary Zone (7 - 10 km).

The questionnaires were designed to suit the subjects considering their rural background enabling to furnish correct information and data as far as possible. Data were collected at village level and household level by questionnaires and focused group discussions.

The study area for the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and Outer Zone (7 - 10 km).

3.6.6 Collection of Data from Secondary Sources

Data from secondary sources were collected on following aspects:

- Demographic profile of the area
- Economic profile of the area

Table 3.43 Type of Information and Sources

Information	Source
Demography	District Census Handbook, Govt. of India
Economic profile of the area	Census of India, Tamil Nadu State

b) Data Presentation and Analysis

The data collected were presented in a suitable, concise form i.e., tabular or diagrammatic or graphic form for further analysis. These tabulated data were interpreted and analyzed with the help of various qualitative techniques and ideographic approaches.

3.7 Background Information of the Area

Tamil Nadu is the 11th largest states in India in terms of area. The state is the seventh most populous state in the country and its main language Tamil has origins that date back to 500 BC. Chennai is the capital of Tamil Nadu and lies on the eastern coast line of India. Tamil Nadu is famous for its wonderful

temples and monuments that have been built 1000s of years ago and has places that have been marked as heritage sites by the United Nations. In a 180-degree paradigm shift, this state with a rich historical importance is also one of the fastest developing centres for technology and trade.

The State can be divided broadly into two natural divisions (a) the Coastal plains of South India and (b) the hilly western area. Parallel to the coast and gradually rising from it is the broad strip of plain country. It can further be subdivided into Coromandal plains comprising the districts of Kancheepuram, Krishnagiri, Cuddalore and Vellore. The alluvial plains of the Cauvery Delta extending over Thanjavur and part of Tiruchirappalli districts and dry southern plains in Krishnagiri, Dindigul, Ramanathapuram, Sivaganga, Virudhunagar, Tirunelveli and Tuticorin districts. It extends a little beyond Western Ghats in Kanyakumari District. The Cauvery Delta presents some extremely distinctive physical and human features, its power being a main factor in the remarkable growth, the towns of Tamil Nādu have witnessed.

3.8 Geography of the Area

Tamil Nadu is one of the 28 states of India, located in the southernmost part of the country. It extends from 8°4'N to 13°35'N latitudes and from 76°18'E to 80°20'E longitudes. Its extremities are

• in eastern - Point Calimere

• in western - hills of Anaimalai

• in northern - Pulicat lake

• in southern - Cape Comorin

It covers an area of 1,30,058 sq.km and 11th largest state in India. It covers 4% of the area of our country. Tamil Nadu is bounded by the Bay of Bengal in the east, Kerala in the west, Andhra Pradesh in the north, Tamil Nadu in the northwest and Indian Ocean in the south. Gulf of Mannar and Palk Strait separate Tamil Nadu from the Island of Sri Lanka, which lies to the southeast of India.

Already we have learnt that the state of Tamil Nadu had only 13 districts at the time of its formation. After that, the state was reorganised several times for the administrative convenience. At present there are 37 districts in Tamil Nadu, including the newly created districts such as Kallakurichi, Tenkasi, Chengalpet, Ranipet and Tirupathur.

3.9 Population Growth Rate

In 1991, there were only 21 districts in the State of Tamil Nadu. In 2001, eight new districts were created by reorganising the territorial jurisdiction. The nine districts are – Krishnagiri, Namakkal, Perambalur, Viluppuram, Thiruvarur, Nagapattinam, and Theni. The population and its growth trend are important economic factors in a developing economy.

Year	Tamil Nadu	India
1941	11.91	14.22
1951	14.66	13.31
1961	11.85	21.51
1971	22.30	24.80
1981	17.50	24.66
1991	15.39	23.86
2001	11.19	21.34
2011	15.61	5.96
2021	5.96	1.0

3.10 Krishnagiri District

Krishna' refers to 'black' and 'giri' refers to 'hill'. This district is gifted with black granite hillocks and named as "krishnagiri". The region came under the rule of Krishna Deva Raya and hence it might have been named after this king.

Krishnagiri district is bounded by Vellore and Thiruvannamalai districts in the East, Karnataka state in the west, State of Andhra Pradesh in the North Dharmapuri District in the south. Its area is **5143 Sq. Kms.** This district is elevated from 300m to 1400m above the mean sea level. Source: https://krishnagiri.nic.in/about-district/district-at-a-glance/

It is located between 11º 12'N to 12º 49'N Latitude,77º 27'E to 78º 38'E Longitude.

3.11 Study Area

Detailed socio-economic survey was conducted in the study area (Core and buffer zone) within 10 km radius of the area at Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri District, Tamil Nadu State. In order to determine the impact of the proposed project on nature and inhabitant. To get an overview of the villagers and their perspectives about this proposed activity, different demographic parameters and social aspects such population density, sex ratio, literacy rate, worker ratio etc. has been identified, analyzed, studied together. These impacts may be beneficial or disadvantageous. If disadvantageous anticipated suggestions measures are advocated in order to have collective development.

3.12 Demographic pattern of 10km study area characteristics a comparative analysis

Table 3.44 Shows the socio-economic profile of the study area as compared to district, state and national level socio-economic profile

Particular	India	Tamil Nadu	Krishnagiri District	Study Area (10km Radius)
Area (in sq. km.)	3,287,263	130058	5143	318
Population Density/ sq. Km.	368	554	370	735
No. of Households	249454252	13357027	448053	55611
Population	1210569573	72147030	1879809	233837
Male	623121843	36137975	960232	119132
Female	587447730	36009055	919577	114705
Scheduled Tribes	104281034	794697	22388	2801
Scheduled Castes	201378086	14438445	267386	28038
Literacy Rate	**73%**	**80%**	**72%**	**76%**
Sex Ratio (Females per 1000 Males)	**943**	**996**	**956**	**963**

Source: Census of India, 2011

Table no 3.44 show demographic pattern of India, Tamil Nadu, Krishnagiri District & Study area (10km Radius). In India had total area of 3.2 sqkm, State of Tamil Nadu area was 130058 sqkm, District of Krishnagiri area was 5143 sqkm and study area is about 318sqkm. Population density is total population per sqkm. So, India population density was 368 sqkm, state of Tamil Nadu density was 554 sqkm, District had density about 370 sqkm and study area density is about 735 sqkm. As per Census 2011, about 5.96percent of population in the state lives in areas. Krishnagiri had comparing state wise 2.61percent of population lives in the district. In study area has 12% around 10km radius. State, District and study area. In Tamil Nadu state SC categories people had about 19 %, district of Krishnagiri about 14.22 % it had decreasing to Study area about 12% increasing in the total population Similarly ST population is about 1.10%, 1.19 % and 1.20 % of the total population in the study area. State level Literacy rate is 80%, district level is 75% but study area has an increased about 76%. There is literacy rate is study area is an increase comparing district level decreased. Sex ratio female per thousand males about state level is 996, District level is 956 and study area is 963.

The study area has population density 735 persons per sq.km of total population about 233837 as per census 2011. There were about 51 percent male and 49% female population. Study area has literate rate is about 76%, District had about 72% of literate rate as per census 2011.

3.13 Population Projection of the Study Area

Krishnagiri Population 2022 – 2023

The last census of Krishnagiri was done in 2011and next census of 2021 has been postponed or cancelled. But we can do projection of future Krishnagiri 2022 Population on the basis likely Population Growth Rate.

Year	Projected Population (Estimation)
2001	**1561118**
2011	**1879809**
2021	2198500
2025	2325976
2030	2485322

Source: https://www.census2011.co.in

A population projection is an estimation of the number of people expected to be alive at a future date that is made based on assumptions of population structure, fertility, mortality and migration. It is an essential to assess the need for new jobs, schools, doctors and nurses, planning urban housing, foods, clothing and requirements of energy and resources. It is also needed for policy discourse i.e., helps to the policy-makers to understand the existing problems and finally supports to develop the suitable solutions.

A population projection gives a picture of what the future size and structure of the population by sex and age might look like. It is based on knowledge of the past trends, and, for the future, on assumptions made for three components: fertility, mortality and migration.

Table 3.45 Total Population of Study Area

Sl No.	Population in 2001	Population in 2011
1	178692	233837

Source: https://censusindia.gov.in/census.website/

Table 3.46 Population Projection of Study Area

S. No	Year	Projected Population (Approximately)
1.	2021	288982
2.	2031	344127
3.	2041	399272
4.	2051	454417

Source: Calculated by SPSS V23 Linear Regression Method.

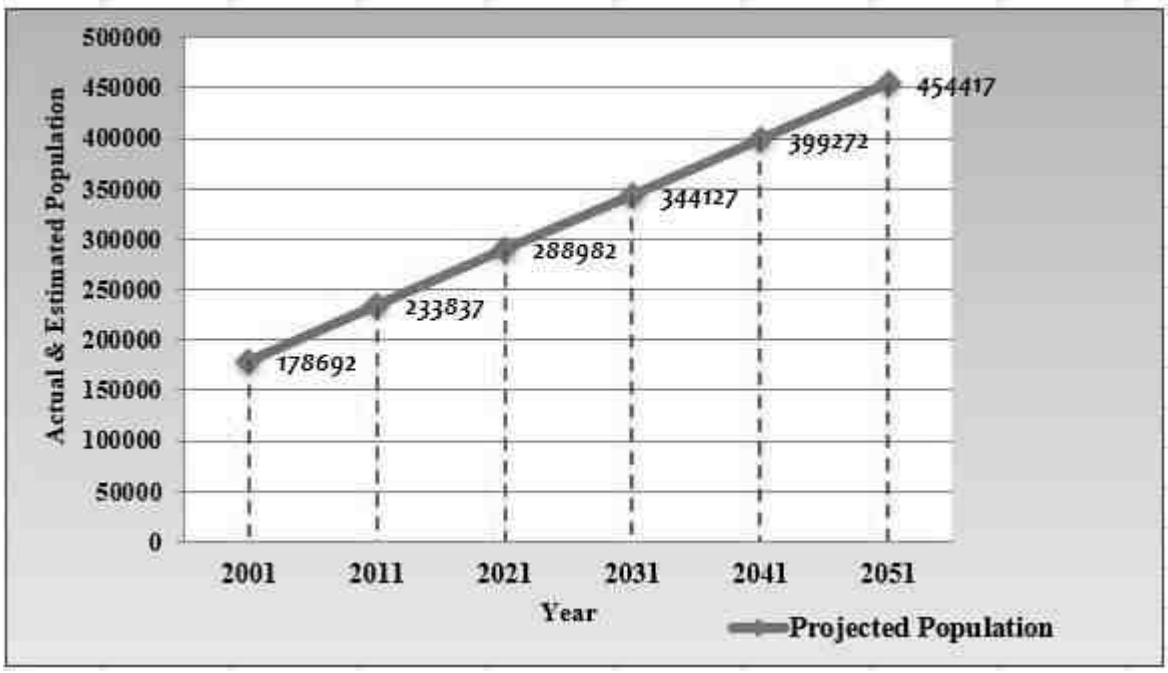


Figure 3.35 Graph Showing Population Projection

Following formula has been used for the projection of population.

$$Y=a+b_t$$

Where: Y= Dependent variable (Population)

a=Intercept

b=Slope

t=Interdependent variables (Time)

Above formula is applied to project population for the years (2021, 2031,2041,2051). Due to avoid the errors in manual calculation the statistical software SPSS (demo version 23) is used to calculate the intercept and the slope.

Due to the shortage of data on population the results show same value of growth for the years (2021,2031,2041,2051). If the researcher gets enough the data on population for earlier years the data projection will be accurate.

- Ref: Indian Economic survey, the SLR (Simple Linear Regression) techniques are used by statistical department, Government of India to project population.
- Source: https://www.ibm.com/in-en/analytics/spss-statistics-software

3.14 Population Growth of the Study Area

Table 3.47 Population Growth rate in Study area

Year	Actual Population	Growth Rate %
2001	178692	
2011	233837	13.09
2021	288982	12.36
2031	344127	11.91
2041	399272	11.60
2051	454417	11.38

Source: Compiled by Author-2022

above table no 3.14.1 is showing the growth rate of population since 2001, as per census in 2001 the population of study area was 178692 and 2011 it was 233837, if the population growth rate is 13.09%, it will approximately gradually an increase about 288982 in year 2021 and 454417 in the year of 2051. It has approximately population growth rate decline will be 11.38%.

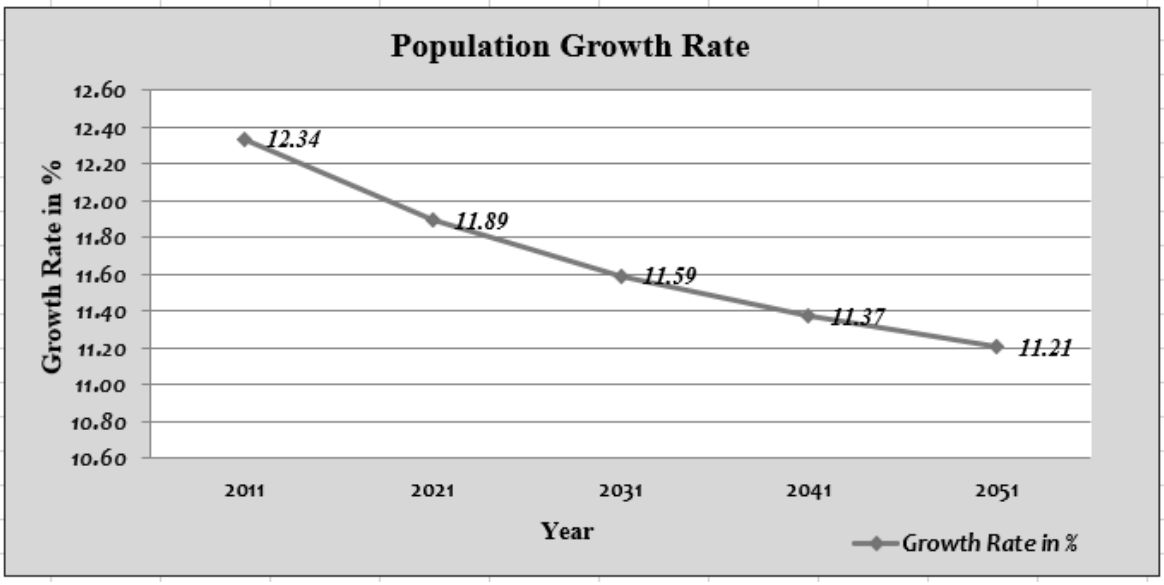


Fig.3.36 Graph Showing Population Growth Rate

Planning Analysis:

Calculating Growth Rates

The percent change from one period to another is calculated from the formula:

Where:

$$PR = \frac{(V_{Present} - V_{Past})}{V_{Past}} x100$$

PR=Percent Rate
$V_{Present}$ =Present or Future Value
V_{Past} = Past or Present Value

The *annual* percentage growth rate is simply the percent growth divided by N, the number of years.
Source: https://pages.uoregon.edu/rgp/PPPM613/class8a.htm

3.15 Population Distribution and Composition of Study Area

The population as per 2011 Census records is 55611 (for 10 km radius buffer zone). Total no. of household is 4629, 10253 and 40729 respectively, in primary, secondary and tertiary zone. Sex ratio is 1011, 937 and 964 (females per 1000 males) observed in primary, secondary and tertiary zone respectively. SC population distribution is 2756, 6862 and 18420 respectively in primary, secondary and tertiary zone. ST population distribution is very less 222,379 and 2200 respectively in primary, secondary and tertiary. Average household size is 4. Zone wise Demographic profile of study area is given in the table 3.49 below:

Source: https://censusindia.gov.in/census.website/data/census-tables

Table 3.48 Zone wise Demographic Profile of Study Area

Zone	No. of Villages	Total Household	Total Population	Male Population	%	Female Population	%
Primary Zone (0 - 3 Km)	4	4629	20920	10404	49.73	**10516**	50.27
Secondary Zone (3 - 7 Km)	17	10253	44663	23063	51.64	**21600**	48.36
Tertiary Zone (7 - 10 km)	21	40729	168254	85665	50.91	**82589**	49.09
Study Area (0-10 km)	**42**	**55611**	**233837**	**119132**	**50.95**	**114705**	**49.05**

Source: Census of India, 2011

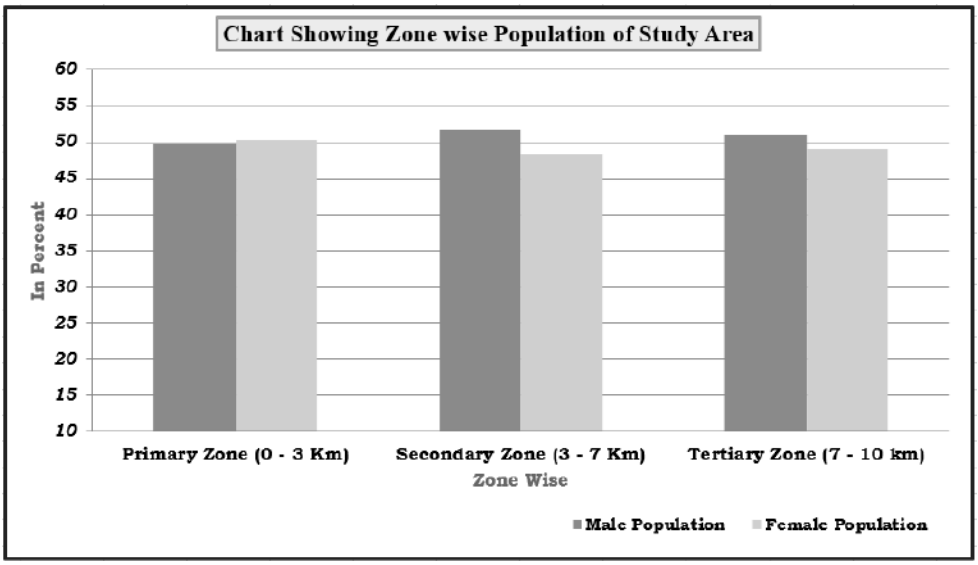


Figure 3.37 Population of study area

- ✓ Above table identifies the presence of villages and their subsequent population divided under three zones from plant boundary (i.e., Primary, secondary and tertiary zone).
- ✓ Primary zone has 4 villages where as much as 4629 households with 20920 population are located. Mostly lying on Built-up land for their livelihood and substance.
- ✓ Secondary and tertiary zone both comprise of 17 and 21 villages having a total population of 44663 and 168254 respectively.

Table.No 3.49 Village wise Demographic Profile of the Study Area (Core and Buffer Zone)

Sno	Name	No.of Households	Total population	Total Male	Total Female	Population below 6	Male below 6	Female below 6	SC population	SC Male	SC Female	ST population	ST Male	ST Female	Literate population	Male Literate	Female Literate	Total workers	Main workers	Marginal workers	Nonworkers
0-3km																					
1	Alur	83	404	205	199	31	15	16	258	132	126	0	0	0	305	152	153	373	22	351	31
2	**Thorapalli Agraharam**	**2177**	**9849**	**4669**	**5180**	**1328**	**694**	**634**	**1178**	**581**	**597**	**10**	**3**	**7**	**6149**	**3014**	**3135**	**3855**	**3157**	**698**	**5994**
3	Kamandoddi	1450	6524	3394	3130	797	415	382	878	460	418	130	76	54	3601	2093	1508	3003	2221	782	3521
4	Thiyarandurgam	919	4143	2136	2007	463	223	240	442	232	210	82	40	42	2245	1337	908	2137	1692	445	2006
	Total	**4629**	**20920**	**10404**	**10516**	**2619**	**1347**	**1272**	**2756**	**1405**	**1351**	**222**	**119**	**103**	**12300**	**6596**	**5704**	**9368**	**7092**	**2276**	**11552**
3-7km																					
1	Bukkasagaram	460	2126	1109	1017	259	128	131	319	165	154	0	0	0	1213	742	471	364	278	86	1762
2	Peddakullu	109	521	265	256	56	28	28	120	66	54	0	0	0	264	141	123	252	241	11	269
3	Karibasanapuram	1	4	2	2	0	0	0	0	0	0	0	0	0	3	1	2	1	1	0	3
4	Chinnakullu	71	331	165	166	38	20	18	69	30	39	0	0	0	207	109	98	195	188	7	136
5	Punugandoddi	187	834	430	404	100	54	46	226	113	113	0	0	0	482	267	215	435	430	5	399
6	Moranapalli	2174	9160	4855	4305	1301	668	633	1503	767	736	13	4	9	5842	3403	2439	4081	3811	270	5079
7	Addakurukki	581	2504	1288	1216	366	191	175	425	226	199	8	4	4	1298	758	540	1023	682	341	1481
8	Marandapalli	963	4663	2355	2308	579	303	276	122	58	64	0	0	0	2363	1355	1008	2427	1688	739	2236
9	Basthalapalli	221	969	485	484	118	66	52	17	10	7	0	0	0	491	301	190	531	528	3	438
10	Subbagiri	158	656	333	323	81	46	35	0	0	0	0	0	0	360	194	166	208	208	0	448
11	Sanamavu	925	4248	2182	2066	513	270	243	659	322	337	183	100	83	2549	1487	1062	1913	1661	252	2335
12	Halekotta	707	2990	1535	1455	301	148	153	209	103	106	83	46	37	1831	1071	760	1263	1098	165	1727
13	Agaram Agraharam	288	1219	620	599	126	68	58	131	71	60	23	9	14	687	389	298	741	692	49	478
14	Thuppuganapalli	989	4281	2192	2089	501	248	253	1201	616	585	0	0	0	2328	1340	988	2395	2322	73	1886
15	Gollapalli	121	534	291	243	58	30	28	0	0	0	0	0	0	241	158	83	308	308	0	226
16	Bairamangalam	1207	4932	2569	2363	520	258	262	1213	638	575	11	5	6	3376	1940	1436	2330	1723	607	2602
17	Uddanapalli	1091	4691	2387	2304	555	308	247	648	326	322	58	28	30	2779	1563	1216	2306	1820	486	2385
	Total	**10253**	**44663**	**23063**	**21600**	**5472**	**2834**	**2638**	**6862**	**3511**	**3351**	**379**	**196**	**183**	**26314**	**15219**	**11095**	**20773**	**17679**	**3094**	**23890**
7-10km																					
1	Meenandoddi	83	358	180	178	48	23	25	62	28	34	0	0	0	176	94	82	200	200	0	158
2	Athimugam	937	4540	2339	2201	572	272	300	334	163	171	17	9	8	2297	1317	980	1936	1525	411	2604
3	Venkatesapuram	650	2873	1484	1389	325	172	153	583	290	293	0	0	0	1655	960	695	1211	965	246	1662
4	Advanapalli	58	239	123	116	34	16	18	1	0	1	0	0	0	125	75	50	68	48	20	171
5	Alnatham	71	327	170	157	28	12	16	77	41	36	0	0	0	176	118	58	91	69	22	236
6	Sudugondapalli	87	447	229	218	50	30	20	95	49	46	0	0	0	217	128	89	329	211	118	118
7	Palavanapalli	258	1096	540	556	114	58	56	370	183	187	0	0	0	637	349	288	480	478	2	616
8	Muthalli	108	444	223	221	46	23	23	130	64	66	0	0	0	222	132	90	156	155	1	288
9	Dhasapalli	152	894	443	451	127	64	63	1	0	1	0	0	0	363	202	161	521	519	2	373
10	A.Settipalli	605	2764	1428	1336	331	178	153	509	264	245	11	8	3	1595	960	635	1577	1415	162	1187
11	Kelavarapalli	117	529	274	255	42	15	27	49	27	22	0	0	0	312	174	138	334	329	5	195
12	Kothagondapalli	1087	4706	2346	2360	552	277	275	1795	881	914	11	7	4	2953	1614	1339	1977	1887	90	2729
13	Nallaganakothapalli	968	3933	2028	1905	524	247	277	419	207	212	26	15	11	2309	1378	931	1659	1383	276	2274
14	Ayaranapalli	1171	4986	2578	2408	558	277	281	768	392	376	702	362	340	2923	1734	1189	2628	2422	206	2358
15	Hosur (M)	29255	116821	59351	57470	14307	7274	7033	9438	4816	4622	200	99	101	89593	47353	42240	43959	39730	4229	72862
16	Nagamangalam	1115	4948	2502	2446	577	298	279	650	322	328	57	25	32	2675	1559	1116	2617	2326	291	2331
17	Udedurgam	763	3441	1780	1661	412	225	187	818	429	389	206	113	93	1792	1041	751	2079	1844	235	1362
18	Pachapanatti	863	3895	1959	1936	446	232	214	380	186	194	231	117	114	2098	1183	915	1772	935	837	2123
19	Hanumanthapuram	1125	5241	2712	2529	705	366	339	652	328	324	739	373	366	2667	1578	1089	2983	2694	289	2258
20	Jagirkarupalli	393	1905	1004	901	231	119	112	132	66	66	0	0	0	1046	630	416	1058	883	175	847
21	Kundumaranapalli	863	3867	1972	1895	436	199	237	1157	594	563	0	0	0	2243	1342	901	1784	1562	222	2083
	Total	**40729**	**168254**	**85665**	**82589**	**20465**	**10377**	**10088**	**18420**	**9330**	**9090**	**2200**	**1128**	**1072**	**118074**	**63921**	**54153**	**69419**	**61580**	**7839**	**98835**
	G.Total	**55611**	**233837**	**119132**	**114705**	**28556**	**14558**	**13998**	**28038**	**14246**	**13792**	**2801**	**1443**	**1358**	**156688**	**85736**	**70952**	**99560**	**86351**	**13209**	**134277**

Source: Village Wise Demographic Profile of the Study Area, *Census of India, 2011*

3.16 Gender and Sex Ratio

Sex ratio is used to describe the number of females per 1000 of males. Sex ratio is a valuable source for finding the population of women in India and what is the ratio of women to that of men in India. In the Population Census of 2011, it was revealed that the population ratio in India 2011 is 940 females per 1000 of males. The study area has 963 females per 1000 males. Gender and sex ratio determine the Human Development Index (HDI) of an area thereby understanding the status of women in that region. Following table entails information about sex ratio of 42 villages lying in study area (buffer zone) as primary, secondary and tertiary zone.

Table 3.50 Sex ratio of the study area

S. No.	Buffer Zone	Sex Ratio of Study area Female/ 1000 Male
1	Primary Zone (0-3 km)	1011
2	Secondary zone (3-7 km)	937
3	Tertiary Zone (7-10 km)	964

Source: Census of India, 2011

Figure 3.38 Sex Ratio within 10 Km study area

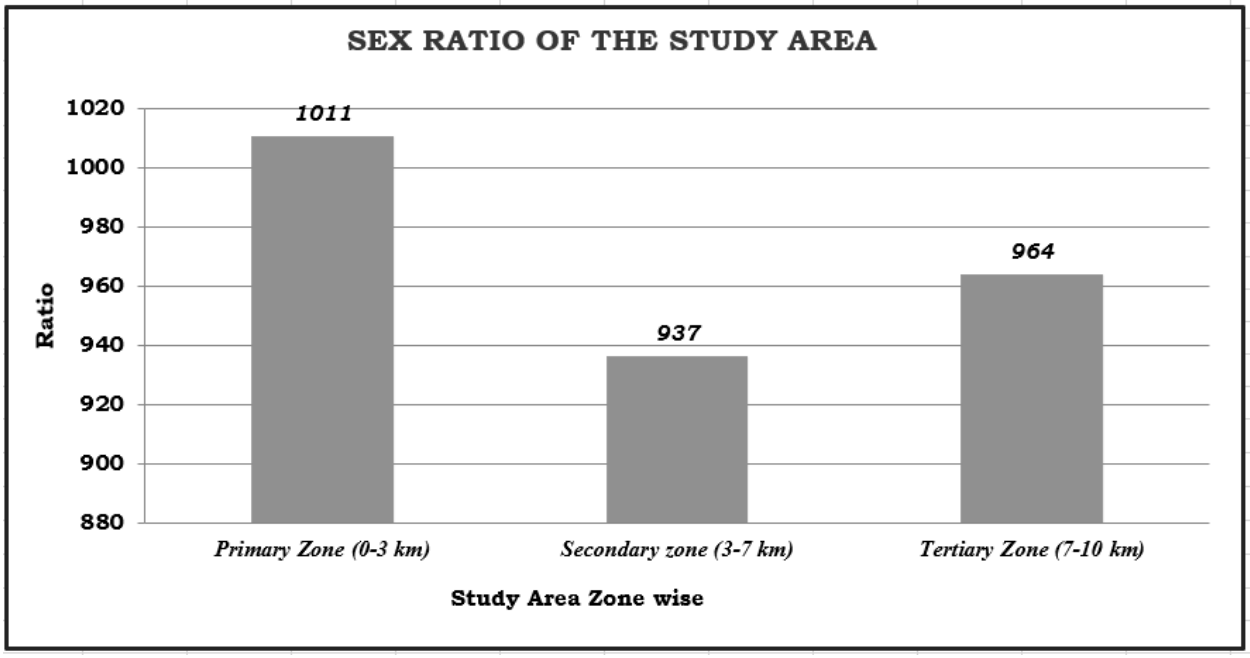


Table No. 3.51 Child Sex ratio of the study area

S. No.	Buffer Zone	Sex Ratio of Study area Female/ 1000 Male
1	Primary Zone (0-3 km)	944
2	Secondary zone (3-7 km)	931
3	Tertiary Zone (7-10 km)	972

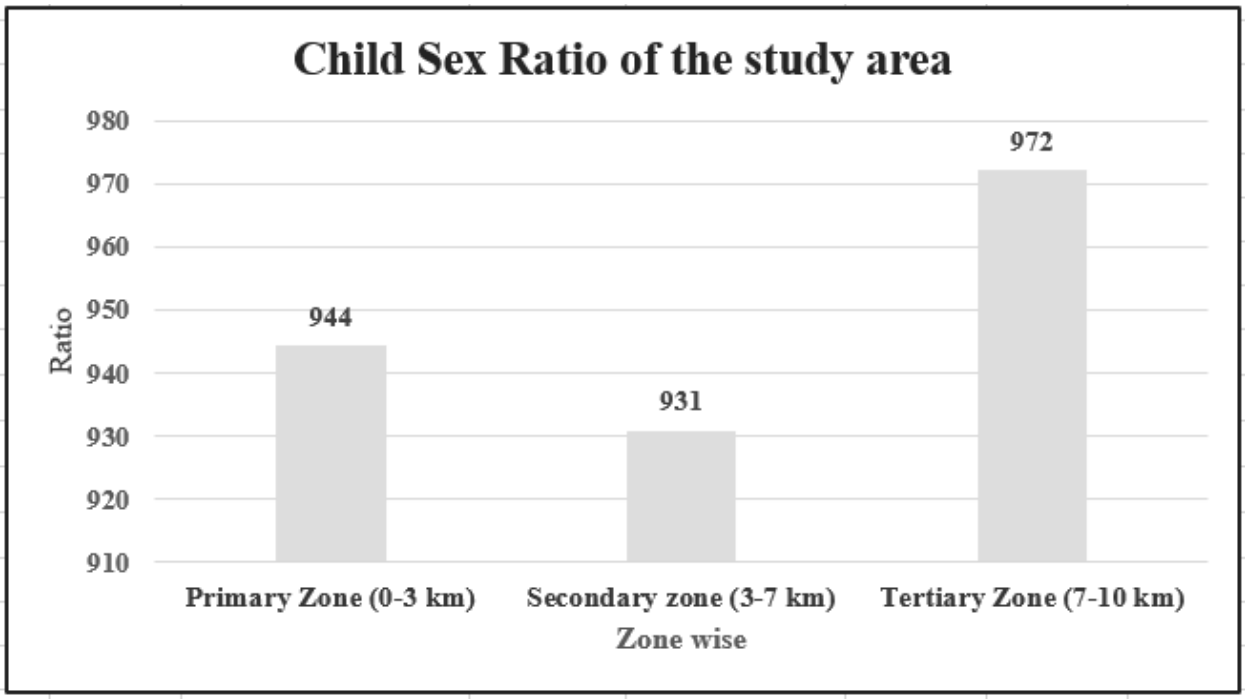


Figure 3.39 Child Sex Ratio within 10 Km study area

3.17 Literacy Rate in Study Area

Literacy Rate is the percentage of people in a country with the ability to read and write. The analysis of the literacy levels is done in the study area. The 10 km radius of study area demonstrates a literacy rate of 76% as per census data 2011. The male literacy rate in the study area indicates 82% whereas the female literacy rate, which is an important indicator for social change, is observed to be 70% as per the census data 2011. This needs to focus on the study area and enhance further development focusing on education. (Table no 3.17.1).

Table 3.52. Literacy Rate of the Study Area

Zone	No. of Villages	Male Literacy Population	Male literacy Rate	Female Literacy Population	Female literacy Rate	Total Literacy	Total Literacy Rate
Primary Zone (0 - 3 Km)	4	**6596**	72.83	**5704**	61.70	**12300**	67.21
Secondary Zone (3 - 7 Km)	17	**15219**	75.23	**11095**	58.51	**26314**	67.14
Tertiary Zone (7 - 10 Km)	21	**63921**	84.90	**54153**	74.69	**118074**	79.89
Study Area (0-10km)	**42**	85736	**81.99**	70952	**70.45**	156688	**76.33**

Source: Census of India, 2011

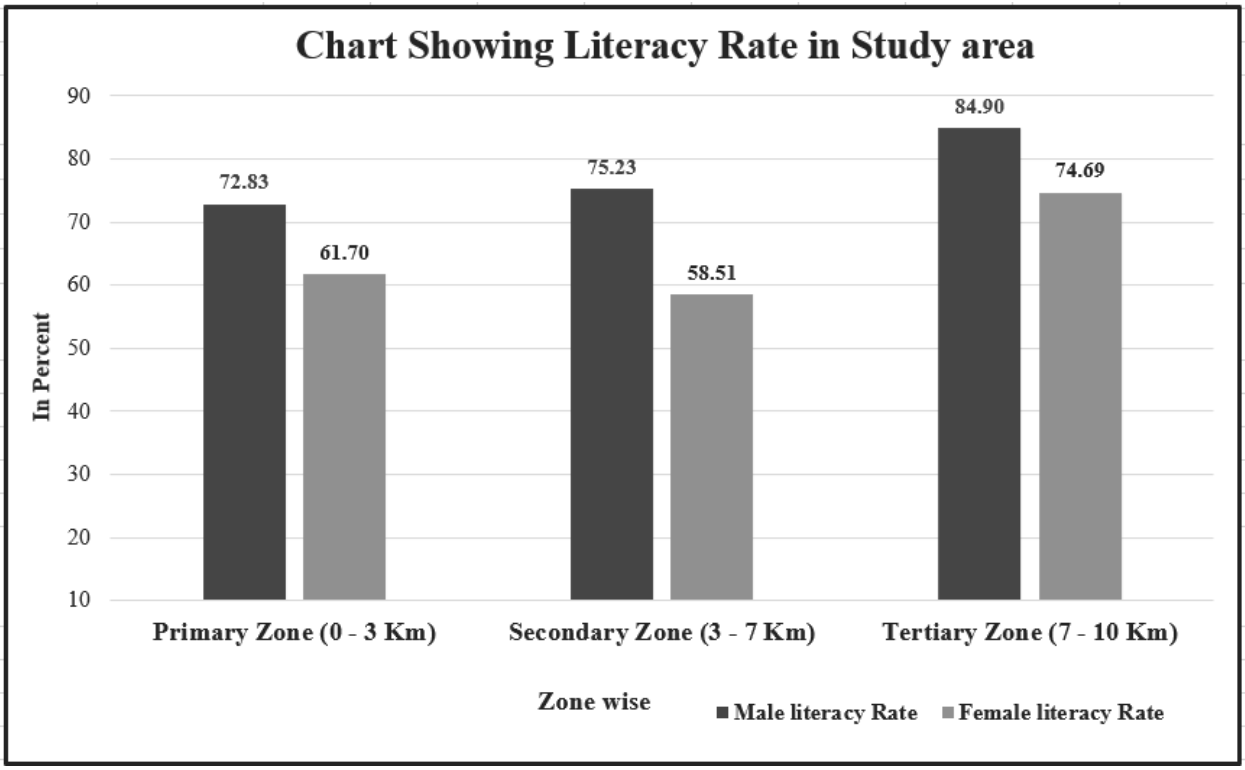


Figure 3.40 Gender wise Literacy Rate in the study area

3.18 Family Size

Size of family also describes about family functioning, resource consumption, total income generated and their expenditure pattern. Census 2011 data suggests that most of these households have a family size of up to 4 members, knowing the size of family also give fair understanding of relating how much resource consumption is being incurred, and annual income being generated and spent.

3.19 Vulnerable Group

While developing an action plan, it is very important to identify the population who fall under the marginalized and vulnerable groups and special attention has to be given towards these groups while

making action plans. Special provisions should be made for them. In the observed villages schedule caste (SC) population is 12% and Schedule Tribe population 1.20 %, Other Population is 87% in total study area.

Table.No 3.53 Vulnerable groups of the study area

Zone	No. of Villages	Vulnerable Groups					
		SC Population	%	ST Population	%	Other Population	%
Primary Zone (0 - 3 Km)	4	2756	13.17	222	1.06	17942	85.76
Secondary Zone (3 - 7 Km)	17	6862	15.36	379	0.85	37422	83.79
Tertiary Zone (7 - 10 Km)	21	18420	10.95	2200	1.31	147634	87.74
Total area (10km)	**42**	**28038**	**11.99**	**2801**	**1.20**	**202998**	**86.81**

Source: Census of India, 2011

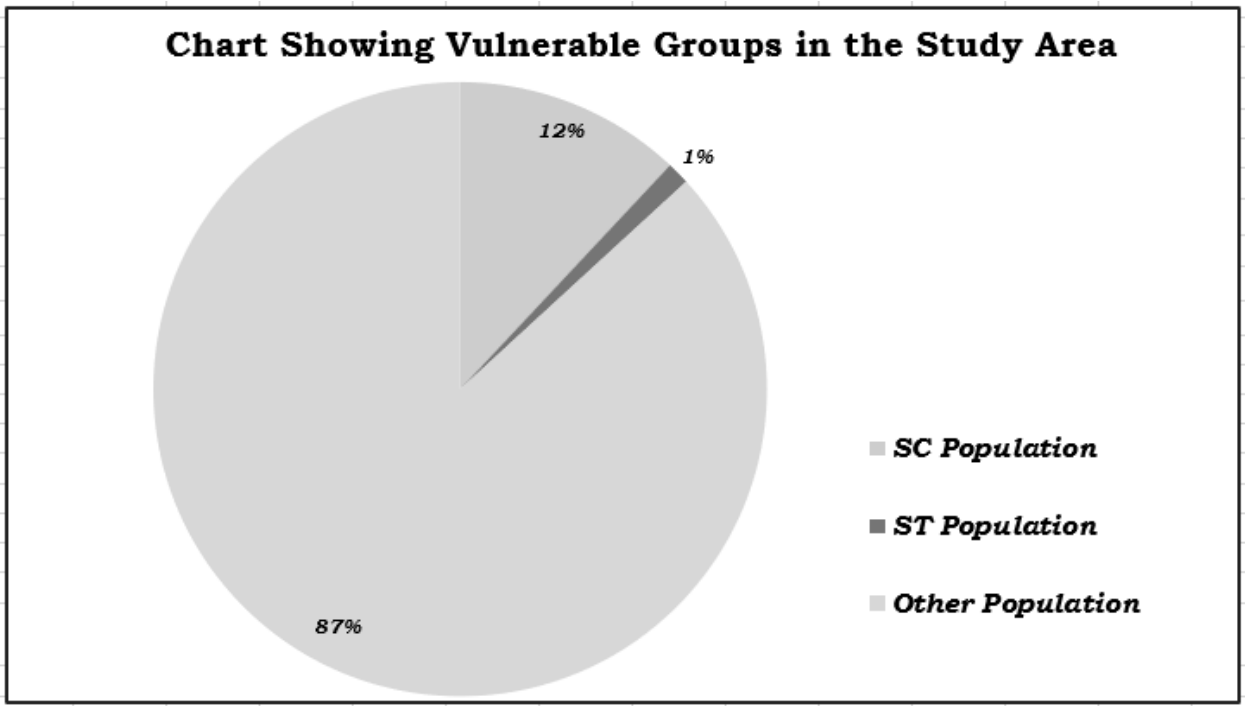


Figure 3.41 vulnerable groups

3.20 Economic Activities

The economy of an area is defined by the occupational pattern and income level of the people in the area. The occupational structure of residents in the study area is studied with reference to work category. The population is divided occupation wise into three categories, viz., Total workers, Main workers and non-workers. The main workers include cultivators, agricultural laborers, those engaged in household industry

and other services. The non-workers include those engaged in unpaid household duties like, students, retired persons, dependents, beggars, vagrants etc. besides Institutional intimates or all other non-workers who do not fall under the above categories.

Table 3.54. Shows the work force of the study area

Zone	No. of Villages	Total Workers	%	Main Workers	%	Marginal Workers	%	Non-Workers	%
Primary Zone (0 - 3 Km)	4	9368	44.78	7092	33.90	2276	10.88	11552	55.22
Secondary Zone (3 - 7 Km)	17	20773	46.51	17679	39.58	3094	6.93	23890	53.49
Tertiary Zone (7 - 10 Km)	21	69419	41.26	61580	36.60	7839	4.66	98835	58.74
Study Area (10 Km)	**42**	**99560**	**42.58**	**86351**	**36.93**	**13209**	**5.65**	**134277**	**57.42**

Source: Census of India, 2011

The above table shows that out of the total working population, the percentage of main workers is 37% while 6% are marginal workers. Number of working populations is 43% and non-working population is 57% in the study area. As per the data obtained from the survey (as mentioned previously in occupational structure) most of these people are employed for major period of the year. Also, to mention the natural environment also restricts the people in finding stable business is performed for only certain months. Thus, proposed project will act as possible exposure for them to get enrol and earn sustain livelihood.

Figure 3.42. Working population in the study area

3.21 Infrastructure Base

A better network of physical infrastructure facilities (built up and roads, irrigation, power and social infrastructure support, viz. health and Education, water and sanitation are essential for the development of the rural economy.

A review of infrastructural facilities available in the area has been done based on the information from baseline survey & census data of the study area. Infrastructural facilities available in the area are described in the subsequent sections.

- **Administrative offices** are located in Tamil Nadu, Krishnagiri District (32km-E) from site which by local transport.
- **Kelevarapalli Reservoir** North western side 8.5km-NW from mine lease boundary this dam requires people around the village and Kelavarapalli Village 7.5km-NW, Peddakullu Village – 6.5km-NW side, **Ponnaiyar River** 640m-SW, some Bathlapalli Lake –(5km -W), Kumudapalli lake (3.0km-NW) Gollapalli Village, Pennamadam Village people require water and Tippalam Lake-4km-W, from mine lease boundary, require people in the study area.
- **Availability of** PUM Government Elementary school, Kothapalli Village Government Boys Higher secondary school, Kelamangalam Town Panchayat Government High school, Uddanapalli Village Government High school, Sanamavu Village, many Pre-primary school, Elementary school, Engineering college, Medical and Training institute found in study area taluk and district level.
- **Health facilities** covered in the area GPHC Hosur municipality (12km-NW), Government PHC Payarkuttalai Village, (7km-N), Government Hospital Nagamangalam Other private clinics and Pharmacy available in the study area taluk and district level.

3.22 Structure details 300m Radius- P1-P4

Figure 3.43 Structure Map Thorapalli Agraharam Roughstone Cluster Quarries- P1-P4

Table 3.55 Structure details Thorapalli Agraharam Roughstone Cluster Quarries- P1-P4

0-50m only three structures in the view of the Image							
Structure Numbers	**Type of Structure**	**Usage Purpose**	**Commercial / industry / residential / farm house / Govt. building**	**Occupants of Building/ Structure**	**Structure belongs to owner**	**Structure Not belongs to owner**	**Remarks**
1	30m-SE-Shed	Mines	Industry	No	No	Yes	No stay
2	50m-SE-Storage yard	Mines	Industry	No	No	Yes	No stay
3	50m-SW-Crusher	Mines	Industry	No	No	Yes	No stay
50-100m Number of Structure - 3 Nos							
Structure Numbers	**Type of Structure**	**Usage Purpose**	**Commercial / industry / residential / farm house / Govt. building**	**Occupants of Building/ Structure**	**Structure belongs to owner**	**Structure Not belongs to owner**	**Remarks**
1	Mines shed– 70m – W	Mines	Industry	Yes	Yes	No Stay	Mines Register entry
2	Labour Shed - 80m-SW	Mines	Industry	No	No	No Stay	Mine Lobour only
3	Magazine-90m-SE	Mines	Industry	No	No	No Stay	Agriculture Equipment and tools
100-200m Number of Structure -one							
1	Farmhouse – 130m – SW	Agriculture	farm house	Yes	Yes	Yes	1 members two for adult and one for Childrern
200-300m Number of Structure -three							
1	Crusher -200m-NW	Mines	Industry	No	No	Yes	No stay
2	Crusher -250m-NW	Mines	Industry	No	No	Yes	No stay
3	Shed- 250m – W	Mines	Industry	Yes	Yes	No Stay	Mines Kitchen room and rest room

3.23. Other Issues in the Study Area

1. Deforestation of Land (Cutting Trees or Plant etc.)
2. Agriculture Land very less in the study area. (Dry with barren land or scrub with grass Land).
3. Lack of awareness among vulnerable groups for their welfare
4. Medical/Clinic facilities, PHC need, for the Core area.
5. Environmental clean with solid wastage pin each village.
6. Proper Functioning of Hospital facilities with Sub Health care centers.
7. Need proper drainage system with public toilet men and women separately.
8. Avoid Road damage during carriage by mine vehicles (tipper Lorry).
9. Use sprinkler water when loading mine materials, to avoid water pollution during dust emission.

10. Water bodies like Ponnaiyar river, Lake, pond avoid dust emission.

3.24 Interpretation

Based on the data, following inferences could be drawn:

- Total literacy rate in the study area is 76%.
- The study area had average educational facilities. The overall status depicts that the education is limited to primary and middle level.
- The schedule tribe community forms 1.20% and Scheduled Caste forms 12% of the total population of study area.
- The Other Population forms 87% of the total population of study area.
- The study area is well connected by NH/SH/Village Road.
- The study area not well health facilities of primary level.
- **Ponnaiyar River.** southern side 270m-SW from mine lease boundary.
- **Perandapalli Forest, Sanamavu R.F** boundary 150-200m-NE from mine lease boundary.
- Considering the above facts, the proposed project will boost the socio-economic development activities in the area and hence will leave positive impact.
- The study area has mobile connectivity.

3.25 Recommendation and Suggestions

The village development plans are made in consultation with the community through Gram Sabha; these appear to address the needs of the community. However, it may be noted that at the implementation stage these plans often are fraught with problem of inadequate funds, lack of proper planning, corruption, vested interests and political agendas. Hence while ascertaining the scope for convergence with the government activities, care must be taken to ascertain realistic possibilities for implementation.

- **Women empowerment–** Home based income generation activities, vocational training programs and common education centre for increasing the literacy rate.
- **Education –** Free uniform, construction of common rooms and library, computer education and physical education, additional schools for girls, furniture and equipment in schools, up-gradation of existing school infrastructure.
- **Agriculture/livestock –** Infrastructure such as agricultural practices, electricity connections, assistance with buying improved tools and equipment, capacity building, supply and/or knowledge of better variety of seeds, pasture land development and trainings on animal husbandry& facility of veterinary doctor.
- **Health –** Improvements in sanitary conditions of villages, assistance with construction of latrines, improvement in drainage system, health camps and awareness campaigns for diseases like Covid-19,

malaria, typhoid, tuberculosis, yellow fever and pneumonia. Repairing of PHCs and Anganwadi centers.

- **People with disability –** Establishment of centre for special education, sensitization of the community towards disabled and awareness on Government schemes.
- 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.
- **Connectivity –**Transport connectivity to easiness accessibility to the region.

3.26 Conclusion

To evaluate the impacts of proposed rough stone quarry project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the locality of the site. Hence it can be concluded that the present environment status of the study area will not be affected by the project as **Thorapalli Agraharam Rough stone Cluster quarries** will adopt adequate control measures to protect the surrounding environment and will contribute in development of the study areas.

Socio Economic/ demographic status of the study area reveals that area further require improvement in the Economy and Infrastructure Development of the area. Hence it can be concluded that the present baseline environment status of the study area will not be affected by the proposed project. 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

The environmental impact can be categorized as either primary or secondary, primary impacts which are attributed directly by the project; secondary impacts are those which are indirectly induced. The open cast mining operations involve development of benches, Approach Road, Haul Road, Excavation and handling of material. If adequate control measures are not taken to prevent/mitigate the adverse environmental impacts/lead to damage of the eco-system.

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 for sustainable resource extraction. 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. The various anticipated impacts will be on.

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

4.1 Land Environment

4.1.2 Anticipated Impact from all Proposed Projects

- Permanent or temporary change on land use and land cover.
- Change in Topography: Topography of the ML area will change at the end of the life of the mine.
- Movement of heavy vehicles sometimes cause problems to agricultural land, human habitations due to dust, noise and it also causes traffic hazards.
- Due to degradation of land by pitting the aesthetic environment of the core zone may be affected.
- Earthworks during the rainy season increase the potential for soil erosion and sediment laden water entering the water ways.
- If no due care is taken wash off from the exposed working area may choke the water course & can also causes the siltation of water course

4.1.2.1 Common Mitigation Measures for Respective Individual Proposed Projects

- The mining activity will be gradual confined in blocks and excavation will be undertaken progressively along with other mitigative measures like phase wise development of greenbelt etc.,
- Construction of garland drains all around the quarry pits and construction of check dam at strategic location in lower elevations to prevent erosion due to surface runoff during rainfall and also to collect the storm water for various uses within the proposed area.

- Green belt development along the boundary within safety zone. The small quantity of water stored in the mined-out pit will be used for greenbelt.
- Thick plantation will be carried out on unutilized area, top benches of mined out pits, on safety barrier, etc.,
- At conceptual stage, the land use pattern of the quarry will be changed into Greenbelt area and temporary reservoir.
- In terms of aesthetics, natural vegetation surrounding the quarry will be retained (such as in a buffer area i.e., 7.5 m safety barrier and other safety provided) so as to help minimise dust emissions.
- Proper fencing will be carried out at the conceptual stage, Security will be posted round the clock, to prevent inherent entry of the public and cattle.

4.1.3 Soil Environment

4.1.4 Impact on Soil Environment

The top layer of the project site in the form of topsoil formation, it will be directly loaded into tippers for the filling and levelling of low-lying areas. There is no disposal of topsoil. The excavated Rough Stone quarry will be directly loaded into dumpers to the needy customers.

There will be no disposal of waste water from the quarry operation, No discharge of toxic effluent from the proposed projects. The dust emission at working face and haul roads will be controlled by water sprinkling and plantation.

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

4.1.5 Common Mitigation Measures for Respective Individual Proposed Projects

- Run-off diversion – Garland drains will be constructed all around the project boundary to prevent surface flows from entering the quarry works areas. And will be discharged into vegetated natural drainage lines, or as distributed flow across an area stabilised against erosion.
- Sedimentation ponds - Run-off from working areas will be routed towards sedimentation ponds. These trap sediment and reduce suspended sediment loads before runoff is discharged from the quarry site. Sedimentation ponds should be designed based on runoff, retention times, and soil characteristics. There may be a need to provide a series of sedimentation ponds to achieve the desired outcome.
- Retain vegetation – Retain existing or re-plant the vegetation at the site wherever possible.
- Monitoring and maintenance – Weekly monitoring and daily maintenance of erosion control systems so that they perform as specified specially during rainy season.

4.1.6 Waste Dump Management

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

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 the maximum depth of the quarry in the cluster is 45m Agl and water table is found at a depth of 76-82m 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.

TABLE 4.1: WATER REQUIREMENTS

PROPOSAL – P1		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5LD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0 KLD**	
PROPOSAL – P2		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0KLD**	
PROPOSAL – P3		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0KLD**	
PROPOSAL – P4		
*Purpose	Quantity	Source
Dust Suppression	0.8KLD	From nearby tank
Green Belt development	0.7KLD	From nearby tank
Sanitation & Drinking	0.5KLD	From existing, bore wells and drinking water will be sourced from Approved water vendors.
Total	**2.0 KLD**	

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

Source: Pre-Feasibility Report

Total water requirement in the cluster quarries is about 7.3KLD, the water for dust suppression and greenbelt development will be sourced from the mine pit water collected during rainy seasons, the water for domestic purpose and drinking will be sourced from the approved water vendors.

4.2.2 Common Mitigation measures:

- Garland drain, settling tank will be constructed along the proposed mining lease area. The Garland drain will be connected to settling tank and sediments will be trapped in the settling traps and only clear water will be discharged out to the natural drainage
- Rainwater will be collected in sump in the mining pits and will be allowed to store and pumped out to surface setting tank of 15 m x 10m x 3m to remove suspended solids if any. This collected water will be judiciously used for dust suppression and such sites where dust likely to be generated and for developing green belt. The proponent will collect and judicially utilize the rainwater as part of rainwater harvesting system.
- Providing benches with inner slopes and through a system of drains and channels, allowing rain water to descent into surrounding drains, so as to minimize the effects of erosion & water logging arising out of uncontrolled descent of water.
- Reuse the water collected during storm for dust suppression and greenbelt development within the mines
- Installing interceptor traps/oil separators to remove oils and greases. Water from the tipper wash-down facility and machinery maintenance yard will pass through interceptor traps/oil separators prior to its reuse;
- Using flocculating or coagulating agents to assist in the settling of suspended solids during monsoon seasons;
- Periodic (every 6 month once) analysis of quarry pit water and ground water quality in nearby villages.
- Domestic sewage from site office & urinals/latrines provided in ML is discharged in septic tank followed by soak pits.
- Waste water discharge from mine will be treated in settling tanks before using for dust suppression and tree plantation purposes.
- De-silting will be carried out before and immediately after the monsoon season.
- Regular monitoring (every 6 month once) and analysing the quality of water in open well, bore wells and surface water.

4.3 Air Environment

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

4.3.1. Anticipated

Impact

- During mining, at various stages activities such as excavation, drilling, blasting, and transportation of materials, particular matter (PM), gases such as Sulphur dioxide, oxides of Nitrogen from vehicular exhaust are the main air pollutants.
- Emissions of noxious gases due to incomplete detonation of explosive may sometimes pollute the air.
- The fugitive dust released from the mining operations may cause effect on the mine workers who are directly exposed to the fugitive dust.
- Simultaneously, the air-borne dust may travel to longer distances and settle in the villages located near the mine lease area.

4.3.1.1. Modelling of Incremental Concentration from all Proposed Projects

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 quarry, wind erosion of the exposed area and movement of light vehicles causes of pollution. This leads to an 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.

The impact on Air Environment is due to the mining and allied activities during Land Development phase, Mining process and Transportation. The emissions of Sulphur dioxide (SO_2), Oxides of Nitrogen (NOx) due to excavation/loading equipment and vehicles plying on haul roads are marginal. Loading - unloading and transportation of Rough Stone quarry, wind erosion of the exposed area and movement of light vehicles will be the main polluting source in the mining activities releasing Particulate Matter (PM_{10}) affecting Ambient Air of the area. Prediction of impacts on air environment has been carried out taking into consideration cumulative production three proposed quarries. Air environment and net increase in emissions by Open pit source modelling in AERMOD Software.

4.3.1.2 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 P1-P4

EMISSION ESTIMATION FOR QUARRY "P1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.120789764	g/s
	Blasting	Point Source	0.006219638	g/s
	Mineral Loading	Point Source	0.047346894	g/s
	Haul Road	Line Source	0.002511769	g/s/m
	Overall Mine	Area Source	0.080840826	g/s

Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.002105471	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000229283	g/s
EMISSION ESTIMATION FOR QUARRY "P2"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.140654286	g/s
	Blasting	Point Source	0.013316169	g/s
	Mineral Loading	Point Source	0.049642029	g/s
	Haul Road	Line Source	0.002529694	g/s/m
	Overall Mine	Area Source	0.086029626	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.00326083	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000370398	g/s
EMISSION ESTIMATION FOR QUARRY "P3"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.109436384	g/s
	Blasting	Point Source	0.003796847	g/s
	Mineral Loading	Point Source	0.046306585	g/s
	Haul Road	Line Source	0.00250587	g/s/m
	Overall Mine	Area Source	0.079037633	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.001680302	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000180243	g/s
EMISSION ESTIMATION FOR QUARRY "P4"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.118293491	g/s
	Blasting	Point Source	0.005602975	g/s
	Mineral Loading	Point Source	0.046990562	g/s
	Haul Road	Line Source	0.002509614	g/s/m
	Overall Mine	Area Source	0.080235803	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.001964241	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000212828	g/s

Source: Approved Revised mining Plan

4.3.2 Frame work of Computation & Model details

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.

Air Pollution Dispersion Modelling

Baseline Air Quality –

Baseline air quality has been measured at 2 locations in the cluster and 5locations within the buffer zone of the study area. The 24 - hourly average samples of particulate matters (PM_{10} and $PM_{2.5}$), SO_2 and NO_x were measured following the National Ambient Air Quality Standards (NAAQS), 2009. Monitoring data of 7 sampling stations are given below –

Meteorological Data –

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

A temporary meteorological station was installed at project site and monitored continually for study period without break. The station was installed at a height of 4 m above the ground level in such a way that there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature are recorded on hourly basis. A weather data was collected from IMD, Krishnagiri agro for the month of Oct2023 – Dec2023 to correlate with site data and found not much of change in the parameters.

FIGURE 4.1: AERMOD TERRAIN MAP

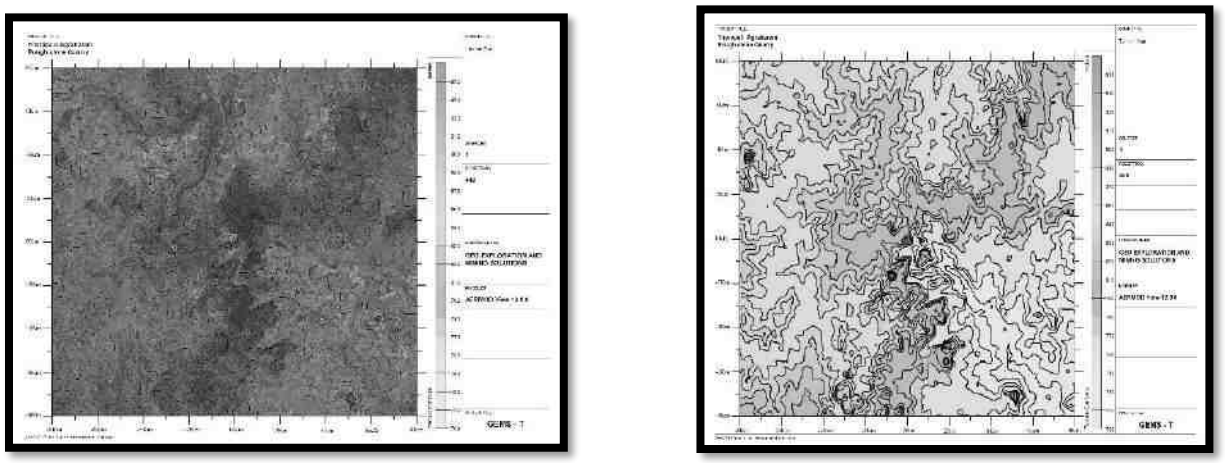


FIGURE 4.2: PREDICTED INCREMENTAL CONCENTRATION OF PM_{10}

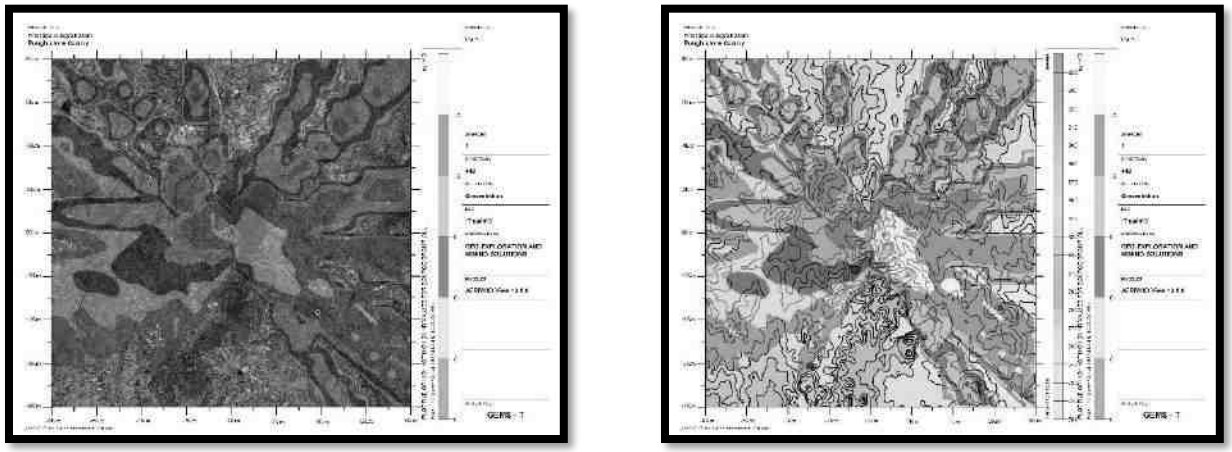


FIGURE 4.3: PREDICTED INCREMENTAL CONCENTRATION OF PM_{25}

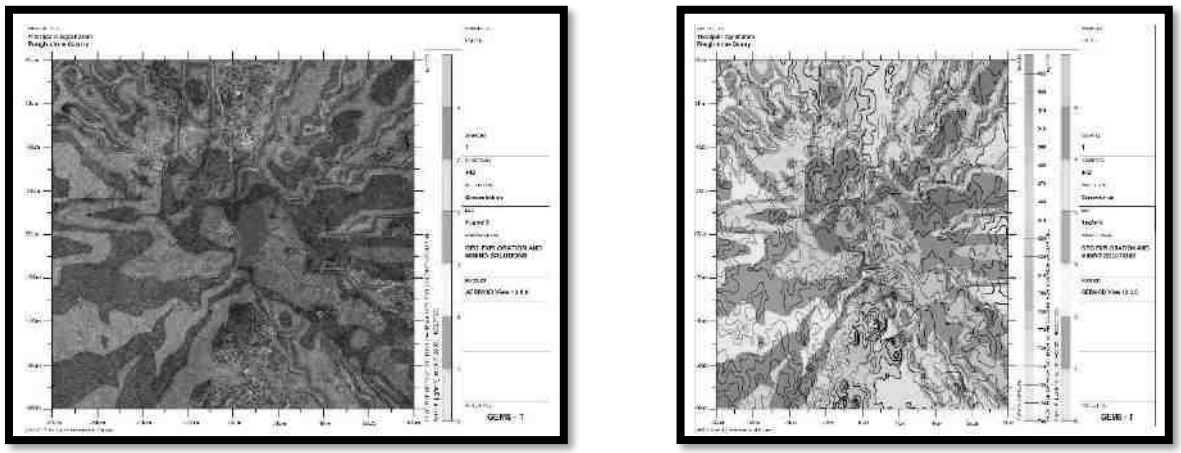


FIGURE 4.4: PREDICTED INCREMENTAL CONCENTRATION OF SO_2

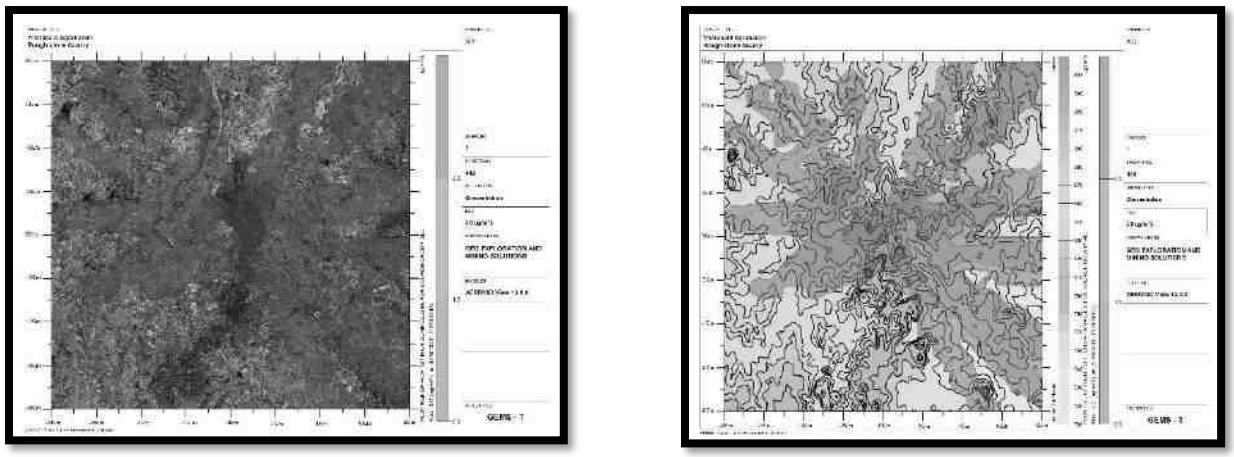


FIGURE 4.5: PREDICTED INCREMENTAL CONCENTRATION OF NO_X

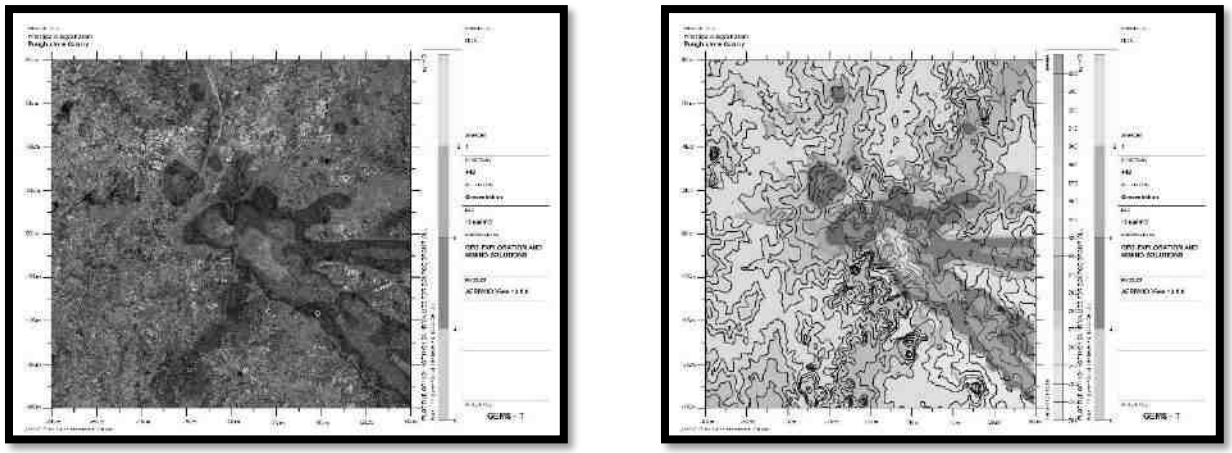
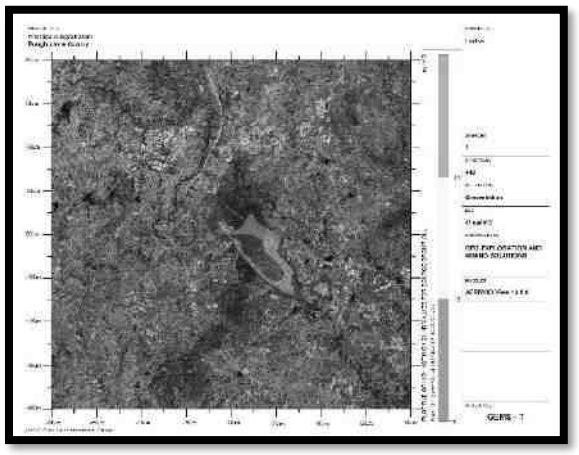
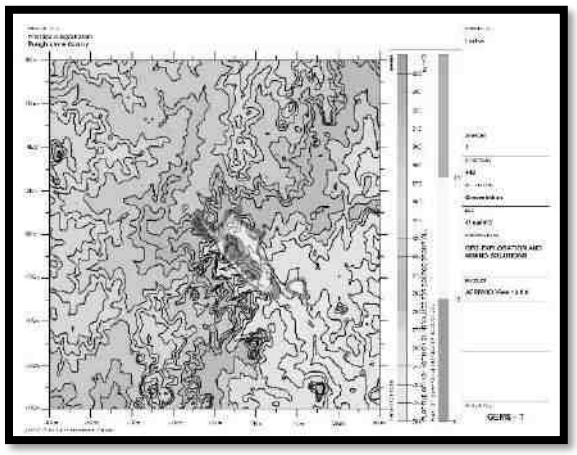


FIGURE 4.6: PREDICTED INCREMENTAL CONCENTRATION OF FUGITIVE DUST





4.3.2.1 Model Results

The post project Resultant Concentrations of PM10, PM2.5, SO2& NOX (GLC) is given in Table below:

TABLE 4.3: INCREMENTAL & RESULTANT GLC OF PM_{10}

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM_{10} ($\mu g/m^3$)	Incremental value of PM_{10} due to mining ($\mu g/m^3$)	Total PM_{10} ($\mu g/m^3$) (5+6)
AAQ1	12°41'27.77"N 77°54'27.66"E	-5	-83	46.0	17.9	63.9
AAQ2	12°41'23.74"N 77°54'23.25"E	-140	-204	43.4	17.28	60.7
AAQ3	12°41'10.24"N 77°53'1.93"E	-2623	-630	43.1	8.6	51.7
AAQ4	12°43'28.40"N 77°56'10.20"E	3125	3666	42.2	10	52.2
AAQ5	12°39'42.41"N 77°50'46.83"E	-6743	-3367	43.5	4	47.5
AAQ6	12°39'22.18"N 77°56'33.99"E	3851	-3990	43.5	15	58.5
AAQ7	12°42'39.58"N 77°52'30.48"E	-3581	2144	43.0	12	55.0

TABLE 4.4: INCREMENTAL & RESULTANT GLC OF $PM_{2.5}$

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline PM2.5 (µg/m3)	Incremental value of PM2.5 due to mining (µg/m3)	Total PM2.5 (µg/m3) (5+6)
AAQ1	12°41'27.77"N 77°54'27.66"E	-5	-83	21.5	9.81	31.3
AAQ2	12°41'23.74"N 77°54'23.25"E	-140	-204	21.5	9.4	30.9
AAQ3	12°41'10.24"N 77°53'1.93"E	-2623	-630	21.7	5.63	27.3
AAQ4	12°43'28.40"N 77°56'10.20"E	3125	3666	21.6	6.55	28.1
AAQ5	12°39'42.41"N 77°50'46.83"E	-6743	-3367	43.5	2.76	46.2
AAQ6	12°39'22.18"N 77°56'33.99"E	3851	-3990	45.2	8.77	53.9
AAQ7	12°42'39.58"N 77°52'30.48"E	-3581	2144	22.4	7.42	29.9

TABLE 4.5: INCREMENTAL & RESULTANT GLC OF SO_2

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline So_2 ($\mu g/m^3$)	Incremental value of So_2 due to mining ($\mu g/m^3$)	Total So_2 ($\mu g/m^3$) (5+6)
AAQ1	12°41'27.77"N 77°54'27.66"E	-5	-83	8.1	3.46	11.6
AAQ2	12°41'23.74"N 77°54'23.25"E	-140	-204	6.1	3.2	9.3
AAQ3	12°41'10.24"N 77°53'1.93"E	-2623	-630	6.3	1.39	7.7
AAQ4	12°43'28.40"N 77°56'10.20"E	3125	3666	8.0	1.5	9.5
AAQ5	12°39'42.41"N 77°50'46.83"E	-6743	-3367	6.7	0	6.7
AAQ6	12°39'22.18"N 77°56'33.99"E	3851	-3990	7.5	2.81	10.3
AAQ7	12°42'39.58"N 77°52'30.48"E	-3581	2144	6.9	2	8.9

TABLE 4.6: INCREMENTAL & RESULTANT GLC OF NO_X

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Nox ($\mu g/m^3$)	Incremental value of Nox due to mining ($\mu g/m^3$)	Total Nox ($\mu g/m^3$) (5+6)
AAQ1	12°41'27.77"N 77°54'27.66"E	-5	-83	23.9	11	34.9
AAQ2	12°41'23.74"N 77°54'23.25"E	-140	-204	20.4	10	30.4
AAQ3	12°41'10.24"N 77°53'1.93"E	-2623	-630	22.2	0	22.2
AAQ4	12°43'28.40"N 77°56'10.20"E	3125	3666	21.7	1	22.7
AAQ5	12°39'42.41"N 77°50'46.83"E	-6743	-3367	21.2	0	21.2
AAQ6	12°39'22.18"N 77°56'33.99"E	3851	-3990	23.9	3.64	27.6
AAQ7	12°42'39.58"N 77°52'30.48"E	-3581	2144	22.9	2.88	25.8

TABLE 4.7: INCREMENTAL & RESULTANT GLC OF FUGITIVE DUST

Station Code	Location	X Coordinate (m)	Y Coordinate (m)	Average Baseline Fugitive ($\mu g/m^3$)	Incremental value of Fugitive due to mining ($\mu g/m^3$)	Total Fugitive ($\mu g/m^3$) (5+6)
AAQ1	12°41'27.77"N 77°54'27.66"E	-5	-83	64.15	31	95.2
AAQ2	12°41'23.74"N 77°54'23.25"E	-140	-204	64.28	10	74.3
AAQ3	12°41'10.24"N 77°53'1.93"E	-2623	-630	63.66	0	63.7
AAQ4	12°43'28.40"N 77°56'10.20"E	3125	3666	67.67	0	67.7
AAQ5	12°39'42.41"N 77°50'46.83"E	-6743	-3367	65.87	0	65.9
AAQ6	12°39'22.18"N 77°56'33.99"E	3851	-3990	68.34	0	68.3
AAQ7	12°42'39.58"N 77°52'30.48"E	-3581	2144	67.61	0	67.6

From the resultant of cumulative concentration i.e., Background + Incremental Concentration of pollutant in all the receptor locations without effective mitigation measures are still within the prescribed NAAQ limits of 100, 80 & 80 µg/m3 for PM10, SO2 & NOX respectively. By adopting suitable mitigation measures, the pollutant levels in the atmosphere can be further being controlled.

4.3.4. Common Mitigation Measures for Respective Individual Proposed Projects

Drilling – To control dust at source, wet drilling will be practiced. Where there is a scarcity of water, suitably designed dust extractor will be provided for dry drilling along with dust hood at the mouth of the drill-hole collar.

Advantages of Wet Drilling: -

- In this system dust gets suppressed close to its formation. Dust suppression become very effective and the work environment will be improved from the point of occupational comfort and health.
- Due to dust free atmosphere, the life of engine, compressor etc., will be increased.
- The life of drill bit will be increased.
- The rate of penetration of drill will be increased.
- Due to the dust free atmosphere visibility will be improved resulting in safer working conditions.

Blasting –

- Establish time of blasting to suit the local conditions and water sprinkling on blasting face
- Avoid blasting i.e., when temperature inversion is likely to occur and strong wind blows towards residential areas
- Controlled blasting includes Adoption of suitable explosive charge and short delay detonators, adequate stemming of holes at collar zone and restricting blasting to a particular time of the day i.e., at the time lunch hours, controlled charge per hole as well as charge per round of hole
- Before loading of material water will be sprayed on blasted material
- Dust mask will be provided to the workers and their use will be strictly monitored

Haul Road & Transportation –

- Water will be sprinkled on haul roads twice a day to avoid dust generation during transportation
- Transportation of material will be carried out during day time and material will be covered with taurpaulin
- The speed of tippers plying on the haul road will be limited below 20 km/hr to avoid generation of dust.
- Water sprinkling on haul roads & loading points will be carried out twice a day
- Main source of gaseous pollution will be from vehicle used for transportation of mineral; therefore, weekly maintenance of machines improves combustion process & makes reduction in the pollution.
- The un-metalled haul roads will be compacted weekly before being put into use.
- Over loading of tippers will be avoided to prevent spillage.
- It will be ensured that all transportation vehicles carry a valid PUC certificate
- Grading of haul roads and service roads to clear accumulation of loose materials

Green Belt –

- Planting of trees all along main mine haul roads and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/trucks
- Green belt of adequate width will be developed around the project areas

Occupational Health –

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

4.4 Noise Environment (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 4-8.

TABLE 4.8: 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. 109 dB (A) for nose prediction modelling.

TABLE 4.9: PREDICTED NOISE INCREMENTAL VALUES

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	47.8	46.2	41.3	45.3	45.9	39.10	40.30
Incremental Value dB(A)	66.1	56.6	34.1	27.0	23.2	26.1	29.2
Total Predicted Noise level dB(A)	66.2	57.0	42.1	45.4	45.9	39.3	40.6
NAAQ Standards	**Industrial** **Day Time- 75 dB (A)** **Night Time- 70 dB (A)** **Residential** **Day Time– 55 dB (A)** **Night Time- 45 dB (A)**						

4.4.2 Common Mitigation Measures for Respective Individual Proposed Projects

The following noise mitigation measures are proposed for control of Noise.

- Time intervals for each quarry during blasting.
- Use of personal protective devices i.e., earmuffs and earplugs by workers, who are working in high noise generating areas.
- Limiting time exposure of workers to excessive noise.
- Proper and regular maintenance of vehicles, machinery and other equipment's.
- The noise generated by the machinery will be reduced by proper lubrication of the machinery and other equipment's.
- Speed of trucks entering or leaving the quarry will be limited to moderate speed to prevent undue noise from empty vehicles...
- Noise levels will be controlled by using optimum explosive charge, proper delay detonators and proper stemming to prevent blow out of holes (occasionally).
- Providing proper noise proof enclosure for the workers separated from the noise source and noise prone equipment.
- Provision of Quiet areas, where employees can get relief from workplace noise.
- The development of green belts around the periphery of the quarry site to attenuate noise.
- 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 the proposed mining activities 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 quarry 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. Nearest habitation from the project area is located 550m North in Gulisandiram 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)

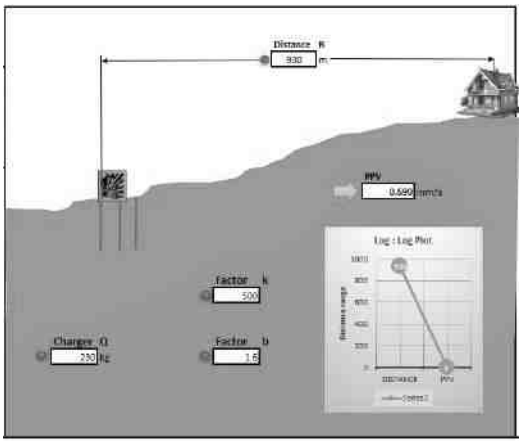
B = constant related to the rock and site (usually 1.6)

R = distance from charge (m)

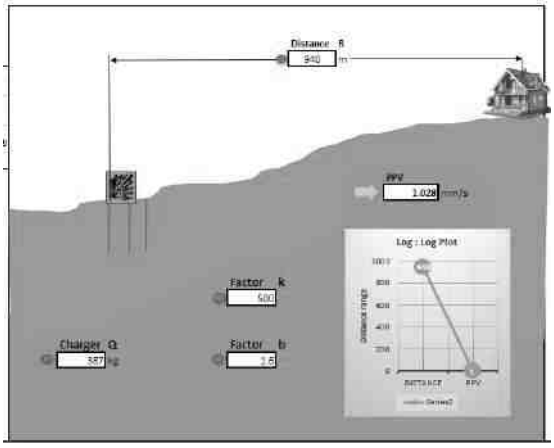
TABLE 4.10: PREDICTED PPV VALUES DUE TO BLASTING

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	230	930 NW	0.690
P2	387	940 NW	1.028
P3	139	1.2km NW	0.350
P4	215	1.2km NW	0.435

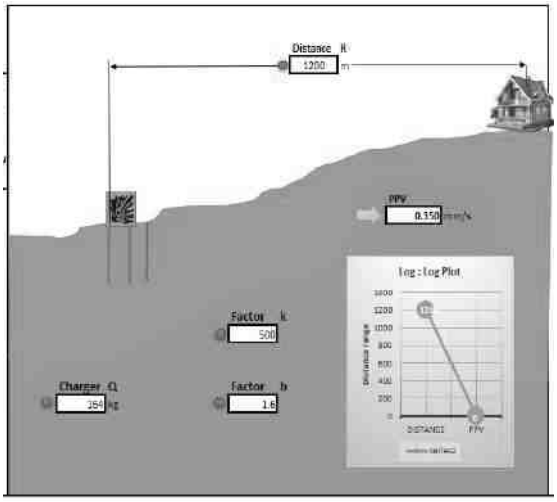
P1

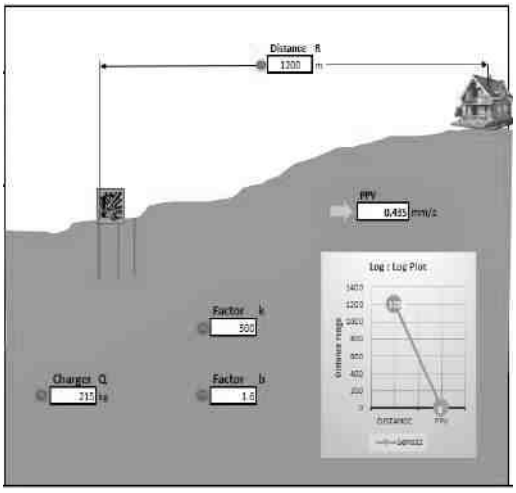


P2



P3 **P4**





From the above, the charge per blast of 387Kg 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 28 Kg 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 Common Mitigation Measures for Respective Individual Proposed Projects

- The blasting operations in the cluster quarries are carried out without deep hole drilling and blasting using delay detonators, which reduces the ground vibrations;
- Proper quantity of explosive, suitable stemming materials and appropriate delay system will be adopted to avoid overcharging and for safe blasting;
- Adequate safe distance from blasting will be maintained as per DGMS guidelines;
- Blasting shelter will be provided as per DGMS guidelines;
- Blasting operations will be carried out only during day time;
- The charge per delay will be minimized and preferably a greater number of delays will be used per blasts;
- During blasting, other activities in the immediate vicinity will 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 Hz.
- Vibration monitoring will be carried out every 6 months to check the efficacy of blasting practices.

4.5 Impact on the Biological Environment

4.5.1. Anticipated Impact on agricultural land associated with flora

1. Dust particle settle on neighbouring agricultural land it is located about 200m on the North side. During operation and minerals are transported in approach roads.
2. There shall be negligible air emissions or effluents from the project site. During the loading of the truck, dust generation will be likely. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly.
3. The Sanamavu Reserve Forest is situated about 475m on the east side and Settipalli R.F situated about 6.2km on the east side The forest type is dry and thorny scrub jungles dominated by Acacia and Euphobias.

4.5.2 Mitigation Measures

4.5.2.1. General Guidelines for Green Belt Development

Drone survey was covered the green belt and fencing as per the terms of references. The green belt and plantation purposes in and around the proposed mine lease area native species, fruit-bearing trees, medicinal plants, and dense canopy trees should be selected. These species should be tolerant to pollution levels as per Bio- Geography zones of India.

After the operation of mining production capacity, green belt and Plantation species should be in accordance with the Terms and Conditions of the Environmental Clearance Green belt is created not only for the purpose of protecting sensitive areas or maintaining the ecological balance but because they also act as efficient biological filters or sinks for particulate and gaseous emissions, generated by vehicular movements and various industrial and mining activities. Optimally designed green belts can be effective in reducing the impact of fugitive emissions and pollutants accidentally or otherwise released at ground levels.

4.5.2.2. Proposed Green Belt

Extensive green belt development will be started during the construction phase, which will continue till the operation of the plant. About 1500-2000 trees will be planted per hectare all around the plant, approach roads, and township premises. Locally available types of trees that are resistant to pollutants will be planted. In addition to the above, all open spaces available within the premises will be developed as nurseries, parks, gardens, and other forms of greenery. 5 m wide greenbelt will be developed along the plant premises, as per land available.

4.5.2.3. Development of Green Belt

The plantation matrix adopted for the green belt development includes pit of 0.3 m x 0.3 m in size with a spacing of 2 m x 2 m. In addition, earth filling and manure may also be required for the proper nutritional balance and

nourishment of the sapling. It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration. Multi-layered plantations comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt.

4.5.3.4. Selection of Plant Species for Green Belt Development

It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration. Multi-layered plantations comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt. Green belt is plantation of trees for reducing the air pollution as they absorb both gaseous and particulate pollutant, thus removing them from atmosphere. Green plants form a surface capable of absorbing air pollutants and forming sinks for pollutants. It improves the aesthetic value of local environment. Under present project, green belts have been planned with emphasis on creating biodiversity; enhance natural surroundings and mitigating pollution. Regional tree saplings in eco-friendly bags like Pterocarpus marsupium, Pongamia pinnata, Limonia acidissima, and Cassia roxburghii will be planted along the Lease boundary and avenues as well as over non-active dumps with intervals 3m in between with the GPS Coordinates. The greenbelt development plan aims to overall improvement in the environmental conditions of the region Native plant species will be preferred.

- The species should be wind-firm and deep-rooted.
- The species should form a dense canopy.
- Fast-growing plants will be planted
- Species tolerance to air pollution like SO2 and NO2 should be preferred.
- Plants having large leaf area index will be considered
- Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).
- Attractive appearance with good flowering and fruit-bearing.
- Birds and insects attract tree species.
- Roadsides will be planted with local vegetation.

Table No 4.11. List of plant species proposed for Greenbelt development

S. No	Scientific name	Tamil Name
1	Aegle marmelos	Vilva maram
2	Albizia lebbeck	Vaagai maram
3	Cassia fistula	Konrai tree
4	Lannea coromandelica	Othiyam
5	Limonia acidissima	Vila maram
6	Syzygium cumini	Naval maram
7	Toona ciliata	Santhana Vembu
8	Ficus hispida	Aththi maram
9	Borassus flabellifer	Panai-maram
10	Madhuca longifolia	Illupai maram

(*Source: Term of Reference-ToR)

Table No 4.12. Species suitable for abatement of noise and dust pollution

S. No	Botanical name	Common name
1	Azadirachta indica	Vembhu maram
2	Ficus religiosa	Arasan maram
3	Ficus hispida	Aththi maram
4	Bombax ceiba	Mul Elavu
5	Syzygium cumini	Naval maram
6	Tamarindus indica	Puliyamaram
7	Mangifera indica	Manga maram
8	Harwickia binata	Anjan maram
9	Delonix regia	Neruppu Kondrai
10	Cassia Fistula	Sara Kondrai

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

The above-suggested list covers species with thick canopy cover, perennial green nature, native origin, and a large leaf area index. The proposed species will help in forming an effective barrier between the mine site area and the surroundings.

These species need to be planted along the periphery of the lease area for absorb fugitive emissions and noise levels which is generated during mining activities. All the open spaces, where tree plantation may not be possible, should be covered with shrubs and grass to prevent erosion of topsoil.

4.5.4. Anticipated Impact on Fauna

- Noise generation due to vehicle may affect avifauna.
- The lease area is not inhabited by any wild life, as there is no forest cover, hence there will not be any effect on migration or extinction of wildlife.
- There is no National Park, Biosphere Reserve, Wildlife corridors, and Tiger/Elephant Reserve found within 10 km radius of the project site.

4.5.4.1. Measures for protection and conservation of wildlife species

- Topsoil has a large number of seeds of native plant species in the mining area.
- Topsoil will be used for restoration and suitable surfaces for planted seedlings.
- Checks and controls the movement of vehicles in and out of the mine.
- Undertaking mitigative measures for a conducive environment to the flora and fauna in consultation with Forest Department.
- A dust suppression system will be installed within the mine and periphery of the mine.
- Plantation around the mine area will help in creating habitats for small faunal species and create a better environment for various fauna. Creating and developing awareness for nature and wildlife in the adjoining villages.

4.5.3. Impact on Aquatic Biodiversity

- The major lake along the project sites doesn't have a rich biodiversity and almost all the species of both fauna and flora listed are either least concerned or not evaluated.
- There is no impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.

Table No. 4.13. Overall Ecological impact assessments of Thorapalli Agraharam Village, Rough stone quarry, Krishnagiri District, Tamil Nadu.

S. No	Attributes	Assessment
	Activities of the project affect the breeding/nesting sites of birds and animals	No breeding and nesting site was identified in the mining lease site. The fauna sighted mostly migrated from the buffer area.
2	Located near an area populated by rare or endangered species	No Endangered, Critically Endangered, or vulnerable species were sighted in the core mining lease area.
3	Proximity to national park/wildlife sanctuary/reserve forest /mangroves/ coastline/estuary/sea	The Sanamavu Reserve forest is situated about 475m on the east side and Settipalli R.F situated about 6.2km on the east side.
4	The proposed project restricts access to waterholes for wildlife	'No '
5	Proposed mining project impact surface water quality that also provides water to wildlife	'No 'scheduled or threatened wildlife animals are sighted regularly core in the core area.
6	Proposed mining project increase siltation that would affect nearby biodiversity areas.	Surface runoff management such as drains is constructed properly so there will be no siltation effect in the nearby mining area.
7	Risk of fall/slip or cause death to wild animals due to project activities.	'No'
8	The project release effluents into a water body that also supplies water to a wildlife.	No water body near to core zone so the chances of water becoming polluted is low.
9	Mining projects affect the forest-based livelihood/ any specific forest product on which local livelihood depended.	'No'
10	The project likely to affect migration routes.	'No 'migration route was observed during the monitoring period.
11	The project is likely to affect the flora of an area, which have medicinal value	'No'
12	Forestland is to be diverted, has carbon high sequestration.	'No 'There was no forest land diverted.

13	The project is likely to affect wetlands, Fish breeding grounds, and marine ecology.	'No'. Wetland was not present in the near core Mining lease area. No breeding and nesting ground is present in the core mining area.

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

4.6 Socio Economic Impats

4.6.1 Construction Phase

Anticipated Impacts:

♣ No. of people will get employment during the construction stage resulting in the ancillary development and growth. Nearby Local people will be given preference for employment on the basis of their skill and experience.

♣ Further due to proposed project, influx of working community will also generate an indirect employment through development of nearby market/ shops, trade centers, activities, transportation etc.

♣ Population influx during the construction phase can introduce various water and vector borne diseases which can lead to various unhygienic health problems in the area by disturbing the existing sanitation infrastructure.

♣ Rapid diverse population influx at the project site can create unusual behavioural activity such as worker-community conflicts, increase violence such as theft/stabbing and increased consumption of drugs/alcohol within the area.

♣ Impacts on the health of nearby villagers can be envisaged due to the transportation activities leading to short term exposure of fugitive dust, resulting in various acute diseases such as increased eye irritation, nausea, headache etc.

Mitigation measures:

♣ Deploying of mobile toilets or the construction of temporary toilets will be done near to the construction site with the adequate water supply.

♣ Awareness programme will be conducted before the monsoon season regarding the spread of water borne/ vector borne diseases.

♣ Mosquito repellents will be provided in the nearby villages and at construction site to avoid the spread of diseases.

♣ To overcome behavioural impact, proper site in charge with timely supervision will be done. In advance, facilities with equipped medical and safety services will be provided to take a control over the incident/violence if any caused.

♣ To overcome behavioural impact, supervision will be done by site in charge. In advance, emergency cell will be formed with fully equipped communication system, medical and safety services to take control over the incident/violence caused.

4.6.2 Operation Phase:

Anticipated Impacts:

♣ Long term exposure to the pollutants such as PM, SO2 and NO2 dust have a potential to create health impacts such as risk of cardiovascular and respiratory disease, eye irritation, bronchitis, lung damage, increased heart ailments, etc.

♣ Other impacts, associated with the applied for rough stone quarry project will create a positive impact as it will result in the overall development of the area in respect to the infrastructure development, educational growth, health facilities etc., as a part of the CSR activity.

Mitigation Measures:

♣ In order to mitigate the long-term health impacts, efficient Air Pollution Control Equipment (APCE) like Bag House / Bag Filter / ESP will be installed at all major stacks to keep the emissions within the permissible limits. To reduce the gaseous emission, Pyro-process itself acts as a long SO2 scrubber and De - NOx system will be installed for fuel burning along with calciner for low NOx formation. To reduce fugitive emission from vehicles and machineries will be regularly monitored and maintained.

♣ For emergency, proposed to develop an occupational health centre for its employees and nearby villagers.

4.3 Impact Evaluation:

Table 4.14 Impact Evaluation Impact evaluation is given in table below.

Impact Evaluation Element	Impact on socio economics due to the applied for Thorapalli Agraharam rough stone Cluster quarries of Government land of Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri District, Tamil Nadu State.			
Potential Effect/ Concern	Proposed project will provide direct & indirect employment opportunities to the local residents, which will help to increase their earning and better living standard as well as further up-liftment of socio-economic status of the area.			
Characteristics of Impacts				
Nature	Positive		Nagative	Netural
	✓			
Type	Direct	Indirect	Cumulative	
			✓	
Extent	Project area	Local	Zonal	Regional
		✓		
Duration	Short time		Long term	
			✓	
Intensity	Low		Medium	High
			✓	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
			✓	
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			✓	

4.7 Occupational Health and Safety

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 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

No waste is anticipated from any of the proposed quarries.

4.9 Mine Closure

Mine closure plan is the most important environmental requirement in 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 along with mining plan. 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 quant ity, 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 plan should be as per the approved Revised mining plan. The mine closure is a part of approved Revised mine plan and activities of closure shall be carried out as per the process described in mine closure plan.

CHAPTER – 5: ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.0 Introduction:

Consideration of alternatives to a project proposal is a requirement of EIA process. This quarry is site specific. The site has been selected based on geological investigation and exploration from the Proposed quarry around the project site. Drilling, Blasting, Excavation, Loading & Transportation will be carried out in this quarrying operation.

- This area denotes the indicative of flow pattern of the rock mass in $N30^0E$ to $S30^0W$ with dipping $SE60^0$.
- Transportation facility for materials & manpower.
- Overall impact on environment and mitigation feasibility.
- Socio – economic background.

Enough infrastructure exists and lesser resources are required to be deployed. Since, any major construction for infrastructure is not required and hence does not affect the environment considerably.

5.1 Factors Behind the Selection of Project Site

Rough Stone Quarry Projects at Thorapalli Agraharam cluster quarries are a 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, fire fighting, 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.

5.2 Analysis of Alternative Site

The mineral deposits are site specific in nature; hence, question of seeking alternate site does not arise for this project.

5.3 Factors Behind Selection of Proposed Technology

Mechanized open cast mining operation with drilling and blasting method will be used to extract Rough Stone quarry in the area. The quarry areas fall in the clusters 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.

5.4 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

Environmental Monitoring will be taken up for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by MoEF & Consent to Operate issued by the State Pollution Control Board. Monitoring reports will be submitted to regulator as per statutory requirements. The entire monitoring work will be carried out by MoEF & CC / NABL recognized laboratories.

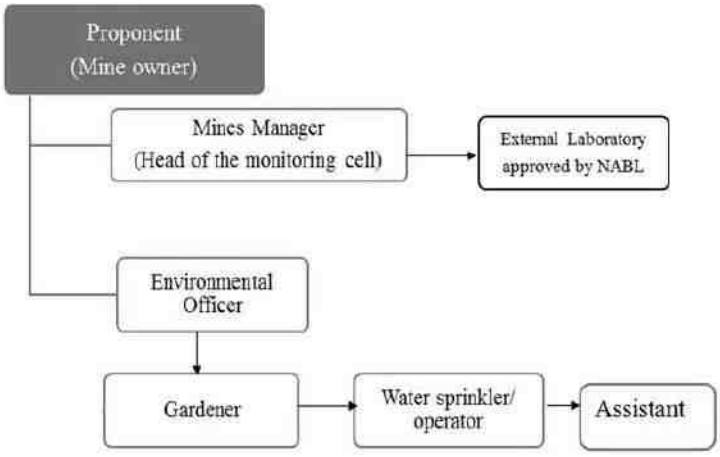
The monitoring and evaluation of environmental parameters indicates potential changes occurring in the environment, which paves way for implementation of rectifying measures wherever required to maintain the status of the natural environment. Evaluation is also a very effective tool to judge the effectiveness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

6.1 Methodology of Monitoring Mechanism

Implementation of EMP and periodic monitoring will be carried out by the proponents and respective quarry owners in the cluster quarries. 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 other hand, implementation of area level protection measures like plantation and green Environmental Management Plan and environmental clearance conditions will be monitored by the proponent. On the 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 the project
2	Soil Quality Control Measures	Before commissioning of the project	Immediately after the commencement of the project
3	Water Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
4	Air Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
5	Noise Pollution Control Measures	Before commissioning of the project and along with mining operation	Immediately and as project progress
6	Ecological Environment	Phase wise implementation every year along with mine operations	Immediately and as project progress

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: PROPOSED MONITORING SCHEDULE POST EC

S. No.	Environment Attributes	Location	Monitoring		Parameters
			Duration	Frequency	
1	Air Quality	2 Locations (1 Core & 1 Buffer)	24 hours	Once in 6 months	Fugitive Dust, $PM_{2.5}$, 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	2 Locations (1SW & 1 GW)	-	Once in 6 months	Parameters specified under IS:10500, 1993 & CPCB Norms
4	Hydrology	Water level in open wells in buffer zone around 1 km at specific wells	-	Once in 6 months	Depth in bgl
5	Noise	2 Locations (1 Core & 1 Buffer)	Hourly – 1 Day	Once in 6 months	Leq, Lmax, Lmin, Leq Day & Leq Night
6	Vibration	At the nearest habitation (in case of reporting)	–	During blasting Operation	Peak Particle Velocity
7	Soil	2 Locations (1 Core & 1 Buffer)	–	Once in six months	Physical and Chemical Characteristics
8	Greenbelt	Within the Project Area	Daily	Monthly	Maintenance

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

6.4 Environmental Policy of the Proponents

The project proponents in the proposed quarries are committed to ensure that:

- Protect the environment by control and prevention of pollution and promote green environment.
- To operate the quarry with an objective of no injuries and accidents at the work place and provide a safe work place for our employees, contractors and others who perform their duties.
- Adequate health care will be taken to all the employees and create process to reduce the adverse effect of the operations on Health of the employees.
- Provide safety appliance and continuous training in safety to employees to ensure safe production and achieve the target of zero accidents.
- Develop safe working methods and practices, remove unsafe work conditions and consider all the aspects at the early stages of process development to provide safe working atmosphere.
- Communicate Safety, Health and Environmental Policy to all employees for better understanding and practice.

6.5 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 proposal is shown in Table 6.3. Monitoring work will be outsourced to external laboratory approved by NABL / MoEF.

The proposed total cost for Environmental Monitoring Programme for fourproposed quarries in cluster for the Scheme of mining plan period is Rs. 2,73,6,000/-

TABLE 6.3 ENVIRONMENT MONITORING BUDGET P1-P4

Parameter	Code	Capital Cost
Air Quality, Meteorology, Water Quality, Hydrology, Soil Quality, Noise Quality, Vibration Study Greenbelt	P1	Rs.6,84,000/-
	P2	Rs.6,84,000/-
	P3	Rs.6,84,000/-
	P4	Rs.6,84,000/-
	Total	**Rs. 27,36,000/-**

Source: Approved Revised Mining Plan

6.6 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 proponent with Environmental Monitoring cell and necessary corrective measures will be carried out. 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
- SEIAA, Chennai, Tamil Nadu

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. Items identified by public and other stakeholders will be incorporated after Public Hearing.

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

7.1. Public Consultation:

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

7.2 Risk Assessment

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

The 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 & CONTROL MEASURES

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; ▪ Fire fighting 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	▪ 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

		Overloading of material While reversal & overtaking of vehicle Operator of truck leaving his cabin when it is loaded.	devices including automatically operated audio-visual reversing alarm, rear view mirrors, side indicator lights etc., are in good condition. ▪ Not allow any unauthorized person to ride on the vehicle nor allow any unauthorized person to operate the vehicle. ▪ Concave mirrors should be kept at all corners ▪ All vehicles should be fitted with reverse horn with one spotter at every tipping point ▪ Loading according to the vehicle capacity ▪ Periodical maintenance of vehicles as per operator manual.
5	Natural calamities	Unexpected happenings	▪ Escape Routes will be provided to prevent inundation of storm water ▪ Fire Extinguishers & Sand Buckets
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

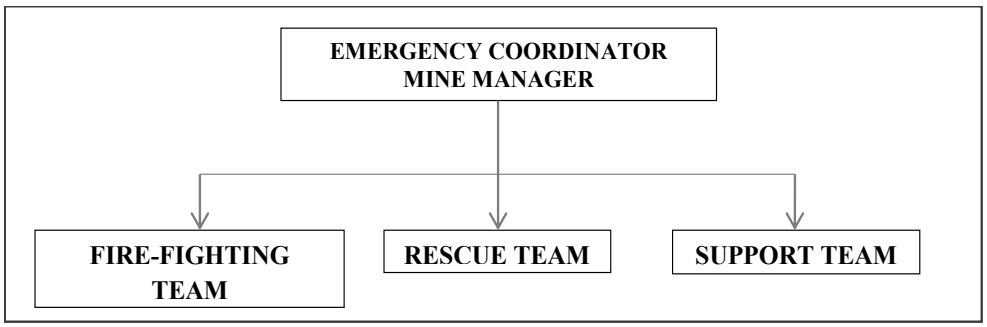
Natural disasters like Earthquake, Land slides has not been recorded in the past history as the terrain is categorized under seismic zone III. The area is far away from the sea hence the disaster due to heavy floods and tsunamis are not anticipated. The Disaster Management Plan is aimed to ensure safety 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:

- 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 TEAM LAYOUT FOR P1 -P4



The emergency organization shall be headed by emergency coordinator who will be qualified competent mines 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/ Emergency Coordinator (EC)	Mines Manager
Team Member	Mines Foreman
Team Member	Mining Mate
RESCUE TEAM	
Team Leader/ Emergency Coordinator (EC)	Mines Manager
Team Member/ Incident Controller (IC)	Environment Officer
Team Member	Mining Foreman
SUPPORT TEAM	
Team Leader/ Emergency Coordinator (EC)	Mines Manager
Assistant Team Leader	Environment Officer
Team Member	Mining Mate
Security Team Leader/ Emergency Security Controller	Mines Foreman

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

Roles and responsibilities of emergency team –

(a) Emergency coordinator (EC)

The emergency coordinator shall assume absolute control of site

(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 is proposed at strategic locations within the quarry.

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
- Fire fighting and first-aid provisions in the mines office complex and mining area will be 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 the quarry in phase manner
- Cleaning of mine faces will be carried out regularly
- Provision of high-capacity standby pumps with generator sets with enough quantity of diesel for emergency pumping especially during monsoon.
- A blasting SIREN will be used at the time of blasting for audio signal.
- Checking of blasting area for any un-blasted hole or material.
- Warning notice boards indicating the time of blasting and NOT TO TRESPASS will be displayed at prominent places

7.4 CUMULATIVE IMPACT STUDY

There are four proposed and one Existing quarries falls in the cluster. The list of quarries is as below –

TABLE 7.3: LIST OF QUARRIES WITHIN 500 METER RADIUS FROM THIS PROPOSAL

PROPOSED QUARRIES					
CODE	**Name of the Proponent and Address**	**S.F. Nos, Village & Taluk**	**Extent in Ha**	**G.O. No & Date**	**Status**
P-1	M/s. Thriveni Earth Movers Private Limited, Part-3	679/2 (Part-3) Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.404/2009/Mines dated: 25.01.2018	**Lr No.SEIAA-TN/F.No.10193/SEAC/ToR-1550/2023 Dated:27.09.2023**
P-2	M/s. Thriveni Earth Movers Private Limited, Part-4	679/2 (Part-4) Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.403/2009/Mines dated: 25.01.2018	**Lr No. SEIAA-TN/F.No.10188/SEAC/1(a)ToR-1574/2023 Dated: 27.09.2023**
P-3	M/s. Sri Navaladiyan Engineers	679/2 (Part-2) Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.405/2009/Mines dated: 25.01.2018	**Lr No.SEIAA-TN/F.No.10190/SEAC/ToR-1558/2023 Dated:27.09.2023**
P-4	Thiru. P. Balasubramanian	679/2 (Part-5) Thorapalli Agraharam Village, Hosur Taluk	5.00.0	Roc.407/2009/Mines dated: 25.01.2018	**Lr No. SEIAA-TN/F.No.10192/SEAC/ToR-1563/2023 Dated:27.09.2023**
P-5	M/S.AVS Building Solutions India Private Limited	662(P) Thorapalli Agraharam Village, Hosur Taluk	2.20.0	Roc.217/2019/Mines dated: 13.06.2019	**EC Granted**

		Total	**22.20.0 Ha**		
EXISTING QUARRY					
CODE	**Name of the Proponent and Address**	**S.F. Nos, Village & Taluk**	**Extent in Ha**	**G.O. No & Date**	**Lease Period**
E-1	M/S.AVS Building Solutions India Private Limited	663/1A (P), 663/1B1(P), 663/1B2(P), 663/1B3(P), 663/2(P), 679/1 Thorapalli Agraharam Village, Hosur Taluk	**4.77.5**	Roc.680/2016/Mines dated: 05.12.2019	**EC Granted** Lr. No.SEIAA-TN/F.No.6969/1(a)/EC.No: 4071/2019 datcd: 06.11.2019
		Total	**4.77.5Ha**		
ABANDONED/EXPIRED QURRIES					
CODE	**Name of the Proponent and Address**	**S.F. Nos, Village & Taluk**	**Extent in Ha**	**G.O. No & Date**	**Lease Period**
A-1	**Thiru.B.Karthikeyan**	**675/1,2** Thorapalli Agraharam Village, Hosur Taluk	**3.53.5**	Roc.382/2016/Mines dated: 22.09.2005	22.09.2005 to 21.09.2010
A-2	**M/s. Thriveni Earth Movers Private Limited,**	**676/2** Thorapalli Agraharam Village, Hosur Taluk	**0.81.5**	Roc.623/2010/Mines-2 dated: 18.08.2011	19.09.2011 to 18.09.2016
A-3	**M/s. Thriveni Earth Movers Private Limited,**	**677 & 678** Thorapalli Agraharam Village, Hosur Taluk	**2.53.0**	Roc.624/2010/Mines-2 dated: 18.08.2011	19.09.2011 to 18.09.2016
		Total	**6.88.0Ha**		
TOTAL CLUSTER EXTENT			**26.97.5 Ha**		

Source :500m Cluster letter by AD, G&M, Krishnagiri.

Note:-

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

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

TABLE 7.4: SALIENT FEATURES OF THE PROPOSED PROJECTS IN CLUSTER P1- P4

SALIENT FEATURES OF PROPOSAL "P1"		
Name of the Mine	M/s. Thriveni Earth Movers Private Limited, (SPR.Venkataachalam Authorized Signatory)	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2 (Part-3)	
Extent	**5.00.0 Ha**	
Depth of Mining	82m including 1m topsoil [58m AGL + 24m BGL]	
Geological Resources	Rough Stone quarry	Topsoil
	29,32,800m^3	49,916m^3
Mineable Reserves	Rough Stone quarry 14,46,978m^3	Topsoil 43,017 m^3
Proposed production for First Five years	Rough Stone quarry	Topsoil
	7,95,738 m^3	43,017m^3
	Rough Stone quarry	Topsoil

Proposed production for remaining three years ten months and twenty-two days	6,51,240 m^3	-
Peak Production for First Five years	1,68,288 m^3	22,500 m^3
Peak Production for remaining three years ten months and twenty two days	1,67,280 m^3	-
Revised Mining Plan Period	5 Years	
Lease Period	Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Ultimate Pit Dimension	(L)562m x (W) 86m (D) 82m (AGL 58m + BGL 24m)	
Toposheet No	57 -H/14	
Water table depth	60m-65m	
Water Requirements	2.0 KLD	
Latitude	12°41'17.65114”N to 12°41'41.13513”N	
Longitude	77°54'17.66222"E to 77°54'26.65791” E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 2.5 towards Southern side and altitude of the area varies between 830m to 772m above from MSL	
Machinery	Crawler mounted drill Machine	2 Nos
	Hand Jack hammer	2 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No
	Truck	4No
	Water Sprinkling Tanker	1Nos
Blasting	The blast design will be properly planned with ideal spacing and burden, ensuring appropriate stemming column with optimized explosive charge, so that ground vibratory effect, fly rocks etc., are properly regulated and controlled.	
Manpower Deployment	36 Nos	
Capital cost	Rs.3,48,60,000/-	
Emp cost	Rs.6,84,000/-	
Total Cost	Rs.3,55,44,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	930m-NW	
Nearest R.F	Sanamavu Ext II– 200 m– NE	
Nearest Wildlife	Cauvery North Wildlife Sanctuary-16km-S Cauvery South Wildlife Sanctuary-40km-S	
SALIENT FEATURES OF PROPOSAL “P2”		
Name of the Mine	M/s. Thriveni Earth Movers Pnvate Limited (SPR.Venkataachalam Authorized Signatory)	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2 (Part-4)	
Extent	**5.00.0 Ha**	
Proposed Depth of Mining	80m including 1m topsoil – (48m AGL + 32m BGL)	
Geological Resources	Rough Stone quarry	Topsoil
	26,60,569 m^3	41,514 m^3
Mineable Reserves	Rough Stone quarry 23,86,840	Topsoil 39,175
Proposed production for First Five years	Rough Stone quarry	Topsoil
	13,42,330 m^3	39,175 m^3

Proposed production for remaining three years ten months and twenty-two days	10,44,510	-
Peak Production for First Five years	2,79,552	26,737
Peak Production for remaining three years ten months and twenty-two days	2,78,040	-
Revised Mining Plan Period	5 Years	
Lease Period	Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Ultimate Pit Dimension	(L)604m x (W) 87m (D) 80m (Agl 48m + Bgl 32m)	
Toposheet No	57 -H/14	
Water table depth	60m-85m	
Water Requirements	2.0 KLD	
Latitude	12°41'20.36281"N to 12°41'40.73244"N	
Longitude	77°54'19.18550"E to 77°54'29.97742"E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 2.5 towards Southern side and altitude of the area varies between 830m to 778m above from MSL	
Machinery	Crawler mounted drill machine	2 Nos
	Hand Jack hammer	2 Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No
	Truck	4 Nos
	Water Sprinkling Tanker	1 Nos
Blasting	The blast design will be properly planned with ideal spacing and burden, ensuring appropriate stemming column with optimized explosive charge, so that ground vibratory effect, fly rocks etc., are properly regulated and controlled.	
Manpower Deployment	36 Nos	
A. Capital cost	3,45,00,000/-	
B. Emp Cost	6,84,000/-	
Total Cost	Rs. 3,51,84,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	940m-NW	
Nearest R.F	Sanamavu Ext II– 160m– NE	
Nearest Wildlife	Cauvery North Wildlife Sanctuary-16km-S Cauvery South Wildlife Sanctuary-40km-S	
SALIENT FEATURES OF PROPOSAL "P3"		
Name of the Mine	M/s. Sri Navaladiyan Engineers (G.Sreenivasulu Authorized Signatory)	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2 (Part-2)	
Extent	**5.00.0 Ha**	
Proposed Depth of Mining	73m including 1m topsoil [47m AGL + 26m BGL]	
Geological Resources	Rough Stone quarry	Topsoil
	18,02,418m³	49,848m³
Mineable Reserves	Rough Stone quarry	Topsoil
	10,16,034 m^3	43,575 m^3
Proposed production for First Five years	Rough Stone quarry	Topsoil
	5,67,114m^3	43,575 m^3

Year wise development Next Four years production (Eight years Ten Months and Twenty-two days)	4,48,920 m^3	-
Peak Production first five years	1,21,104	31,675
Peak Production (Eight years Ten Months and Twenty-two days)	1,13,760	-
Revised Mining Plan Period /	5 Years	
Lease Period	Eight years ten months and twenty-two days (Total lease period Ten Years but 1 year 1 month and 8 days already completed)	
Ultimate Pit Dimension	(L)249m x (W) 175m (D)73m (Agl 47m + Bgl 26m)	
Toposheet No	57 -H/14	
Water table depth	60m-85m	
Water Requirements	2.0 KLD	
Latitude	12°41'16.56967”N to 12°41'25.20675”N	
Longitude	77°54'14.53917"E to 77°54'25.05381”E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 3.6 towards Southern side and altitude of the area varies between 822m to 774m above from MSL	
Machinery	Crawler mounted drill machine	1Nos
	Hand Jack hammer	2Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No
	Truck	4 No
	Water Sprinkling Tanker	1 Nos
Blasting	85mm diameter Slurry explosives are proposed to be used for shattering and heaving effect for removal and winning of Rough stone.	
Manpower Deployment	33Nos	
A.Capital Cost	Rs.3,24,70,000/-	
B.EMP cost	Rs.6,84,000/-	
Total Cost	Rs.3,31,54,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	1.2km-NW	
Nearest R.F	Sanamavu Ext II– 490m– NE	
Nearest Wildlife	Cauvery North Wildlife Sanctuary-15km-S Cauvery South Wildlife Sanctuary-39km-S	
SALIENT FEATURES OF PROPOSAL “P4”		
Name of the Mine	Thiru. P. Balasubramanian **(Power of Attorney Thiru. SPR Venkataachalam)**	
Land Type	It is a Govt land – non-Forest	
S.F. No.	679/2(Part-5)	
Extent	**5.00.0 Ha**	
Proposed Depth of Mining	64m including 1m topsoil – (46m AGL + 18m BGL)	
Geological Resources	Rough Stone quarry	Topsoil
	29,11,783m^3	47,466m^3
Mineable Reserves	Rough Stone quarry	Topsoil
	13,02,980m^3	39,183m^3
Year wise development first five years production	Rough Stone quarry	Topsoil
	7,46,132 m^3	39,183 m^3

Year wise development remaining three years ten months and twenty-three days	5,56,848m³	-
Peak Production first five years	1,56,972	19,934
Peak Production remaining three years ten months and twenty-three days	1,55,562	-
Revised Mining Plan Period	5 Years	
Lease Period	Eight years ten months and twenty-three days (Total lease period 10 Years but, 1 year 1 month and 7 days already completed)	
Ultimate Pit Dimension	(L)633m x (W) 73m (D) 64m (AGL 46m + BGL 18m)	
Toposheet No	57 -H/14	
Water table depth	60m-85m	
Water Requirements	2.0 KLD	
Latitude	12°41'19.57130"N to 12°41'40.73408"N	
Longitude	77°54'22.23061"E to 77°54'32.42688" E	
Highest Elevation	The lease applied area is situated in hilly terrain. The gradient of the area is 1 in 3.6 towards Southern side and altitude of the area varies between 832m to 784m above from MSL	
Machinery	Crawler mounted drill machine	2Nos
	Hand Jack hammer	2Nos
	Compressor	1 No
	Excavator with Bucket and Rock Breaker	2 No
	Truck	4 No
	Water Sprinkling Tanker	1 Nos
Blasting	85mm diameter Slurry explosives are proposed to be used for shattering and heaving effect for removal and winning of Rough stone.	
Manpower Deployment	36Nos	
A.Capital Cost	Rs.3,48,60,000/-	
B.EMP cost	Rs.6,84,000/-	
Total Cost	Rs.3,55,44,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	1.2km-NW	
Nearest R.F	Sanamavu Ext II– 490m– NE	
Nearest Wildlife	Cauvery North Wildlife Sanctuary-15km-S Cauvery South Wildlife Sanctuary-39km-S	

Source: Approved Revised Mining Plan

SALIENT FEATURES OF PROPOSAL "P5"		
Name of the Mine	M/S.AVS Building Solutions India Private Limited (Mr.S.Srinivasan, Managing Director)	
Land Type	It is a Govt land – non-Forest	
S.F. No.	662 (P)	
Extent	**2.20.0 Ha**	
Proposed Depth of Mining	51m including 1m topsoil – (16m AGL + 35m BGL)	
Geological Resources	Rough Stone quarry	Topsoil
	8,66,891m³	14,467m³
Mineable Reserves	Rough Stone quarry	Topsoil
	3,04,455m³	7,344m³
Year wise development for five years production	Rough Stone quarry	Topsoil
	3,04,455m³	7,344m³

Peak Production first five years	66,410	6,240
Mining Plan/Lease Period	5 Years	
Existing Quarry Pits	Pit-:1 (L)160m x (W) 60m (D) 19.5m (AGL 16m + BGL 3.5m)	
Ultimate Pit Dimension	Pit-:1 (L)186m x (W) 62m (D) 51m (AGL 16m + BGL 35m) Pit:II (L)156m x (W) 40m (D) 51m (AGL 16m + BGL 35m)	
Toposheet No	57 -H/14	
Water table depth	70m-65m	
Water Requirements	2.0 KLD	
Latitude	12°41'35.04"N to 12°41'45.02"N	
Longitude	77°54'06.94"E to 77°54'14.16" E	
Highest Elevation	The lease applied area is exhibits an undulated topography. The area has gentle sloping towards Southern side. The altitude of the area is 812m amsl.	
	Hand Jack hammer	8Nos
	Compressor	2 No
	Excavator with Bucket and Rock Breaker	2 No
	Tippers	3 No
Blasting	85mm diameter Slurry explosives are proposed to be used for shattering and heaving effect for removal and winning of Rough stone.	
Manpower Deployment	32Nos	
A.Capital Cost	Rs.1,61,43,000/-	
B.EMP cost	Rs.3,80,000/-	
Total Cost	Rs.1,65,23,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	700m-NW	
Nearest R.F	Sanamavu Ext II– 300m– NE	
Nearest Wildlife	Cauvery Wildlife Sanctuary-17km-SW	

Source: Approved Mining Plan

SALIENT FEATURES OF PROPOSAL "E1"		
Name of the Mine	M/S.AVS Building Solutions India Private Limited (Mr.S. Srinivasan, Managing Director)	
EC Copy	Lr. No.SEIAA-TN/F.No.6969/1(a)/EC.No: 4071/2019 datcd: 06.11.2019	
Ec Approved Quantity	8,82,511m³ for Roughstone	
Land Type	It is a Govt land – non-Forest	
S.F. No.	663/1A (P), 663/1B1(P), 663/1B2(P), 663/2(P), 663/1B3(P), 679/1	
Extent	**4.77.5 Ha**	
Proposed Depth of Mining	57m (l5m above the ground level+42m below the ground level)	
Geological Resources	Rough Stone quarry	Topsoil
	25,85,933m³	49,148m³
Mineable Reserves	Rough Stone quarry	Topsoil
	8,82,511m³	24,472m³
Year wise development for five years production	Rough Stone quarry	Topsoil
	8,82,511m³	24,472m³
Peak Production first five years	1,96,105	15,010

Mining Plan/Lease Period	5 Years	
Existing Quarry Pits	Pit-:1 (L)160m x (W) 60m (D) 19.5m (AGL 16m + BGL 3.5m)	
Ultimate Pit Dimension	Pit-:1 (L)186m x (W) 62m (D) 51m (AGL 16m + BGL 35m) Pit:II (L)156m x (W) 40m (D) 51m (AGL 16m + BGL 35m)	
Toposheet No	57 -H/14	
Water table depth	70m-65m	
Water Requirements	2.0 KLD	
Latitude	12°41'35.57"N to 12°41'46.96"N	
Longitude	77°54'11.54"E to 77°54'22.89" E	
Highest Elevation	The lease applied area is exhibits an undulated topography. The area has gentle sloping towards Southern side. The altitude of the area is 812m amsl.	
	Hand Jack hammer & Compressor	6Nos
	Excavator with Bucket and Rock Breaker	1No
	Tippers	3 No
Blasting	85mm diameter Slurry explosives are proposed to be used for shattering and heaving effect for removal and winning of Rough stone.	
Manpower Deployment	18Nos	
A. Capital Cost	Rs.68,00,000/-	
B.EMP cost	Rs.6,60,000/-	
Total Cost	Rs.74,60,000/-	
CER Cost	Rs.5,00,000/-	
Nearest Habitation	200m-NE	
Nearest R. F	Sanamavu R.F– 75m– NE	
Nearest Wildlife	Cauvery Wildlife Sanctuary-17km-S	

Source: Approved Mining Plan

Impact on Air Environment –

Calculating the Cumulative Load of Mining within the cluster is as shown in table 7.5 & 7.6

TABLE 7.5 CUMULATIVE PRODUCTION LOAD OF ROUGH STONE QUARRY IN CLUSTER

Quarry	Production for Five-year plan period m^3	Per Year Production in m^3	Per Day Production in m^3	Number of Lorry Load Per Day @ $12m^3$ per load
P1	7,95,738	159148	530	44Trips /Day
P2	13,42,330	268466	895	75Trips /Day
P3	5,67,114	113423	378	32Trips /Day
P4	7,46,132	149226	497	41Trips /Day
P5	3,04,455	60891	203	17Trips /Day
Total	**37,55,769**	**7,51,154**	**2503**	**209 Trips /Day**
Quarry	**Production for five-year plan period m^3**	**Per Year Production in m^3**	**Per Day Production in m^3**	**Number of Lorry Load Per Day @ $12m^3$ per load**
E1	8,82,511m^3	1,76,502	588	49 Trips /Day
Total	**8,82,511m^3**	**1,76,502**	**588**	**49 Trips /Day**
G.Total	**4,638,280**	**927,656**	**3,091**	**258 Trips /Day**

TABLE 7.6: CUMULATIVE PRODUCTION OF TOPSOIL IN CLUSTER

Quarry	Production for Two-Three-year plan period m^3	Per Year Production in m^3	Per Day Production in m^3	Number of Lorry Load @ $12m^3$ per load
P1	43,017	14,339	48	4 Trips /Day
P2	39,175	13,058	44	4 Trips /Day
P3	43,575	14,525	48	4 Trips /Day
P4	39,183	13,061	44	4 Trips /Day
P5	7,344	3,672	12	1 Trips /Day
Total	**1,72,294**	**58,655**	**196**	**17 Trips/ Day**
E1	24,472	12,236	41	3Trips /Day
Toal	**24,472**	**12,236**	**41**	**3Trips /Day**
G. Total	**1,96,766**	**70,891**	**237**	**20 Trips/ Day**

Source: Approved Mining plans of the respective projects

Based on the above production quantities the emissions due to various activities in all the 3proposal quarries and 1 existing quary includes various activities like ground preparation, excavation, handling and transport of mineral. These activities have been analysed systematically basing on USEPA-Emission Estimation Technique Manual, for Mining AP-42, to arrive at possible emissions to the atmosphere and estimated emissions are given in Table 7.7.

TABLE 7.7: EMISSION ESTIMATION FROM CLUSTER

EMISSION ESTIMATION FOR QUARRY "P1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.120789764	g/s
	Blasting	Point Source	0.006219638	g/s
	Mineral Loading	Point Source	0.047346894	g/s
	Haul Road	Line Source	0.002511769	g/s/m
	Overall Mine	Area Source	0.080840826	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.002105471	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000229283	g/s
EMISSION ESTIMATION FOR QUARRY "P2"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.140654286	g/s
	Blasting	Point Source	0.013316169	g/s
	Mineral Loading	Point Source	0.049642029	g/s
	Haul Road	Line Source	0.002529694	g/s/m
	Overall Mine	Area Source	0.086029626	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.00326083	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000370398	g/s
EMISSION ESTIMATION FOR QUARRY "P3"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.109436384	g/s
	Blasting	Point Source	0.003796847	g/s
	Mineral Loading	Point Source	0.046306585	g/s
	Haul Road	Line Source	0.00250587	g/s/m
	Overall Mine	Area Source	0.079037633	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.001680302	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000180243	g/s
EMISSION ESTIMATION FOR QUARRY "P4"				
Estimated Emission Rate for PM_{10}	**Activity**	**Source type**	**Value**	**Unit**
	Drilling	Point Source	0.118293491	g/s

	Blasting	Point Source	0.005602975	g/s
	Mineral Loading	Point Source	0.046990562	g/s
	Haul Road	Line Source	0.002509614	g/s/m
	Overall Mine	Area Source	0.080235803	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.001964241	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000212828	g/s
EMISSION ESTIMATION FOR QUARRY "P5"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.091386961	g/s
	Blasting	Point Source	0.001541827	g/s
	Mineral Loading	Point Source	0.042989258	g/s
	Haul Road	Line Source	0.002493434	g/s/m
	Overall Mine	Area Source	0.054467977	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.000776936	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000038668	g/s
EMISSION ESTIMATION FOR QUARRY "E1"				
	Activity	**Source type**	**Value**	**Unit**
Estimated Emission Rate for PM_{10}	Drilling	Point Source	0.126444802	g/s
	Blasting	Point Source	0.007818427	g/s
	Mineral Loading	Point Source	0.047826630	g/s
	Haul Road	Line Source	0.00251491	g/s/m
	Overall Mine	Area Source	0.080297599	g/s
Estimated Emission Rate for SO_2	Overall Mine	Area Source	0.002321123	g/s
Estimated Emission Rate for NOx	Overall Mine	Area Source	0.000244257	g/s

Source: Emission Formula

TABLE 7.8: INCREMENTAL & RESULTANT GLC WITHIN CLUSTER

PM_{10} in $\mu g/m^3$	
Location	AAQ1 – CORE
Background (average)	46.0
Highest Incremental	17.9
Resultant	63.9
NAAQ Norms	100 $\mu g/m^3$
PM2.5 in $\mu g/m^3$	
Background (average)	21.5
Highest Incremental	9.81
Resultant	31.3
NAAQ Norms	80 $\mu g/m^3$
SO_2 in $\mu g/m^3$	
Location	AAQ1 – CORE
Background (average)	8.1
Highest Incremental	3.46
Resultant	11.6
NAAQ Norms	80 $\mu g/m^3$
NO_x in $\mu g/m^3$	
Location	AAQ1 – CORE
Background (average)	23.9
Incremental	11.0
Resultant	34.9
NAAQ Norms	80 $\mu g/m^3$

Noise Environment

Noise pollution is mainly due to operation like drilling & blasting and plying of trucks & HEMM. Cumulative Noise modelling has been carried out considering blasting and compressor operation (drilling) and transportation

activities. Predictions have been carried out to compute the noise level at various distances around the different quarries within the 500 m radius.

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

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

Where:

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

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

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

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

Source data has been computed taking into account of all the machinery and activities used in the mining process.

TABLE 7.9: PREDICTED NOISE INCREMENTAL VALUES FROM CLUSTER

Location ID	N1	N2	N3	N4	N5	N6	N7
Maximum Monitored Value (Day) dB(A)	47.8	46.2	41.3	45.3	45.9	39.10	40.30
Incremental Value dB(A)	66.1	56.6	34.1	27.0	23.2	26.1	29.2
Total Predicted Noise level dB(A)	66.2	57.0	42.1	45.4	45.9	39.3	40.6
NAAQ Standards	**Industrial** **Day Time- 75 dB (A)** **Night Time- 70 dB (A)** **Residential** **Day Time– 55 dB (A)** **Night Time- 45 dB (A)**						

Source: Lab Monitoring Data

The incremental noise level is found within the range of 22.6– 41.0 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(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.).

Ground Vibrations

Ground vibrations due to mining activities in the all the 2-proposal quarry within cluster are anticipated due to operation of Mining Machines like Excavators, drilling and blasting, transportation vehicles, etc. However, the major source of ground vibration from the all the 2-proposal quarry 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 cluster quarries respectively are as in below Table 7.10.

TABLE 7.10: NEAREST HABITATION FROM EACH MINE

Location ID	Distance in Meters
Habitation Near P1	930m-NW
Habitation Near P2	940m-NW
Habitation Near P3	1.2km-NW
Habitation Near P4	1.0km-NW
Habitation Near P5	700m-NW
Habitation Near E1	200m-NE

Source: Satellite Imagery and Field Data

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 7.11: GROUND VIBRATIONS CLUSTER QUARRIES

Location ID	Maximum Charge in kgs	Nearest Habitation in m	PPV in m/ms
P1	230	930m-NW	0.690
P2	387	940m-NW	1.028
P3	139	1.2km-NW	0.350
P4	215	1.0km-NW	0.435
P5	88	700m-NW	0.504
E1	255	200m-NE	8.761

Source: PPV Calculation

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

Socio Economic Environment –

The 6 mines shall provide employment and revenue will be created to government.

TABLE 7.12: SOCIO ECONOMIC BENEFITS FROM CLUSTER MINES

Location Code	Employment	Project Cost	CER Cost
P1	36	Rs.3,55,44,000/-	Rs.5,00,000/-
P2	36	Rs. 3,51,84,000/-	Rs.5,00,000/-
P3	33	Rs.3,31,54,000/-	Rs.5,00,000/-
P4	36	Rs.3,55,44,000/-	Rs.5,00,000/-
P5	32	Rs.1,65,23,000/-	Rs.5,00,000/-
Total	**173**	**Rs.15,59,49,000/-**	Rs.25,00,000/-
E1	18	Rs. 74,60,000/-	Rs.5,00,000/-
Grand Total	**191**	**Rs. 16,34,09,000/-**	**Rs.30,00,000/-**

A total of 173people will **Rs.15,59,49,000/-**get employment due to 5 mines in cluster. 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.

- 5 Proposed projects shall fund towards CER – **Rs.25,00,000/-**
- 1 Existing projetcs shall fund towards CER **Rs. 5,00,000/-**

TABLE 7.13: GREENBELT DEVELOPMENT BENEFITS FROM 4MINES

PROPOSAL FOR P1				
Year	**No. of trees proposed to be planted**	**Survial %**	**Area to be planted**	**Name of the species**
I	It is proposed to plant **2500Nos** of trees in the 1st year	80%	Safety barrier, Un utilized areas and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc
PROPOSAL FOR P2				
I	It is proposed to plant **2500Nos** of trees in the 1st year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,
PROPOSAL FOR P3				
I	It is proposed to plant **2500Nos** of trees in the 1st year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,
PROPOSAL FOR P4				
I	It is proposed to plant **2500Nos** of trees in the 1st year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,

Based on the Proposed Mining Plans it's anticipated that there shall growth of native species of Neem, Pongamia Pinnata, Casuarina, etc in the Cluster at a rate of 2500 Trees Planted over a period of 5 Years with Survival Rate of 80% over an area of all proposed quarries.

7.5 PLASTIC WASTE MANAGEMENT PLAN FOR P1 TO P3

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

Objective –

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

TABLE 7.14: ACTION PLAN TO MANAGE PLASTIC WASTE

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

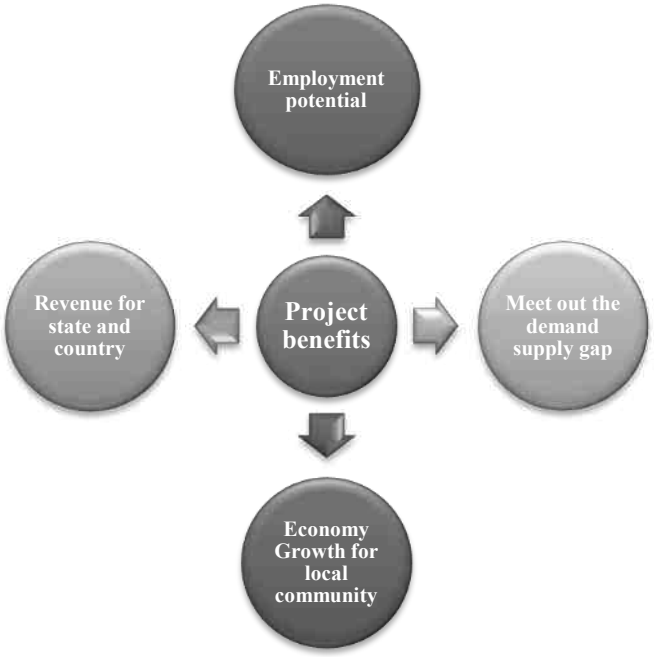
Source: Proposed by FAE's and EC

CHAPTER – 8: PROJECT BENEFITS

8.0 General

The four Proposed Projects for Quarrying Rough Stone quarry at Thorapalli Agraharam Village Cluster Quarries Village aims to produce cumulatively **34,51,314** m^3 Rough Stone quarry over period of five Years and 1,64,950m^3 of Topsoil over a period of 3 Years. This will enhance the socio-economic activities in the adjoining areas and will result in the following benefits

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



8.1 Employment Potential

It is proposed to provide employment to about 138persons for carrying out mining operations and give preference to the local people in providing employment. In addition, there will be opportunity for indirect employment to many people in the form of contractual jobs, business opportunities, service facilities etc. the economic status of the local people will be enhanced due to mining project.

8.1 Socio-Economic Welfare Measures Proposed

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

8.1 Improvement in Physical Infrastructure

The proposed project site is located in Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri 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.

8.1 Improvement in Social Infrastructure

The quarry projects in the region will have positive impact on the social economic condition of the area by way of providing employment to the local peoples; thereby increasing 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 proponents.
- Supplementing Govt. efforts in health monitoring camps, social welfare and various Awareness programs among the rural population.

8.1 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

Individual Project 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. Those involved with the undertaking of CSR activities will be provided with adequate training and re-orientation.

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

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

CSR Cost Estimation

- CSR activities will be taken up in the Thorapalli Agraharam 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, all the mines being a green field project & Capital Investment is ≤ 100 crores, they shall contribute 2% of Capital Investment towards CER as per directions of EAC/SEAC and the total CER amount from the 3 proposed mines is Rs **Rs 20,00,000/-.**

TABLE 8.1 CER – ACTION PLAN

Code	CER
P1	Rs 5,00,000/-
P2	Rs 5,00,000/-
P3	Rs 5,00,000/-
P4	Rs 5,00,000/-
Total	**Rs 20,00,000/-**

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

10.1 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.

10.2 Environmental Policy

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

The Proponent **M/s. Thriveni Earth Movers Private Limited** will

- Meet the requirements of all laws, acts, regulations, and standards relevant to its operations and activities.
- 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 a program to train employees in general environmental issues and individual workplace environmental responsibilities.
- 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 of each Proposed Quarry.

The said team will be responsible for:

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

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

10.3 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

10.4 Soil Management

Top Soil Management –

- There is topsoil 43,017m^3

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel. The Gravel will be directly loaded into tippers for the filling and levelling of lowlying 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

10.5 Water Management

In the 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 82m including 1m topsoil [58m AGL + 24m BGL] the water table in the area is 60-65m below ground level, hence the proposed projects 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 Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.6 Air Quality Management

The 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 daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	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	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 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
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring shall 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	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.8 Ground Vibration and Fly Rock Control

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting 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
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.9 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 quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area.
- It is also proposed to implement the greenbelt development programme and post plantation status will be regularly checked for 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 installing a sprinkler unit near the newly planted area.
- Year wise greenbelt development will 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.

10.9.1 Green Belt Development Plan

About 2500nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. 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 FOR 10 YEAR PLAN PERIOD – P1

PROPOSAL FOR P1				
Year	**No. of trees proposed to be planted**	**Survial %**	**Area to be planted**	**Name of the species**
I	It is proposed to plant 2500 **Nos** of trees in the 1st year	80%	Safety barrier, Un utilized areas and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc

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.

10.9.2 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 – P1

S.No	Botanical Name	Local Name	Importance
1.	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2.	Tamarindus indica	Tamarind	Edible & Medicinal and other Uses
3.	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
4.	Borassus Flabellifer	Palmyra Palm	Tall Wind breaker tree and its fruits are edible

Source: Proposed by FAE's & EIA Coordinator

10.10 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 impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.10.1 Medical Surveillance and Examinations –

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

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a detail 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 below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE – P1

Sl. No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
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A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check – up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups: - Work force will be divided into three targeted groups age wise as follows: -		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.10.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose-fitting clothes having light colours will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.
- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness and harmony amongst employees and co quarry owners.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS – P1

10.10.3 Health and Safety Training Programme

The Proponents 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 Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES – P1

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

				Fire warning Ground control hazards First aid Electrical hazards Accident prevention Explosives Respirator devices
Hazard Training	All employees exposed to mine hazards	Once	Variable	Hazard recognition and avoidance Emergency evacuation procedures Health standards Safety rules Respiratory devices

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

10.10.4 Budgetary Provision for Environmental Management –

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

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT – P1

	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	50000	50000
	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 - 4Units	20000	1000
	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	100000
	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	2068919
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	50000	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	1000000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 2500Trees - (720Inside Lease Area & 2280 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)	144000	21600
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	684000	68400
	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	166500	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	4694854	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6’ X 5’ with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000

	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) -36Employees	144000	36000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	36000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	10000
	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	250000	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	0
TOTAL			**3852000**	**3378918.8**

In order to implement the environmental protection measures, an amount of Rs.38 lakhs as capital cost and recurring cost as Rs. 33.78 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	72,30,918.8
2nd Year	35,47,864.7
3rd Year	37,25,258
4th Year	39,11,520.9
5th Year	42,73,596.9
Total	**Rs. 227Lakshs**

10.11 Conclusion

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

CHAPTER - 10: ENVIRONMENTAL MANAGEMENT PLAN – P2

10.1 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.

10.2 Environmental Policy

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

The Proponent **M/s. Thriveni Earth Movers Pnvate Limited** will –

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

Description of the Administration and Technical Setup –

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

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory
- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.

- Co-ordination of the environment related activities within the project as well as with outside agencies
- Collection of health statistics of the workers and population of the surrounding villages
- Green belt development
- Monitoring the progress of implementation of the environmental monitoring programme
- Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

10.3 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

10.4 Soil Management

Top Soil Management –

- There is topsoil 39,175m3.

Overburden / Waste and Side Burden Management –

- The overburden in the form of Gravel. The Gravel will be directly loaded into tippers for the filling and levelling of lowlying 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

10.5 Water Management

In the 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 restricted upto a depth 80m including 1m topsoil – (48m AGL + 32m BGL) the water table in the area is 60-85m below ground level, hence the proposed projects 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 Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.6 Air Quality Management

The 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 daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	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	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 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
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring shall 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	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.8 Ground Vibration and Fly Rock Control

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting 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
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.9 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 quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to implement the greenbelt development programme and post plantation status will be regularly checked for 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 installing a sprinkler unit near the newly planted area.
- Year wise greenbelt development will 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.

10.9.1 Green Belt Development Plan

About 2500nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. 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 FOR 5 YEAR PLAN PERIOD – P2

PROPOSAL FOR P2			
It is proposed to plant **2500Nos** of trees in the 1st year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,

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.

10.9.2 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,
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- 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

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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 below tests keep upgrading the database of medical history of the employees.

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3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
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Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.10.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose-fitting clothes having light colours will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.

- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness and harmony amongst employees and co quarry owners.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS – P2

10.10.3 Health and Safety Training Programme

The Proponents 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 Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES – P2

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation

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

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

10.10.4 Budgetary Provision for Environmental Management –

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

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT – P2

	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	50000	50000
	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 - 4Units	20000	1000
	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	100000
	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	3490058
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	50000	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	1000000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 2500Trees - (530Inside Lease Area & 2470 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)	106000	15900
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	741000	74100
	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	112500	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	7919747	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000

	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) -36Employees	144000	36000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	36000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	10000
	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	250000	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	0
TOTAL			**3871000**	**4800058**

In order to implement the environmental protection measures, an amount of Rs.38.71 lakhs as capital cost and recurring cost as Rs. 48.00 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	Rs 86,71,058
2nd Year	Rs 50,40,060.9
3rd Year	Rs 52,92,063.945
4th Year	Rs 55,56,667.142
5th Year	Rs 59,47,000.499
Total	**Rs.305 Lakhs**

10.11 Conclusion

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct 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 - 10: ENVIRONMENTAL MANAGEMENT PLAN – P3

10.1 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.

10.2 Environmental Policy

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

The Proponent **M/s. Sri Navaladiyan Engineers** will –

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

Description of the Administration and Technical Setup –

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

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory
- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.

- Co-ordination of the environment related activities within the project as well as with outside agencies
- Collection of health statistics of the workers and population of the surrounding villages
- Green belt development
- Monitoring the progress of implementation of the environmental monitoring programme
- Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

10.3 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

10.4 Soil Management

Top Soil Management

- The thickness of topsoil in this area is 1.0m and the total volume of Topsoil will be 43,575m^3.

Disposal of Overburden

- The overburden in the form of Topsoil is **43,575m^3** up to depth 1m for during this lease period. Topsoil formation will be removed and dumped at all side boundary barrier of the lease area. It will be utilized for afforestation and road low lying areas.

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

10.5 Water Management

In the 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 restricted upto a depth 73m including 1m topsoil [47m AGL + 26m BGL]the water table in the area is 60-85m below ground level, hence the proposed projects 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 Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.6 Air Quality Management

The 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 daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	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	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 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
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring shall 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	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.8 Ground Vibration and Fly Rock Control

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting 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
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.9 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 quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to implement the greenbelt development programme and post plantation status will be regularly checked for 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 installing a sprinkler unit near the newly planted area.
- Year wise greenbelt development will 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.

10.9.1 Green Belt Development Plan

About 2500 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. 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 FOR 5 YEAR PLAN PERIOD – P3

PROPOSAL FOR -P3			
It is proposed to plant **2500Nos** of trees in the 1st year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,

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.

10.9.2 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 – P3

S.No	Botanical Name	Local Name	Importance
1	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2	Tamarindus indica	Tamarind	Edible & Medicinal and other Uses
3	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
4	Borassus Flabellifer	Palmyra Palm	Tall Wind breaker tree and its fruits are edible

Source: Proposed by FAE's & EIA Coordinator

10.10 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 impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.10.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.

- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a detail 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 below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE – P3

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					
A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check – up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.10.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose-fitting clothes having light colours will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.

- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness and harmony amongst employees and co quarry owners.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS – P3

10.10.3 Health and Safety Training Programme

The Proponents 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 Environmental Consultants to provide periodical training to all the employees 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

10.10.4 Budgetary Provision for Environmental Management –

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

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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 - 2 Units	50000	5000
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	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	100000
	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	1474496
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	50000	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	1000000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 2500Trees - (650Inside Lease Area & 2570 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)	130000	19500
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	771000	77100
	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	135750	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	3345973	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6’ X 5’ with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000

	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) -33Employees	132000	33000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	33000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	10000
	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	250000	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	0
TOTAL			**3913000**	**2785096.4**

In order to implement the environmental protection measures, an amount of Rs.39.13 lakhs as capital cost and recurring cost as Rs. 27.85 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	66,98,096.4
2nd Year	29,24,351.22
3rd Year	30,70,568.781
4th Year	32,24,097.22
5th Year	35,21,052.081
Total	**Rs.194 Lakhs**

10.11 Conclusion

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct 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 - 10: ENVIRONMENTAL MANAGEMENT PLAN – P4

10.1 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.

10.2 Environmental Policy

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

The Proponent **Thiru. P. Balasubramanian** will –

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

Description of the Administration and Technical Setup –

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

The said team will be responsible for:

- Monitoring of the water/ waste water quality, air quality and solid waste generated
- Analysis of the water and air samples collected through external laboratory
- Implementation and monitoring of the pollution control and protective measures/ devices which shall include financial estimation, ordering, installation of air pollution control equipment, waste water treatment plant, etc.
- Co-ordination of the environment related activities within the project as well as with outside agencies

- Collection of health statistics of the workers and population of the surrounding villages
- Green belt development
- Monitoring the progress of implementation of the environmental monitoring programme
- Compliance to statutory provisions, norms of State Pollution Control Board, Ministry of Environment and Forests and the conditions of the environmental clearance as well as the consents to establish and consents to operate.

10.3 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

10.4 Soil Management

Top Soil Management

- The thickness of topsoil in this area is 1.0m and the total volume of Topsoil will be 39,183m^3.

Disposal of Overburden

- The overburden in the form of Topsoil is **39,183m^3** up to depth 1m for during this lease period. Topsoil formation will be removed and dumped at all side boundary barrier of the lease area. It will be utilized for afforestation and road low lying areas.

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

10.5 Water Management

In the 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 restricted upto a depth 64m including 1m topsoil – (46m AGL + 18m BGL) the water table in the area is 60-85m below ground level, hence the proposed projects 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 Foreman
Temporary and permanent garland drain will be constructed to contain the catchments of the mining area and to divert runoff from undisturbed areas through the mining areas	Mines Manager
Natural drains/nallahs/brooklets outside the project area should not be disturbed at any point of mining operations	Mines Manager
Ensure there is no process effluent generation or discharge from the project area into water bodies	Mines Foreman
Domestic sewage generated from the project area will be disposed in septic tank and soak pit system	Mines Foreman
Monthly or after rainfall, inspection for performance of water management structures and systems	Mines Manager
Conduct ground water and surface water monitoring for parameters specified by CPCB	Manager Mines

Source: Proposed by FAE's & EIA Coordinator

10.6 Air Quality Management

The 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 daily (twice) water sprinkling on working face and daily (twice) water sprinkling on haul road	Mines Manager
Wet drilling procedure /drills with dust extractor system to control dust generation during drilling at source itself is implemented	Mines Manager
Maintenance as per operator manual of the equipment and machinery in the mines to minimizing air pollution	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	Mines Manager
Provision of Dust Mask to all workers	Mines Manager
Greenbelt development all along the periphery of the project area	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.7 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
Development of thick greenbelt all along the Buffer Zone (7.5 Meters) of the project area to attenuate the noise and the same will be maintained	Mines Manager
Preventive maintenance of mining machinery and replacement of worn-out accessories to control noise generation	Mines Foreman
Deployment of mining equipment with an inbuilt mechanism to reduce noise	Mines Manager
Provision of earmuff / ear plugs to workers working in noise prone zones in the mines	Mining Mate
Provision of effective silencers for mining machinery and transport vehicles	Mines Manager
Provision of sound proof AC operator cabins to HEMM	Mines Manager
Sharp drill bits are used to minimize noise from drilling	Mines Foreman
Controlled blasting technologies are adopted by using delay detonators to minimize noise from blasting	Mines Manager
Annual ambient noise level monitoring shall 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	Mines Manager
Reduce maximum instantaneous charge using delays while blasting	Mining Mate
Change the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination	Mines Manager
Undertake noise or vibration monitoring	Mines Manager

Source: Proposed by FAE's & EIA Coordinator

10.8 Ground Vibration and Fly Rock Control

TABLE 10.6: PROPOSED CONTROLS FOR GROUND VIBRATIONS & FLY ROCK

CONTROL	RESPONSIBILITY
Controlled blasting using delay detonators will be carried out to maintain the PPV value (below 8Hz) well within the prescribed standards of DGMS	Mines Manager
Drilling and blasting 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
Suitable spacing and burden will be maintained to avoid misfire / fly rocks	Manager Mines
Number of blast holes will be restricted to control ground vibrations	Manager Mines
Blasting will be carried out only during noon time	Mining Mate
Undertake noise or vibration monitoring	Mines Manager
ensure blast holes are adequately stemmed for the depth of the hole and stemmed with suitable angular material	Mines Foreman

Source: Proposed by FAE's & EIA Coordinator

10.9 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 quarried out area etc.,

Following control measures are proposed for its management and will be the responsibility of the Mines Manager.

- Greenbelt development all along the safety barrier of the project area
- It is also proposed to implement the greenbelt development programme and post plantation status will be regularly checked for 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 installing a sprinkler unit near the newly planted area.
- Year wise greenbelt development will 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.

10.9.1 Green Belt Development Plan

About 2500 nos. of saplings is proposed to be planted for the Mining plan period in safety barrier of applied mine lease area with survival rate 80%. 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 FOR 5 YEAR PLAN PERIOD – P4

PROPOSAL FOR -P3			
It is proposed to plant **2500Nos** of trees in the 1st year	80%	Safety barrier, Un utilized area's and nearby village roads	Neem, Pongamia pinnata, Casuarina, etc.,

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.

10.9.2 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 – P4

S.No	Botanical Name	Local Name	Importance
1	Azadirachta indica	Neem, Vembu	Neem oil & neem products
2	Tamarindus indica	Tamarind	Edible & Medicinal and other Uses
3	Polyalthia longifolia	Nettilinkam	Tall and evergreen tree
4	Borassus Flabellifer	Palmyra Palm	Tall Wind breaker tree and its fruits are edible

Source: Proposed by FAE's & EIA Coordinator

10.10 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 impact in quarries are fugitive dust and noise. Safety of employees during quarrying operation and maintenance of mining equipment will be taken care as per Mines Act 1952 and Rule 29 of Mines Rules 1955. To avoid any adverse effect on the health of workers due to dust, noise and vibration sufficient measures have been provided.

10.10.1 Medical Surveillance and Examinations –

- Identifying workers with conditions that may be aggravated by exposure to dust & noise and establishing baseline measures for determining changes in health.

- Evaluating the effect of noise on workers
- Enabling corrective actions to be taken when necessary
- Providing health education

The health status of workers in the mine shall be regularly monitored under an occupational surveillance program. Under this program, all the employees are subjected to a detail 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 below tests keep upgrading the database of medical history of the employees.

TABLE 10.9: MEDICAL EXAMINATION SCHEDULE – P4

Sl.No	Activities	1st Year	2nd Year	3rd Year	4th Year	5th Year
1	Initial Medical Examination (Mine Workers)					
A	Physical Check-up					
B	Psychological Test					
C	Audiometric Test					
D	Respiratory Test					
2	Periodical Medical Examination (Mine Workers)					
A	Physical Check – up					
B	Audiometric Test					
C	Eye Check – up					
D	Respiratory Test					
3	Medical Camp (Mine Workers & Nearby Villagers)					
4	Training (Mine Workers)					

Medical Follow ups:- Work force will be divided into three targeted groups age wise as follows:-		
Age Group	**PME as per Mines Rules 1955**	**Special Examination**
Less than 25 years	Once in a Three Years	In case of emergencies
Between 25 to 40 Years	Once in a Three Years	In case of emergencies
Above 40 Years	Once in a Three Years	In case of emergencies
Medical help on top priority immediately after diagnosis/ accident is the essence of preventive aspects.		

10.10.2 Proposed Occupational Health and Safety Measures –

- The mine site will have adequate drinking water supply so that workers do not get dehydrated.
- Lightweight and loose-fitting clothes having light colours will be preferred to wear.
- Noise exposure measurements will be taken to determine the need for noise control strategies.
- The personal protective equipment will be provided for mine workers.
- Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.
- At noisy working activity, exposure time will be minimized.
- Dust generating sources will be identified and proper control measure will be adopted.
- Periodic medical examinations will be provided for all workers.

- Strict observance of the provisions of DGMS Acts, Rules and Regulations in respect of safety both by management and the workers.
- The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented. They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centres. All personal protective equipment's will be provided to them.
- A safety committee meeting every month will be organized to discuss the safety of the mines and the persons employed.
- Celebration of annual mines safety week and environmental week in order to develop safety awareness and harmony amongst employees and co quarry owners.

FIGURE 10.1: PERSONAL PROTECTIVE EQUIPMENT TO THE MINE WORKERS – P4

10.10.3 Health and Safety Training Programme

The Proponents 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 Environmental Consultants to provide periodical training to all the employees to carry out the mining operation in and eco-friendly manner.

TABLE 10.10: LIST OF PERIODICAL TRAININGS PROPOSED FOR EMPLOYEES – P4

Course	Personnel	Frequency	Duration	Instruction
New-Employee Training	All new employees exposed to mine hazards	Once	One week	Employee rights Supervisor responsibilities Self-rescue Respiratory devices Transportation controls Communication systems Escape and emergency evacuation

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

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

10.10.4 Budgetary Provision for Environmental Management –

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

TABLE 10.11: EMP BUDGET FOR PROPOSED PROJECT – P4

	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	50000	50000
	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 - 4Units	20000	1000
	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	100000
	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	1447805
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	50000	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	1000000	10000
	3. Progressive Closure Activity Green belt development - 500 trees per one hectare - Proposal for 2500Trees - (930Inside Lease Area & 2070 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)	186000	27900
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	621000	62100
	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	16500	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	3285403	0
Implementation of EC, Mining Plan & DGMS Condition	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10000	1000
	Air, Water, Noise and Soil Quality Sampling every 6 Months for Compliance Report of EC Conditions	Submission of 2 Half Yearly Compliance - Lab Monitoring Report as per CPCB norms	0	50000

	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee) -36Employees	132000	33000
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0	33000
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	10000
	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	250000	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	0
TOTAL			**3819000**	**2751804.8**

In order to implement the environmental protection measures, an amount of Rs.38.19 lakhs as capital cost and recurring cost as Rs. 27.51 lakhs as recurring cost is proposed considering present market price considering present market scenario for the proposed project.

Year Wise Break Up	
1st Year	65,70,804.8
2nd Year	28,89,395
3rd Year	30,33,864.8
4th Year	31,85,558
5th Year	33,61,335.9
Total	**Rs.190 Lakhs**

10.11 Conclusion

Various aspects of mining activities were considered and related impacts were evaluated. Considering all the possible ways to mitigate the environmental concerns Environmental Management Plan was prepared and fund has been allocated for the same. The EMP is dynamic, flexible and subjected to periodic review. For project where the major environmental impacts are associated, EMP will be under regular review. Senior Management responsible for the project will conduct 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

Thorapalli Agraharam Rough Stone Cluster Quarries (Extent 26.97.5 ha) falls under "B" category as per MoEF & CC Notification (S.O. 3977 (E)).

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

A detailed Draft EIA/ EMP Report is prepared for public and other stakeholders' suggestions and a Final EIA/ EMP Report will be prepared based on the outcome of Public Consultation.

Environmental monitoring and audit mechanism have been recommended before and after commencement of the project, where necessary, to verify the accuracy of the EIA predictions and the effectiveness of recommended mitigation measures.

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

Sustainable and modern mining leads us to see positive impact of mining operation and providing consistent employment for nearly 141 people directly in the cluster and indirectly around 150 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 Thorapalli Agraharam Rough Stone Cluster quarries (Extent: 26.97.5 ha).

CHAPTER 12: DISCLOSURE OF CONSULTANTS

The Project Proponent's –

1. **M/s. Thriveni Earth Movers Private Limited,**
2. **M/s. Thriveni Earth Movers Private Limited,**
3. **M/s. Sri Navaladiyan Engineers**
4. **Thiru. P. Balasubramanian**

have engaged M/s Geo Exploration and Mining Solutions, an Accredited Organization under Quality Council of India – National Accreditation Board for Education & Training, New Delhi, for carrying out the EIA Study as per the ToR Issued.

Name and address of the consultancy:

GEO EXPLORATION AND MINING SOLUTIONS
No 17, Advaitha Ashram Road,
Alagapuram, Salem – 636 004
Tamil Nadu, India
Email: infogeoexploration@gmail.com
Web: **www.gemssalem.com**
Phone: 0427 2431989.

The Accredited Experts and associated members who were engaged for this EIA study as given below –

Sl.No.	Name of the expert	In house/ Empanelled	EIA Coordinator		FAE	
			Sector	Category	Sector	Category
1	**Dr. M. Ifthikhar Ahmed**	**In-house**	**1**	**A**	WP GEO SC	B A A
2	Dr. P. Thangaraju	In-house	-	-	HG GEO	A A
3	Mr. A. Jagannathan	In-house	-	-	AP NV SHW	B A B
4	Mr. N. Senthilkumar	Empanelled	38 28	B B	AQ WP RH	B B A
5	Mrs. Jisha parameswaran	In-house	-	-	SW	B
6	Mr. Govindasamy	In-house	-	-	WP	B
7	Mrs. K. Anitha	In-house	-	-	SE	A
8	Mrs. Amirtham	In-house	-	-	EB	B
9	Mr. Alagappa Moses	Empanelled	-	-	EB	A
10	Mr. A. Allimuthu	In-house	-	-	LU	B
11	Mr. S. Pavel	Empanelled	-	-	RH	B
12	Mr. J. R. Vikram Krishna	Empanelled	-	-	SHW RH	A A

Abbreviations	
EC	EIA Coordinator
AEC	Associate EIA Coordinator
FAE	Functional Area Expert
FAA	Functional Area Associates
TM	Team Member
GEO	Geology
WP	Water pollution monitoring, prevention and control
AP	Air pollution monitoring, prevention and control
LU	Land Use
AQ	Meteorology, air quality modeling, and prediction
EB	Ecology and bio-diversity
NV	Noise and vibration
SE	Socio economics
HG	Hydrology, ground water and water conservation
SC	Soil conservation
RH	Risk assessment and hazard management
SHW	Solid and hazardous wastes
MSW	Municipal Solid Wastes
ISW	Industrial Solid Wastes
HW	Hazardous Wastes

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA/EMP

Declaration by experts contributing to the EIA/EMP for Thorapalli Agraharam Rough Stone Cluster Quarries over an Extent of 26.97.5ha in Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri District, Tamil Nadu State. 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**

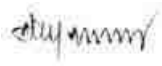
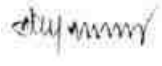
Date & Signature:

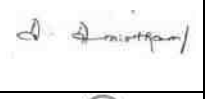
Period of Involvement: **January 2022 to till date**

Associated Team Member with EIA Coordinator:

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

FUNCTIONAL AREA EXPERTS ENGAGED IN THE PROJECT

Sl. No.	Functional Area	Involvement	Name of the Expert/s	Signature
1	AP	▪ Identification of different sources of air pollution due to the proposed mine activity ▪ Prediction of air pollution and propose mitigation measures / control measures	Mr. A. Jagannathan	
2	WP	▪ Suggesting water treatment systems, drainage facilities ▪ Evaluating probable impacts of effluent/waste water discharges into the receiving environment/water bodies and suggesting control measures.	Dr. M. Ifthikhar Ahmed	
			Mr. N. Senthilkumar	
3	HG	▪ Interpretation of ground water table and predict impact and propose mitigation measures. ▪ Analysis and description of aquifer Characteristics	Dr. P. Thangaraju	
4	GEO	▪ Field Survey for assessing the regional and local geology of the area. ▪ Preparation of mineral and geological maps. ▪ Geology and Geo morphological analysis/description and Stratigraphy/Lithology.	Dr. M. Ifthikhar Ahmed	
			Dr. P. Thangaraju	
5	SE	▪ Revision in secondary data as per Census of India, 2011. ▪ Impact Assessment & Preventive Management Plan	Mrs. K. Anitha	

		▪ Corporate Environment Responsibility.		
6	EB	▪ Collection of Baseline data of Flora and Fauna. ▪ Identification of species labelled as Rare, Endangered and threatened as per IUCN list. ▪ Impact of the project on flora and fauna. ▪ Suggesting species for greenbelt development.	Mrs. Amirtham	
			Mr. Alagappa Moses	
7	RH	▪ Identification of hazards and hazardous substances ▪ Risks and consequences analysis ▪ Vulnerability assessment ▪ Preparation of Emergency Preparedness Plan ▪ Management plan for safety.	Mr. N. Senthilkumar	
			Mr. S. Pavel	
			Mr. J. R. Vikram Krishna	
8	LU	▪ Construction of Land use Map ▪ Impact of project on surrounding land use ▪ Suggesting post closure sustainable land use and mitigative measures.	Mr. A. Allimuthu	
9	NV	▪ Identify impacts due to noise and vibrations ▪ Suggesting appropriate mitigation measures for EMP.	Mr. A. Jagannathan	
10	AQ	▪ Identifying different source of emissions and propose predictions of incremental GLC using AERMOD. ▪ Recommending mitigations measures for EMP	Mr. N. Senthilkumar	
11	SC	▪ Assessing the impact on soil environment and proposed mitigation measures for soil conservation	Dr. M. Ifthikhar Ahmed	
12	SHW	▪ Identify source of generation of non-hazardous solid waste and hazardous waste. ▪ Suggesting measures for minimization of generation of waste and how it can be reused or recycled.	Mr. A. Jagannathan	
			Mr. J. R. Vikram Krishna	

LIST OF TEAM MEMBERS ENGAGED IN THIS PROJECT

Sl.No.	Name	Functional Area	Involvement	Signature
1	Mr. S. Nagamani	AP; GEO; AQ	▪ Site Visit with FAE ▪ Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures ▪ Provide inputs on Geological Aspects ▪ Analyse & provide inputs and assist FAE with meteorological data, emission estimation, AERMOD modelling and suggesting control measures	
2	Mr. Viswanathan	AP; WP; LU	▪ Site Visit with FAE ▪ Provide inputs & Assisting FAE with sources of Air Pollution, its impact and suggest control measures ▪ Assisting FAE on sources of water pollution, its impacts and suggest control measures ▪ Assisting FAE in preparation of land use maps	

3	Mr. Santhoshkumar	GEO; SC	▪ Site Visit with FAE ▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan ▪ Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
4	Mr. Umamahesvaran	GEO	▪ Site Visit with FAE ▪ Provide inputs on Geological Aspects ▪ Assist in Resources & Reserve Calculation and preparation of Production Plan & Conceptual Plan	
5	Mr. A. Allimuthu	SE	▪ Site Visit with FAE ▪ Assist FAE with collection of data's ▪ Provide inputs by analysing primary and secondary data	
6	Mr. S. Ilavarasan	LU; SC	▪ Site Visit with FAE ▪ Assisting FAE in preparation of land use maps ▪ Provide inputs & Assisting FAE with soil conservation methods and identifying impacts	
7	Mr. E. Vadivel	HG	▪ Site Visit with FAE ▪ Assist FAE & provide inputs on aquifer characteristics, ground water level/table ▪ Assist with methods of ground water recharge and conduct pump test, flow rate	
8	Mr. D. Dinesh	NV	▪ Site Visit with FAE ▪ Assist FAE and provide inputs on impacts due to proposed mine activity and suggest mitigation measures ▪ Assist FAE with prediction modelling	
9	Mr. Panneer Selvam	EB	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	
10	Mrs. Nathiya	EB	▪ Site Visit with FAE ▪ Assist FAE with collection of baseline data ▪ Provide inputs and assist with labelling of Flora and Fauna	

DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT ORGANIZATION

I, Dr. M. Ifthikhar Ahmed, Managing Partner, Geo Exploration and Mining Solutions, hereby, confirm that the above-mentioned Functional Area Experts and Team Members prepared the EIA/EMP for Thorapalli Agraharam Rough Stone Cluster Quarries over an Extent of 26.97.5ha in Thorapalli Agraharam Village, Hosur Taluk, Krishnagiri District, Tamil Nadu State, It is also certified that information furnished in the EIA study are true and correct to the best of our knowledge.

Signature& Date:

Name:	**Dr. M. Ifthikhar Ahmed**
Designation:	**Managing Partner**
Name of the EIA Consultant Organization:	**M/s. Geo Exploration and Mining Solutions**
NABET Certificate No & Issue Date:	**NABET/EIA/2225/RA 0276 Dated: 20-02-2023**
Validity:	**Valid till 06.8.2025**

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