

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For
ARANARAI NORTH ROUGH STONE QUARRY
OVER AN EXTENT OF 9.00.0 Ha.
(Schedule 1(a) Mining of Minerals 'B1' Category)

Located at

Survey No : **120/2A1A Part**
Village : **Aranarai North**
Taluk : **Perambalur**
District : **Perambalur**
State : **Tamil Nadu**

By



M/s. Tamil Nadu Minerals Limited
No. 31, Kamarajar Salai,Chepauk,Chennai-600005.

ToR Id No. TO26B0108TN5513073N dated: 11/05/2026

Baseline period: Feb to April 2026

Baseline Carried out by: M/s. Mats India Pvt Ltd

Purpose of report: Submission for SEAC

Document No.EHSL/EIA/1(a)/038/May/2026

EIAConsultant

M/s. EHS360 Labs Private Limited

Ashok Nagar, Chennai

NABETCertificate No. NABET/EIA/25-28/RA 0418 validity July 16 2028

June 2026

PREFACE

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For

“ARANARAI NORTH ROUGH STONE QUARRY OVER AN EXTENT OF 9.00.0 Ha.”

Government Poramboke Land

Located in SF No. 120/2A1A Part Aranarai North Village, Perambalur Taluk,
Perambalur District, Tamil Nadu, India.

For and on behalf of M/s. EHS360 Labs Pvt. Ltd.,

Approved by: Santhosh kumar. A

Signature: A. S. 7

Designation: CEO

Date: 03.06.2026

Document Control			
Name of the Document	DraftEnvironmental Impact Assessment report for M/s. Tamil Nadu Minerals Limited, ARANARAI NORTH ROUGH STONE QUARRY over an extent of 9.00 Ha Located at SF No. 120/2A1A Part, Aranarai North Village, Perambalur Taluk, Perambalur District, Tamil Nadu, India.		
Document No.	EHSL/EIA/1(a)/038 /May/2026	Issue No:	R0
		Date:	03.06.2026

DISCLAIMER & DECLARATION:

This report has been prepared by M/s. EHS360 Labs Pvt. Ltd. for obtaining Environmental Clearance as per ToR along with public hearing issued by SEIAA-TN. Information provided in this report (unless attributed to references) shall not be copied or used without the written consent of M/s. EHS360 Labs Pvt. Ltd. Compliance The Environmental Impact Assessment & Environmental Management Plan have been prepared with compliance of Terms of Reference alongwith public hearing as per the Generic Structure and Process described in Annexure-III of EIA Notification 2006 and MoEFCC Office Memorandum J-11013/41/2006-IA. II (I) Dated.04.08.2009.

Revision History:

Revision No.	Date of Revision	Revision Information	Prepared By	Reviewed By	Approval BY	Dispersal Record
R0	03.06.2026	Draft EIA Report preparation as per obtained Terms of Reference, confirmation of the project details and proposed mitigation measures	Tatiparthi Rajani	Gaddam Raja Reddy	Santhoshkumar. A	1st Draft report submitted to client

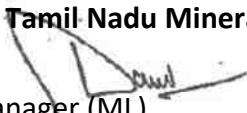
DECLARATION BY THE PROPONENT

(Compliance to MoEF&CC Office Memorandum J-11013/41/2006-IA. II (I) Dated.04.08.2009)

I, Dr.E.Ganesan, Manager (Mining Lease)of M/s. Tamil Nadu Minerals Limited gives this declaration/ undertaking to the effect that the EIA report preparation has been undertaken in the compliance with Terms of Reference with public hearing (ToR for the Proposed ARANARAI NORTH ROUGH STONE QUARRY quarry over an extent of 9.00 Ha Located at SF No. 120/2A1A Part Aranarai North Village, Perambalur Taluk, Perambalur District, Tamil Nadu and the information and content provided in the report are factually correct.

The Environmental Impact Assessment & Environmental Management Plan have been prepared as per the Generic Structure and Process described in Annexure-3 of EIA Notification 2006.

For Tamil Nadu Minerals Ltd,


Manager (ML)
Authorized Signatory

DECLARATION OF EXPERTS CONTRIBUTING TO THE EIA:

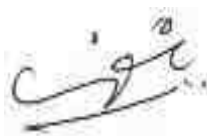
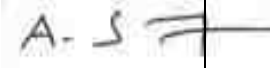
Declaration by Experts Contributing to Draft Environmental Impact Assessment for the “M/s. Tamil Nadu Minerals Limited, Rough Stone quarry over an extent of 9.00 Ha Located at SF No. 120/2A1A Part Aranarai North Village, Perambalur Taluk, Perambalur District, Tamil Nadu”.

I hereby certify that I was a part of the EIA report in the following capacity that developed the above said EIA.

EIA Coordinator	Team Member
 Name: Tatiparthi Rajani Date: 03.06.2026 Period of Involvement: August 2025 to till date.	 Name: Mr. Santhosh kumar A Date: 03.06.2026 Period of Involvement: August 2025 to till date.

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Functional Area Experts (FAEs):

S. No.	FAs	Name of the Expert/s	Involvement (Period & Task)	Signature
1.	AP	Tatiparthi Rajani (TM)	Period: Aug 2025 to till now Task: Site visit and Kick of meeting with client. Assisting with FAE during Selection of monitoring locations, Identification of most suitable control device for reducing process emission at source and contribution to EIA documentation	
2.	AQ	Ms. Tushali Jagwani	Period: Aug 2025 to till now Task: Developing meteorological data with collected secondary data, identification of impacts, Draftization of mitigation measures and contribution to EIA documentation	
		Mr. Santhosh kumar A	Period: Aug 2025 to till now Task: Assistance to FAE during Developing meteorological data with collected secondary data, Preparation of Emission Inventory, AERMOD Modelling for Proposed activities identification of impacts and contribution to EIA documentation	
3.	WP	Mrs. Tatiparthi Rajani	Period: Aug 2025 to till now Task: Identification of sampling locations for surface water, Coordination with Lab team during the collection of Sampling and preservation & Ground water samples, Verification of analysis results and Ionic balance/correlation of parameters. Incorporation of results in the EIA report. Identification of Impacts pollution evaluation of water control management, Draftization of mitigation measures and contribution to EIA documentation	
		Tatiparthi Pranay Kumar (TM)	Period: Aug 2025 to till now Task: Assistance to FAE during auditing water use, Identification of Impacts pollution evaluation of water control	

			management and contribution to EIA documentation.	
4.	SHW (SW& HW)	Mrs. Tatiparthi Rajani	Period: Aug 2025 to till now Task: Identification of waste generation and suggestion disposal methods, proposed adequate Mitigation measure for management of hazardous waste and contribution to EIA documentation	
		Mr. Santhosh kumar A	Period: Aug 2025 to till now Task: Assistance to FAE during Studying adequacy of Mitigation measure for management of haardous waste and contribution to EIA documentation	
5.	SE			
		Srimathi Velu (FAA)	Period: Aug 2025 to till now Task: Collection ofsecondary and primary data from thesurrounding area/villages of the proposed project for Impact identification and contributing to the EIAdocumentation	
6.	EB	Mr. G. Raja Reddy	Period: Aug 2025 to till now Task: Site visit and conduct of ecological survey, assessment ofthe impacts of proposed project activities on the biological environment and contribution to EIAdocumentation	
		Mrs. Tatiparthi Rajani	Period: Aug 2025 to till now Task: Assisting FAE during Site visit, conduct of ecological survey, and contribution to EIAdocumentation	
7.	HG	Mr. Mallikarjuna Rao	Period: Feb 2025to till now Task: Understanding and representing groundwater conditions, Supervision of groundwater sampling locations, Draftization ofsurvey findings, identification of impacts, suggestion of mitigationmeasures and contribution to the EIA documentation.	
8.	GEO	Mr. Mallikarjuna Rao	Period: Aug 2025 to till now Task: Geological features & formations, topography & Lithology of the 10 km radius area and lease area	

9.	NV	Mr. Vivek Prabhakar Navare	Period: Aug 2025 to till now Task: Site visit and checking of noise sampling results and predict the vibrations due Blasting and identification of Impacts on surrounding structures and analysis of data identification of impacts and proposed mitigation measures, and contribution to EIA documentation	V. P. Novan
10.	RH	Mr. Santhosh kumar A	Period: Aug 2025 to till now Task: Identification of hazards and hazardous substance,preparation of impacts & mitigation measures for proposed project	A. S. 7
		Monishadevi B (FAA)	Period: Aug 2025 to till now Task: Assesting FAE duringIdentification of hazards and hazardous substance,preparation of impacts & mitigation measures, and contribution to EIA documentation	B. Monishadevi
11.	SC	R. Rajendran	Period: Aug 2025 to till now Task: Understanding and representingsoil conditions, supervision of soilsampling locations, Draftization ofsurvey findings, identification of impacts, suggestion of mitigationmeasures and contribution to the ELA documentation	R. Rajendran

- LU** - Land Use
- AP** - Air Pollution monitoring, prevention, and control
- AQ** - Meteorology, air quality modeling and prediction
- WP** - Water pollution monitoring, prevention, and control
- EB** - Ecology and biodiversity
- NV** - Noise& Vibration
- SE** - Socioeconomics
- HG** - Hydrology, ground water and water conservation
- GEO** - Geology
- RH** - Risk assessment and hazards management
- SHW** - Solid and hazardous waste management
- SC** - Soil Conservation

**DECLARATION BY THE HEAD OF THE ACCREDITED CONSULTANT
ORGANIZATION/AUTHORIZED PERSON**

I, Mr. Santhoshkumar.A hereby, confirm that the above-mentioned experts prepared the Draft EIA/EMP report for "M/s. Tamil Nadu Minerals Limited, ARANARAI NORTH ROUGH STONE QUARRY over an extent of 9.00 Ha Located at SF No. 120/2A1A Part Aranarai North Village, Perambalur Taluk, Perambalur District, Tamil Nadu".

I hereby certify that I was a part of the EIA in the following capacity that developed the above EIA. I also confirm that the consultant organization shall be fully accountable for any misleading information mentioned in the statement.

Signature

: A. S. 7

Date

: 03.06.2026

Name

: Mr. Santhosh Kumar. A

Designation

: Chief Executive Officer

Name of the EIA Consultant Organization

: M/s. EHS360 Labs (P) Ltd, Chennai

NABET Certificate No & validity

: NABET/EIA/25-28/RA 0418 valid up to- July
16rd, 2028



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LIST OF ANNEXURES

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1	Terms of Reference
2	FMB Sketch
3	A-Register
4	TAMIN Board of Director
5	Village Map 300M Radius
6	Precise Area Communication Letter
7	Mining Plan Approval Letter
8	District Survey Report
9	Approved Mining Plan
10	Sectional Plates
11	AD Mines Letter
12	Topo map of the study area

Note: Annexure are provided as a separate book

LIST OF ABBREVIATIONS

AAQ	Ambient Air Quality
AAQM	Ambient Air Quality Monitoring
AGL	Above Ground Level
AMSL	Above Mean Sea Level
BGL	Below Ground Level
CPCB	Central Pollution Control Board
CER	Corporate Environmental Responsibility
CSR	Corporate Social Responsibility
DMP	Disaster Management Plan
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Plan
GLC	Ground Level Concentration
GO	Government Order
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
O. B	Over Burden
S. B	Side Burden
kWh	Kilowatt Hour
MSDS	Material Safety Data Sheet
MMR	Metalliferous Mines Regulations
MoEF&CC	Ministry of Environment, Forest, and Climate Change
NAAQS	National Ambient Air Quality Standard
NABET	National Accreditation Board for Education and Training
QCI	Quality Council of India
R & D	Research & Development
RA	Risk Assessment
ROM	Run of Mine
SOM	Scheme of Mining
SEIAA	State Environmental Impact Assessment Authority
SEAC	State Expert Appraisal Committee
TDS	Total Dissolved Solids
TOR	Terms of Reference

Executive Summary

1. Introduction

The project site is located at survey No: 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District. The quarry lease area for mining Rough Stone is 9.00.0 Ha which is categorized as Government Poramboke land. The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per EIA Notification 2006 and its amendments thereafter.

The project area does not fall in CRZ zone. There are no Western Ghats within the radius of 15Km from project area. There are no notified bird sanctuaries or wildlife sanctuaries as per Wildlife protection Act 1972, within a radius of 15Km. The project area does not fall in 'HACA' region.

Government of Tamil Nadu granted precise area communication letter to TAMIN for quarrying Rough Stone over an extent of 9.00.0 Ha of Government poramboke land in (SF No). 120/2A1A situated in Aranarai Village, Perambalur Taluk of Perambalur District for a period of 20 years under Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959 vide Government letter Rc.No.202/G&M/2025 Assistance Director, Geology and Mining Department, dated.29.10.2025.

As directed in the precise area communication letter TAMIN has prepared the Mining Plan for quarrying Aranarai North Rough Stone over an extent of 9.00.0Ha. at SF.No. 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District.

Subsequently, the Mining Plan has been approved by the Assistant of the Geology and Mining Vide Letter Rc No. 202/G&M/2025, Dated,06.03.2026.

The Geological reserves Rough Stone have been computed based on the Geological Plan & Sections up to the economically workable average depth of 48.47m from the top of the hill which works out to 42,30,446.76 M³.

The Total Mineable reserve is about 62,75,058.873 M³ Rough Stone formation, for a period of 14 years up to a depth of 48.47 m for AGL (Above ground level).

Mineable Reserves have been computed as 62,75,058.873 M³ based on the Conceptual Plan and sections. Production is estimated at 2,292,123.57 tonnes of rough stone in the first five-year period, 2,292,129.566 tonnes in the second five-year period, and 1,690,801.752 tonnes in the remaining four-year period. An open-cast semi-mechanized method will be followed for the proposed mining, as per the mining plan. Sectional plates are enclosed as Annexure-4.

TAMIN applied for ToR via Online Proposal No. SIA/TN/MIN/574254/2026, Dated: **11/05/2026** and remitted ₹3.5 lakh as processing fee per SEIAA-TN Guidelines. The proposal was appraised in the 707nd SEAC Meeting held on 20.04.2026 (SEIAA No. 13604, Unit: IV),

and ToR was issued with Public Hearing requirement under Identification No. TO26B0108TN5513073N, dated 11.05.2026, for preparation of the EIA/EMP Report.

The EIA report has been prepared in accordance with the issued ToR (Identification No. TO26B0108TN5513073N, dated 11.05.2026. Baseline environmental studies were conducted during the period from Feb 2026 to April 2026. The draft EIA report will be circulated for public review in coordination with the Tamil Nadu Pollution Control Board (TNPCB).

2. Project Description

Project Salient Features

S. No	Particulars	Details		
1	Latitude	11°15'57.70"N to 11°15'52.05"N		
2	Longitude	78°50'12.63"E to 78°50'14.32"E		
3	The lease area height	48.47 from top of the hill.		
4	Topo sheet no.	58I/15,16,11,12		
5	Topography	Hilly terrain.		
6	Land Type	Government Poramboke land.		
7	Extent of lease area	9.00Ha.		
8	Nearest National highway	NH45 Chennai Trichy Hwy,6.68,SE		
9	Nearest State highway	SH 142 Thuraiyur Perambalur Rd,3.13,S		
10	Nearest railway station	Ariyalur Railway Station,27.81,ESE		
11	Nearest airport	Tiruchirappalli International Airport,55.93,S		
12	Nearest town / city	Town: Perambalur,4.91SE City/ District HQ: Perambalur,4.91SE		
13	Hills / valleys	Nill in 15 Km radius.		
14	Archaeologically important places	Ranjankudi Fort 13.77, NE.		
15	National parks / Wildlife Sanctuaries	Nill in 15 Km radius.		
16	Seismicity	Seismic zone-II (LOW risk).		
17	Defense Installations	Nill in 15 Km radius.		
18	State Boundary	Nill in 15 Km radius.		
19	Water Bodies	Description	Dist. (~Km)	Dir.
		Sweta Nadi	13.64	NNE
		Kallar R	14.06	NNW
		Canal	14.22	NW
		Konmathura Pond	13.87	NNW
		Vengalam lake	12.01	NNW
		Siruvayalur pond	9.4	NNE
		anukkur Pond	7.47	N
		Palaiyur pond	8.77	N
		Mettupalayam Pond	11.41	NE

S. No	Particulars	Details		
		Tambai Pond	11.66	ENE
		Koneri Ar	0.51	ESE
		Kil Puliur pond	12.48	ENE
		Sirukudai Pond	9.41	ENE
		Elumur Lake	14.49	E
		Elumur Ar	11.58	ESE
		Marudaiyar R	7.77	SSE
		Toramangalam Pond	5.65	SE
		Kavulpalayam	7.18	SE
		Sengunam Pond	7.29	E
		VRS Puram Pond	7.63	NE
		MGR Nager Pond	4.97	ENE
		ayilur Pond	10.08	SSE
		Varaguppadi Pond	11.96	SSE
		Karai Market Pond	14.12	SSE
		Pudukkuruchi Pond	14.09	S
		Marudati Pond	10.73	S
		alattur Pond	14.75	S
		Pudunaduvalur Pond	8.13	S
		Punnampatti Pond	13.18	SW
		Velur Pond	11.64	SW
		Nattarmangalam Eri	14.18	SSW
		Kalarampatti Big Lake	14.22	WSW
		Ladapuram Lake	8.53	WSW
		Ladapuram West Lake	11.92	W
		Canal	11.43	W
		Canal	11.43	WSW
		KOneri ar	5.92	WSW
		Annamagalam Lake	6.93	NW
		Kurumbaur Lake	4.11	WSW
		Senjeri Lake	3.31	SW
		Alambadi Lake	0.85	W
		Esanai Lake	3.65	NNW
		Somandapudur Eri	1.96	N
		Koneripalaiyam Eri	2.82	ESE
		Elambalur Lake	4.02	E
		Vella Thangiyamman Lake	4.22	SSE
		Aranarai Eri	3.75	SSE
		Senjeri lake	3.12	SSE
		Check Dam	1.07	S

S. No	Particulars	Details			
20	Reserve Forests/ Protected Forests	Description	Dist. (~Km)	Dir.	
		Puliyur Extension RF	2.19	WNW	
		Pachaimalai Hills	5.04	WNW	
		Puliyur Extension RF2	5.43	NNW	
		Manalodai RF	9.64	W	
		Palamalai RF	12.77	WSW	
		Nakkaselam RF	12.87	SW	
		Kurumbalur RF	4.64	SSW	
		Chattramani RF	9.94	SW	
		Siruvachur RF	7.77	S	
		Velur RF	11.34	S	
		Naranamangalam RF	10.84	S	
		Chittali RF	10.81	ESE	
		Kunnam RF	14.65	ESE	
		Sirukudal RF	10.48	ENE	
		Mangalam RF	13.57	ENE	
		Peraiyur RF	13.96	NE	
		Venbavur RF	10.32	N	
		Mavaligal RF	13.48	N	
21	Monuments	Ranjankudi Fort, 13.77, NE			
22	Nearest Villages	S. No	Name	Distance (~km)	Population Census 2011
		1	Aranarai	0.74	2752
		2	Chokkanathapuram	1.76	9005
		3	Perambalur	1.44	24659

Project Summary

S. No	Particulars	Details
1.	Project Location	SF.No.120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State.
2.	Land classification	Government Poramboke land
3.	Extent of lease area (Ha.)	9.00
5.	Lease Period	20 years
6.	Estimated Geological Reserves (ROM) M ³	42,30,466.76
7.	Estimated Mineable Reserves (ROM) M ³	62,75,058.873
8.	Rough Stone production per annum M ³	4,58,428 Tonnes
9.	Depth of Mining	48.47 m above ground level (from Top of the hill)
10.	Method of Mining	Open cast semi mechanized method
11.	Water Requirement (KLD)	3.5
12.	Source of Water	Authorized vendors and local panchayat

13.	Power requirement (kVA)	60
14.	Power Backup (DG set) kVA	1* 125
15.	Fuel requirements (Lts/Day)	200
16.	Manpower (Nos)	35
17.	Municipal Solid Waste Generation (kg/day)	15.75
18.	Waste Oil generation (Lts/Year)	3.0
19.	Project Cost in Lakhs	99.97 (1 Cr)

3. Description of Environment

Project Influence Area (PIA)/Study Area: An area covering 10 km radius from Aranarai North Rough Stone quarry boundary has been earmarked as study area for baseline studies.

Study Period: The baseline environmental surveys were carried out during (Feb 2026 – April 2026) within the study area.

- ▶ The site has a hilly terrain with level 85.0 m (Maximum) above MSL.
- ▶ The project site falls under Zone-III (Moderate risk) as per IS 1893(Part-I).
- ▶ The predominant wind direction is W during study period.
- ▶ Max Temperature:37°C, Min Temperature: 21 °C & Avg Temperature:29.7°C
- ▶ Average Relative Humidity:49.42 %
- ▶ Average Wind Speed:2.47 m/s.

A. Ambient Air Quality:

Ambient air quality was monitored twice a week for One (01) season (it covers 12 weeks), i.e., 3 months (**Feb 2026 – April 2026**). PM₁₀, PM_{2.5}, SO₂, NO_x, Pb, NH₃, C₆H₆, C₂₀H₁₂, As & Ni were monitored. The ambient air quality monitoring data was compared with the National Ambient Air Quality Standards (NAAQS), as prescribed by the Ministry of Environment, Forest & Climate Change (MoEFCC), Government of India, in its 16.11.2009 notification.

- Particulate Matter (PM₁₀): 39.7 – 57.2 µg/m³ (within the NAAQS limit of 100 µg/m³ for 24-hour average).
- Fine Particulate Matter (PM_{2.5}): 21.7 – 27.8 µg/m³ (within the NAAQS limit of 60 µg/m³ for 24-hour average).
- Sulfur Dioxide (SO₂): 7.3 – 11.3 µg/m³ (well below the NAAQS limit of 80 µg/m³).
- Nitrogen Dioxide (NO₂): 17.2 – 25.1 µg/m³ (well below the NAAQS limit of 80 µg/m³).
- The air quality parameters monitored at different locations during the study period were within the permissible limits set by NAAQS.
- The concentration of pollutants in the study area does not exceed the regulatory thresholds, indicating that the air quality is acceptable.
- The findings suggest that the overall ambient air quality in the monitored locations is average, meaning it does not pose significant health risks based on the measured parameters.
- Since PM₁₀ and PM_{2.5} levels remain within the limits, the air pollution from dust and fine particulate emissions is controlled within regulatory standards.
- The low levels of SO₂ and NO₂ indicate minimal emissions from industrial activities, vehicular pollution, or combustion sources in the study area.

B. Noise Environment

Ambient noise levels have been established by monitoring noise levels at Eight (08) locations in and around 10Km distance from project area during the study period using precision noise level meter.

The noise level monitoring results were compared against the Central Pollution Control Board (CPCB) standards, which define permissible noise levels for different environmental settings (Residential, Industrial, etc.). The Noise levels recorded during the daytime (6:00 a.m to 10:00 p.m) and night-time (10:00 p.m to 6:00 a.m) at all stations are within the CPCB limits. The major source of noise in the study area is transportation and vehicular movement.

Residential Areas (N1, N2, N3, N5, N6, N7, N8):

- The daytime noise levels (48.5 – 54.0 dB(A)) are within CPCB limits (55 dB(A)).
- The nighttime noise levels (39.6 – 44.2 dB(A)) are within CPCB limits (45 dB(A)).
- No significant noise pollution: levels remain under permissible limits.

Near Project Site (N4 - Industrial Area):

- Daytime noise level: 51.5 dB(A) (within the CPCB limit of 75 dB(A)).
- Nighttime noise level: 42.8 dB(A) (well below the CPCB limit of 70 dB(A)).
- Noise levels at the project site are considerably lower than the industrial limit, indicating minimal industrial noise impact.

C. Surface Water Quality Monitoring Results:

To establish the baseline status of water environment, the representative 08 sampling locations for surface water within a radial distance of 10 Km from project site have been selected.

The surface water samples were analyzed and compared with IS 2296:1992 standards and CPCB Water Quality Criteria for designated best use. Based on the test results, the water quality of the studied locations falls under Class E, which means it is suitable for irrigation, industrial cooling, and controlled waste disposal, but not for drinking or direct human consumption.

Parameter	Observed Range	IS 2296:1992 Limits (Class A)	Interpretation
pH	7.12 – 7.85	6.5 – 8.5	Within Limits – Indicates neutral to slightly alkaline water.
Electrical Conductivity (EC)	625 – 1100 μ S/cm	No specific limit	Higher EC values suggest moderate dissolved solids, which may indicate mineral content.
Chloride (Cl^-)	113 – 220 mg/l	250 mg/l	Within Limits – No immediate concern.
Sulphate (SO_4^{2-})	28.2 – 55.0 mg/l	400 mg/l	Within Limits – Indicates low sulfate pollution.
Total Hardness	108.8 – 240.7 mg/l	300 mg/l	Within Limits – Water is moderately hard, but still usable for industrial and irrigation purposes.
Chemical Oxygen Demand (COD)	24.6 – 40.5 mg/l	No specific limit	Elevated COD levels indicate presence of organic matter and potential pollution.
Biochemical Oxygen Demand (BOD)	1.1 – 4.5 mg/l	2 mg/l (Class A)	Some locations exceed limits, suggesting organic contamination, possibly from agricultural or industrial runoff.

- pH, Chloride, Sulfate and hardness levels are within acceptable limits, meaning the water does not have immediate chemical hazards.
- Higher EC values suggest moderate dissolved solids, indicating mineral presence but not necessarily harmful.
- COD and BOD levels are slightly elevated, suggesting some degree of organic pollution, likely due to agricultural runoff or nearby human activities.
- Since the water is classified as Class E, it is not fit for direct human consumption but can be used for industrial and irrigation purposes.

D. Ground Water Quality Monitoring Results:

Total **Eight (08)** ground water monitoring locations were identified for assessment in different villages around the project site. The groundwater results are compared with the acceptable and permissible water quality standards as per IS: 10500 (2012) for drinking water. Based on the test results, the groundwater quality in the studied locations meets the permissible limits, making it safe for drinking purposes.

Parameter	Observed Range	IS 10500:2012 Limits	Interpretation
pH	7.18 – 7.68	6.5 – 8.5	Within Limits – Indicates neutral to slightly alkaline water.
Total Dissolved Solids (TDS)	439 – 728 mg/l	500 mg/l (Acceptable), 2000 mg/l (Permissible)	Within Limits – Slightly high but safe for consumption.
Chloride (Cl ⁻)	123 – 208 mg/l	250 mg/l (Acceptable), 1000 mg/l (Permissible)	Well Within Limits – No immediate concerns.
Sulphate (SO ₄ ²⁻)	30.7 – 52.1 mg/l	200 mg/l (Acceptable), 400 mg/l (Permissible)	Within Limits – No indication of sulfate-related contamination.

- pH levels are within the permissible range, indicating good water quality.
- TDS levels are slightly elevated but within the permissible limits, suggesting moderate mineral content, which is not harmful.
- Chloride and sulfate concentrations are within acceptable limits, confirming no significant contamination from industrial or agricultural sources.
- The groundwater is suitable for drinking, as per IS 10500:2012 standards.

These interpretations relate to the sample tested for location only. To prevent ground water contamination and improving the quality and Quantity, rainwater harvesting, and groundwater recharging may be helpful.

E. Soil Quality:

Eight locations in and around the proposed project were selected for soil sampling. At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface. Soil analysis was carried out as per IS: 2720 methods.

- The soil quality analysis was conducted at eight locations and compared with ICAR (Indian Council of Agricultural Research) standards to determine the fertility and suitability of the soil for agriculture and environmental health.

Parameter	Observed Range	ICAR Standard Classification	Interpretation
pH	6.99 – 7.77	Neutral to Slightly Alkaline	Soils are suitable for agriculture but may require adjustments for specific crops.
Electrical Conductivity (EC)	138 – 385 μ hos/cm	Average	Indicates low to moderate salinity, suitable for crop growth.
Nitrogen (N)	71 – 141 kg/ha	Less to Good	Some locations have low nitrogen content, requiring fertilization for improved fertility.
Phosphorus (P)	15 – 25 kg/ha	Less to Very Less	Low phosphorus levels indicate a need for phosphorus fertilizers to support plant growth.
Potassium (K)	58 – 91 kg/ha	Very Less	Deficient potassium levels, requiring soil amendments for optimal agricultural productivity.
Organic Carbon (%)	0.188 – 0.342	Low to Moderate	Indicates low organic matter, suggesting the need for organic fertilizers or compost.

- Soil pH is suitable for agriculture, though slightly alkaline in some areas.
- Low nitrogen, phosphorus, and potassium levels indicate poor fertility, requiring soil enrichment through fertilization.
- Organic matter content is low, indicating the need for composting or organic farming practices.
- Moderate conductivity suggests that soil is not saline and can support plant growth.

F. Bioological Environment:

This is a comprehensive biodiversity assessment covered flora, fauna, avifauna, mammals, reptiles, amphibians, butterflies, and fish diversity in the study area.

1. Flora Diversity

- Study Area: 136 plant species (87% native, 13% invasive).
 24 species (1 invasive - *Opuntia delleni*).
 - Dominance of native species indicates a healthy ecosystem.
 - Invasive plants (e.g., *Callistemon speciosus*, *Cordia dichotoma*) may threaten native biodiversity.
 - Presence of medicinal plants (*Neem*, *Tulsi*, *Amla*) shows economic and ecological value.
 - IUCN Status: All species are *Least Concern (LC)*.

2. Avifauna (Birds) Diversity

- 59 species recorded in the study area.
 - Birds represent diverse feeding groups (insectivores, frugivores, raptors).
 - Presence of water birds suggests good wetland health.
 - Conservation Concerns:
 - *Green Imperial Pigeon* is *Near Threatened (NT)* (IUCN).
 - *Indian Peafowl* is under Schedule I of WPA, 1972 (high protection).

3. Mammalian Fauna

- 7 mammal species recorded in the study area.
 - Includes carnivores (Jackal, Jungle Cat), rodents, primates (Bonnet Macaque), and bats.
 - No immediate conservation threats (*IUCN: LC*), but human-wildlife interactions should be monitored.
 - Ecological Role:
 - Carnivores control pest populations.
 - Bats aid pollination and seed dispersal.

4. Mammals

- 21 species recorded with a mix of large mammals, herbivores, and carnivores.
- Conservation Concerns:
 - Endangered (EN): Asian Elephant, Lion-tailed Macaque, Dhole, Tree Shrew.
 - Vulnerable (VU): Leopard, Sloth Bear, Indian Bison, Nilgiri Langur, Sambar Deer.
 - Schedule I (WPA, 1972): 14 species, requiring strict legal protection.

5. Reptile & Amphibian Diversity

- 6 reptiles and 4 amphibians recorded.
 - Mostly common species (*IUCN: LC*).
 - Indian Cobra (*Naja naja*) is under Schedule II (WPA, 1972) – protected species.

6. Butterfly Diversity

- 35 species recorded, dominated by Nymphalidae family (14 species).
 - Indicates a healthy plant-pollinator network.
 - Presence of diverse butterfly families suggests good floral diversity.

7. Fish Diversity

- 19 species recorded, mostly from Cyprinidae family (9 species).
 - Presence of native fish species suggests a stable aquatic ecosystem.
 - Critically Endangered (CR) species: *Hypselobarbuspulchellus* (Jerdon's Carp) – requires urgent conservation.

Socio Economic Profile:

1. Literacy Rate:

- The overall literacy rate in the study region is 58.88%, with slight variations between the 0-5 km zone (58.73%) and the 5-10 km zone (60.56%).
- The literacy rate is moderate, indicating the need for further educational initiatives.

2. Employment and Workforce:

- Non-workers constitute more than 30% of the population in both impact zones (46.45% in 0-5 km, 45.84% in 5-10 km).
- Main workers account for 39.78% of the total population, while marginal workers make up 13.82%, highlighting seasonal or temporary employment patterns.
- The high non-working population (46.39%) suggests a need for employment-generating industries to improve economic conditions.

3. Gender Distribution:

- The male-to-female ratio is relatively balanced, with males (50.25%) and females (49.75%) in the total study area.

4. Social Composition:

- The Scheduled Caste (SC) population accounts for 24.13%, while the Scheduled Tribe (ST) population is 8.40%.
- The presence of SC/ST communities indicates the need for inclusive developmental programs to enhance social and economic opportunities.

4. Anticipated Environmental Impacts and Mitigation Measures

A. Land Environment:

The proposed site is located at S.F. No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District. The lease area for mining of Roughstone is 9.00 Ha. The quarry land is classified as Government Poramboke land. The quarry lease was applied; quarry lease a period of 20 years under Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959 vide Assistance Director, Geology and Mining Department, Perambalur Letter Rc.No.202/G&M/2025, dated. 29.10.2025.

Impact and Mitigation Measures on Land Environment:

S. No.	Project Activity/Aspect	Potential Environmental Impact on LU/LC	Summary of Impact	Mitigation Measures
1	Land Acquisition	Negative (-ve)	Change in existing land use from unused/hill terrain to mining zone.	Utilize barren or non-agricultural land.
2	Site Clearing/Vegetation Removal	Negative (-ve)	Conversion of vegetated/hill slope land to bare area; localized loss of vegetation.	Minimize vegetation clearance; implement greenbelt development using native species around the lease boundary and infrastructure.
3	Excavation	Negative (-ve)	Alteration of natural landform; formation of pits and benches in Roughstone terrain.	Phased excavation with designated ultimate pit limits. Use benches and systematic quarry design to stabilize slopes.
4	Land Reclamation/Post-Mining Land Use	Negative (-ve)	Quarry pit remains as a permanent topographical change; some areas become water reservoirs.	Post-mining land use planning to include fencing of pit area and conversion to water storage. No backfilling is required due to hard rock nature.
5	Overburden Dumping	Negative (-ve)	Erosion risk, land degradation, and potential dump instability.	OB dumps will be properly leveled and stabilized with a max height <10 m, 26° slope, toe wall, and garland drains. Native grass and shrub plantation on slopes.
6	Surface Infrastructure Development	Neutral to Slight Negative	Minor changes to LU/LC due to site office, roads, and loading zones.	Use minimal land area for infrastructure. Include landscaping and vegetative cover around buildings and along haul roads.

7	Soil Stripping & Topsoil Stockpiling	Neutral	Temporary change in land cover; risk of erosion or compaction of topsoil.	Topsoil will be stored with bunds and reused for greenbelt and reclamation. Avoid long-term exposure of stockpiles.
8	Water Flow Alteration During Monsoon	Negative (-ve)	Risk of erosion, siltation, and localized flooding from stormwater runoff.	Construct garland drains, silt traps, and proper stormwater management structures around quarry and OB dumps. Maintain existing drainage pattern.
9	Abandonment and Site Safety Post-Closure	Negative (-ve)	Safety risk due to open pits; visual impact if not managed.	Quarry pits will be fenced after lease period. Signage and access restrictions to prevent accidental entry. Pits may serve as water storage or recharge structures.
10	Greenbelt Development (Progressive)	Positive (+ve)	Improvement in visual aesthetics, dust control, and ecological value over time.	Year-wise plantation of native trees and shrubs along the lease boundary, haul roads, OB dumps, and around infrastructure. Maintenance and monitoring for survival rate to be ensured.

B. Air Environment:

During AERMODE Prediction studies it was observed that the maximum ground level concentration observed due to mining activities and traffic movement without control measures for PM₁₀, PM_{2.5} and NO_x are 18.0µg/m³, 9.7µg/m³ and 15µg/m³ respectively. The highest concentration levels identified at the project site only. So, it can be concluded that even during operation of quarry the impact envisaged is moderate.

Sources of Air Pollution, Impacts and Mitigation Measures

S. No.	Source of Emission	Primary Pollutants	Anticipated Impacts	Mitigation Measures
1	Excavation / Mining Activity	Particulate Matter (PM)	Dust emissions affecting air quality and visibility; potential respiratory health impacts to workers and nearby residents.	Water sprinkling at excavation sites; phased excavation; covering exposed surfaces; dust suppression using water tankers.

2	Drilling with compressors & jackhammers	PM, Noise, Minor Gaseous Emissions	Fine dust generation and local air quality degradation; occupational exposure for operators.	Use of dust aprons, wet drilling methods; regular maintenance of drilling equipment; PPE (masks, goggles) for workers.
3	Blasting Activities	PM, NOx, CO, SOx	Short-term high concentration of dust and gases; potential irritation, visibility reduction, and risk to nearby flora/fauna.	Use of controlled blasting techniques (e.g., NONEL detonators); proper stemming; use of adequate boosters/primers for complete detonation to minimize fumes.
4	Loading & Unloading of Roughstone Blocks	PM	Dust generation at handling points; risk of fugitive dust emissions near stockpiles and transfer points.	Minimize drop heights; regular water spraying at loading points; shielding of transfer points; paved loading zones.
5	Transportation of Mined Material	PM, NOx, CO	Dust raised from haul roads and emissions from diesel trucks; dispersion of pollutants along the route impacting roadside vegetation and habitations.	Water sprinkling on haul roads; regular maintenance of vehicles; use of covered trucks; limiting vehicle speed; scheduling movement to avoid peak human activity hours.
6	Operation of Diesel Machinery & Generators	NOx, CO, HC, PM	Emissions from fossil fuel combustion; minor contribution to ambient air pollution load.	Regular engine maintenance; use of low-sulfur diesel; shifting to fuel-efficient or electric equipment where feasible.

7	Wind Erosion from Topsoil/Overburden Dumps	PM	Airborne dust during dry and windy conditions; potential contribution to ambient particulate levels.	Compaction and covering of topsoil stockpiles; use of native grass cover; bund construction; periodic water spraying.
8	Lack of Vegetation Cover (Initial Phase)	--	Less absorption of pollutants; enhanced dispersion of dust and heat.	Greenbelt development over 0.18.2 ha using native species (2352 saplings); planting along approach roads, lease boundaries, and around infrastructure using topsoil for nourishment.

C. Water Environment:

There are no surface sources and ground water regime will not be altered during mining. The mine surface runoff along with the chemicals, lubricants and rough stone particle sediments may enter the canal which will affect the water quality.

Impact Identification and Mitigation Measures on Water Environment

S. No	Source of Water Pollution	Potential Impact	Mitigation Measures
1	Domestic Sewage from Mine	Untreated sewage from mining activities can contaminate nearby water bodies and soil, leading to waterborne diseases and environmental degradation.	Implement a proper sewage treatment system such as a septic tank or bio-toilets to manage domestic wastewater efficiently.
2	Surface Runoff Carrying Pollutants	Runoff from mining activities may contain chemicals, lubricants, and rough stone particle sediments, which can enter nearby canals and affect water quality.	Construct settling ponds to trap sediments, use oil-water separators for hydrocarbons, and implement proper drainage channels to prevent contamination of surface water.
3	Impact on Surface/Groundwater Quality	Seepage of mining-related pollutants into groundwater or surface water bodies may alter water quality and make it unfit for consumption.	Regular monitoring of water quality, adoption of controlled chemical usage, and ensuring proper storage of lubricants and fuels to prevent spills.

4	Changes to Hydraulic Regime	Excessive water extraction and quarrying activities may alter the natural flow of groundwater, affecting nearby wells and water resources.	Use stored rainwater from quarry pits for dust suppression and mining operations instead of relying on groundwater sources. Implement water recharge pits to maintain the water table.
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D. Noise & Vibration Management

The primary sources of noise pollution during mining operations include:

- Drilling
- Blasting
- Loading operations (which are intermittent)
- Vehicular movement (which occurs sporadically throughout working hours)

These activities contribute to increased background noise levels, particularly within the active mining zone. While noise levels tend to diminish over distance, they may still pose concerns for workers and nearby communities.

Impact and Mitigation Measures for Noise Pollution

S. No.	Source of Noise	Potential Impacts	Mitigation Measures
1	Drilling	High noise levels affecting Workers Noise-induced hearing loss Stress and fatigue	Use of sharp drill bits to reduce noise Provide earmuffs/earplugs to workers
2	Blasting	Sudden high-intensity noise Vibration affecting nearby areas Disturbance to local communities	Develop a green belt to reduce noise propagation Conduct controlled blasting
3	Excavation & Material Handling	Continuous noise from heavy Machinery. Increased ambient noise in the mining zone	Maintain equipment regularly to reduce noise Periodic monitoring as per CPCB
4	Transportation of Materials	Noise from vehicles Temporary and permanent hearing damage Disturbance to residents & wildlife	Restrict vehicle speed to 25 kmph Avoid unnecessary honking
5	Machinery Operation	Prolonged noise exposure causing worker fatigue and communication issues	Proper maintenance and lubrication of machinery Install silencers on equipment

6	Community Disturbance	Noise from mining affecting nearby schools, hospitals, and residential areas	Develop a green belt buffer zone Schedule high-noise activities during non-sensitive hours
7	Worker Health & Safety	Hearing impairment Increased accident risk due to communication difficulties	Provide PPE (earmuffs, earplugs) Rotate workers in high-noise areas

Impact and Mitigation Measures for Vibration:

S. No.	Aspect	Potential Impact	Mitigation Measures
1	Drilling	Ground vibrations due to drilling operations.	Use controlled drilling techniques to minimize vibrations. Maintain safe distances from sensitive structures.
2	Blasting	High-intensity ground vibration and air overpressure due to explosives.	Use appropriate stemming and delay systems. Avoid overcharging of blast holes. Maintain safe blasting zones around the quarry.
3	Loading & Unloading of Minerals	Short-term, localized vibrations.	Implement proper handling techniques. Use low impact loading equipment where feasible.
4	Transportation Vehicles	Continuous low-frequency vibrations affecting surrounding areas.	Maintain speed limits within the quarry. Ensure proper vehicle maintenance to minimize vibration levels.
5	Proximity to Infrastructure	Structural damage to facilities within the mine lease area.	Maintain safe distances from infrastructure. Use vibration-dampening measures like greenbelt development along sensitive areas.
6	Ground Subsidence	Risk of soil destabilization over time.	Conduct geotechnical surveys before excavation. Implement controlled blasting and excavation methods.
7	Human Health Effects	Fatigue, muscle strain, joint pain, sleep disturbances, and cardiovascular problems due to vibration.	Provide workers with proper PPE (earplugs, anti-vibration gloves). Implement job rotation schedules to reduce prolonged exposure.

E. Biological Environment

Summary of Existing Biological Environment

- Flora: 136 species (87% native). Includes ecologically important and medicinal plants. No endangered species, but 16 invasive species are present.
- Avifauna: 57 bird species, including Indian Peafowl (Schedule I, WPA) and Green Imperial Pigeon (Near Threatened, IUCN).
- Mammals: 7 species observed. All are of Least Concern (IUCN).
- Reptiles & Amphibians: 10 species recorded. Only Indian Cobra is protected (Schedule II, WPA).
- Butterflies: 35 species. Dominance of nectar-feeding Nymphalidae indicates floral richness.
- Fish: 19 species, mostly native. Jerdon's Carp (Critically Endangered & Endemic) needs urgent conservation.

Most of these species fall under the 'Least Concern' category in study areas other than biological data, but certain species require conservation measures based on ecological roles, conservation status, and local threats and the conservation plan is prepared based on the biological baseline data collected from the study area of the proposed project site. The objective is to ensure the safeguarding of ecologically significant and sensitive species observed in the project impact zone.

Identified Species for Conservation plan

S. No.	Species Name	Ecological Importance / Status	Conservation Measures
1	Ducula aenea (Green Imperial Pigeon)	Near Threatened (IUCN)	Protect fruiting trees, avoid habitat disturbance, conduct periodic monitoring.
2	Pavo cristatus (Indian Peafowl)	Schedule I (WPA), Ecologically significant bird	Ensure nesting and foraging ground protection, avoid hunting, raise awareness.
3	Hypselobarbus pulchellus (Jerdon's Carp)	Critically Endangered (IUCN), Endemic fish	Prevent water pollution, restrict overfishing, habitat restoration in streams.
4	Azadirachta indica (Neem)	Medicinal, native tree species	Promote plantation in buffer areas, protect existing trees.
5	Ocimum tenuiflorum (Tulsi)	Medicinal herb	Encourage cultivation in greenbelt areas and awareness programs.
6	Cynopterus sphinx (Fruit Bat)	Pollinator and seed disperser	Preserve fruit trees, reduce night-time disturbances.

A dedicated team should periodically monitor the status of the identified species and habitats. Adaptive management strategies should be implemented to ensure the success of the conservation efforts. This conservation plan aims to support biodiversity and ecological balance in the project area. Continued commitment and stakeholder involvement are critical to safeguarding the flora and fauna identified.

Impacts and Mitigation Measures on Biological Environment and Biodiversity

S. No.	Activity / Aspect	Examples of Aspects / Causes	Potential Biodiversity Impacts	Mitigation Measures
1	Land Extraction / Clearing	Land clearing	Loss of habitat, introduction of plant diseases, siltation of water bodies	Limit land clearing to required areas only; afforestation with native species; implement soil erosion control measures
2	Blasting, Digging, Hauling	Dust, noise, vibration, water pollution	Disruption of water courses; impact on aquatic ecosystems due to altered hydrology and water quality	Controlled blasting; water sprinkling for dust suppression; noise mitigation; sedimentation ponds to manage runoff
3	Waste Dumping / Handling	Land disturbance, soil & water contamination	Loss of habitat, contamination of soil and water, increased sedimentation	Designated waste disposal areas with liners; retaining walls and runoff barriers; regular monitoring of soil and water quality
4	Air Emissions from Operations	Air pollution (dust and gaseous emissions)	Dust deposition on leaves, reduced photosynthesis, habitat degradation	Greenbelt development; regular maintenance of machinery; use of dust suppression systems (sprinklers, water tankers)
5	Waste Disposal (hazardous/non-hazardous)	Oil spills, contaminated runoff	Encouragement of pests, spread of disease, groundwater contamination	Secure storage of chemicals/oils; spill containment systems; proper treatment of waste; pest control measures
6	Infrastructure Development (e.g., Power Lines)	Land clearing	Fragmentation of habitats, displacement of species	Avoid ecologically sensitive zones, replanting native flora post-construction

7	Accommodation & Worker Facilities	Land clearing, sewage, domestic waste	Habitat loss, pollution from sewage, spread of diseases	Installation of STP/soak pits for sewage; waste segregation and disposal; plantation around facilities
8	Access Roads Construction	Clearing vegetation, altering natural drainage	Habitat fragmentation; waterlogging upslope, reduced drainage downslope	Route roads along existing clearings; design proper cross-drainage structures; restore vegetation along roadsides
9	Population Growth / Human Activity	Land pressure, hunting, increased resource use	Pressure on flora/fauna; introduction of invasive species; loss of native biodiversity	Community awareness programs; habitat restoration initiatives; avoid illegal poaching and grazing
10	Water Use / Abstraction	Groundwater extraction, mine dewatering	Alteration in aquatic habitat; species displacement due to reduced water levels	Controlled water extraction; water harvesting structures; recharge pits; monitoring of water levels
11	Noise from Operations	Drilling, blasting, transport noise	Disturbance to fauna; migration of birds and animals	Noise barriers; limit noisy operations to daytime; maintenance of silencers and mufflers
12	Dust Deposition on Vegetation	Movement of vehicles and mining operations	Reduced photosynthesis; leaf damage; stunted growth	Regular water spraying on haul roads; roadside plantations using dust-tolerant native species

F. Socio Economic Environment

Impacts with Mitigation and Monitoring Measures on Socio-Economic Environment

Impact Area	Potential Effects	Consequences on Local Livelihood / Community	Mitigation Measures	Monitoring Strategies
Air Pollution	Increased CO ₂ , NO _x , SO ₂ , PM ₁₀ & PM _{2.5} emissions	Respiratory diseases; reduced agricultural productivity	Use low-emission machinery; dust suppression; greenbelt development	Air quality monitoring (PM ₁₀ , CO ₂ , NO _x) near mining zones
Water Pollution	Acid mine drainage, heavy metal leaching	Contaminated drinking water; aquatic biodiversity loss	Water treatment plants; lined tailing storage	Ground and surface water quality monitoring; pH, metals
Soil Degradation	Land clearing, loss of fertility	Reduced crop yield; dependence on external food sources	Topsoil conservation; land reclamation	Satellite vegetation tracking; soil quality testing
Climate Change	CO ₂ emissions, land-use change	Erratic rainfall; higher cooling costs; health issues	Reduce deforestation	Monitoring of climate-related indicators
Health & Safety	Dust, noise, and traffic-related issues	Respiratory and hearing problems; accident risks	PPEs, dust control, traffic safety	Health audits; accident tracking
Traditional Occupation Shift	Loss of farming and grazing jobs	Livelihood loss; forced occupational shift	Skill development; green jobs; eco-tourism promotion	Employment audits; training participation records
Resource Competition	Increased use of water and local utilities	Local scarcity; price inflation	Sustainable resource use; recycling	Resource consumption tracking
Cultural Disruption	Influx of migrant labor	Cultural dilution; social conflicts	Local hiring preference; community programs	Social cohesion surveys; stakeholder consultations
Livelihood Displacement	Shift away from agriculture and small-scale trade	Income instability; out-migration	Compensation; alternate livelihood; CSR-based support	Livelihood impact assessments; CSR program reviews

G. Occupational Health Impacts, Mitigation Measures

S. No	Impact Area	Anticipated Impacts	Mitigation Measures
1	Dust Exposure	Dust-related pneumonia, tuberculosis	Water sprinkling on haul roads, wet drilling systems, greenbelt development
2	Physical Strain	Rheumatic arthritis due to heavy labor	Ergonomic work practices, regular breaks, training in safe handling methods

3	Vibration from Equipment	Segmental vibration syndrome from long-term use of vibrating tools	Use of anti-vibration tools, scheduled breaks, health monitoring for vibration-related symptoms
4	Noise Pollution	Noise-induced hearing loss	Use of earplugs/muffs, acoustic enclosures for equipment, regular noise level monitoring
5	Fire and Emergency Risks	Injuries and fatalities from fire/explosions	Emergency Response Plan (ERP), installation of fire extinguishers, mock drills, and training
6	Hazardous Material Handling	Exposure-related health issues	PPEs suited for materials handled, training in safe chemical handling procedures
7	Medical Emergencies	Lack of immediate care can worsen injuries	On-site first aid facilities, tie-ups with local hospitals, trained medical personnel
8	Worker Health Monitoring	Chronic illnesses going undetected	Periodic health check-ups, occupational health surveillance, medical records maintenance
9	Community Health Linkages	Potential spread of occupational diseases to nearby communities	Extension of emergency medical support to communities, awareness programs
10	Blasting Operations	Increased risk of injuries due to flying debris and air shock	Restricted entry, sirens, cordoning of the blast zone, proper training and SOPs

5. Analysis of Alternative

S. No	Mining Activity	Available Technologies	Potential Impact	Preferred Technology to be followed
1	Drilling	Jackhammer Manual Drilling	Emission of dust and noise generation	-
		Wet Drilling	Minimal dust emissions	Wet Drilling
		Tamrac Machine Drilling	Insignificant dust and noise levels	-
		Wagon Drill	Produces dust and noise	-
		LD Bore	Dust emission	-
		PRD Drilling	Low dust emissions	-
2	Blasting	Conventional Blasting	Generates noise	-
		Muffle Blasting	Reduced noise impact	-
		Expansive Mortar / Rock Breaking Powder	Negligible noise impact	-
		Controlled Blasting	Reduces ground vibrations and noise	Controlled Blasting

		Hydraulic Splitting	No noise or vibration, water-pressure based	Hydraulic Splitting
		Chemical Blasting	Non-explosive, slow rock breakage, minimal impact	Chemical Blasting
		Shock Tube Blasting	Controlled explosion, reduced fly rock	-
		Silent Blasting (Gas-Expansion Systems)	Fractures rock with gas expansion, no noise	-

5. Proposed Greenbelt Development plan

Local Name of the Tree	Scientific Name of the Tree	Survival	No. of Species
Vaagai	Albizia Lebbeck	80 %	4500
Manjadi	AdenaantheraPavonina		
Aatru Poovarasu	Hibiscus Tiliaceous		
Panai	Borassus Flabellifer		
Yetti	Strychnos Nuxvomica		
Purangai Naari, Pudanga Naari	Premna Tomentosa		
Magizha Maram	MimusopsElengi		
Puthranjivi	PuthranjivaRoxburghii		
Pisin Pattai	LitseaGlutinosa		
Sandhana Vembu	Toona Ciliate		
Eachai	Phoenix Sylvestre		

6. Environmental Monitoring Plan

The comprehensive Environment Monitoring Plan is prepared along with a budget of **50,000/-**

"The project proponent will take overall responsibility for monitoring and ensuring environmental compliance throughout the lifecycle of the project. For each environmental component, the monitoring plan will define specific parameters, monitoring locations, frequency, duration, applicable standards, and assign responsibilities for implementation and supervision, as per the Environmental Monitoring Plan.

7. Additional Studies

The report is covered Risk assessment with associated activities and precautionary measures, the Mining and related activities pose various potential hazards to both workers and the public. It is essential that mine workers operate in a safe and healthy environment

without compromising their efficiency. The safety measures required to ensure the well-being of employees, and the security of mining operations, are outlined in the Mines Act, 1952. Fire protection system, Emergency safety equipment & Reporting and response to emergencies. Emergency Help from nearby industries and tie up with nearby industries. An adequate number of external and internal telephone connections should be installed.

- ▶ Fire Protection System
- ▶ Off Site Emergency Plan

8. Project Benefits

- ▶ Improvement in per capita income of the local population.
- ▶ Enhancement of the overall socio-economic conditions of nearby villages due to the proposed project.
- ▶ Approximately 35 people will be directly employed in the quarry operations as skilled and unskilled workers.
- ▶ Around 20 individuals will benefit indirectly through allied services and support activities.
- ▶ The direct beneficiaries will include local people employed in mining operations in roles such as equipment operators, laborers, and maintenance staff.
- ▶ The project is environmentally compatible, financially viable, and will support the construction industry indirectly benefiting the wider community.
- ▶ Community development initiatives under Corporate Social Responsibility (CSR) and Corporate Environmental Responsibility (CER) will benefit nearby villages.
- ▶ As per O.M. F.No. 22-65/2017-IA.III dated 01.05.2018, 2.0% of the project cost is to be allocated for Corporate Environment Responsibility (CER) activities. Accordingly, an amount of Rs. 2.0 Lakhs will be spent towards the development of aranrai North Village Government Higher Secondary School. Corporate Environmental Responsibility (CER) Plan details are provided in **Table 4-30**.
- ▶ The State Government will also benefit directly from the proposed mine, through increased revenue from royalties, CESS, DMF, GST etc.
- ▶ Improvement in communication, transport, education, community development and medical facilities and overall change in employment and income opportunity.

Corporate Environmental Responsibility

S. No	CER Activities for Aranarai North Village, Government Hr. Sec. School	Amount (Lakhs)
2.	Govt Girls High School- Toilet facilities	1.00
3.	Govt Girls High School- Providing Library Books in connection with Environmental	0.50
4	Govt Girls High School-Drinking Water facility (Portable RO System with Cooling facility)	0.50
Total		2.00

9. Environmental Benefit Analysis

Not recommended during scoping stage.

10. Environmental Management Plan

Upon approval of the Environmental Impact Assessment (EIA) and the associated Environmental Management Plan (EMP), a comprehensive administrative framework will be established to ensure the systematic implementation of all proposed mitigation measures. A dedicated Environmental Management Cell (EMC), comprising qualified and experienced personnel, will be constituted to oversee, coordinate, and monitor all environmental protection and management activities throughout the life of the project. To facilitate the effective execution of the EMP, the following budgetary provisions have been made:

- **Capital Cost:** Rs. 15,65,000/-
- **Recurring Cost:** Rs. 8,51,500/- per annum

This financial provision encompasses all essential activities including pollution control, environmental quality monitoring, greenbelt development, occupational health and safety measures, solid and hazardous waste management, and community-related environmental initiatives. Environmental Management cost is given in **Table 9-12**.

11. Summary and Conclusion

The proposed rough stone quarry is expected to generate moderate environmental impacts, all of which can be effectively mitigated through a comprehensive Environmental Management Plan (EMP). Key concerns include emissions of particulate matter from operations like drilling, blasting, and transportation, as well as runoff-induced water pollution and habitat disturbances.

To address air quality impacts, measures such as wet drilling, controlled blasting, and routine water sprinkling on roads and work areas will be adopted. Dust and noise will be further

controlled through greenbelt development within and around the lease area using native species. Surface runoff will be managed through the construction of garland drains, catch pits, and stormwater bunds, while rainwater harvesting structures will help in groundwater recharge. Noise levels are currently within the prescribed CPCB standards, and the use of noise-compliant equipment and PPE like earplugs and earmuffs will ensure occupational safety. In terms of biodiversity, the project site does not intersect with any ecologically sensitive zones, and protective steps such as afforestation and fencing will help reduce any localized disturbances. From a socio-economic standpoint, the project promises direct and indirect employment, improved local infrastructure, and community development through CSR and CER commitments.

To further enhance environmental safeguards, advanced methods like, NONEL blasting, and non-explosive rock-breaking agents will be employed to reduce vibrations, fly rock, and dust. With baseline environmental parameters well within permissible limits, the planned mitigation strategies aim to maintain environmental quality and ensure regulatory compliance throughout the quarry lifecycle.

Additionally, as discussed in Chapter 10, an Environmental Management Cell (EMC) will be constituted. This cell will be responsible for:

- Monitoring and implementing EMP measures
- Ensuring compliance with environmental regulations
- Overseeing environmental performance across air, water, and land components

With minimal anticipated impacts and robust mitigation in place, the project is expected to foster employment, improve local infrastructure, and enhance the socio-economic condition of nearby communities. Considering these benefits, the proposed project may be recommended for Environmental Clearance.

1 INTRODUCTION

1.1 Project

M/s. Tamil Nadu Minerals Limited (An Undertaking of Government of Tamil Nadu hereinafter referred as TAMIN) was established in the year 1978 to carryout systematic mining and development of different minerals all over the state.

The Mining plan has been prepared for quarrying rough stone over an extent of 9.00.0Ha in SF.No.120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State for 20 years in accordance with Precise area communication has been granted vide Assistant Director, Geology and Mining, Perambalur District, Letter. No. Rc.No.202/G&M/2025 dated 29.10.2025

The Rough stone Quarry is located over an extent of 9.00 hectares in S.F.No.No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State, Tamil Nadu State. The land is classified as Government Poramboke land, and TAMIN has obtained the lease from the Government of Tamil Nadu.

The project area does not fall in CRZ zone. There are no Western Ghats within the radius of 15 Km from project area. There are no notified bird sanctuaries or wildlife sanctuaries as per Wildlife protection Act 1972, within a radius of 15 Km. The project area does not falls in the 'HACA' region.

Initially, Government of Tamil Nadu granted precise area communication letter to TAMIN for quarrying rough stone over an extent of 9.00 Ha of Government poramboke land in Survey Field No (SF No). 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State for a period of 20 years under Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules,1959 vide Government letter Precise area communication has been granted vide Assistant Director, Geology and Mining, Perambalur District, Letter. No. Rc.No.202/G&M/2025 dated 29.10.2025

The area lies in 78°50'12.63"E to 78°50'14.32"E and Northern latitude from 11°15'57.70"N to 11°15'52.05"N The area does not fall under forest land of any category. It is Government Poramboke land.

As directed in the precise area communication letter TAMIN has prepared the Mining Plan for quarrying rough stone over an extent of 9.00Ha. at SF.No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State

Subsequently, the Mining Plan has been approved by the Assistant of the Geology and Mining Vide Letter Rc No. 202/G&M/2025, Dated,06.03.2025.

1.1.1 Present Proposal details:

The EIA report has been prepared in accordance with the issued ToR (Identification No. TO26B0108TN5513073N, dated 11/05/2026. Baseline environmental studies were conducted during the period from Feb 2026 to April 2026. The draft EIA report will be circulated for public review in coordination with the Tamil Nadu Pollution Control Board (TNPCB).

1.1.2 Project

The Rough stone Quarry lease area over an extent of 9.00 ha located in SF. No120/2A1A situated in Aranarai Village, Perambalur Taluk of Perambalur District, lies in the Eastern Longitude from 78°50'12.63"E to 78°50'14.32"E and Northern latitude from 11°15'57.70"N to 11°15'52.05"N

The area is marked in the survey of India Topo sheet No. 58I/15,16,11,12 The Rough Stone quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches.

Benches are proposed with a height of 5m and width bench not less than the height. The area applied for quarry lease is exhibits hilly terrain; the altitude of the area is 85.0m (Maximum) above MSL.

1.1.3 Project Proponent

M/s. Tamil Nadu Minerals Limited (An Undertaking of Government of Tamil Nadu hereinafter referred as TAMIN) was established in the year 1978 to carryout systematic mining and development of different minerals all over the state.

1.2 Letter of Intent (LoI) & Mining Plan approval details

- i. The Government of Tamil Nadu has issued the precise area communication letter to furnish the approved Mining plan as per Go. TN, Natural Resources (MME.1) Department for quarrying rough stone over an extent of 9.00 Ha of Government poramboke land in SF No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State for a period of 20 years vide Govt. Letter Precise area communication has been granted vide Assistant Director, Geology and Mining, Perambalur District, Letter. No. Rc.No.202/G&M/2025 dated 29.10.2025 is enclosed as Annexure-7.
- ii. Subsequently, the Mining Plan has been approved by the Assistant of the Geology and Mining Vide Letter Rc No. 202/G&M/2025, Dated,06.03.2025. is enclosed as Annexure-8.

1.3 Land Acquisition Status

The entire mine lease area of 9.00 Ha is Government Pormabokeland which is leased by TAMIN. The precise area communication letter is enclosed as Annexure-7. Details of the project site are given in the Table 1-1.

Table 1-1 Land Use Description

District	Taluk	Village	S.F No	Area (Ha.)	Classification
Perambalur	Perambalur	Aranarai (North)	120/2A1A	9.00	Government poramboke land
Total				9.00	

1.4 Purpose and status of the report

The rough stone Quarry is located over an extent of 9.00 hectares in S.F. No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State. The land is classified as Government Poramboke land, and TAMIN has obtained the precise area communication letter from the Government of Tamil Nadu.

The project area does not fall in CRZ zone. There are no Western Ghats within the radius of 15 Km from project area. There are no notified bird sanctuaries or wildlife sanctuaries as per Wildlife protection Act 1972, within a radius of 15 Km. The project area does not fall in 'HACA' region.

Government of Tamil Nadu granted precise area communication letter to TAMIN for quarrying rough stone over an extent of 9.00 Ha of Government poramboke land in Survey Field No (SF No). 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State. for a period of 20 years under Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959 vide Government letter Tamil Nadu Minor Mineral Concession Rules, 1959 vide Assistance Director, Geology and Mining Department, Perambalur Letter Rc.No.202/G&M/2025, dated. 29.10.2025.

As directed in the precise area communication letter TAMIN has prepared the Mining Plan for quarrying rough stone over an extent of 9.00 Ha. at SF.No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State.

Subsequently, the Mining Plan has been approved by the Assistant Director of the Geology and Mining vide Letter Rc No. 202/G&M/2025, Dated, 06.03.2025.

The Geological reserves of rough stone have been computed based on the Geological Plan & Sections up to the economically workable average of 48.47 m from the top of the hill works out to 42,30,446.76 M3.

Mineable Reserves have been computed as 62,75,058.873 M3 based on the Conceptual Plan and sections. Production is estimated at 2,292,123.57 tonnes of rough stone in the first five-year period, 2,292,129.56 tonnes in the second five-year period, and 1,690,801.752 tonnes in the remaining four-year period. An open-cast semi-mechanized method will be followed for the proposed mining, as per the mining plan. Sectional plates are enclosed as **Annexure-4**.

1.5 Brief Description of the Project

1.5.1 Nature of the Project

The rough stone Quarry is located over an extent of 9.00 hectares in S.F. No. 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District, Tamil Nadu. The land is classified as Government Poramboke land, and TAMIN has obtained precise area communication letter from the Government of Tamil Nadu.

The project area does not fall in CRZ zone. There are no Western Ghats within the radius of 15 Km from project area. There are no notified bird sanctuaries or wildlife sanctuaries as per Wildlife protection Act 1972, within a radius of 15 Km. The project area does not fall in 'HACA' region.

Government of Tamil Nadu had granted precise area communication letter to TAMIN for quarrying rough stone over an extent of 9.00 Ha of Government poramboke land in Survey Field No (SF No). 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District for a period of 20 years under Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959 vide Government letter Rc.No.202/G&M/2025 Assistance Director, Geology and Mining Department, dated.29.10.2025.

1.5.2 Size of the Project

The total extent area of the lease for this quarry is 9.00Ha, at S.F. 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District, Tamil Nadu State. Quarry Land is classified as Government Poramboke land and leased to by Tamil Nadu Minerals Limited (TAMIN).

The Geological reserves of rough stone have been computed based on the Geological Plan & Sections up to the economically workable average depth of 48.47 m from the surface level and the top surface of the rough stone body works out to 42,30,446.76 M³.

Mineable Reserves have been computed as 62,75,058.87 M³ based on the Conceptual Plan and sections. Production is estimated at 2,292,123.57 tonnes of rough stone in the first five-year period, 2,292,129.56 tonnes in the second five-year period, and 1,690,801.752 tonnes in the remaining four-year period. An open-cast semi-mechanized method will be followed for the proposed mining, as per the mining plan. Sectional plates are enclosed as **Annexure-4**.

The Total Mineable reserve is about 62,75,058.873 M³ Rough Stone formation, for a period of 14 years up to a depth of 48.47 m for AGL (Above ground level). **Table 1-2**.

Table 1-2 Estimated rough stone Reserves

S. No	Geological (M ³)	Mineable Reserves (M ³)	Mineable Saleable Rough Stone Reserves 100% Recovery (M ³)	Mineable Saleable Rough Stone Reserves 100% Recovery (M ³)
1	42,30,466.76	22,81,839.59	22,81,839.59	62,75,058.873

Anticipated life of the quarry:

Updated Mineable Reserves : 22,81,839.590 M³
Average Production per annum : 4,58,428 Tonnes
Anticipated Life of the Quarry : 62,75,058.873/4,58,428 Tonnes, 13.68@14 years.

Table 1-3 Proposed year wise development and production plan

Year	Run of Mines in		Saleable Rough Stone Recovery @ 100%	
	M ³	Tonnes	M ³	Tonnes
First	166699.40	458423.350	166699.40	458423.350
Second	166701.00	458427.750	166701.00	458427.750
Third	166699.90	458424.725	166699.90	458424.725
Fourth	166700.18	458425.495	166700.18	458425.495
Fifth	166699.00	458422.250	166699.00	458422.250
Total	833499.48	2292123.57	833499.48	2292123.57

Specific Gravity for Rough stone: 2.75.

Source: Appendix II of the TMMCR, 1959 Note: No.2

Table 1-4 Ultimate dimension of the Quarry at the top and bottom level

S. No	Ultimate Pit Dimensions at Top (m)		Ultimate Pit Dimensions at Bottom (m)		Depth	SF. No
	Length	With	Length	Width		
1	480.0	160.0	418.50	39.48	48.47	120/2A1A

1.5.3 Location of the project

The rough stone Quarry is located over an extent of 9.00 Ha, located at S.F. No. 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District, Tamil Nadu, lies in the Eastern Longitude from 78°50'12.63"E to 78°50'14.32"E and Northern latitude from 11°15'57.70"N to 11°15'52.05"N The area falls in topo sheet No. 58I/15,16,11,12 The altitude of the area is 85.0m (Maximum) above MSL. The boundary co-ordinates of the mine lease area are tabulated in Table 1-5.

Table 1-5 Boundary Coordinates of the project

Boundary Pillar no	Latitude	Longitude
1	11°15'56.73"N	78°50'30.09"E
2	11°15'52.11"N	78°50'14.32"E
3	11°15'57.70"N	78°50'12.62"E
4	11°16'2.33"N	78°50'28.40"E

1.5.4 Connectivity of the Project

Existing road is available to from quarry ends with NH45 Chennai Trichy Hwy, 6.68, SE, SH 142 Thuraiyur Perambalur Rd, 3.13, S. The nearest railway station is Ariyalur Railway Station, 27.81, ESE, Tiruchirappalli International Airport, 55.93, S.

1.5.5 Need for the project and its importance to the country and or region

The Rough stone, quarrying project falls in Perambalur District, Tamilnadu. Rough Stone is an important commercial product, with several applications. The proposed project will fulfill its end uses in building and construction of roads, paving and many other exterior projects. This project will give employment opportunities to 35 members. Mineral Industries of the state of Tamilnadu provide employment opportunities for the people of the state as well as in the specific project area. This also helps in countries' economic development Through this project will give employment opportunities to 35 employees. This material is well known in the international supermarket of rough stone which will fetch a good fetch a good foreign exchange to the nation.

1.5.5.1 Demand –Supply Gap

The existing road facilities are already available, which shall be used and maintained. The labors requirement is drawn from the nearest villages. Medical facilities are available near the project site, government and private hospitals and other basic amenities and infrastructure facilities like communication centers, school, supermarket and bus stand are also available in Aranarai Village located at distance of 0.74 km (SW) of the project site. This mining project will provide employment for about 35 personnel directly and 20 people indirectly.

1.5.5.2 Imports Vs Indigenous

Rough Stone is an important commercial product, with several applications. The proposed project will fulfill its end uses in building and construction of roads, paving and many other exterior projects.

1.5.5.3 Export possibility.

There is no possibility for export of this rough stone.

1.5.5.4 Domestic/export markets

The excavated rough stone is used for construction industries for Government & Public sector projects besides catering domestic housing and infrastructure projects in and around the district.

1.6 EIA Study

As a part of compliance to the regulatory requirement i.e., to obtain Environmental Clearance from SEIAA, TN, TAMIN has appointed Environmental Consultants accredited by National Accreditation Board for Education and Training (NABET)-Quality Council of India (QCI), New Delhi. The work of undertaking field studies and preparation of Draft EIA/EMP report under B1 category as per obtained Terms of Reference from SEIAA-TN, was assigned to M/s. EHS360 Labs Pvt. Ltd., Chennai is accredited by NABET, vide possession of Certificate No. NABET/EIA/25-28/RA0418, valid up to July 16 2028.

1.7 EIA Cost

EIA Studies including Baseline undertaken by EHSL for an amount of INR Rs.1,34,400/-

1.8 Scope of the Study

The scope of the work mentioned includes an assessment study of the proposed quarry project and their impact on the region. This study puts forward the most effective ways to protect the environment from increasing pollution caused by the mining activities and recommendations for environmental-friendly development initiatives in the region.

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative that, the mining activities may have on the environment, together consisting of the natural, social, and economic aspects, i.e., aiming at "Sustainable Development" due to the project activities.

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may arise during mining. This report also highlights the Environmental Monitoring Program during the operation phase of the project and the post mine management program. The generic structure of the EIA document will be as per the EIA Notification of the MoEF&CC dated 14th September 2006 and subsequent amendments. The basic structure of the report will be as under:

Structure of Environmental Impact Assessment Report:

Chapter No	Description of Content
Chapter 1	Introduction Give the brief outline of the project as details of need of the EIA report, project proponent, nature and size of the project, location of the project, and need of project, scope of EIA study and applicable environmental regulations and standards
Chapter 2	Project Description The chapter gives details about the type and capacity of the project, need of the project, project location, layout & area break up, details of product, raw materials, manufacturing process and technology description, details of machinery and equipment, resource requirements, details on aspects of the project causing environmental impacts and mitigation measures incorporated to meet the standards.
Chapter 3	Description of the Environment The chapter describes the study area, study period, methodology and components selected for baseline studies, baseline status for ambient air, water, soil, socioeconomic, land use and meteorology of the study area within 10km radius.

Chapter 4	Anticipated Environmental Impacts and Mitigation Measures In this chapter, the anticipated environmental impacts due to proposed project activities are identified, analyzed, and assessed and thereafter the mitigation measures for the adverse impacts are proposed. The significance of impacts is determined. This chapter is prepared based on Chapter 2&Chapter 3 by correlating the activities under proposed project and their impacts on receiving environmental attributes.
Chapter 5	Analysis of Alternatives (Technology/site) The chapter describes the alternative sites and the proposed factors for locating at the mentioned location. This would also describe the alternative technologies if any for manufacturing proposed products.
Chapter 6	Environmental Monitoring Programme The chapter proposes the post project monitoring plan and the budgetary provisions for the various environmental components.
Chapter 7	Additional Studies This chapter is provided the Public Consultation. Risk Assessment, Disaster Management Plan, and R&R Studies and any additional recommended during the Scope stage/ToR.
Chapter 8	Project Benefits Highlights the direct and indirect benefits on the physical infrastructure and social infrastructure due to proposed projects.
Chapter 9	Environmental Cost Benefit Analysis is not recommended during scoping stage for this project, Hence, consider for Environmental Management Plan The chapter proposes the Environmental Management Plan highlighting the mitigation measures and roles and responsibilities of the management. This would include specific time frames for completion, resources required and specific responsibility.
Chapter 10	Assessment of ecological damage, remediation plan and natural and community resource augmentation plan as project falls under category due operational without prior EC
Chapter 11	Summary and Conclusion Summarize the entire report and conclude the summary of the EIA report.
Chapter 12	Disclosure of Consultants Engaged Provides the brief profile of the EIA consultant organization and EIA project team for the current study.

1.8.1 Objectives of the Study

- ▶ To ensure environmental considerations are explicitly addressed and incorporated into the development decision-making process.
- ▶ To anticipate and avoid, minimize, or offset the adverse significant biophysical, social, and other relevant effects of the above project proposal.
- ▶ To protect the productivity and capacity of natural systems and the ecological processes which maintain their respective functions.

- ▶ To promote development that is sustainable and optimizes resource use as well as management opportunities.
- ▶ To fully recognize the scope and requirements of the TOR and comply with the same.
- ▶ The major objective of this study is to prepare a detailed Environmental Impact Assessment study within the study area i.e 10km radius from the project.

1.8.2 Methodology adopted for the Study.

An Environmental Impact Assessment (EIA) is an assessment of the possible impact, whether positive or negative, that a proposed project may have on the environment, together consisting of the natural, social, and economic aspects, i.e., aiming at “Sustainable Development” due to the project activities.

1.8.3 Applicable Regulatory Framework

The EIA process followed for this EIA report is composed of the following stages:

- ▶ Study of project information.
- ▶ Screening & Scoping.
- ▶ Environmental pre-feasibility study & application for approval of ToR.
- ▶ Collection of detailed project management plan/report.
- ▶ Baseline data collection.
- ▶ Impact identification, Prediction & Evaluation.
- ▶ Mitigation measures & marking out of EMP.
- ▶ Risk assessment and safety & disaster management plan.
- ▶ Review & Draftization of EIA Report based on the ToR requirements.
- ▶ Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

1.8.4 Legal Completeness

The establishment and functioning of the mining industry will be governed by following Environmental acts/regulations besides the local zoning and land use laws of the States.

1. The Water (Prevention and Control of Pollution) Act, 1974 as amended.
2. The Water (Prevention and Control of Pollution) Cess Act, 1977, as amended.
3. The Air (Prevention and Control of Pollution) Act, 1981 as amended (Air Act).
4. The Noise Pollution and Regulation Act: 2000
5. The Environment (Protection) Act, 1986 (EPA)
6. The Wildlife (Protection) Act, 1972 as amended.
7. The Forest (Conservation) Act, 1980 as amended.
8. The Public Liability Insurance Act, 1991
9. The Mines and Minerals (Regulation and Development) Act, 1957 as amended.
10. Circulars issued by the Director-General Mines Safety (DGMS).
11. Contract Labor Regulation and Abolition Act 1970
12. The Motor Vehicles Act – 1989
13. PESO – Explosives and handling of Hazardous Material: 1934

1.8.5 Terms of Reference Compliance

The Terms of Reference (ToR) issued by SEIAA-TN compliance is given as follows:

1. Seac Conditions - Site Specific

S. No	Terms of Reference	Compliance
1.	The PP shall carry out the structure enumeration study located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m along with the 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.	The structures are located within 50m, 100m, 150m, 200m, 250m, 300m and is provided in Chapter 2. There are no sensitive structures located within the 500m radius from the project site.
2.	The Project Proponent shall obtain a clarification letter from the Assistant Director of Mines, Perambalur, regarding the already quarried portion observed along the periphery of the proposed project site.	Noted.
3.	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining	The following documents will be furnished during Final EIA Submission i) Copy of the agreement forming CMC. ii) Organization chart of the Committee iii) Standard Operating procedures (SoP)

	operation in the luster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: i) Copy of the agreement forming CMC. ii) The Organization chart of the Committee with defining the role of the members iii) The 'Standard Operating Procedures' (SoP) executing the planned activities.	
4.	The PP shall install the CCTV camera for the continuous surveillance of mining activity & furnish the photographic/video graphic evidence along with the EIA report.	Noted.
2. Seiaa Specific Conditions:		
	After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant Terms of Reference (ToR) along with Public Hearing for the quantity of	Noted.

	22,81,838.14m³ of Rough Stone up to the depth of 48.47m (from top of the hill) and the annual peak production shall not exceed 1,66,701.00m³ of Rough Stone as per the approved mining plan, under cluster for undertaking the combined Environment Impact Assessment Study and preparation of separate Environment Management Plan subject to the conditions as recommended by SEAC & normal conditions & the SEIAA Standard conditions.	
3. Seiaa Standard Conditions:		
	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	The Cluster Management Committee will be formed which include all the existing as well as proposed quarry and do all the works as directed in the EC after obtaining EC.
2.	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc.,	Noted.
3.	The List of members of the committee formed shall be	Noted.

	submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	
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.	Blasting details are provided in the Chapter 7, Section 7.1.2.5.
5.	The committee shall deliberate on risk & emergency management plan, fire safety & evacuation plan and sustainable development goals pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.	Noted.
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	PP will provide the Environmental policy during the final EIA submission.

	Environmental policy devised shall be given in detail in the EIA Report.	
7.	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner	Noted & will be complied.
8.	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public in the vicinity	Noted & will be complied.
	Agriculture & Agro-Biodiversity	
9.	Impact on surrounding agricultural fields around the proposed mining Area.	No. of trees detail are provided in Chapter 2.
10.	Impact on soil flora & vegetation around the project site.	
11.	Details of type of vegetation including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetation all along the boundary of the proposed mining area shall committed mentioned in EMP.	
12.	The Environmental Impact Assessment should study the agro-biodiversity, agro-forestry, horticultural	
		The Impact on surrounding agricultural fields, soil flora & vegetation, n. of t

	plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.		
13.	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services	The entire mine lease area of 9.00.0 Ha is Government land which is le communication letter is enclosed as Annexure-7 . The Lease applied area features a hillock terrain, entirely covered with roo rainfall, resulting in sparse vegetation growth within the lease area. Never enhance the local ecosystem. The area's elevation ranges upto 85.0 meter annual rainfall of approximately 816.0 mm	
14.	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock		
Forests			
15.	The project proponent shall detail study on impact of mining on Reserve forests and free ranging wildlife.	The entire mine lease area of 9.00.0 Ha is Government Poramboke land wh area communication letter is enclosed as Annexure-7. There is no forest land	
16.	The Environmental Impact Assessment should study impact on forest, vegetation, endemic vulnerable and endangered indigenous flora and fauna	Complied. - There are no National Parks, Sanctuary, Biosphere Reserve, Tiger Rese - in core and buffer zones within the 1km radius of the project. - No wildlife is found in the quarry Lease area. To minimize the impact Afforestation plan will be envisaged with native plants. Detailed biodiversity study is provided in the Chapter 3, Section 3.10.	
17.	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection	Complied. Standing trees and the existing trees are provided in Chapter 2, within 300m the any existing plant. However regular dust suppression will be maintained in and around provided under afforestation program with native species.	
18.	The Environmental Impact Assessment should study	Complied.	

	impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	The Environmental Impact Assessment covers Reserve Forests in nearby project area and Wildlife pathways, near project site.
	Water Environment	
19.	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.	The number of ground water pumping & open wells, and surface water bodies within 1 km (radius) with depth of wells and water availability is provided in Chapter 4. Hydro-geological study is carried out and submitted during the Final EIA/EMP Report.
20.	Erosion Control measures.	Erosion Control measures are provided in Chapter 4 Section 4.3.2.1 under sub-section 4.3.2.1.
21.	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Waterbodies/ Rivers, & any ecological fragile areas	Complied. The details are provided in Chapter 4, Section 4.3.
22.	The project proponent shall study impact on fish habitats and the food	There are no major fish habitats and the food chain in the water body and River.

	WEB/ food chain in the water body and Reservoir	
23.	The project proponent shall study and furnish the details on potential fragmentation impact on natural Environment, by the activities.	Complied. The study details are provided in Chapter 4, Section 4.2.
24.	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	There are no aquatic plants and animals in water bodies and landscape and site, and archaeological sites possible landform changes visual and aesthetic impacts in the area, and archaeological sites within the core area other than Archaeological sites. The distance of the site from the nearest water body is ~0.85 km (NE). Alambadi lake is located at distance of ~0.85 km (W) which may have aquatic life. Activities are not planned in the lake.
25.	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components	Complied. The soil physical, chemical components of soil health details are provided in Chapter 4, Section 4.2.
26.	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	There are no major wetlands, water bodies, rivers streams, lakes in nearby panchayat area.
27.	The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment. b) Bio-geochemical processes and its foot	Will be complied.

	prints including Environmental stress. c) Sediment geochemistry in the surface streams	
	Energy	
28.	28. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Complied. The proposed Rough Stone quarry will be operated with the Open Cast Sem excavation are carried out through diesel drive machinery. The methodology of mining is provided in provided in Chapter 2.
	Climate Change	
29.	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.	The emission like PM10, PM2.5, NOX and SO2 are major pollution contribution. It was observed that the maximum ground level concentration observed without control measures for PM10, PM2.5 and NOx are 18.0 µg/m ³ , 9.7 µg/m ³ concentration levels identified at the project site only. So, it can be concluded envisaged is moderate.
30.	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features.	Study impact on climate change, temperature rise, pollution, and above soil & Final EIA Submission.
31.	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	Impact of mining on pollution leading to GHGs emissions and the impact provided in the Chapter 4, Table 4-18.
	Mine Closure Plan	
32.	Detailed Mine Closure Plan covering the entire mine	Complied. The details are provided in Chapter 7, Section 7.1.4

	lease period as per precise area communication order issued.	
	EMP	
33.	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs.	Complied. The Environment Management Plan along with adaptation, mitigation & rem
34.	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan	Complied. EMP with budget for green belt development and mine closure plan inclu Chapter 10.
	Risk Assessment	
35.	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Complied. The Environment Management Plan along with adaptation, mitigation & r Section 7.1.2.
	Disaster Management Plan	
36.	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	Complied. A disaster management plan and disaster mitigation measure are provided in

	due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued	
	Others	
37.	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	The PP will furnish VAO certificate with reference to 300m radius regard to sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc. during Final EIA Submission.
38.	As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan	The concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan after public Hearing.
39.	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	During quarry operations, Municipal solid waste and waste oil are likely to be generated. Hazardous Waste and Non-hazardous Waste. Further, the generated solid waste shall be segregated into Recyclable and Inert compounds. Yearwise production details are provided in the Updated Mineable Reserves Table 1-3 Average Production per annum : 4,58,428 Tonnes Anticipated Life of the Quarry : 62,75.058.873/4,58,428Tonnes, 13.68@

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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)

All corners co-ordinates of the mine lease area is given in Chapter 1

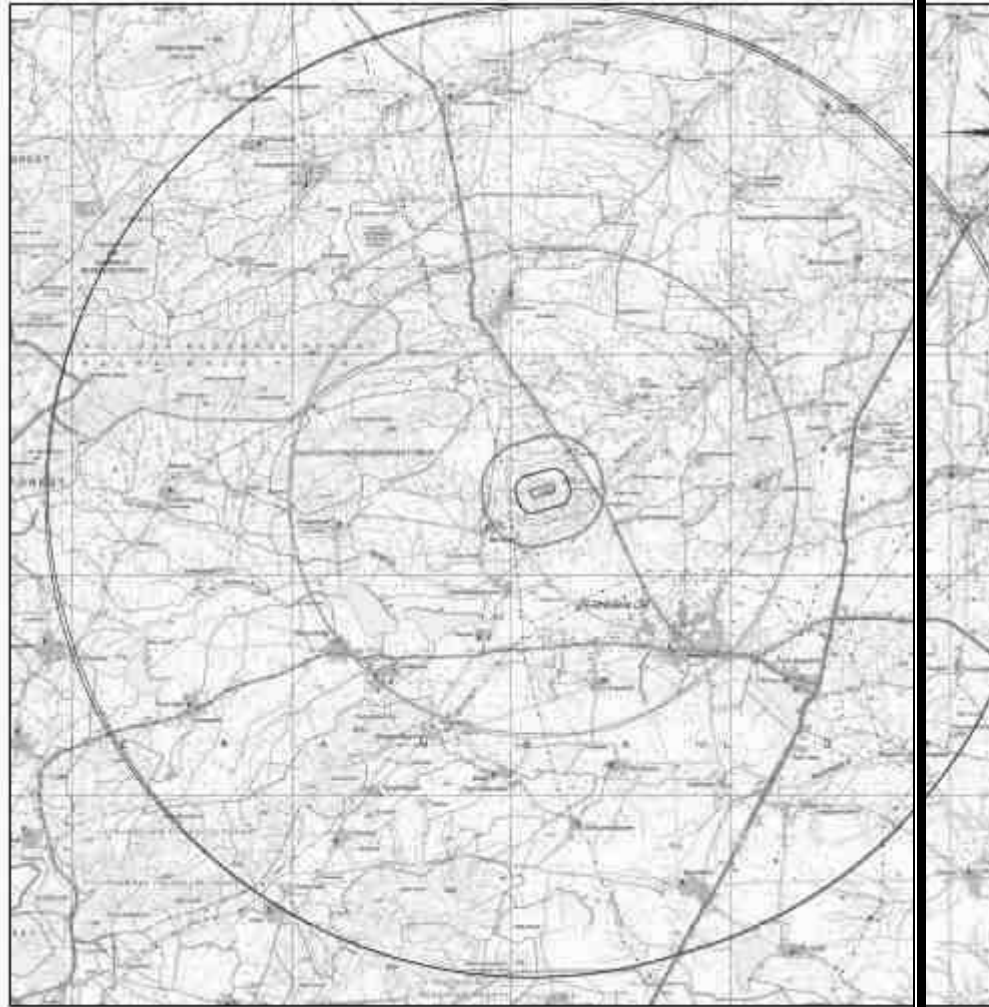


Figure 2-9. Geology and Geomorphology of the area is provided in Chapter 2.
Reference source not found..

Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics

Topo map with existing minerals and mining history of the area, important characteristics are prepared in 1:50000 scale and is given as Figure 3-2. Geomorphology pattern of the study area is shown in Chapter 33.4. Drainage map is shown as Figure 3-9.

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	shareholders or stakeholders at large, may also be detailed in the EIA Report		
	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 a Rough Stone quarry and open cast Mining methodology will be followed from the top of the hill. Mining methodology is provided in Chapter 2 and Section 2.9 and Section 2.10, 4, Section 4.10.	
	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	10 Km radius from the project periphery area is considered as study area. The production and waste generation from quarry activities is estimated at 2.7.	
	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	The environmental sensitive areas covering an aerial distance of 15km from the project periphery are provided in Figure 3.2 and Table 3-1. Land use of the study area is provided in Figure 3-6 and Table 3-3 with delineation of forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features.	

	land use should be given	
	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	It is a government poramboke land lease obtained lease for 20 years by the issues are involved in the proposed project. No waste or Sub-grade mineral is anticipated during the mining plan period, and utilized. Hence, no waste dump is proposed, and waste dump management is
	A 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. No forest land is involved in the lease area.
	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and	Not applicable since, no forest land is involved in the lease area.

	compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished	
	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. No scheduled tribes and other traditional forest dwellers are observed in the non-forest government poramboke land.
	The vegetation in the RF / PF areas in the study area, with necessary details, should be given	The list of Reserve forests available within the 15km radius is provided in Chapter 4, Section 4.7.
	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	Baseline Biological survey was carried out to assess the ecology of the study area. The study identified various types of plants, shrubs, climbers, and herbs. Similarly, the faunal diversity is grouped into mammals, birds, reptiles, amphibians, and insects. There are no extinct flora and fauna species found in the study area. Biodiversity details are provided in Chapter 4, Section 4.7. The mitigation measure is provided in Chapter 4, Section 4.7.
	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	No Biosphere Reserves, Wildlife Corridors, Tiger/Elephant Reserves are available within the 15km radius of the study area. The detailed Environmental Sensitivity areas within the 15km radius of the study area are provided in Table 3-1 and Figure 3-3.

should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished		
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 alongwith budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary	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 and list of Flora & Fauna is detailed is given in Chapter 3, Section	10 km radius of the periphery of the mine lease)] shall be carried out and list of Flora & Fauna is detailed is given in Chapter 3, Section

	allocation of funds for implementing the same should be made as part of the project cost	
	Proximity to Areas declared as Critically Polluted or the Project areas likely to come under the Aravali 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 Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered	Not applicable, Since the proposed project area does not falls under Critically
	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 since proposed lease does not fall under CRZ area.
	R&R Plan/compensation details for the Project Affected People (PAP)	Not applicable.

should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including them R&R and socio-economic aspects should be discussed in the Report	The lease area is classified as Government Poramboke land. TAMIN has obtained from Govt. of Tamil Nadu for 20 years. There is no Rehabilitation and Resettlement Plan. Precise area communication letter is enclosed as Annexure-7.	s obt on an
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	One season (Feb 2026 – April 2026) the primary baseline data on ambient air quality, noise level, soil and flora and fauna, Site- specific meteorological data are given in Chapter-3. 1. Meteorology Section 3.5.2 Temperature, Relative Humidity, Rainfall, 2. Ambient Air Quality Section 3.5.4. As per NAAQS, 2009 3. Ambient Noise Levels Section 3.6 Day equivalent noise levels, Night equivalent noise levels 4. Water Quality Surface water – Section 3.7.2 Ground water – Section 3.7.3 5. Soil Quality Section 3.8 ICAR (Indian Council of Agricultural Research) 6. Ecology Section 3.9 Flora and Fauna	nt air logical fall, Nigh ectio rese

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. Sitespecific 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	Social Economic Status Section 3.11 (Socio Economic Profile of Livelihood, Education and Literacy, etc.,)	Stu
Air quality modeling 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 modeling should be provided. The air quality contours may be shown on a location map clearly	AERMOD Air quality modeling has been carried out to predict the air quality impacts within the 10km radius of the project site for PM10, PM2.5 and Nox 4, Section 4.2.4. The maximum ground level concentration observed due to mining activities PM10, PM2.5, and NOx are 18.0µg/m³, 9.7µg/m³ and 15.0µg/m³ respectively. The details are given in Chapter 4, Section 4.2.3 Predominant wind direction 4-1.	ity du ities respec direction

	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		
	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated	The water requirement for the project is addressed in Chapter 2 Section 2.11	2.11
	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided	No ground water withdrawal to meet the water requirement. The total water requirement is sourced from Vendor or village panchayat.	
	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	Water conservation measures are proposed in Chapter 4 and Section 4.3. Rainwater harvesting detailed are provided in Chapter 3 Section 4.3.2.3	
	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	Impacts on water environment & water conservation measures are proposed	
	Based on actual monitored data, it may clearly be shown whether working will intersect	The proposed depth of mining is 48.47 m from the top of the hill. The Average Ground water table is 8.12 m as per the Mining plan. The PP during Final EIA Submission.	PP

	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		
	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out	Not Applicable. There are no streams, or seasonal streams passing through the project area s However, TAMIN provided all safety measures for nearby water bodies and a	
	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 altitude of the area is 85 m (Maximum) above MSL and average annual water level is 8.12 m depth from ground level. Site Salient features are given in Chapter 2, Table 2-2.	
	A time bound Progressive Greenbelt Development Plan shall be prepared in a	About 0.18.2 Ha of area is proposed for Green Belt development. It proposed Development plan is given in Chapter 2, Section 2.16.8, Table 2 22	

tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution		
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	There is no impact on the local transport infrastructure due to the project estimated at 4,58,428 m³ of Rough Stone. Based on an operating schedule of production will be around 9.8 m³ per day. Assuming an average truck capacity of approximately 2–3 truck trips per day, depending on market conditions. This will not have a significant impact on the existing transportation infrastructure. Impacts and mitigation measures on transportation is given in Chapter 4, Section 4.1.2.	

	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	
	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report	Sanitation facilities are provided to mine's workers in temporary structures infrastructure within the lease area. The area breakup details are given in Chapter-2, Section 2.11 & Table 2.11.
	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	Conceptual post mining land use and Reclamation and restoration sections and with adequate number of sections are provided in Error! Reference source not found.
	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	Occupational Health impacts & preventive measures detailed given in Chapter 10 The EMP details are given as a separately as Chapter 10 along with EMP Cost

	proposed in the mining area may be detailed		
	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	Occupational Health impacts & preventive measures detailed given in Chapter 10 The EMP details are given as a separately as Chapter 10 along with EMP Cost	
	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	Impacts and measures are addressed in Chapter 4 and Section 4.5 and Section 4.6	
	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	The EMP details are given as a separately as Chapter 10.	
	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with	The draft EIA is prepared as per obtained ToR and will be submitted for public hearing and obtaining minutes the point wise proponent compliance will be	

	budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project		
	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given	There is no litigation pending against the project.	
	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt ou	The project Cost is addressed in Chapter 2, Section 2.8 & Table 2-9.	
	A Disaster management Plan shall be prepared and included in the EIA/EMP Report	Disaster Management Plan is given in Chapter 7 and Section 7.1.2.	
	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 benefits are given in Chapter 8.	
	Besides the above, the below mentioned general points are also to be followed: - a) All documents to be properly referenced with index and continuous page numbering. b) Where data are presented in the Report	All documents addressed with properly referenced with index and continuous page numbering. Yes, sources for all tables are addressed. All the analysis/testing reports of Water, Soil, Air, Noise etc. are conducted by the consultant. The disclosure of consultant is given in Chapter 12.	nuou ted b

especially in Tables, the period in which the data were collected, and the sources should be indicated. c) 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. d) Where the documents provided are in a language other than English, an English translation should be provided. e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF 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. g) Changes, if any made in the basic scope and project parameters (as submitted	The entire document is prepared in English only. Questionnaire for environmental appraisal of mining projects will be prepared EIA is Prepared as per generic structure prescribed in Appendix–III of EIA Not Noted. Not Applicable, as it is a new project. All the Sectional Plates are enclosed as Annexure- 13.	
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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.

h) 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. i) 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		
	A. 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	Yearwise production details are provided in the Updated Mineable Reserves Average Production per annum : 4,58,428 Tonnes Anticipated Life of the Quarry : 62,75.058.873/4,58,428Tonnes, 13.68@ Table 1-3.	
	2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given	Government of Tamil Nadu granted lease to TAMIN for quarrying, Rou SF.No.120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tam 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959 vide Asistan Perambalur Letter Rc.No.202/G&M/2025, dated. 29.10.2025	
	3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee	All documents including approved mine plan, EIA and Public Hearing should mine lease area, production levels, waste generation and its management, m	

4) All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

All corners co-ordinates of the mine lease area is given in Chapter 1

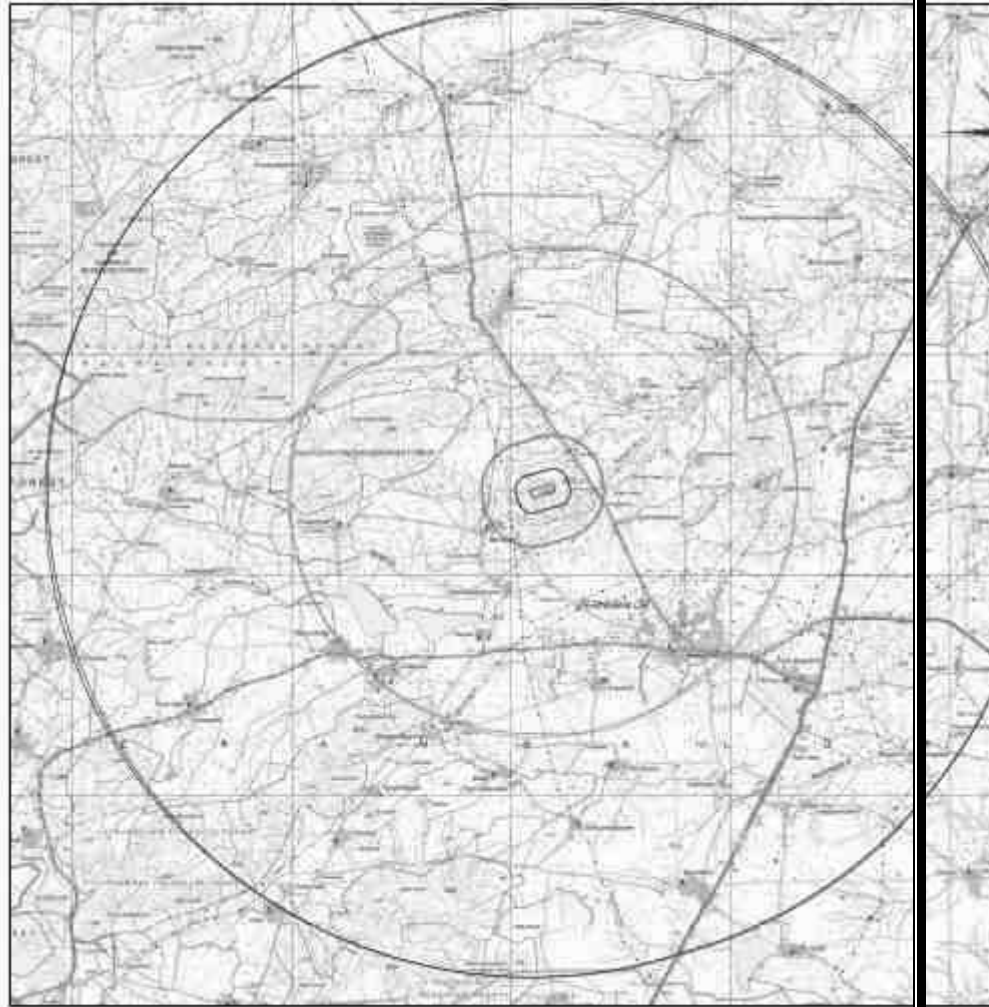


Figure 2-9. Geology and Geomorphology of the area is provided in Chapter 2. Reference source not found..

5) Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.

Topo map with existing minerals and mining history of the area, important characteristics are prepared in 1:50000 scale and is given as Figure 3-2. Geomorphology pattern of the study area is shown in Chapter 3, Section 3.1. Reference source not found.. Drainage map is shown as Figure 3-9.

6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	Government of Tamil Nadu granted lease to TAMIN for quarrying at SF.No.120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu vide Perambalur Letter Rc.No.202/G&M/2025, dated. 29.10.2025. The production of stone is for the purpose of construction.	ROU Tam istan ction
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	Environmental Policy of TAMIN is given in Chapter 9 Section 9.2.1.	

	stakeholders at large, may also be detailed in the EIA Report.		
	8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided	It is a Rough Stone quarry and open cast. Mining methodology will be followed from the top of the hill. Mining methodology is provided in Chapter 2 and Section 2.9 and Section 2.10 , Section 4.10 .	follow n 2.1
	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.	10 Km radius from the project periphery area is considered as study area. The 3 . The production and No waste generation from quarry activities are 2.7 .	a. The estim
	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,	The environmental sensitive areas covering an aerial distance of 15km from the 3.2 and Table 3-1 . Land use of the study area is provided in Figure 3-6 and Table 3-3 with delineation of forest area, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements, etc.	rom t eline s, hu

	of change of land use should be given	
	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	It is a government poramboke land lease obtained lease for 20 years by the issues are involved in the proposed project. No waste or Sub-grade mineral is anticipated during the mining plan period, and utilized. Hence, no waste dump is proposed, and waste dump management is
	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. No forest land is not involved in the lease area.
	13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of Net Present	Not applicable. No forest land is not involved in the lease area.

	Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished	
	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. No scheduled tribes and other traditional forest dwellers are observed in the non-forest government poramboke land.
	15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given	The list of Reserve forests available within the 15km radius is provided in Chapter 3.
	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	Baseline Biological survey was carried out to assess the ecology of the study area. The study identified various types of shrubs, climbers, and herbs. Similarly, the faunal diversity is grouped into mammals, birds, reptiles, and amphibians. There are no extinct flora and fauna species found in the study area. The biodiversity details are provided in the Chapter 3, Section 3.9.
	17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within	No Biosphere Reserves, Wildlife Corridors, Tiger/ Elephant Reserves are present in the study area. The detailed Environmental Sensitivity areas within the 15km radius of the project are provided in Table 3-1 & Figure 3-3.

10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.		
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	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 and list of Flora & Fauna is detailed is given in Chapter 3, Section 3.10	10 km radius of the periphery of the mine lease]

	details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost	
	19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali 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, Since the proposed project area is not falls under Critically Polluted
	20) Similarly, for Coastal Projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease with respect to CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not applicable since proposed lease does not fall under CRZ area.
	21) R&R Plan/compensation details	

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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.	11. Soil Quality Section 3.8 ICAR (Indian Council of Agricultural research) 12. Ecology Section 3.9 Flora and Fauna 13. Social Economic Status Section 3.10 (Socio Economic Profile of Study area (Population Profile, Employment etc.,)	
23) Air quality modeling 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 modeling should be provided. The air quality	AERMOD Air quality modeling has been carried out to predict the air quality due to impacts within the 10km radius of the project site for PM₁₀, PM_{2.5} and NO_x 4, Section 4.2.4. The maximum ground level concentration observed due to mining activities for PM₁₀, PM_{2.5}, and NO_x are 18.0 µg/m³, 9.7 µg/m³ and 15.0 µg/m³ respectively. The details are given in Chapter 4, Section 4.2.3 Predominant wind direction 4-1.	

	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.		
	24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The water requirement for the project is addressed in Chapter 2, Section 2.1	
	25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	No ground water withdrawal to meet the water requirement. The required water will be procured from authorized 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.	Water conservation measures are proposed in Chapter 4 and Section 4.3 . Rainwater harvesting detailed are provided in Chapter 3, Section 4.3.2 .	
	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	Impacts on water environment & water conservation measures are proposed	

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	The proposed depth of mining is 48.47 m from the top of the hill. Mining activities will not intersect with ground water table as the proposed hill. The PP will provide the Hydro Geological Study report will be submitted at the	
29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Not Applicable. There are no streams, or seasonal streams passing through the project area. However, TAMIN provided all safety measures for nearby water bodies are provided.	
30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic	The altitude of the area is 85 m (Maximum) above MSL and average annual water level is 8.12 m depth from ground level. Site Salient features are given in Chapter 2, Table 2-2.	

	diagram may also be provided for the same	
	31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	About 0.18.2 Ha of area is proposed for Green Belt development. It proposed Development plan is given in Chapter 2, Section 2.16.8, Table 2 22.
	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	Impacts and mitigation measures on transportation is given in Chapter 4, Section 4.16.8

	(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																
	33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Sanitation facilities are provided to mine’s workers in temporary structures in the area. The area breakup details are given in Chapter-2, Section 2.11.1, <table><tr><th>District</th><th>Taluk</th><th>Village</th><th>S.F No</th><th>Area (Ha.)</th></tr><tr><td>Perambalur</td><td>Perambalur</td><td>Aranarai North</td><td>120/2A1A Part</td><td>9.00</td></tr><tr><td colspan="4">Total</td><td>9.00</td></tr></table> Table 2-11.	District	Taluk	Village	S.F No	Area (Ha.)	Perambalur	Perambalur	Aranarai North	120/2A1A Part	9.00	Total				9.00
District	Taluk	Village	S.F No	Area (Ha.)													
Perambalur	Perambalur	Aranarai North	120/2A1A Part	9.00													
Total				9.00													
	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	Conceptual post mining land use and Reclamation and restoration sections and with adequate number of sections are provided in Error! Reference source not found.															
	35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical	Occupational Health impacts & preventive measures detailed given in Chapter 10 The EMP details are given as a separately as Chapter 10 along with EMP Cost															

	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.		
	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.	Occupational Health impacts & preventive measures detailed given in Chapter 10. The EMP details are given as a separately as Chapter 10 along with EMP Cost.	Chapter 10
	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	Impacts and measures are addressed in Chapter 4 and Section 4.5 and Section 4.6	Section 4.5 and Section 4.6
	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	The EMP details are given as a separately as Chapter 10.	

	land, if any, occupational health impacts besides other impacts specific to the proposed Project.	
	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	There is no litigation pending against the project.
	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The project Cost is addressed in Chapter 2 and Section 2.8, Table 2-9.
	A Disaster management Plan shall be prepared and included in the EIA/EMP Report	Disaster Management Plan is given in Chapter 7 and Section 7.1.2.
	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.	Project benefits are given 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	Executive Summary of EIA Report enclosed separately
	b) All documents to be properly referenced with index and continuous page numbering	All documents addressed with properly referenced with index and continuous page numbering

	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	Yes, sources for all tables are addressed.	
	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	All the analysis/testing reports of Water, Soil, Air, Noise etc. are conducted by MoEF&CC/NABL. The disclosure of consultant is given in Chapter 11.	
	e) Where the documents provided are in a language other than English, an English translation should be provided	The entire document is prepared in English only.	
	f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted	Noted.	
	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.	EIA is Prepared as per generic structure prescribed in Appendix-III of EIA Notification, 2009.	

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	It is Documentation Revised.
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, as it is a new project.
j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and	All the Sectional Plates are enclosed as Annexure-12

	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	
	In addition to the above, the following shall be furnished: - The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the	
	1. Project name and location (Village, District, State, Industrial Estate (if applicable).	Noted and followed the same.
	2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.	Noted and followed the same.
	3. Measures for mitigating the impact on the environment and mode of discharge or disposal	Noted and followed the same.
	4. Capital cost of the project, estimated time of completion	Noted and followed the same.
	5. The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity.	Noted and followed the same.
	6. A detailed study of the lithology of the mining lease area shall be furnished	Noted and followed the same.
	7. Details of village map, "A" register and FMB sketch shall be furnished.	FMB sketch & A-Register is attached as an Annexure – 2 & 3.

8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be submitted along with EIA report	Complied. The details are provided in Chapter 7, Section 7.1.4.
9. Obtain a letter /certificate from the Assistant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report.	AD Mines Letter is attached as an Annexure – 14.
10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010	Noted.
11. Detail plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.	Noted & will be provided during Final EIA submission.
12. The EIA study report shall include the surrounding mining activity, if any	Noted and followed the same.
13. Modeling study for Air, Water and noise shall be carried out in this field and incremental	The details are given in Chapter 4, Section 4.2.

	increase in the above study shall be substantiated with mitigation measures	
	14. A study on the geological resources available shall be carried out and reported	Estimated geological resources are provided in the Table 2-6 .
	15. A specific study on agriculture & livelihood shall be carried out and reported.	A specific study on agriculture & livelihood will be carried out & PP will provide
	16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.	Complied. The soil physical, chemical components of soil health details are provided in
	17. Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)	Noted and followed the same.
	18. Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population	Noted and followed the same.
	19. Identification of hazards in handling,	Noted and followed the same.

	processing and storage of hazardous material and safety system provided to mitigate the risk.	
	20. Likely impact of the project on air, water, land, flora-fauna and nearby population	Noted and followed the same.
	21. Emergency preparedness plan in case of natural or in plant emergencies	Noted and followed the same.
	22. Issues raised during public hearing (if applicable) and response given	Noted and followed the same.
	23. CER plan with proposed expenditure	Noted and followed the same.
	24. Occupational Health Measures	Noted and followed the same.
	25. Post project monitoring plan	Noted and followed the same.
	26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited agencies.	PP will provide the detailed hydro geological study through intuitions/NABET submission.
	27. A detailed report on the green belt development already undertaken is to be furnished and also submit the proposal for green belt activities.	Greenbelt development details are provided in the Chapter 4, Section 4.6.1.
	28. The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines.	Suitable control measure to control the fugitive emissions during the operations of the mines. Section 2.17.3.8.

	29. A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals	Biodiversity details are provided in the Chapter 3, Section 3.10.	
	30. Reserve funds should be earmarked for proper closure plan.	Complied. EMP with budget for green belt development and mine closure plan included in Chapter 10.	
	31. A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and forests (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. In this connection, the project proponent has to furnish the action plan.	PP will provide a detailed plan on plastic waste management during the final	
	Besides the above, the below mentioned general points should also be followed: -		
	a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.	Noted and followed the same.	
	b. All documents may be properly referenced with index, page numbers and	Noted and followed the same.	

	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.	Noted and followed the same.
	d. 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 also be followed.	Noted and followed the same.
	e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J - I1013/77/2004- IA-II(I) dated 2nd December, 2009, 18th March 2010,	Noted and followed the same.

	28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website http://www.moef.nic.in/ may be referred.	
	▪ After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.	Noted and followed the same.
	▪ The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance	Noted and followed the same.
	The TORs with public hearing prescribed shall be valid for a period of three years from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August 2017.	Noted and followed the same.

2 PROJECT DESCRIPTION

2.1 Type of Project including interlinked and interdependent projects

There are no Interlink and interdependent projects in this rough stone quarry. Lease land/quarry land is overextend of 9.00 Ha. The rough quarry follows semi mechanized open cast method by formation of benches. Benches are proposed with a height of 5m & 5m width bench not less than the height. The area applied for quarry lease is exhibits hilly terrain; the altitude in SF No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State.

The Geological reserves of rough stone have been computed based on the Geological Plan & Sections up to the economically workable average depth of 48.47 m from the Hilly terrain. the rough stone body works out to 42,30,446.76 m³. Summary of project reserves are provided in the **Table 2-1**.

The lease area falls in the survey of India Toposheet no 58I/15,16,11,12 and lies between the GPS coordinates of Longitude from 78°50'12.63"E to 78°50'14.32"E and Northern latitude from 11°15'57.70"N to 11°15'52.05"N

Table 2-1 Summary of Project Reserves

S. No	Description	Quantity (m ³)
Geological Reserves:		
1	Geological Reserves (ROM)	42,30,446.76
Mineable Reserves:		
1	Mineable Reserves (ROM)	62,75,058.873 (14 years)
3	Total Production for proposed 5 Year (at 100% Recovery)	2,292,123.57
4	Annual Peak Production	4,58,428 Tonnes

2.2 Need of the Project

The Rough stone, quarrying project falls in Perambalur District, Tamilnadu. Rough Stone is an important commercial product, with several applications. The proposed project will fulfill its end uses in building and construction of roads, paving and many other exterior projects. This project will give employment opportunities to 35 members. Mineral Industries of the state of Tamilnadu provide employment opportunities for the people of the state as well as in the specific project area. This also helps in countries' economic development

2.3 Location of the Quarry

The Quarry is located at S.F. No. 120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State Quarry lease area falls in the survey of India Toposheet no 58I/15,16,11,12 and lies between the GPS coordinates of Longitude from 78°50'12.63"E to 78°50'14.32"E and Northern latitude from 11°15'57.70"N to 11°15'52.05"N The area applied for quarry lease is exhibits hilly terrain; the altitude is 85.0m AMSL.

The boundary coordinates of the site are shown in **Table 1-5**. The project location map is given in **Figure 2-1**. Google image of the lease area is shown

Figure 2-2. 500m radius Google imagery of the lease area is shown in

Figure 2-3. Google Imagery of 1, 5 & 10km radius of the lease area is shown in **Figure 2-4**, **Figure 2-5** & **Figure 2-6** respectively. Environmental Sensitive areas within 15km radius of the lease area demarcated on Google image is shown in **Figure 2-7**. The top map of the study is shown in **Figure 2-9**. Salient Features within 15km radius of the project boundary is given in **Table 2-2**. Project Summary is provided **Table 2-1**.

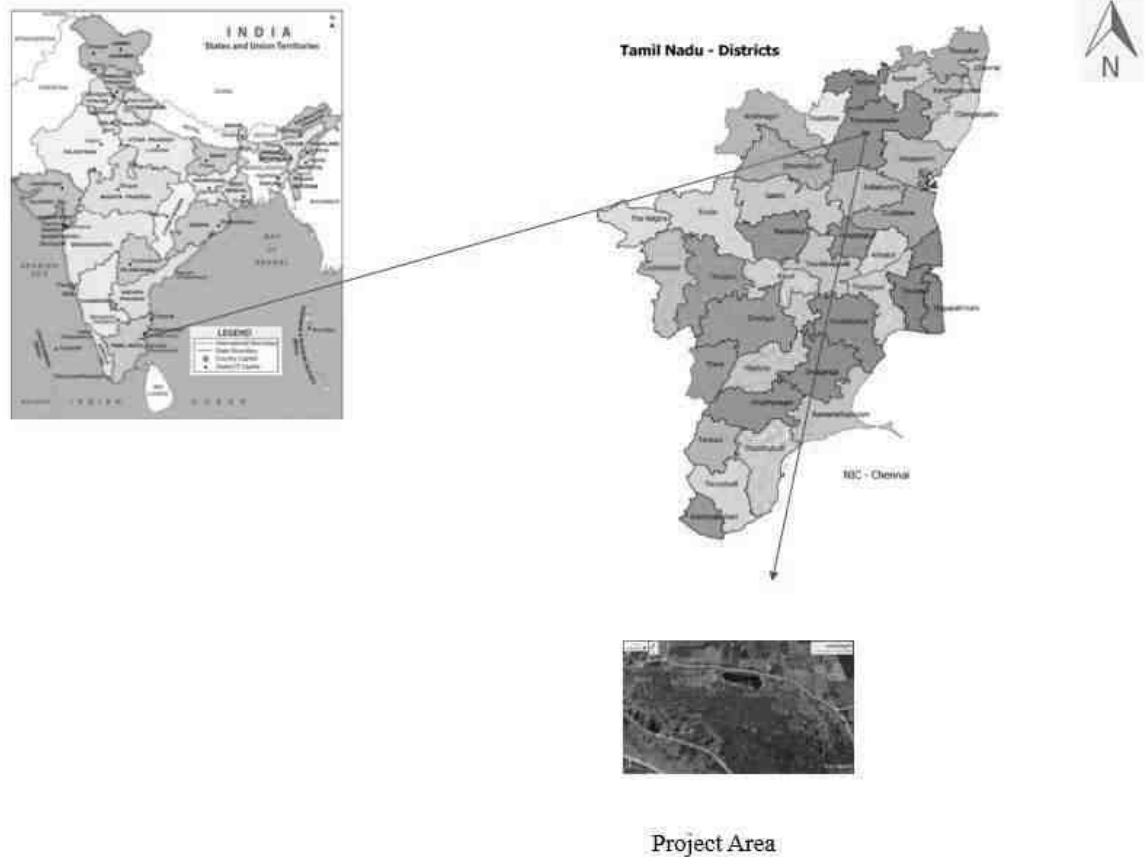


Figure 2-1 Project site Location map



Figure 2-2 Google image of the lease area



Distance Range	No. of Structures	Type of Structures (Kuchcha/ Brick/ Cement/ RCC/ Framed Structures)	Ownership (Belongs to PP/ Not belongs to PP)
0-50m	-	-	Not belongs to PP
50-100m	2	motor Room/ Shed	Not belongs to PP
100-200m	1	Crusher Unit	Not belongs to PP
200-300m	5	Motor Room / Shed	Not belongs to PP

Figure 2-3 500m radius google imagery map of the lease area



Figure 2-41km radius google imagery map of the lease area



Figure 2-5 5km radius google imagery map of the lease area

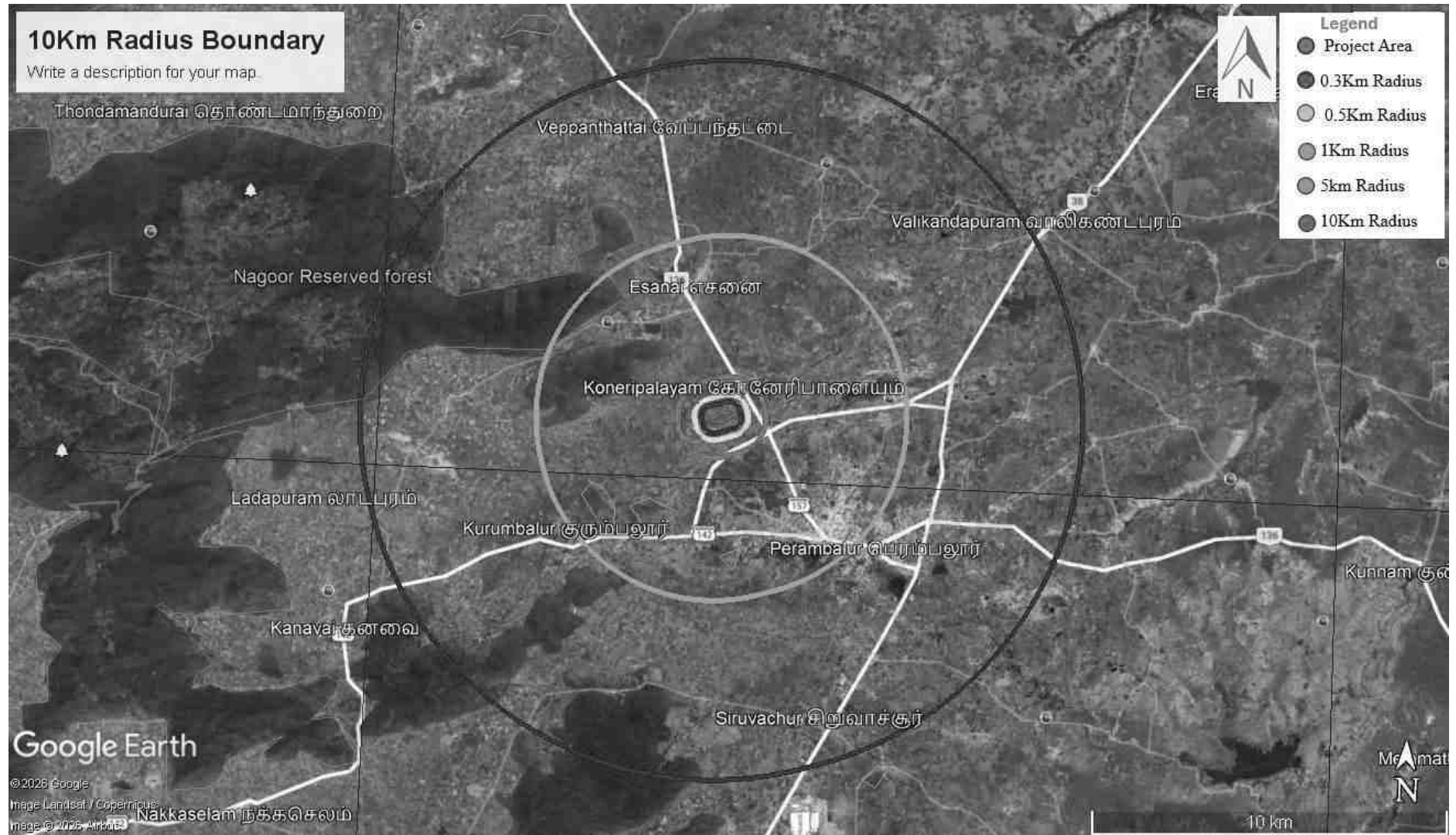


Figure 2-610 km radius google imagery map of the lease area

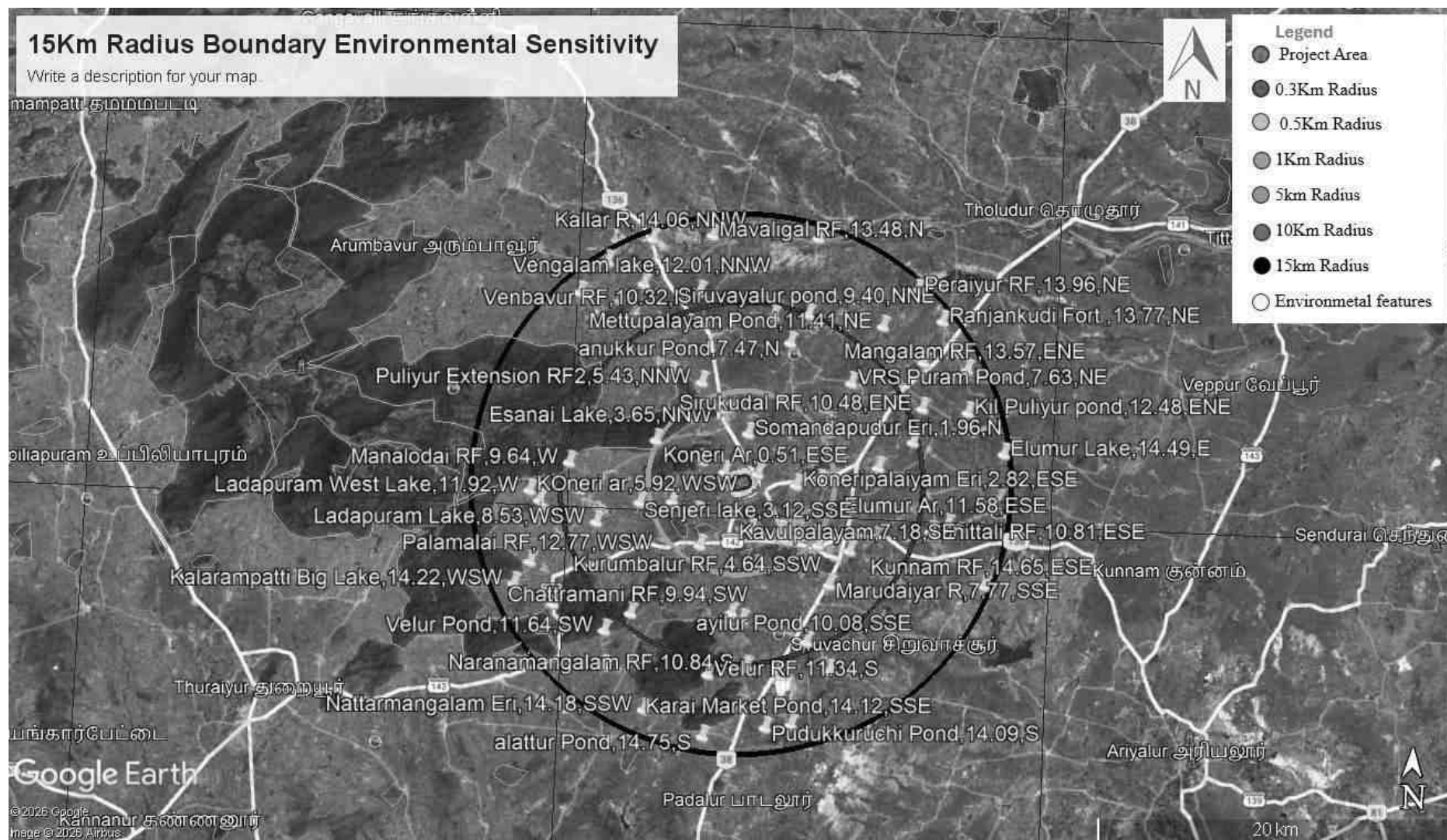


Figure 2-7 Environmental Sensitivity map of the study area



Figure 2-8 Project Site photographs

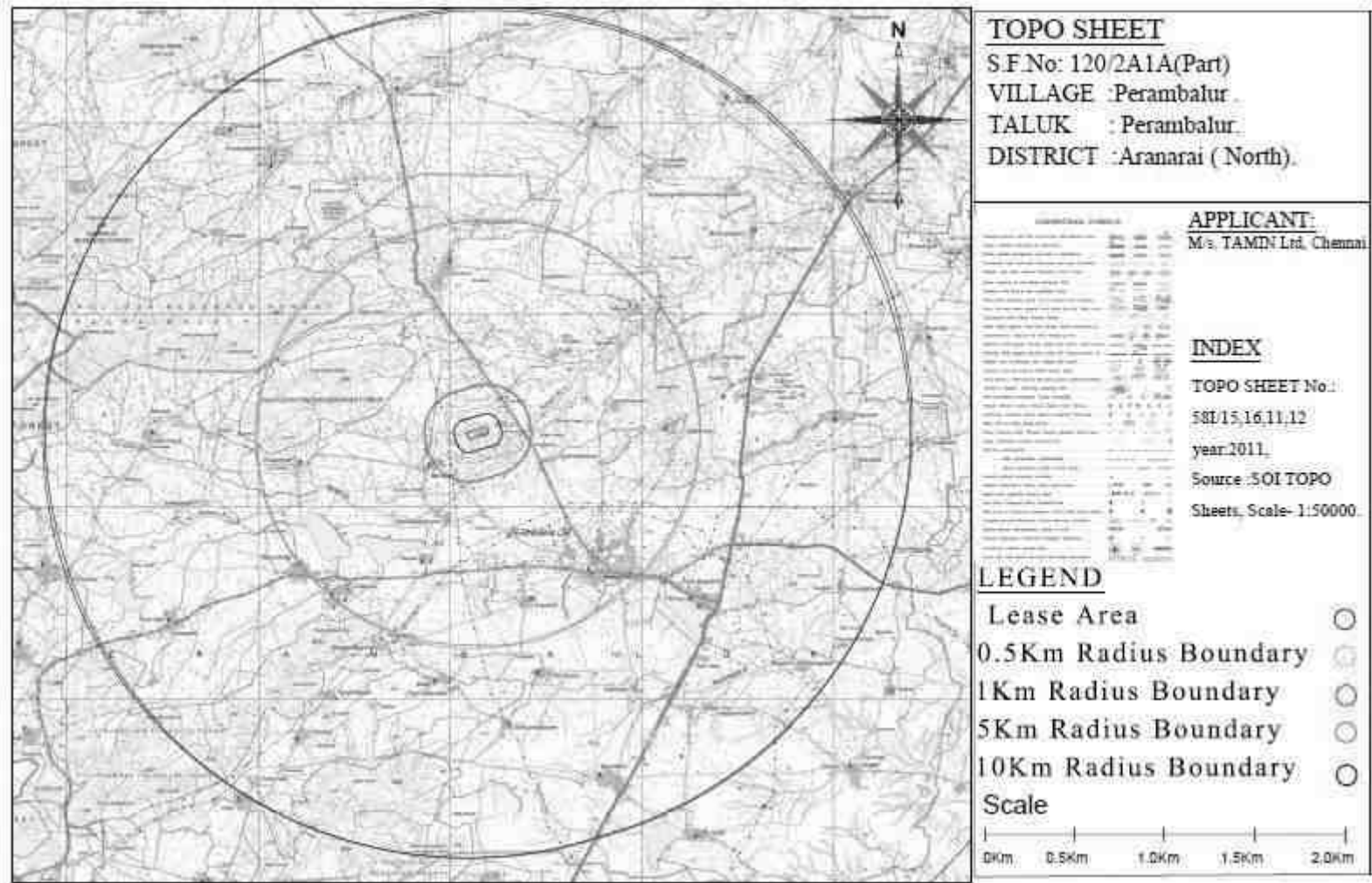


Figure 2-9 Topo map of the study area

Table 2-2 Salient Features within 15km radius of the lease area

S. No	Particulars	Details		
1	Latitude & Longitude	78°50'12.63"E to 78°50'14.32"E 11°15'57.70"N to 11°15'52.05"N		
2	Site Elevation above MSL (m)	85.0m AMSL		
3	Topography	Hilly terrain		
4	Lease area Topo Sheet details	58I/15,16,11,12		
5	Land classification	Government Poramboke land		
6	Nearest highway	NH45 Chennai Trichy Hwy,6.68, SE		
7	Nearest Railway station	SH 142 Thuraiyur Perambalur Rd,3.13,S		
8	Nearest Airport	Tiruchirappalli International Airport,55.93, S		
9	Nearest Town / City	Town: Peranbalur,4.91SE City/ District HQ: Peranbalur,4.91SE		
10	Areas which are important or sensitive for ecological reasons – Wetlands, Watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Description	Dist. (~Km)	Dir.
		Sweta Nadi	13.64	NNE
		Kallar R	14.06	NNW
		Canal	14.22	NW
		Konmathura Pond	13.87	NNW
		Vengalam lake	12.01	NNW
		Siruvayalur pond	9.4	NNE
		anukkur Pond	7.47	N
		Palaiyur pond	8.77	N
		Mettupalayam Pond	11.41	NE
		Tambai Pond	11.66	ENE
		Koneri Ar	0.51	ESE
		Kil Puliur pond	12.48	ENE
		Sirukudai Pond	9.41	ENE
		Elumur Lake	14.49	E
		Elumur Ar	11.58	ESE
		Marudaiyar R	7.77	SSE
		Toramangalam Pond	5.65	SE
		Kavulpalayam	7.18	SE
		Sengunam Pond	7.29	E
		VRS Puram Pond	7.63	NE
		MGR Nager Pond	4.97	ENE
		ayilur Pond	10.08	SSE
		Varaguppadi Pond	11.96	SSE
		Karai Market Pond	14.12	SSE
		Pudukkuruchi Pond	14.09	S
		Marudati Pond	10.73	S
		alattur Pond	14.75	S
		Pudunaduvalur Pond	8.13	S
		Punnampatti Pond	13.18	SW

		Velur Pond	11.64	SW	
		Nattarmangalam Eri	14.18	SSW	
		Kalarampatti Big Lake	14.22	WSW	
		Ladapuram Lake	8.53	WSW	
		Ladapuram West Lake	11.92	W	
		Canal	11.43	W	
		Canal	11.43	WSW	
		KOneri ar	5.92	WSW	
		Annamagalam Lake	6.93	NW	
		Kurumbaur Lake	4.11	WSW	
		Senjeri Lake	3.31	SW	
		Alambadi Lake	0.85	W	
		Esanai Lake	3.65	NNW	
		Somandapudur Eri	1.96	N	
		Koneripalaiyam Eri	2.82	ESE	
		Elambalur Lake	4.02	E	
		Vella Thangiyamman Lake	4.22	SSE	
		Aranarai Eri	3.75	SSE	
		Senjeri lake	3.12	SSE	
		Check Dam	1.07	S	
11	Reserve Forests	Description	Dist. (~Km)	Dir.	
		Puliyur Extension RF	2.19	WNW	
		Pachaimalai Hills	5.04	WNW	
		Puliyur Extension RF2	5.43	NNW	
		Manalodai RF	9.64	W	
		Palamalai RF	12.77	WSW	
		Nakkaselam RF	12.87	SW	
		Kurumbalur RF	4.64	SSW	
		Chattramani RF	9.94	SW	
		Siruvachur RF	7.77	S	
		Velur RF	11.34	S	
		Naranamangalam RF	10.84	S	
		Chittali RF	10.81	ESE	
		Kunnam RF	14.65	ESE	
		Sirukudal RF	10.48	ENE	
		Mangalam RF	13.57	ENE	
		Peraiyur RF	13.96	NE	
		Venbavur RF	10.32	N	
		Mavaligal RF	13.48	N	
12	Seismic Zone	Zone-II (Low risk)			
13	Defense Installations	Nil within 15 km radius			
14	Interstate Boundary	Nil within 15 km radius			

- The project area does not fall in CRZ zone.
- There are no Western Ghats within the radius of 15 Km from project area.
- There are no notified bird sanctuaries or wildlife sanctuaries as per Wildlife protection Act 1972, within a radius of 15 Km.
- The project does not fall in the 'HACA' region.

Project Summary:

S. No	Particulars	Details
1.	Project Location	SF.No.120/2A1A of Aranarai (North) Village, Perambalur Taluk & District, Tamil Nadu State
2.	Land classification	Government Poramboke land
3.	Extent of lease area (Ha.)	9.00
4.	Precise area	Precise area communication has been granted vide Assistant Director, Geology and Mining, Perambalur District, Letter. No. Rc.No.202/G&M/2025 dated 29.10.2025
5.	Lease Period	20 years
6.	Estimated Geological Reserves M ³	42,30,446.76
7.	Estimated Mineable Reserves M ³	62,75,058.873 m ³
8.	production per annum M ³	4,58,428 Tonnes
9.	Depth of Mining	48.47m above ground level (from Top of the hill)
10.	Method of Mining	Open cast semi mechanized method
11.	Water Requirement (KLD)	3.5
12.	Source of Water	Authorized vendors and local panchayat
13.	Power requirement (kVA)	60
14.	Power Backup (DG set) kVA	1* 125
15.	Fuel requirements (Lts/Day)	200
16.	Manpower (Nos)	35
17.	Municipal Solid Waste Generation (kg/day)	15.75
18.	Waste Oil generation (Lts/Year)	3.0
19.	Project Cost in Lakhs	99.97 (1 Cr)

2.4 Nearest Human Settlement

The details of nearest human settlement from the project site are provided below in **Table 2-3**.

Table 2-3 Nearest Human Settlement

S. No	Name of the villages	Distance (~km) & Direction	Population (Census 2011)
1	Aranarai	0.74	2752
2	Chokkanathapuram	1.76	9005
3	Perambalur	1.44	24659

2.5 Details of alternate sites considered

There are no alternative sites examined. Since quarry reserves are site specific.

2.6 Size or Magnitude of operation

The rough stone quarrying operations is carryout by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 5m & 5m.

Mineable Reserves have been computed as 62,75,058.873 M³ based on the Conceptual Plan and sections. Production is estimated at 2,292,123.57 tonnes of rough stone in the first five-year period, 2,292,129.566 tonnes in the second five-year period, and 1,690,801.752 tonnes in the remaining four-year period. An open-cast semi-mechanized method will be followed for the proposed mining, as per the mining plan. Sectional plates are enclosed as **Annexure-4. Table 2-4.**

Table 2-4 Land use details of the quarry area

S. No	Description	During the Life of the Mine (Ha)
1	Mining (Quarry)	7.68.0
2	Infrastructure	0.01.0
3	Mine Road	0.01.0
4	Afforestation	0.18.2
5	Unutilized Aea	1.11.8
Total		9.00.0

2.7 Geological Reserves

The Geological reserves of rough stone have been computed based on the Geological Plan & Sections up to the economically workable average depth of 48.47 m from the surface level and the top surface of the rough stone body works out to 42,30,446.76 m³. Rough stone Quarry Reserves is given in **Table 2-5**. Estimation of Geological Reserves and Mineable Reserves at present availability is given in **Table 2-6**. Mineable Reserve are given in **Table 2-7**. Yearwise Production details are given in **Table 2-8**. Surface Plan of the Quarry is given in **Figure 2-10**. Environmental Plan is shown as **Figure 2-11**.

Table 2-5 Rough Stone Quarry Reserves

S. No	Description	Quantity (m ³)
Geological Reserves:		

1	Geological Reserves (ROM)	42,30,446.76
Mineable Reserves:		
1	Mineable Reserves (ROM)	62,75,058.873
2	Mineable Reserves (at 100% Recovery)	62,75,058.873
3	Total Production for proposed 5 Year	22,81,839.59
4	Annual Peak Production	4,58,428 Tonnes

2.7.1 Present Estimation

The details of estimation of Geological Reserves and estimation of Mineable Reserves as per present ground reality have been furnished with reference to the Geological Plan & Sections and Conceptual Plan & Sections as shown in Plate No.3 and Plate No.6 respectively.

Table 2-6 Estimation of Geological Reserves and Mineable Reserves at present

S. No	Geological (M ³)	Mineable Reserves (M ³)	Mineable Saleable Rough Stone Reserves 100% Recovery (M ³)	Mineable Saleable Rough Stone Reserves 100% Recovery (M ³)
1	42,30,466.76	22,81,839.59	22,81,839.59	62,75,058.873

Mineable Reserves:**Table 2-7 Mineable Reserves**

Year	Run of Mines in		Saleable Rough Stone Recovery @ 100%	
	M ³	Tonnes	M ³	Tonnes
First	166699.40	458423.350	166699.40	458423.350
Second	166701.00	458427.750	166701.00	458427.750
Third	166699.90	458424.725	166699.90	458424.725
Fourth	166700.18	458425.495	166700.18	458425.495
Fifth	166699.00	458422.250	166699.00	458422.250
Total	833499.48	2292123.57	833499.48	2292123.57

Anticipated Life of the Quarry:

Updated Mineable Reserves : 22,81,839.590 M³

Average Production per annum : 4,58,428 Tonnes

Anticipated Life of the Quarry : 62,75.058.873/4,58,428 Tonnes, 13.68@14 years.

Table 2-8

Year wise

Year	Run of Mines in		Saleable Rough Stone Recovery @ 100%	
	M ³	Tonnes	M ³	Tonnes
Sixth	166699.95	458424.863	166699.95	458424.863
Seventh	166700.10	458425.275	166700.10	458425.275
Eighth	166700.70	458426.925	166700.70	458426.925
Ninth	166700.70	458426.925	166700.70	458426.925
Tenth	166700.21	458425.578	166700.21	458425.578
Total	833501.66	2292129.566	833501.66	2292129.566

Production details

Block -II

Specific Gravity for Rough stone: 2.75.**Source: Appendix II of the TMMCR, 1959 Note: No.2**

Block -III

Year	Run of Mines in		Saleable Rough Stone Recovery @ 100%	
	M ³	Tonnes	M ³	Tonnes
Eleventh	166699.95	458424.863	166699.95	458424.863
Twelfth	166700.13	458425.358	166700.13	458425.358
Thirteenth	166700.05	458425.138	166700.05	458425.138
Fourteenth	114736.87	315526.393	114736.87	315526.393
Fifteenth	Nil	Nil	Nil	Nil
Total	614837.00	1690801.752	614837.00	1690801.752



Figure 2-10 Surface Plan of the Quarry



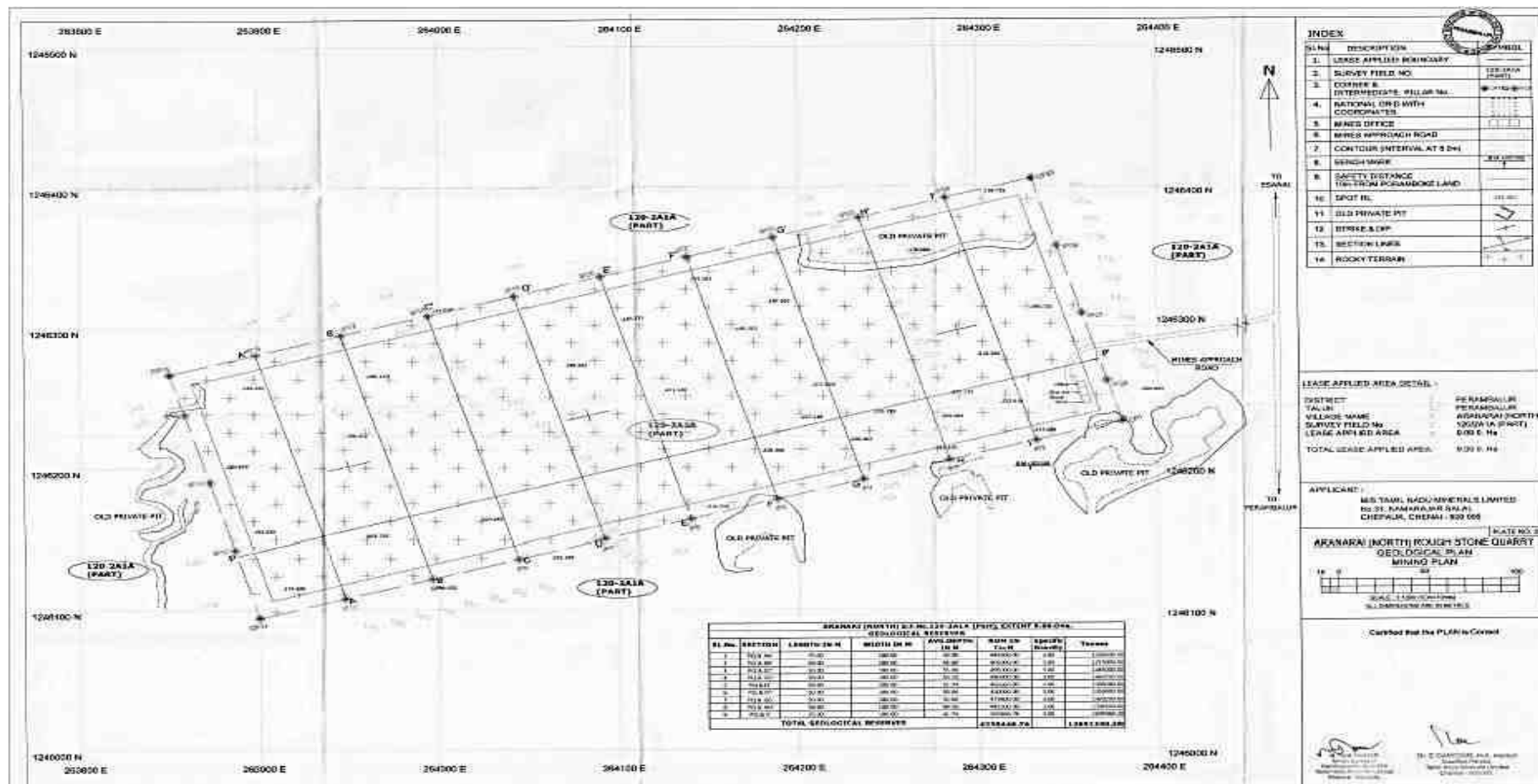


Figure 2-12 GEOLOGICAL & MINEABLE RESERVES (WITH SECTION) Plan

2.8 Project Cost

The project cost is summarized in **Table 2-9**.

Table 2-9 Project cost

S. No	Description of the Cost	Amount in Rs.
A. Fixed Cost		
1	Land Cost	Nil. Because Govt. land
2	Labour shed	50,000/-
3	Sanitary facilities	50,000/-
4	Fencing Cost	1,25,000/-
Total		2,25,000/-
B. Operational Cost		
1	Jack Hammers	1,98,000/-
2	Compressor	19,82,000/-
3	Blasting	4,87,000/-
4	Diesel General	4,00,000/-
5	Excavators	6,00,000/-
6	Tippers	58,00,000/-
7	Drinking water facilities for the labours	50,000/-
8	Safety kits	50,000/-
Total Operational Cost		95,67,000/-
C. EMP Cost		
1	Afforestation	30,000/-
2	Water Sprinkling	50,000/-
3	Water Quality test	25,000/-
4	Air Quality test	25,000/-
5	Noise/Vibration test	25,000/-
6	CSR activities	50,000/-
Total EMP Cost		2,05,000/-
Total Cost of the Project (A+B+C)		99,97,000/-

2.9 Technology & Process Description

2.9.1 Technology

The primary step of mining minerals is the removal of the deposits from the ground. Once the minerals / ore are removed, an additional preparation process is required to isolate the valuable minerals from their waste gangue minerals. There are two basic methods of mining of minerals opencast and underground mining. The choice of method depends on the geological, hydrological, geo-technical, geographic, economic, technological, environmental, safety, Socio - political and financial considerations. Schematic Diagram of Mining Process is given in **Figure 2-13**.



Figure 2-13 Schematic Diagram of Mining Process

2.9.1.1 Method of Mining-Open Cast Working

In accordance with Regulation 106(2) (a) of the Metalliferous Mines Regulations 1961, in all open cast workings where the ore body forms a hard rock, the working faces and sides should be adequately benched and sloped; A bench height not exceeding 5m and a bench width not less than the height must be maintained. The slope angle of such benches and sides should not exceed 60° from horizontal.

However, observance of these statutory provisions into rough stone dimensional stone mining is seldom possible due to the field difficulties and technical reasons as given below:

- 1) Recovery of the rough stone mineral should be as undamaged rectangular dimensional blocks. In the attempt to form the benches and sides with the above statutory parameters, haphazard blasting may be involved. In which case, the commercial rough stone body may get damaged due to generation of blasting cracks.
- 2) In the exercise of forming the benches with 60° slope within the rough stone deposit, the portion confined between vertical and 60° as well as its complimentary part in the extricated block will become mineral waste while shaping into rectangular blocks.
- 3) Formation of too many benches with less height and the width equal to the height may lead to large volume of mineral locked up.

Hence to avoid mineral locked-up and to facilitate economical and convenient mining operations, it is proposed to obtain relaxation to the provisions of Regulation 106(2) (a) up to a bench parameter of 5m height and 6m width with vertical faces. Such a provision for relaxation of the Regulation has been provided within regulation 106(2). Further, it is to be noteworthy that opencast rough stone mining operations with the above proposed bench parameters may not be detrimental to Mines Safety, since the entire terrain is made up of hard rock, compact sheet and possess high stability on slope even at higher vertical angles.

It is proposed not to back fill the pit in as much as good quantities of reserves are underlining the pits. A mine office, storeroom, first-aid room and workers rest shelter will be provided within the lease area where mining is not proposed due to technical reasons and quality consideration.

2.10 Process Description

2.10.1 Mining

An open cast semi mechanized mining with a 5m vertical bench with a bench width of 5m has been proposed. On 10m safety distance has been earmarked for the adjoining Govt lands.

Under regulation 106(2) (a) of the Metalliferous Mines Regulations, 1961, in all open cast workings in hard ore body, the benches and sides should be properly benched and sloped. The bench height should not exceed 6m and the bench width should not be less than the bench height. The slope of the benches should not exceed 60° from horizontal.

As far as the mining of rough stone dimensional stones is concerned, observance of the provisions of the Regulation 106(2) (a) as above is seldom possible due to various inherent petrogenetic and mining difficulties.

Hence it is proposed to obtain relaxation to the provisions of the above regulation from the Chief Inspector of Mines, for which necessary provision is available within Regulation 106 (2) (a).

Opencast method of shallow mining is proposed. Excavators will be used to carry out the quarrying of rough stone up to a depth of 48.47 m (AGL) Above ground level for the drilling and blasting are proposed in this quarry. The excavated rough stone will be directly loaded into the Tippers/lorries and sent to the local market/needy customers.

Opencast semi mechanized mining using jackhammer drilling, blasting, excavation through excavator & mineral transport through tippers will be carried out. The top gravel is soft and can be directly excavated. The rough stone below will be blasted and then excavated. Bench height of 5m & 5m width is considered

Sl. No	Name of the Equipment	Capacity	Requirements	Power
1	Jack Hammer (32mm dia.)	1.2 to 6m	4	Compressed Air
2	Compressor	400 psi	1	Diesel Drive
3	Tractor Mounted Air Compressor	-	1	Diesel Drive
4	Diesel Generator	125kva	1	Diesel

II. LOADING EQUIPMENT

S. No	TYPE	Nos.	Capacity	Power
1	Excavator with Bucket and Rock Breaker.	1	300LC	Diesel Drive

III. HAULAGE WITHIN THE MINE & TRANSPORT EQUIPMENT

S. No	TYPE	Nos.	Capacity	Make	Power
1	Dumper	3	25Tonnes	Man	Diesel Drive

The above machineries are adequate to meet out the simultaneous development and production schedule drawn out in this Mining Plan

2.10.2 Blasting

The blasting parameters in the mining of rough stonedimensional stone are entirely different from that of industrial minerals since the basic purpose for the use of explosives in both the cases are entirely different.

The portion to be extricated from the parent rock body is freed in all planes by adopting different methods. Only mild explosives such as gun powder, detonating cord, ordinary detonators etc. will be used to produce rough stone blocks. The blast holes of 32mm dia. are drilled up to the bottom of the horizontal plane all along the required vertical planes without deviation.

Conventional 32mm dia. blast holes are drilled perfectly parallel to each other at 20cm to 25cm intervals without any hole deviations, all along the required plan of splitting. The holes are drilled up to a depth a few cm above the required horizontal plane. Sub-grade drilling is not necessary since the splitting will be affected up to a further distance of few cm from the drill hole on blasting. Since the splitting will be affected up to a further distance a few cm from the drill hole on blasting. Such sub grade drilling may affect the underlying rough stone deposit.

The massive formation shall be broken into pieces of portable size by drilling and blasting using jack hammers and shot hole blasting. Powder factor of explosives for breaking such hard rock shall be in the order of 6 to 7 Tonnes per Kg of explosives. Blasting parameters are as follows.

1. Diameter of the hole : 30-32 mm
2. Spacing between holes : 1.2m
3. Depth of each hole : 1 to 1.5m
4. Burden for hole : 1.0m
5. Inclination of hole : 80° from horizontal
6. Use of delay detonators : NONEL/Electronic
7. Detonating fuse : Detonating cord
8. Blasting Design : Staggered ' V ' Pattern

The explosives required for this mine are obtained from the authorized, licensed dealer for which necessary permission will be obtained from the authority concerned. The blasting will be under the direct supervision of the statutory persons of TAMIN as approved by the DGMS under MMR, 1961.

2.10.3 Loading & Transportation

Hired Tippers having 10Ts capacity will be utilized for Transportation of excavated rough stone. The tippers will be covered by Tarpaulin to prevent spillage and dust emission. During the transportation of material through the village and populated area vehicles are strictly prohibited not to exceed the 40km speed limit

2.11 Exploration

Systematic geological mapping and demarcation of the commercially viable rough stone deposit has been prepared with relevant structural features such as dip and strike of the country rock. Different joint patterns and their pattern of repetition etc., have been marked. Based on these features, estimation of geological reserves and mineable reserves have been arrived, Hence no exploration Programme is envisaged during the fourteen-year period of mining.

2.11.1 Storage of Explosives

The applicant will engage an authorized explosive agency to carry out the small amount of blasting as such no storage of explosives is envisaged for this proposal. The blasting will be supervised by DGMS authorized Mines Foreman /Mines Manager certificate of competency.

2.11.2 Mine Drainage

The lease applied area features a hillock terrain, entirely covered with rocky outcrops. The region experiences moderate rainfall, resulting in sparse vegetation growth within the lease area. Nevertheless, efforts will be made to plant trees and enhance the local ecosystem. The area's elevation ranges up to 85.0 meters above Mean Sea Level (MSL), with an average annual rainfall of approximately 816.0 mm. During the rainy seasons the surface run of water and the ground water are collected at one point called as sump and dewatered nearby agricultural field with the help of 10HP oil engines.

2.11.3 Disposal of Waste

No waste or sub-grade mineral is anticipated during the mining plan period, as all excavated material is saleable and fully utilized. Hence, no waste dump is proposed, and waste dump management is not applicable for this lease area.

2.11.4 Topsoil Management

Topsoil will be properly stacked at earmarked dump site with adequate measures. It will be used for growing plants along the fringes of the site roads and reclamation of external dump and backfilled areas. The top-soil stockpiles will be low height and will be grassed to retain fertility. Besides these topsoil stacks there will be temporary stacks near the excavation area and the area to be reclaimed which will be made use of for concurrent lying without bringing the topsoil to the soil stack near the OB dump.

2.11.5 Stabilization of Dump

As the waste generation in the mine includes hard rock fragments of considerable size and irregular shape with varying angularity, the waste dump will be stable on its own even at higher slopes of the sides. However, suitable variety of soil will be identified and brought from outside and used for increasing the stability of the sides of the waste dumps and also for planting trees over the dumps in a phased manner.

2.12 Requirements**2.12.1 Land Requirement and Land Use Planning**

Quarry Land details are shown in **Table 2-10** and Land use pattern is provided in **Table 2-11**.

Table 2-10 Quarry Land details

District	Taluk	Village	S.F No	Area (Ha.)	Classification
Perambalur	Perambalur	Aranarai North	120/2A1A Part	9.00.0	Government poramboke land
Total				9.00.0	

Table 2-11 Land Use Pattern of the lease area

S. No	Description	During the Life of the Mine (Ha)
1	Mining (Quarry)	7.68.0
2	Infrastructure	0.01.0
3	Mine Road	0.01.0
4	Afforestation	0.18.2
5	Un utilized Area	1.11.8
Total		9.00

2.12.2 Water Requirement

The total water requirement is 3.5KLD. The total water requirement will be met from authorised vendors or local panchayat. The rough quarry will not produce toxic effluent in the

form of solid, liquid or gas. No wastewater will be generated by quarry operation except domestic sewage. Domestic sewage will be disposed to septic tank followed by soak pit. Septic tank will be cleaned periodically. The water requirement details are given in **Table 2-12**.

Table 2-12 Water requirement breakup

S. No	Description	Water Requirement (KLD)
1	Drinking & Domestic purpose	1.0
2	Dust suppression	1.5
3	Green Belt	1.0
Total		3.5

2.12.3 Power & Fuel Requirement

The Power and Fuel requirement details are given in **Table 2-13**.

Table 2-13 Power Requirements

S. No	Description	Power Required
1	Power requirement (kVA)	60
2	Power Backup (DG set)	1*125 kVA
3	Fuel requirements (Lts/Day)	200

2.12.4 List of Equipment

The list of Equipment is given in **Table 2-14**.

Table 2-14 List of Machineries

S. No	Purpose	Machinery	Numbers	Capacity	Make	Motive Power
1	Drilling	Jack Hammer (32mm dia)	6	1.2 to 6 m	Atlas Copco	Compressed Air
		Compressor	2	400 psi	Atlas Copco	Diesel Drive
		Tractor Mounted Air Compressor	1	-	-	Diesel Drive
		DG	1	125 KVA	Powerica	Diesel
2	Loading	Excavator	1	3000 LC	TATA Hitachi	Diesel Drive
3	Transport	Dumpers	2	25 Tons	Ashok Leyland	Diesel Drive

2.12.5 Manpower Requirement**Table 2-15 Manpower Details**

S.No	Description	No of Persons
Direct Manpower		
1	Manager (Second Class Manager certificate of competency Restricted)	1
2	Mine Foreman (Foreman Certificate of competency Restricted)	1
3	Operators & Drivers	7
4	Workers (Skilled, semiskilled & unskilled)	26
Total		35
Indirect Manpower		20

2.12.6 Solid Waste Management

The municipal solid waste generation and management details are given in **Table 2-16**.

Table 2-16 Municipal Solid Waste generation & Management

S. No	Type	Quantity Kg/day	Disposal method
1	Organic	6.3	Panchayat bin including food waste
2	Inorganic	9.45	TNPCB authorized recyclers
Total		15.75	

As per CPHEEO guidelines: MSWpercapita/day=0.45

2.12.7 Hazardous waste Management

The type of hazardous waste and the quantity generated are detailed in **Table 2-17**.

Table 2-17 Hazardous Waste Management

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

2.13 Infrastructure facilities

Mine office, storeroom, first-aid room etc, will be provided on semi-permanent structure within the lease area.

2.14 Resource optimization/recycling and reuse envisaged in the project.

No optimization/recycling and reuse envisaged in the rough stone quarry.

2.15 Availability of water its source, Energy/power requirement and source

This quarry project does not require huge water and quarry operation will be carried out during the general shift only. Limited Scale of activities entails only the negligible power requirement and the same is met from TNEB or from solar light.

2.16 Schematic Representations of the Feasibility Drawing which Give Important Information for EIA Purpose

A schematic representation of the overall feasibility and environmental assessment process is shown in **Figure 2-14**. The EIA process is composed of the following stages:

- Study of project information
- Screening & Scoping
- Environmental pre-feasibility study & application for approval of TOR
- Collection of detailed project management plan/report
- Baseline data collection
- Impact identification, Prediction & Evaluation
- Mitigation measures & delineation of EMP
- Risk Assessment and Safety & Disaster Management plan

- Review & Draftization of EIA report based on the TOR requirements.
- Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

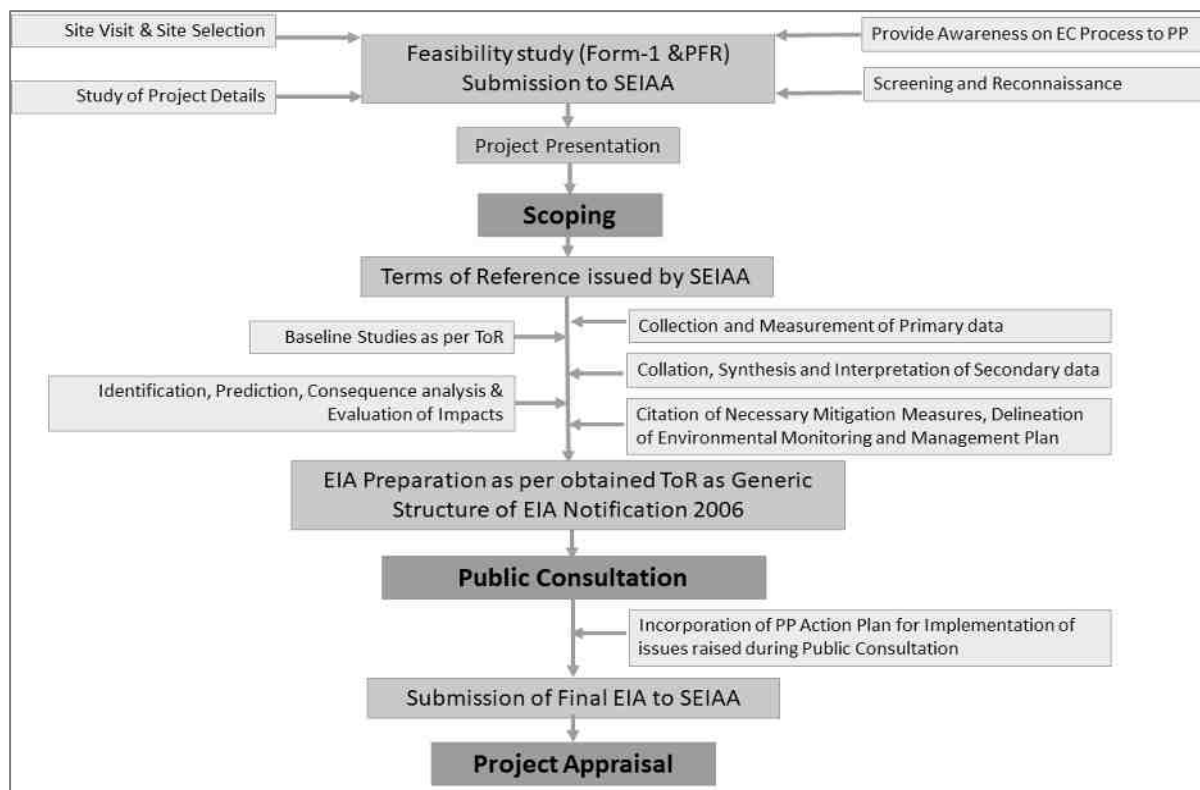


Figure 2-14 Feasibility & Environmental Assessment Process

2.17 Description of Mitigation Measures Incorporated into the Project to Meet the Environmental Standards

From an environmental perspective, this phase is of paramount significance due to its potential to invoke long-term impacts. The adverse effects that are likely to occur during operational phase of the project are: Air Pollution (gaseous emissions), Effluent/Sewage generation, Noise generation, Solid waste generation etc.,

2.17.1 Land Environment

Landscape will be changed due to open cast quarry. There will be no land subsidence as area is made up of hard rock. Aesthetic environment will be affected. Soil cover and the weathered material accounts for the Over Burden. Agriculture is seen mainly in the plains far away from the lease area. A few bushes will be cleared to facilitate mining and other related activities and there are no big trees.

2.17.1.1 Discharges on Land-Impact

Domestic:

Domestic wastewater is being disposed into septic tank followed by soak pit.

Mitigation Measures

- ▶ The mine waste in the mine includes the topsoil/rock fragments and rubble generated as mineral rejects during production works and the country rock fragments generated during development works as approach road formation or dumping yard sites etc.,
- ▶ The dumps may also be a source of air pollution due to wind erosion if they are not properly rehabilitated. Topsoil and overburden will be generated from the mining project which will be stacked separately at the designated areas.

2.17.1.2 Impacts- Soil Contamination

Potential impacts on land environment are envisaged due to hazardous and non-hazardous wastes generated due to various operations in the project site like municipal waste from domestic use and waste diesel oil from quarry machineries. Poor management of such materials/wastes from the operations is a potential risk of soil contamination.

Mitigation Measures

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

2.17.2 Air Environment

Mining operations contribute towards air pollution in two ways: addition of gaseous pollutants to the atmosphere and the dust particles. The gaseous pollutants include NO_x, SO₂ and Hydrocarbons. The sources of pollutants from the mining activity include:

- Operation of Heavy Earth Moving Machinery (HEMM) which mostly run on diesel.
- Loading/unloading operations.
- Transportation of mineral/overburden in dumpers
- Drilling and Blasting operations.

2.17.3 Sources of Air Pollution**2.17.3.1 Point Source/Single Source**

These are stationary sources, which emit air pollutants into the atmosphere from a certain fixed point. In the existing quarry, the following sources, or activities from the point sources, which emit Suspended Particulate Matter (SPM).

2.17.3.2 Drilling

Drilling is an important activity of mining process. The secondary splitting in to required size involves drilling up to the bottom of the separated block. Air pollution in the form of SPM is envisaged from this activity.

Conventional 32mm dia blast holes are drilled perfectly parallel to each other at 20 to 25cm intervals without any hole deviations, all along the required plane of splitting. The holes are drilled up to depth few cm above the required horizontal planes. Sub grading drilling is not followed since the splitting will be affected up to a further distance of cm from the drill hole, because sub grade drilling may affect the underlaying rough stone deposit.

2.17.3.3 Loading

In the proposed project, the loading of side burden and rough stone is proposed by Hydraulic excavators. This activity is likely to contribute air pollution in the form of SPM (dust) during discharge of material from bucket and gaseous pollutants like SO₂, NO_x and Hydrocarbons due to combustion of fuel (diesel) in the loading machinery.

2.17.3.4 Unloading

The generated rough stone at mine face will be transported by dumpers and unloaded at the designated locations. During unloading operation of both the material, air pollution in the form of SPM (dust) is envisaged due to discharge of material from the dumper and gaseous pollutants like SO₂, NO_x and Hydrocarbons due to consumption of fuel (diesel) by dumper while unloading the material.

2.17.3.5 LineSources

These are normally mobile sources, which emit atmospheric pollutants in the area through which they pass.

2.17.3.6 Transportation

Hired Tippers having 10Ts capacity will be utilized for Transportation of excavated rough stone. The tippers will be covered by Tarpaulin to prevent spillage and dust emission. During the transportation of material through the village and populated area vehicles are strictly prohibited not to exceed the 40km speed limit

2.17.3.7 Area Sources/Multiple Sources

These constitute pollution from various sources and activities situated in the mine lease area. The total mine area with all its mining activities constitutes the area source. These include all the mining activities, equipment/machinery operations (HEMM), wind erosion from active mine pits, and waste dump locations and haul road which contribute to the atmospheric pollution from the various units/activities.

2.17.3.8 Instantaneous Sources

The instantaneous sources consist of air pollution due to sudden/instantaneous activities like blasting in the mine area. The blasting process involves dislodgement of big blocks of hard strata/mineral from the mines. This operation generates maximum dust, which results in the increase of SPM concentration. It also contributes to emissions of certain gases (Oxides of Nitrogen and Ammonia) due to the use of explosives.

The size of the dust particles emitted into the atmosphere plays a major role in deciding the distance to which they may be transported. Particles of larger size fall rapidly and closer to their source, because of gravitational settling. However, the aerosols, because of their small size, may be held in suspension for years in the atmosphere and may be transported on a global scale. Eventually, these smaller particles are collected in raindrops and fall on earth. The composition of these particles largely depends on the composition of the mineral being processed.

Mitigation Measures

- ▶ The increment in the fugitive emissions will be mainly due to transportation activity. Therefore, emissions due to mineral handling during mining operation are not much and restricted to the lease area only.

- ▶ Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits are as follows:
- ▶ Watering of haul roads and other roads at regular intervals.
- ▶ Spraying of water on permanent transport roads at required frequencies.
- ▶ Provision of dust filters / mask to workers working at highly dust prone and affected areas.
- ▶ Provision of green belt by vegetation for trapping dust.
- ▶ Green belt development along the haul roads, dumps and along the boundaries of the lease area.
- ▶ The utmost care will be taken to prevent the spillage of sand and stone from the trucks.
- ▶ Covered tarpaulin for transport of materials.

2.17.4 Noise & Vibration Environment

The sound pressure level generated by noise source decreases with increasing distance from the source due to wave divergence. The main sources of noise in the mine are as follows:

- ▶ Drilling and Blasting
- ▶ Excavation of the material
- ▶ Loading & unloading minerals
- ▶ Transportation vehicles

2.17.4.1 Noise Levels

Heavy Earth Moving Machineries (HEMM) are deployed in mining operations. The noise levels of the major equipment are in the range of 88 to 90 dB (A). The noise levels are localized within the mining areas. Occupational hazard is envisaged if proper personal protective equipment is not provided to the operator and workers.

2.17.4.2 Vibration

The vibration due to blasting can cause damage to the nearby structures if appropriate technology and control measures are not adopted in the blasting operation. Fly rock is another possible damage causing outcome of blasting. There are many factors which influence fly rock during blasting. Most important of these factors are long explosive columns with little stemming column, improper burden, loose material or pebbles near the holes and long water column in the hole.

TAMIN will follow shallow holes of 32mm dia are drilled and conventional low explosives such as gun powder, ordinary detonators etc are used for the splitting of hard rock mass. Hence, ground vibration and noise pollution will be minimal and restricted to within the mine workings. The blasting will be taken up at appointed times only and with sufficient caution from the public. By adopting controlled blasting, the problems will be greatly minimized, and the impacts will also be minimized by choosing a proper detonating system, optimizing total charge and delay.

Ground vibration, flying rock, air blast, noise, dust, and fumes are the deleterious effects of blasting on environment. The explosive energy sets up a seismic wave in the ground, which can cause significant damage to structures and disturbance to human occupants. The impact will be minimized by choosing proper detonating system and optimizing total charge and charge/delay and by regular monitoring of magnitude of ground vibrations and air blast.

Impact

A noise generation source during the operation phase is classified into two categories:

- ▶ Stationary sources due to operation of heavy-duty machinery at the project site like Compressors, DG sets, Quarry vehicles and drilling machinery etc.,

Mitigation Measures

- ▶ The major noise generating equipment like Compressors, DG sets, Excavator, & Tippers etc, will be enclosed in an acoustic enclosure designed for an insertion loss of 25 dB (A) and silencers to other equipment etc.
- ▶ Drilling will be carried out with the help of sharp drill bits which will help in reducing noise.
- ▶ Secondary blasting will be totally avoided.
- ▶ Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained.
- ▶ The blasting will be carried out during favorable atmospheric condition and less human activity timings i.e. during lunch interval or during change of shifts.
- ▶ Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce noise generation.
- ▶ Greenbelt and plantation will be developed around the mining activity area and long-haul roads. The plantation minimizes the propagation of noise.
- ▶ Periodical monitoring of noise will be done.
- ▶ The occupational noise exposure to the workers in the form of eight hourly weighted average will be maintained well within the prescribed Occupational Safety and Health Administration (OSHA) standard limits.
- ▶ Adequate PPE will be provided for the staff exposed to noise risks.
- ▶ Acoustic silencers will be provided in equipment wherever necessary.
- ▶ Use of personal protective Equipment's/devices such as earmuffs, ear plugs etc., will be strictly enforced for the workers engaged in high noise areas.
- ▶ Periodic maintenance of the equipment to be used in the developmental works will be carried out. Worn out parts will be replaced, and rotating parts will be lubricated to minimize noise emissions.
- ▶ Implementation of greenbelt for noise attenuation will be undertaken.
- ▶ Ambient noise levels will be monitored at regular intervals during the operational phase of the project.

- ▶ Low vibration generating machines/equipment will be selected to meet international standards and foundations will be designed to minimize vibrations and secure properly.
- ▶ Vibration generating sources and their platforms should be maintained properly to minimize vibrations and related impacts.
- ▶ Vibration dampers will be provided around the source of generation.
- ▶ Transportation Management Plan will be prepared, and the transportation of materials will be planned in line with the same.

2.17.5 Water Environment

Impact on Existing Water Resources

The total water requirement for a quarry is 3.5 KLD. The total water requirement is met by authorized vendors and local Panchayat; Domestic sewage is being disposed into Septic tank & no toxic/other effluent generation. Hence the impact due to the project is very minimal.

2.17.5.1 Impacts on Surface Water Bodies

The surface water and groundwater are the lifeline of the villages. All the ponds in the area are working as recharge sites for the underlying groundwater and hence the surface water and ground water systems are acting like a single unit and therefore cannot be seen in isolation. Any contamination in surface drainage due to operation of project could collapse the system and will have serious impacts on the water resources especially the availability of potable water in the PIA area. The impacts will be high in the core area, especially the 10 km radius area. Therefore, it is apparent that there will be negligible impact of mining on the surface water regime.

2.17.5.2 Impact on Ground Water

There will not be any ground water withdrawal, as the total water requirement is being met by private tank waters. As, the mine lease area is a hilly area. Site elevated at 770 m height from the ground level. Hence, there will not be any groundwater level intersect as the planned depth of mining is 48.47 m from the top of the hill.

Mitigation Measures

The following measures are proposed as a part of development to improve the ground water scenario and to ensure that ground water is not contaminated. Strategic plans such as implementing the following structures for rainwater harvesting and groundwater recharging purposes in project site will be adhered.

- ▶ Rainwater storage ponds/tanks
- ▶ Storage cum recharge ponds
- ▶ Monitoring water quality and groundwater level variations in the project site.

2.17.6 Biological Environment

Impact on migratory paths for wildlife and forest blocks

There are no identified migratory paths for major and minor wildlife in the project site and the study area. The identified fauna which are observed at the project site and in the study area are local migrants only. Therefore, the proposed project operations are not likely to have any

adverse impact on the paths for avid fauna.

Mitigation Measures

- ▶ Discharge of waste into the water bodies during the quarry operation phase would not be allowed.
- ▶ Awareness will be given to workers about the importance and conservation of terrestrial ecology and biodiversity.

2.17.7 Solid Waste Management

2.17.7.1 Impact due to Solid Waste Generation

During quarry operations, Municipal solid waste and waste oil are likely to be generated which can be broadly categorized as Hazardous Waste and Non-hazardous Waste. Further, the generated solid waste generation may include Biodegradable, Recyclable and Inert compounds.

The details of solid waste generation and its management proposed are discussed in **Chapter 2, Section 2.11.6 & 2.11.7**. If the solid waste generated is not properly managed and disposed of in an unauthorized manner, it will impact soil quality, groundwater, and air quality.

2.17.7.2 Solid Waste Management

Strict guidelines will be put in place to manage solid waste generation during the operational phase of development. The main goals of the guidelines will be to ensure adopting recycling techniques and encouraging sorting of solid waste at source into organic and inorganic waste. Waste management is given in **Figure 2-15**.

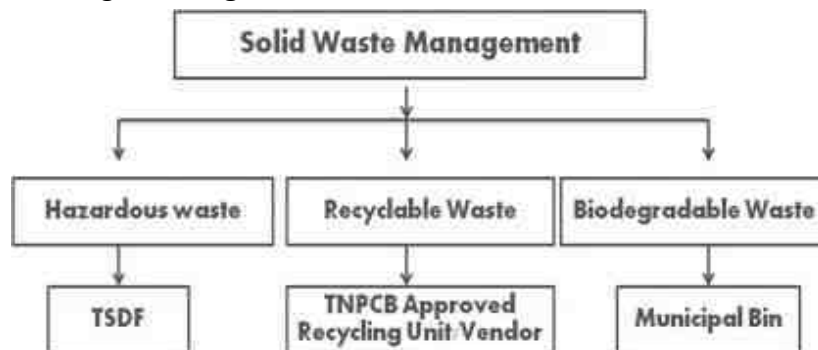


Figure 2-15 Waste Management Concepts

2.17.8 Afforestation

The safety distance along the eastern side of the lease area has been identified to be utilized for afforestation. Native species will be planted in phased manner as given in **Table 2-18**.

Table 2-18 Afforestation Plan details

Local Name of the Tree	Scientific Name of the Tree	Survival	No. of Species
Vaagai	Albizia Lebbeck	80 %	4500
Manjadi	AdenaantheraPavonina		
Aatru Poovarasu	Hibiscus Tiliaceous		
Panai	Borassus Flabellifer		
Yetti	StrychnosNuxvomica		

Purangai Naari, Pudanga Naari	Premna Tomentosa		
Magizha Maram	MimusopsElengi		
Puthranjivi	PuthranjivaRoxburghii		
Pisin Pattai	LitseaGlutinosa		
Sandhana Vembu	Toona Ciliate		
Eachai	Phoenix Sylvestre		

2.17.9 Assessment of New and untested technology for the risk of technological failure

The project is a rough stone quarry project. The technology used for mining is made by TAMIN; in house there would not be any changes in the Mining. Mining technology is a tried& tested method, and therefore there is no risk of technological failure. In addition to this, the TAMIN is being processed to take care of any technological failures.

3 DESCRIPTION OF ENVIRONMENT

3.1 Preamble

This chapter depicts the establishment of baseline for environmental components, as identified in and around the Aranarai North rough stone Quarry” in SF No. 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District. The primary baseline data monitored covered three (3) months i.e., from **February 2026 to April 2026**, and secondary data was collected from Government and Semi-Government organizations. The primary baseline data has been conducted by M/s. Ekdant Enviro Services (P) Limited, Chennai, NABL approved Environmental Testing Laboratory for following Terrestrial environmental components.

S. No	Description of Section	Section	Parameters
1	Meteorology	Section 3.6.2	Temperature, Relative Humidity, Rainfall, Wind Speed & Direction
2	Ambient Air Quality	Section 3.6.4	As per NAAQS, 2009 and TVOC as per ToR
3	Ambient Noise Levels	Section 3.7	Day equivalent noise levels, Night equivalent noise levels (As per CPCB Standards)
4	Water Quality	Surface water – Section 3.8.2 Ground water – Section 3.8.3	Ground Water – IS 10500:2012 Surface Water – IS 2296 (Class – A)
5	Soil Quality	Section 3.9	ICAR (Indian Council of Agricultural research)
6	Ecology	Section 3.10	Flora and Fauna
7	Social Economic Status	Section 3.11	Socio Economic Profile of Study area (Population Profile, Employment and Livelihood, Education and Literacy, etc.,)

3.2 Description of Study Area

A 10 Km radial distance from the proposed project site boundary has been identified as the general study area for assessing the baseline environmental status. The core study area is the project area and its immediate surroundings to the tune of 1.0 Km radius from the boundary. Further the Project Impact/Influence Area (PIA) is 10Km from the boundary of the project. The PIA covers approximately 22 villages and 1 Township. The map showing the satellite image of the study area is given in

Figure 3-1 and Topo Map of the study area is given in **Figure 3-2**.

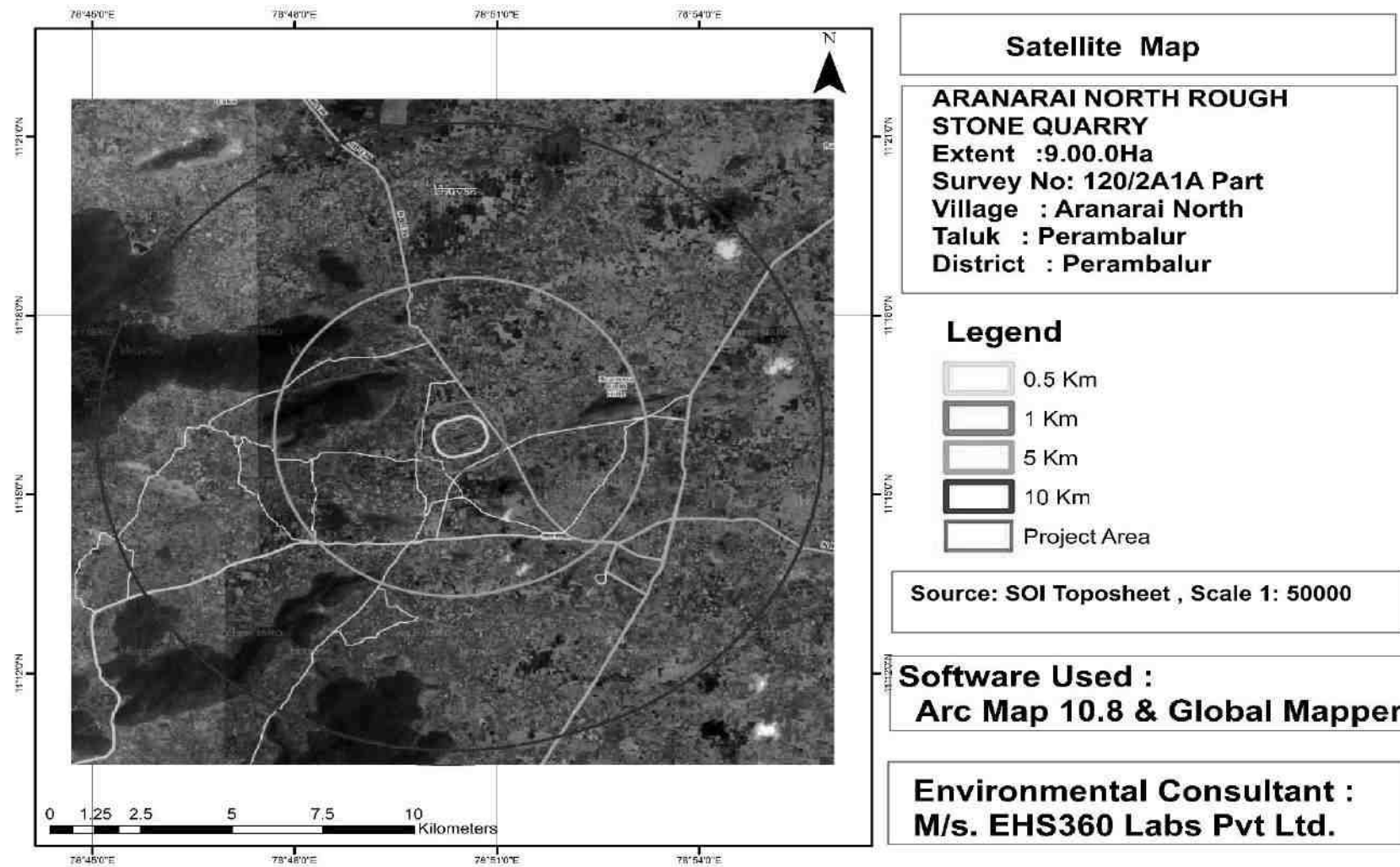


Figure 3-1 Satellite Image of the study area of Project

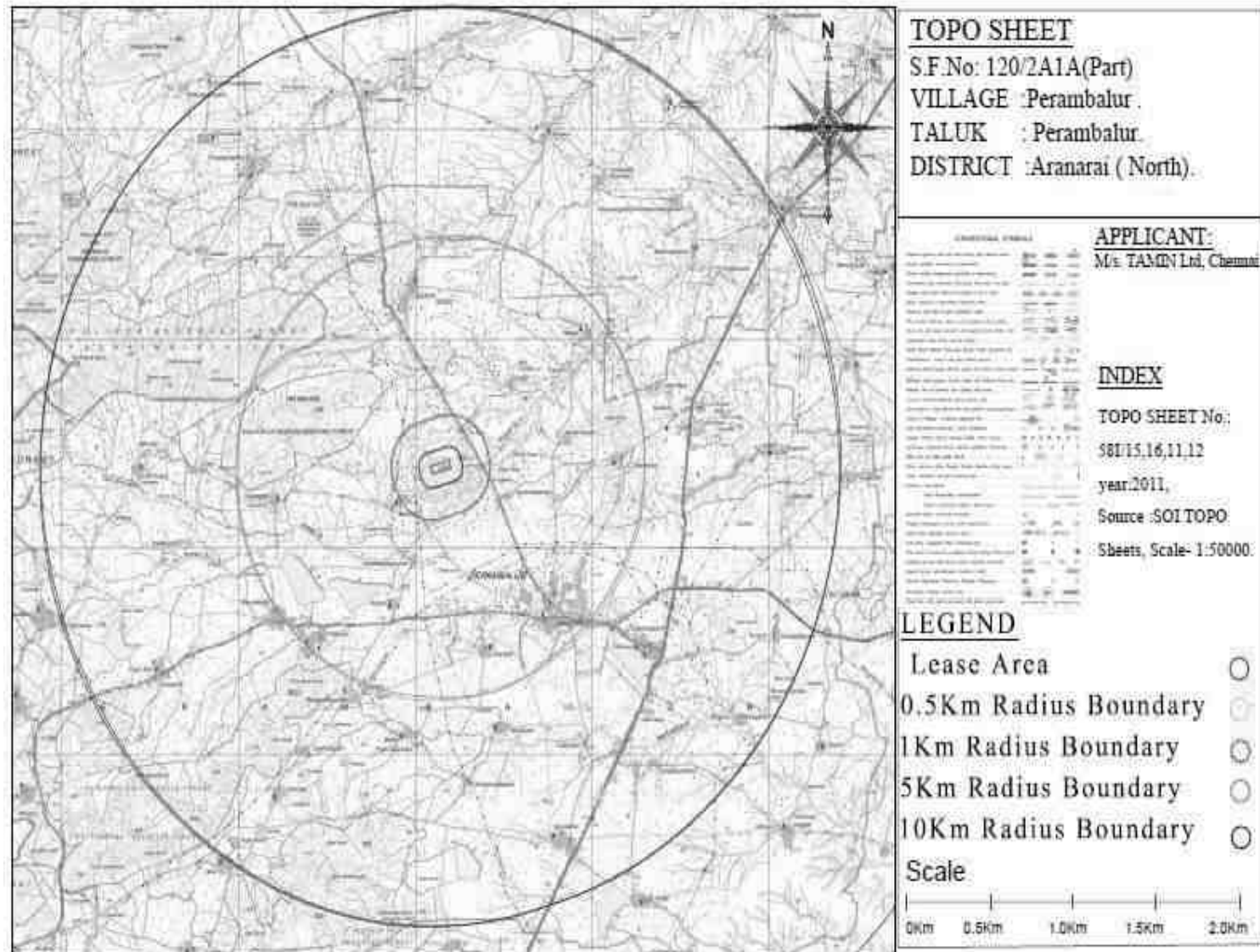


Figure 3-2Topo Map of Study area

3.3 Environmentally/Ecologically Sensitive areas

The environmental sensitive areas covering an aerial distance of 15km from the project boundary is given in **Table 3-1** and Map showing Environmental sensitive areas within 15 km from project boundary is given in **Figure 3-3**.

Table 3-1 Environmentally Sensitive Areas within 15km from Project Boundary

S. No.	Areas	Distance & Direction from project boundary		
1	List of Monuments and Heritages	Nil within the 15km radius.		
2	List of Water Bodies	Description	Dist. (~Km)	Dir.
		Sweta Nadi	13.64	NNE
		Kallar R	14.06	NNW
		Canal	14.22	NW
		Konmathura Pond	13.87	NNW
		Vengalam lake	12.01	NNW
		Siruvayalur pond	9.4	NNE
		anukkur Pond	7.47	N
		Palaiyur pond	8.77	N
		Mettupalayam Pond	11.41	NE
		Tambai Pond	11.66	ENE
		Koneri Ar	0.51	ESE
		Kil Puliur pond	12.48	ENE
		Sirukudai Pond	9.41	ENE
		Elumur Lake	14.49	E
		Elumur Ar	11.58	ESE
		Marudaiyar R	7.77	SSE
		Toramangalam Pond	5.65	SE
		Kavulpalayam	7.18	SE
		Sengunam Pond	7.29	E
		VRS Puram Pond	7.63	NE
		MGR Nager Pond	4.97	ENE
		ayilur Pond	10.08	SSE
		Varaguppadi Pond	11.96	SSE
		Karai Market Pond	14.12	SSE
		Pudukkuruchi Pond	14.09	S
		Marudati Pond	10.73	S
		alattur Pond	14.75	S
		Pudunaduvalur Pond	8.13	S
		Punnampatti Pond	13.18	SW
		Velur Pond	11.64	SW
		Nattarmangalam Eri	14.18	SSW
		Kalarampatti Big Lake	14.22	WSW
		Ladapuram Lake	8.53	WSW

		Ladapuram West Lake	11.92	W
		Canal	11.43	W
		Canal	11.43	WSW
		KOneri ar	5.92	WSW
		Annamagalam Lake	6.93	NW
		Kurumbaur Lake	4.11	WSW
		Senjeri Lake	3.31	SW
		Alambadi Lake	0.85	W
		Esanai Lake	3.65	NNW
		Somandapudur Eri	1.96	N
		Koneripalaiyam Eri	2.82	ESE
		Elambalur Lake	4.02	E
		Vella Thangiyamman Lake	4.22	SSE
		Aranarai Eri	3.75	SSE
		Senjeri lake	3.12	SSE
		Check Dam	1.07	S
3	List of Reserved Forests	Description	Dist. (~Km)	Dir.
		Puliyur Extension RF	2.19	WNW
		Pachaimalai Hills	5.04	WNW
		Puliyur Extension RF2	5.43	NNW
		Manalodai RF	9.64	W
		Palamalai RF	12.77	WSW
		Nakkaselam RF	12.87	SW
		Kurumbalur RF	4.64	SSW
		Chattramani RF	9.94	SW
		Siruvachur RF	7.77	S
		Velur RF	11.34	S
		Naranamangalam RF	10.84	S
		Chittali RF	10.81	ESE
		Kunnam RF	14.65	ESE
		Sirukudal RF	10.48	ENE
		Mangalam RF	13.57	ENE
		Peraiyur RF	13.96	NE
		Venbavur RF	10.32	N
		Maivaligal RF	13.48	N
4	Nearby Town, City and Head Quarters	Town: Peranbalur, 4.91, SE City/ District HQ: Peranbalur, 4.91, SE.		
5	Nearest Airport, Port and Railway Stations	Ariyalur Railway Station, 27.81, ESE		

6	Nearest Densely Populated Habitations	S. No.	Location	Distance (~km)	Population
		1	Aranarai	0.74	2752
		2	Chokkanathapuram	1.76	9005
		3	Perambalur	1.44	24659

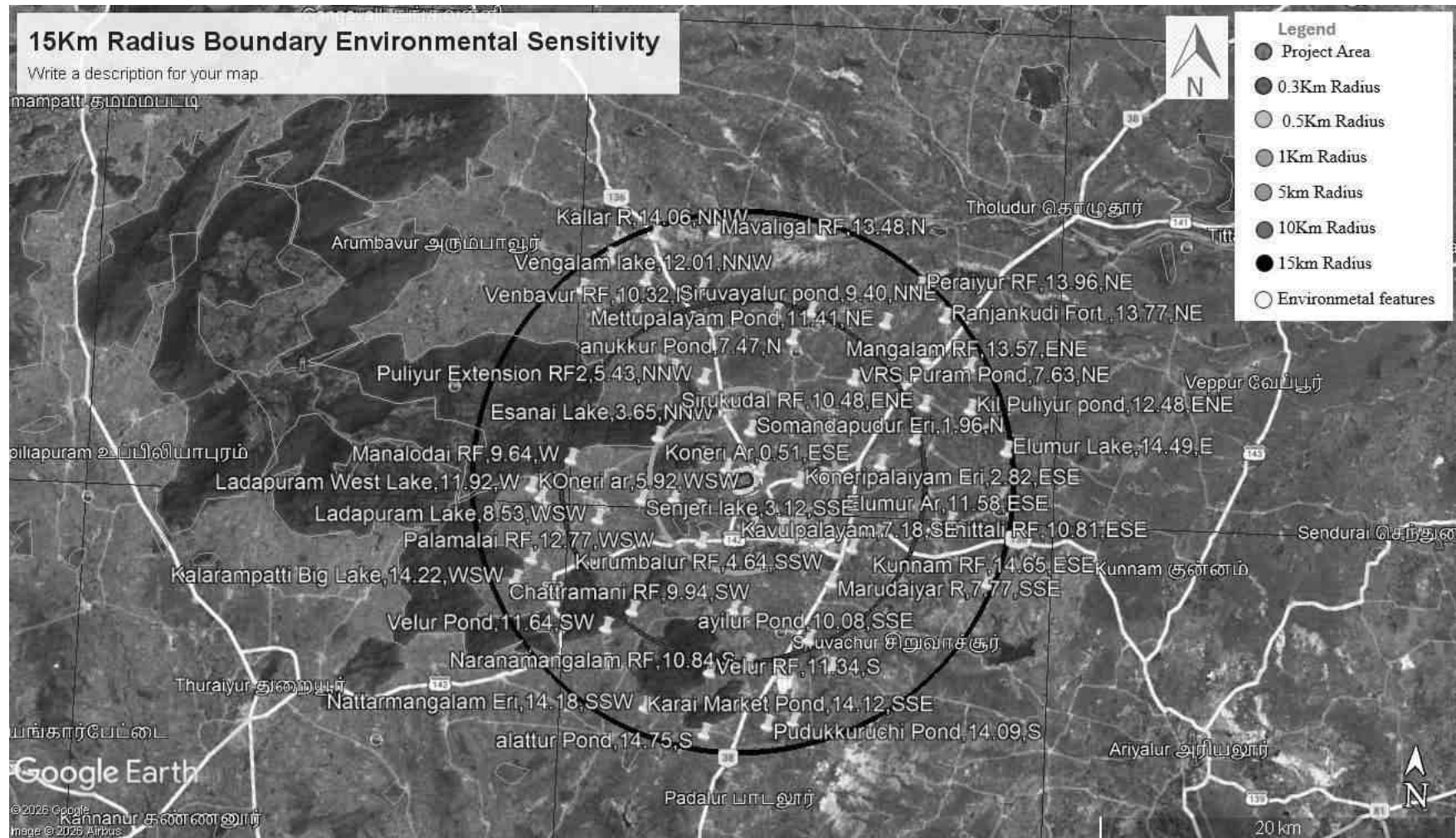


Figure 3-3 Environmental sensitive areas within 15 km from project boundary

3.4 Physical Conditions of PIA district

In this section, the physical conditions of PIA district are discussed in general and wherever possible references to the conditions prevailing in the study area are also provided.

3.4.1 PIA District Profile

District Statistical Office, Perambalur has been publishing the District Statistical Hand Book every year incorporating the statistical data viz Population, Literate, Agriculture, Industries, Prices, Livestock, Co-operation, Education and Public health etc., particulars are collected for the publication of Perambalur District for the year 2022 - 23. There is an encouraging demand for block level and district level statistics for formulating suitable policies by the central and state Government and for the planning purpose at micro level. Maintenance of Block / District level information are assuming importance in the context of planning. An encouraging shift is being made through the introduction of block level planning to decentralize the planning process. It is to be made obligatory that all the Government agencies operating at Block / District level should spare a copy of the periodical reports to the Block / District Statistical Unit. In the long run these units become a purveyor of information generated in these areas. The District Statistical Hand Book 2022 – 2023 the main purpose of the present effort is to bring out a case for providing information (Data) at Block / District level. The information furnished in this hand book has been collected from central and state Government departments. The data furnished in this book are widely used by needy whether it is an official or research organization. The co-operation extended by the various Departments / Agencies in furnishing the data is gratefully acknowledged. I also acknowledge the tireless work rendered by the statistical unit of this district for the successful presentation of the hand book. Perambalur District consists of one Revenue Division viz., Perambalur, Four Taluks viz., Perambalur, Veppanthattai, Kunnam, Alathur comprising of 152 Revenue Villages. The district has four blocks viz. Perambalur, Veppanthattai, Veppur, Alathur comprising of 121 Village Panchayats. There is one Municipality viz. Perambalur and four Town Panchayats viz. Arumbavur, Kurumbalur, Labbaikudikadu and Poolambadi.

Source : <https://Perambalur.nic.in/district-at-a-glance/>

3.4.2 Climatic Conditions and Rainfall

Perambalur district experience mostly hot weather althrough the year. The mean maximum actual temperature varies from month to month, the highest was recorded during May 2011 with 38.9 degree celsius. The district has a high mean temperature and low degree of humidity. Even though the region does not have an extreme climate, the summer months are quite hot and the difference between maximum and minimum temperature is moderate. With little moisture during the early months of the year, the atmosphere is dry. The winter season is pleasant and enjoyable. By March, the Mercury acquires an uptrend and the temperature increase during the course of time. This trend of the barometer indicates the ushering of summer with its hot days. The hot season continue until the southwest monsoon sets in. With the effect of northeast monsoon during Oct-Dec, the district receives the highest rainfall.

Source : [DH 2011 3314 PART A DCHB PERAMBALUR](#)

3.5 Natural Resources of PIA District

3.5.1 Forest Resources of PIA district

The total forest area of this district is 16506.94 hectares, which represent 9.4% of the total geographical area of Perambalur district. The types of forest include (1) Dry mixed deciduous forest, (2) Tropical dry deciduous forest, (3) Tropical evergreen forest and (4) Sub-tropical hill forest. Most of the forests in the district are tropical dry deciduous and tropical dry thorn. The chief forest products are firewood, casuarina, bamboo, eucalyptus hybrid and to a lesser extent sandal wood and timber such as teak, rose wood, pillamarudu, etc. Special steps are taken to conserve the forest areas and to ensure among other things, adequate pastures for livestock, supply of firewood for domestic consumption and raw materials for industries. With the social forestry program, the Forest Department has enlarged its activities even outside the reserve forest. The vegetative cover of the forest is being destroyed by nearby villagers for fuel consumption. Afforestation measures must be taken up in all these forests and in the hill bottom, which in addition to providing a proper vegetative cover on the hills, help to prevent the sedimentation in rivers and to preserve the fertile soils from erosion. Perambalur district is not significant in terms of the availability of flora and fauna. Commonly found flora and fauna in the district are not different from that of other districts. Number of fruit trees include tamarind, mango and coconut in the district. In the hilly tracks, jack and orange trees are grown. The varieties of timber found in the hilly regions include teak, vanni, malai vembu, manja kadambu and bamboo. Wild pigs, bears, small game animals are found in Pachamalai hills. All the game birds found in other districts are also found in this district.

Source : DH 2011 3314 PART A DCHB PERAMBALUR

3.5.2 Irrigation of PIA district

The chief irrigation source in the area are tanks, dug wells, tube wells and canals. The tank and dug wells are the major irrigation source in Veppanthattai block. Cauvery is the major river flowing in the region and the composite district has a canal system covering just 47 kms stretch and ayacut of 11,610 hectares. The ground water resource through tubewells and wells contribute nearly 68% of irrigated area.

Source : DH 2011 3314 PART A DCHB PERAMBALUR

3.5.3 Agricultural Resources of PIA district

Agriculture is a predominant activity in the district. Both wet and dry land cultivation are undertaken. Major crops grown in the district include paddy, maize and cotton in the district. Perambalur district is the major producer of maize and onion (small) in Tamil Nadu, with 27% and 50% of the State's share respectively. Cultivation in dry lands takes place from June to August which depends on the southwest monsoon and mono-cropping is followed. In Veppanthattai, Perambalur and Alathur blocks, a significant practice of maize, cotton and chilly cultivation is undertaken purely with rain water. Paddy, sugarcane, elephant foot yam, onion, tomato and tapioca are cultivated with the help of well irrigation. Major horticulture crops cultivated in this district are fruits crops like mango, banana and lime, and vegetables like tomato, brinjal, onion, gourds and tapioca. Flowers such as tuberose and chrysanthemum are grown in the district.

Source : DH 2011 3314 PART A DCHB PERAMBALUR

3.5.4 Mineral Resources of PIA district

Mineral deposits in this district include Celeste, Limestone, Gypsum, rough stone, Canker and Phospate nodules which are found at various places in the district. Building stones and lime stones are common and found utilized by the people for various purposes. A good deal of building stone is quarried in Perambalur, Kunnam and Veppanthattai taluks. The rough stone has been quarried largely in the district, followed by line stone. The following table explains different minerals extracted in the district during 2010-.

Source : DH 2011 3314 PART A DCHB PERAMBALUR

3.5.5 Land Use & Land Cover of PIA district

According to the village record data provided by the revenue authorities, the total geographical area of the district is 175736 hectares. Out of this, only 89127 hectares (50.72%) were Net area sown. 26268 hectares (14.94%) were kept as fallow lands. The lands put to non-agricultural purposes occupy 26890

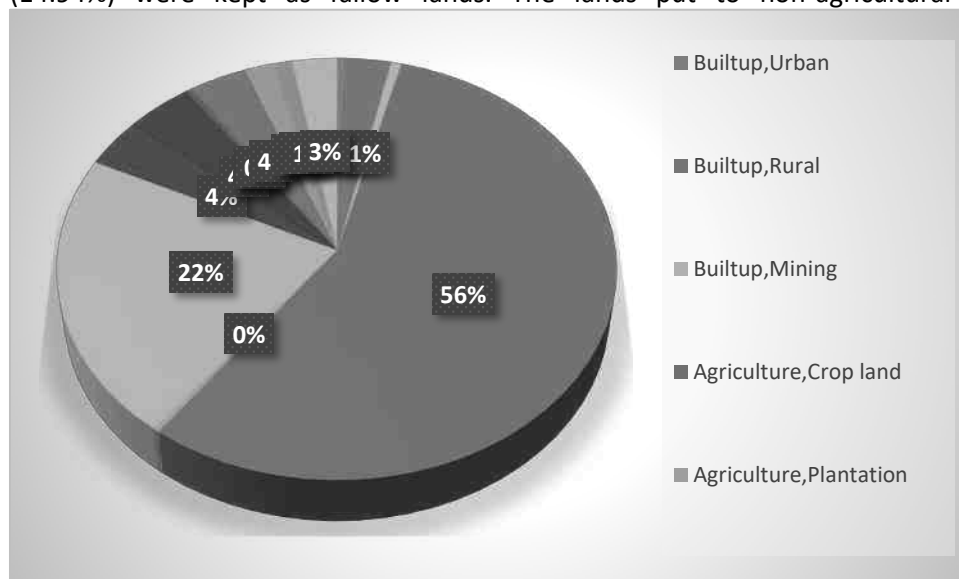


Figure 3-4.

Table 3-2 District land use/land cover statistics (2015-16) for Perambalur district

S. No	Division of Land Use/Land Cover	Area in Sq. km.	Area (%)
1	Builtup, Urban	8.96	0.512
2	Builtup, Rural	50.24	2.869
3	Builtup, Mining	11.77	0.672
4	Agriculture, Crop land	981.25	56.039
5	Agriculture, Plantation	5.7	0.326
6	Agriculture, Fallow	381.07	21.763
7	Forest, Evergreen/ Semi evergreen	66.11	3.776
8	Forest, Deciduous	73.02	4.170
9	Forest, Forest Plantation	0.87	0.050
10	Forest, Scrub Forest	0.16	0.009
11	Barren/unculturable/ Wastelands, Salt Affected land	4.87	0.278
12	Barren/unculturable/ Wastelands, Gullied/Ravinous Land	64.47	3.682
13	Barren/unculturable/ Wastelands, Scrub land	31.99	1.827

14	Barren/unculturable/ Wastelands, Barren rocky	3.3	0.188
15	Wetlands/Water Bodies, Inland Wetland	0.06	0.003
16	Wetlands/Water Bodies, River/Stream/canals	17.59	1.005
17	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	49.57	2.831
Total		1751	100.0

Source : <https://bhuvan-app1.nrsc.gov.in/thematic/thematic/index.php>

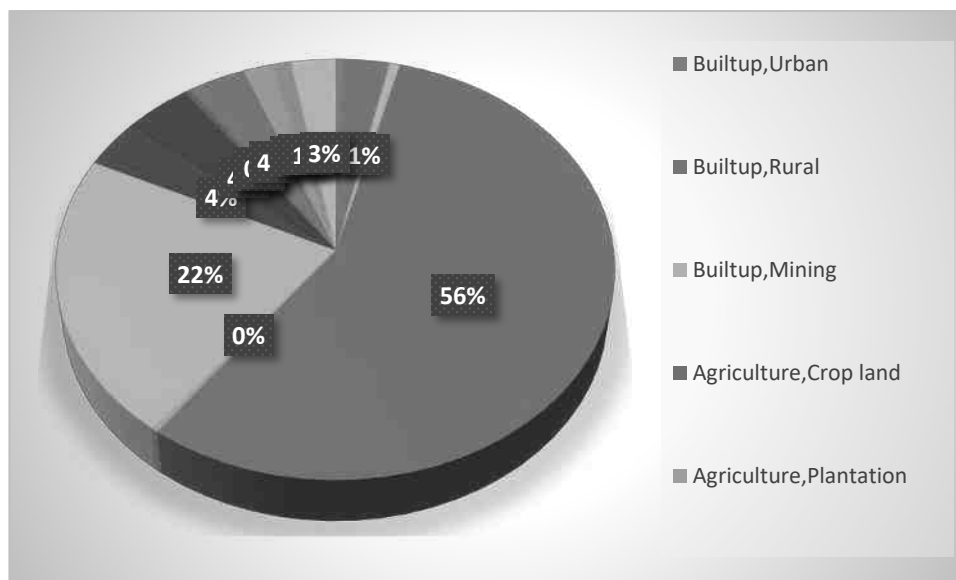


Figure 3-4 Land Use pattern of Perambalur district

3.5.5.1 Land Use and Land Cover of the Study Area

The total Project Study area is **578.32 Sq.km**. The Land Use Pattern is given in **Table 3-3**. The Land Use Pattern and Land Use Map of the Study area are given in **Figure 3-5** and **Figure 3-6** respectively.

Table 3-3 Land Use Pattern of the Study Area

S. No	Description	Area (Sq. Km)	Area (Acres)	Area (Hectares)	Percentage (%)
1	Barren rocky	2.97	0.001	0.000	0.51
2	Crop land	288.43	0.069	0.029	49.87
3	Deciduous	41.24	0.010	0.004	7.13
4	Evergreen / Semi Evergreen	32.32	0.008	0.003	5.59
5	Fallow	131.31	0.032	0.013	22.71
6	Forest Plantation	0.47	0.000	0.000	0.08
7	Gullied / Ravinous	11.29	0.003	0.001	1.95
8	Mining	5.72	0.001	0.001	0.99
9	Plantation	0.59	0.000	0.000	0.10
10	River / Stream / Canals	1.87	0.000	0.000	0.32
11	Rural	25.56	0.006	0.003	4.42
12	Salt affected land	2.17	0.001	0.000	0.38
13	Scrub land	10.24	0.002	0.001	1.77

14	Urban	8.98	0.002	0.001	1.55
15	Waterbodies	15.16	0.004	0.002	2.62
Total		578.32	0.139	0.058	100

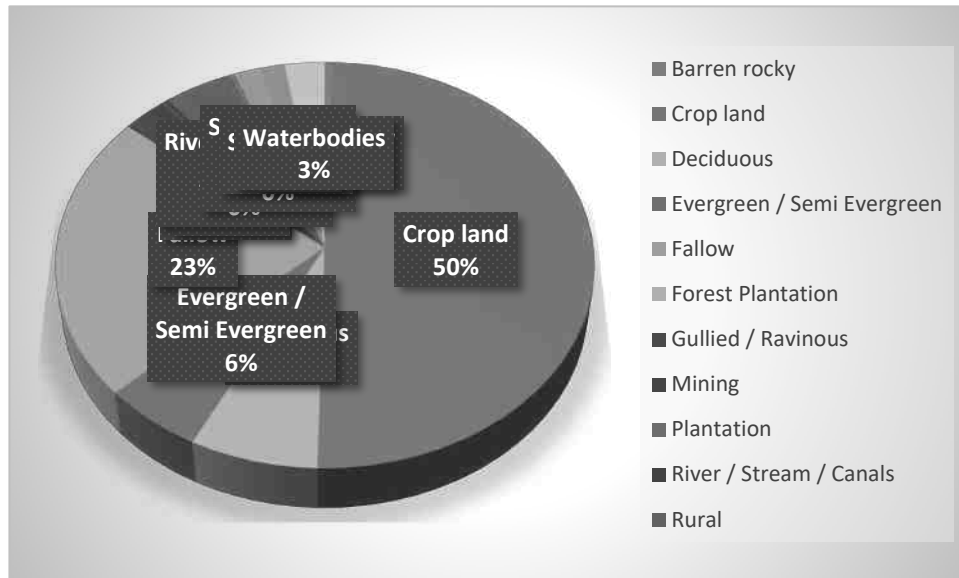


Figure 3-5 Land Use Pattern of the Study Area

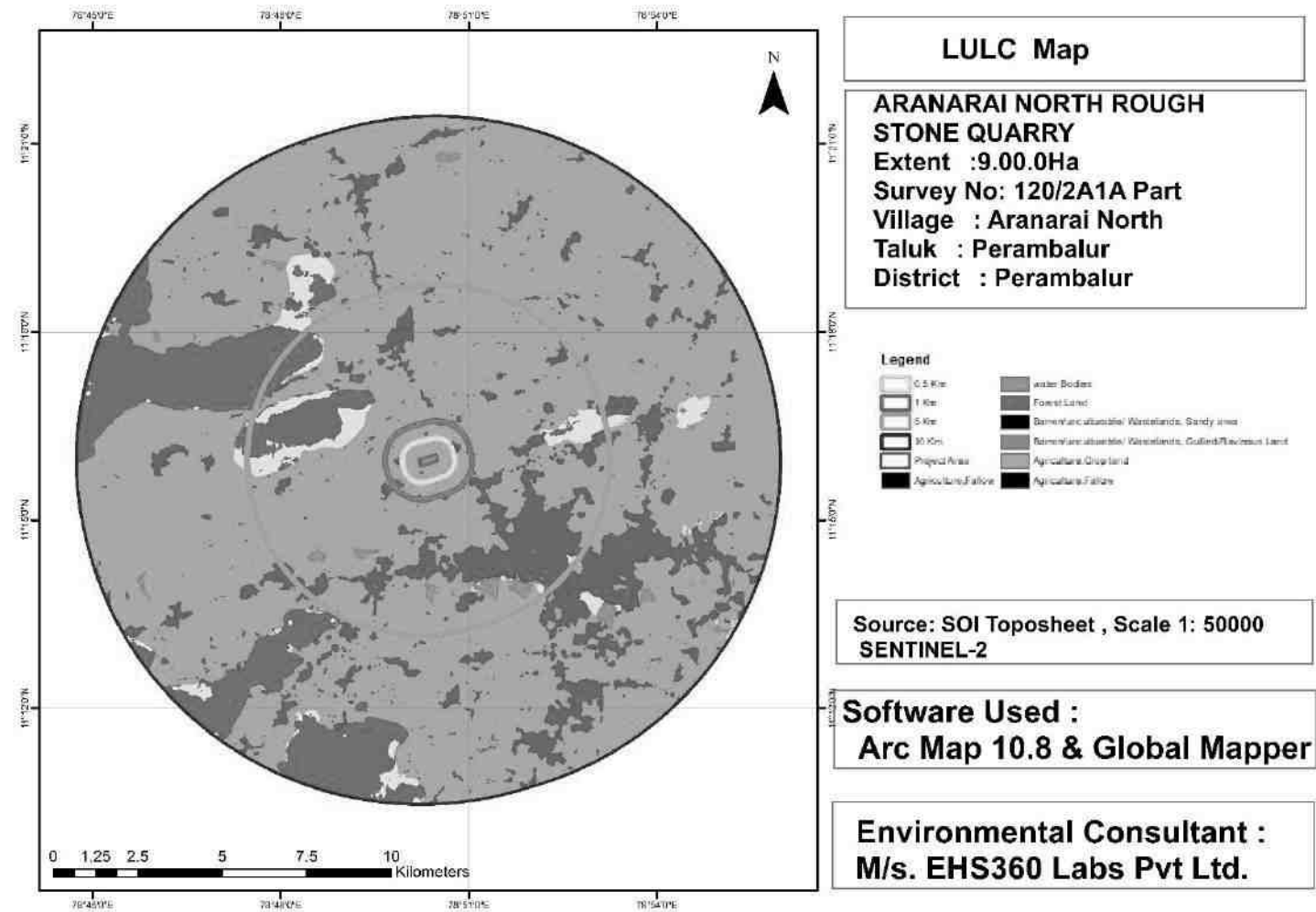


Figure 3-6 Land Use Land Cover map of the study area

3.5.6 Geology of PIA district

The north and western part of the district is mainly covered (> 80 %) with Archaean rocks and is mainly comprises of Hornblende Gneiss and Chaornockite and the eastern part is covered with cretaceous sediments . The Sathyamangalam rocks are distributed along the east-west tract in central Tamil Nadu confined between Bhavani – Attur lineament in the north and Noyil – Cauvery lineament in the south (Subramanian and Selvan, 2001). Similar rocks are also known in the northwestern part of the state in Dharmapuri district. The equivalents of Sakarsanahalli (Sargur) supracrustals are 8 described in Dimbam–Tattakarai areas of Kollegal – Krishnagiri terrane (GSI, 1998). Though the Sathyamangalam Group of rocks are said to be exposed within the Bhavani gneiss in the E-W trending belt in central Tamil Nadu in parts of Coimbatore, Salem, Namakkal, Perambalur and Tiruchirapalli districts map of the study area is given in **Figure 3-7**.

Source: <https://cdn.s3waas.gov.in/>

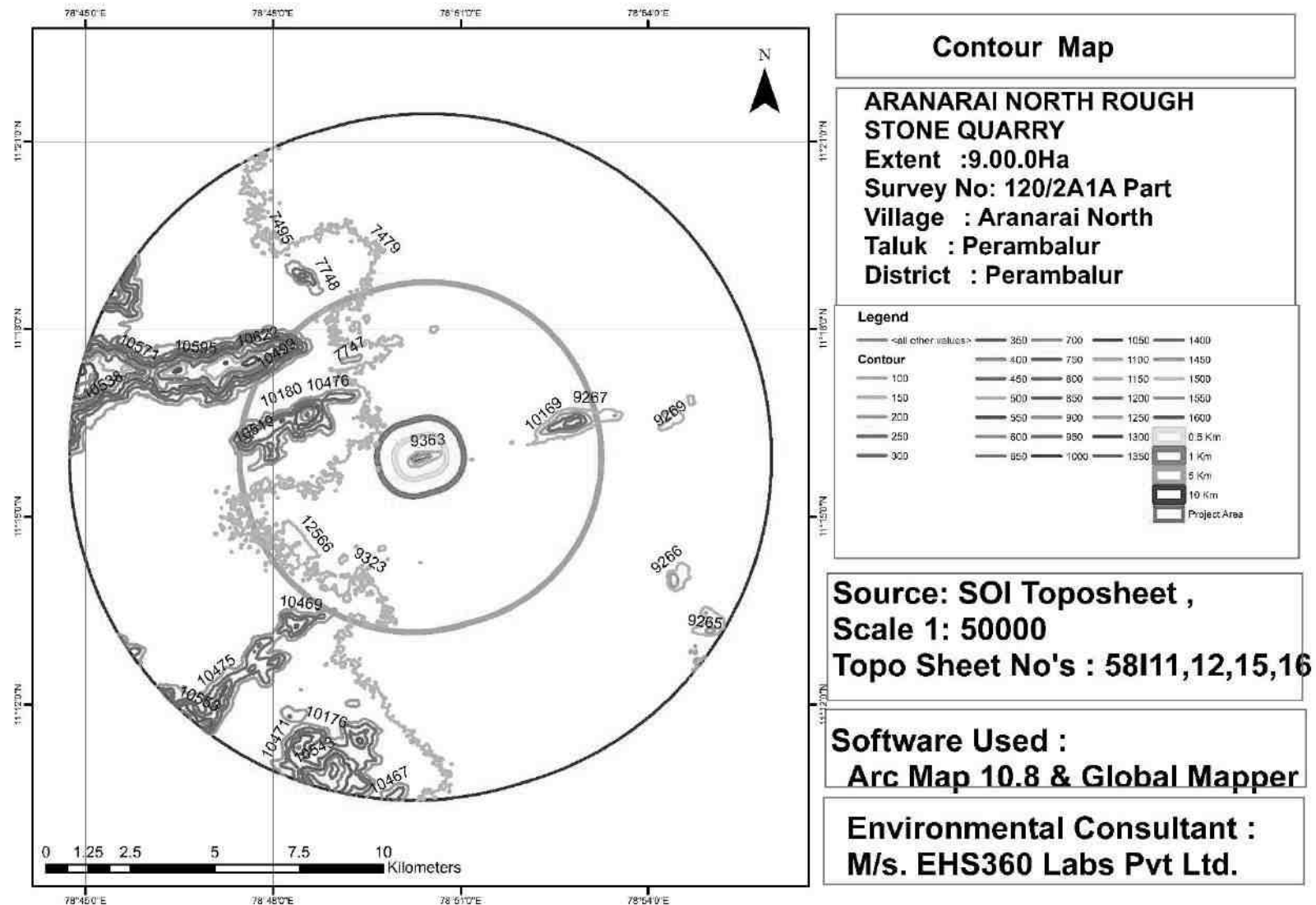


Figure 3-7 Contour map of study area

3.5.7 Geomorphology of PIA district

Perambalur district is centrally located in the State, 267 kms away from Chennai on the southern direction. The district lies between 10°54" and 11°30"-degree northern latitude and 78°40" and 79°30" degree eastern longitude. The district is bounded on the north by Cuddalore and Salem districts, south and west by Tiruchirappalli district and east by Ariyalur district. The district has no coastline. The Vellar river flow in the north and has no well-marked natural divisions. The Pachamalai hill situated on the north of Perambalur is the most important hill in the district. The average height of the hill is 610 metres though a few of its peaks rise to about 1036 meters above the mean sea level. Mostly, the district is dry. Pachamalai (hill) which spread over with a few places on high ranges is a haven for the tribals of this region. *Pachai* means 'green' and *malai* means 'mountain or hill'. Myluthu falls is located on the foot hills of Pachamalai, a place of scenic beauty. It is about 15 kms away from Perambalur.

Source : <https://perambalur.nic.in/>

3.5.8 Geomorphology of the Study Area

The total Geographical area of the study area is **578.32 Sq.km**. The Geomorphology of the study area is given in **Table 3-4** and Geomorphology pattern and Geomorphology Map of the study area is given in **Figure 3-8** and **Error! Reference source not found.** respectively.

Table 3-4 Geomorphology of the Study Area

S. No	Description	Area (Sq.km)	Area (Acres)	Percentage
1	Structural Origin-Moderately Dissected Hills and Valleys	331.00	0.082	57.23
2	Structural Origin-Low Dissected Hills and Valleys	17.26	0.004	2.98
3	Denudational Origin-Low Dissected Hills and Valleys	46.95	0.012	8.12
4	Denudational Origin-Pediment-PediPlain Complex	163.63	0.040	28.29
5	Anthropogenic Origin-Anthropogenic Terrain	2.46	0.001	0.43
6	Waterbodies	17.03	0.004	2.94
Total		578.32	0.143	100.00

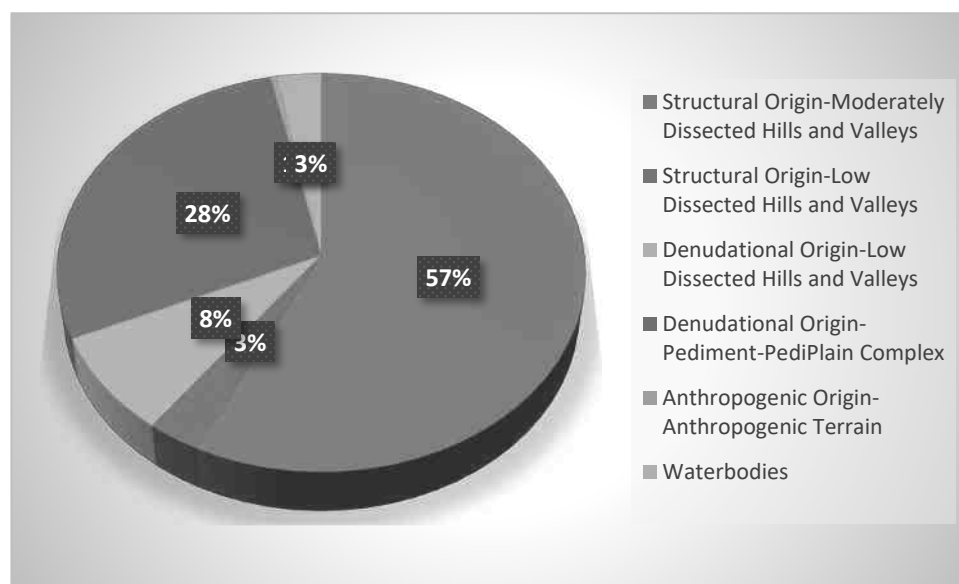


Figure 3-8 Geomorphology Pattern of the Study Area

3.5.9 Hydrogeology of PIA district

The district is underlain by the various geological formations Geologically in Perambalur district, western part is covered by hard rocks, south east by cretaceous formation, thin fringe of Gondwana in south and north Alluvium

Source : <https://cdn.s3waas.gov.in>

3.5.10 Drainage Pattern of PIA district

The Vellar river rises in Salem district and during the course, it forms the boundary between Cuddalore and Perambalur districts for many kilometers. Vellar river runs for a distance of 73 kms in Perambalur and Cuddalore districts and then it falls into Bay of Bengal at Porto-Novo, now called Parangipettai near Chidambaram in Cuddalore district. Vasistanadi (river) flows towards southeast for about 26 kms along with boundary between Attur and Perambalur taluk on the one side and Virudhachalam taluk of Cuddalore district on the other. Near Peraiyur in the Perambalur taluk, it is joined by Swetanadhi at 4 kms to the west of the Chennai - Trichy National Highway near Tholudur in Cuddalore district. The Chinnar, minor rivers of Kallar, Killiar and Maruthaiyar are some other rivers in Perambalur district. The Marudaiyar joins the river Coleroon. The Chinnar and Kallar join in the river Vellar. The Swetanadhi (river) originate from northern portion of Kolli hills, flowing towards southeastern side through Valakombai, Salem and Perambalur districts. The river drains through Seradi, Valakombai, Thamampatti and their adjoining places **Figure 3-9.**

Source : DH 2011 3314 PART A DCHB PERAMBALUR

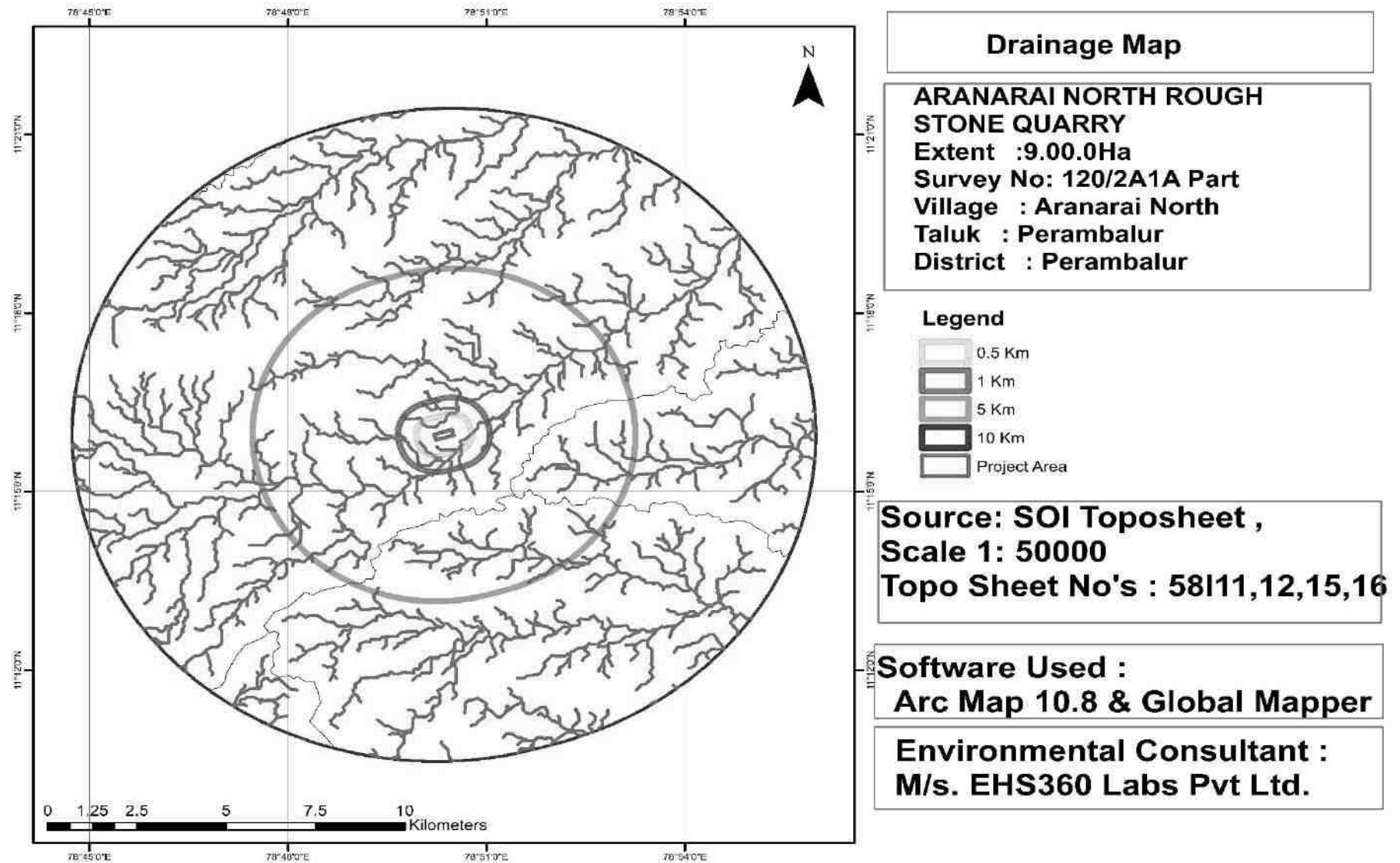


Figure 3-9 Drainage map of the study area

3.5.11 Seismicity

As per Seismicity Map of India, the project location/study area falls in Zone II, which is categorized as a Moderate Active zone. The Seismicity Map of India is shown in **Figure 3-10**.



Figure 3-10 Seismicity map of India

3.5.12 Soils of PIA District

The predominant soil in the district is red sand with scattered pockets of black soil. The best quality of soil is found in Perambalur taluk. The soil in the district is best suited for raising dry crops. Soil testing laboratory is available in the district headquarters. There are three types of soil being noticed in the district; Red loam, Alluvium and Black soil. The red soil is found in the hard rock terrains and the black soil in the limestone regions and the alluvial nature in the sandstone regions. Red loam soil is found in parts of Alathur block and black soil is found in Veppur, Alathur (part), Veppanthattai and Perambalur blocks.

Source : DH 2011 3314 PART A DCHB PERAMBALUR

3.6 Air Environment

Baseline ambient air quality assessment gives the status in the vicinity of site and is an indispensable part of environmental impact assessment studies. The baseline status of air environment in the study area is assessed through a systematic air quality surveillance program.

3.6.1 Meteorological Conditions

The regional air quality is influenced by the meteorology of that region. The principal weather parameters that influence the concentration of the air pollutants in the surroundings are wind speed, wind direction and temperature. Meteorological data is useful for proper interpretation of the baseline data. It is used as input for air quality dispersion models for predicting the post project environmental scenario i.e., ground level concentrations due to proposed utilities like Thermic fluid Heater & DG sets etc.

3.6.2 General Meteorological Scenario based on IMD Data

The nearest Indian Meteorological Department (IMD) station located to project site is Thiruchirapalli. The Climatological data of Thiruchirapalli (10°47'25.74"N and 78°42'17.40"E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 29-year period (1971-2000), is presented in the following sections on the meteorological conditions of the region. The monthly variations of the relevant meteorological parameters are reproduced in Table 3-5.

Table 3-5 Climatological Summary –Perambalur (1971-2000)

Month	Temp (°C)		Rainfall		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)	
	Daily Max.	Daily Min.	Total (mm)	No. of days		08:30	17:30
Jan	31.2	20.8	17.3	1.1	5.7	E	E
Feb	33.2	21.5	12.2	0.7	6.3	E	E
Mar	36.0	23.4	9.7	0.7	6.6	E	E
Apr	38.2	26.2	42.8	1.0	6.9	SW	E
May	39.2	26.6	39.8	2.1	9.8	W	W
Jun	37.6	26.4	27.7	1.8	16.9	W	W
Jul	36.5	25.9	59.2	3.6	16.6	W	W
Aug	36.2	25.6	87.4	4.4	14.7	W	W
Sep	35.6	24.9	121.7	6.6	9.6	W	W
Oct	34.5	23.9	139.3	7.4	6.1	W	E
Nov	32.3	22.7	168.3	8.1	5.1	E	E
Dec	31.3	21.5	111.6	5.2	5.5	E	E
Max.	39.2	26.6	168.3	8.1	16.9	The Predominant wind direction is East	
Min.	31.2	20.8	9.7	0.7	5.1		
Annual Avg./Total.	35.2	24.2	836.9	42.7	9.2		

Source : IMD

3.6.3 Meteorological Scenario during Study Period

The meteorological scenario in and around the project site is an essential requirement during the study period for proper interpretation of baseline air quality status. Meteorological data was collected during the study period (**February 2026 –April 2026**) and is presented in **Table 3-6**. The wind rose for the study period is given in

Figure 3-11.

Table 3-6 Meteorological Data for the Study Period (Jan 2026 to March 2026)

S. No	Parameter	Observation
1.	Temperature	Max Temperature: 32 ⁰ C Min Temperature: 30 ⁰ C Avg Temperature: 31 ⁰ C
2.	Average Relative Humidity	49.42 %
3.	Average Wind Speed	2.47 m/s
4.	Predominant Wind Direction during study period	W

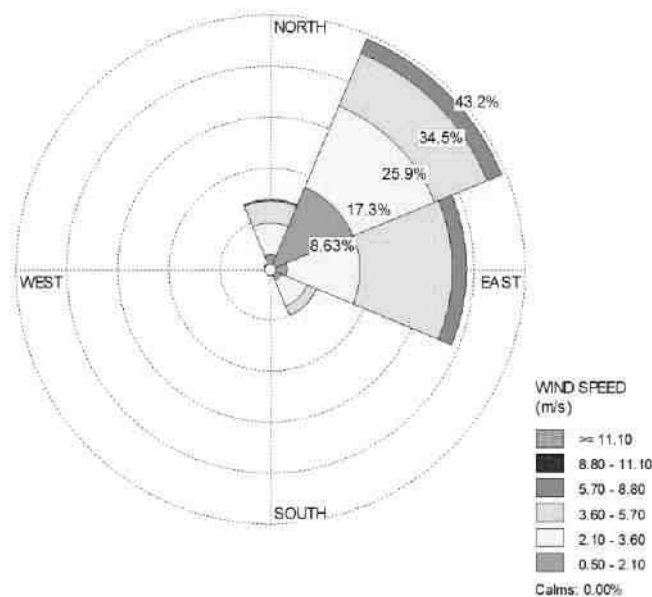


Figure 3-11 Wind rose for the study period

3.6.4 Ambient Air Quality

3.6.4.1 Ambient Air Quality Monitoring Stations

Eight (08) monitoring locations have been identified as per annual wind predominance of Thiruchirapalli. IMD. AAQ monitoring locations are selected based on Annual wind predominance, map showing the Ambient Air Quality monitoring locations is given in **Figure 3-12** and the details of the locations are given in **Table 3-7**.

Table 3-7 Details of Ambient Air Quality Monitoring Locations

Description	Wind Direction	Distance	Direction	Latitude	Longitude
Aranarai North	U/W	0.44	W	78.8338282	11.26529968
Thiruppeyar	U/W	1.82	W	78.8238762	11.26264128
Samathuvapuram	D/W	2.67	E	78.8665414	11.27016037
Perambalur	D/W	2.41	E	78.865415	11.27169478
Esanai	C/W	3.06	NNW	78.8317096	11.29409922
Kaikalathur	C/W	3.38	NNW	78.8305055	11.29588959

EIA/EMP Report

9.00.0 Ha of ARANARAI NORTH ROUGH STONE QUARRY at SF No. 120/2A1A Part, Aranarai North Village, Perambalur Taluk, Perambalur District, TamilNadu, Proposed by M/s. Tamil Nadu Minerals Limited (TAMIN)

Aranarai	C/W	1.83	SE	78.8555111	11.25424065
Alambadi	C/W	2.09	S	78.8414846	11.24542607

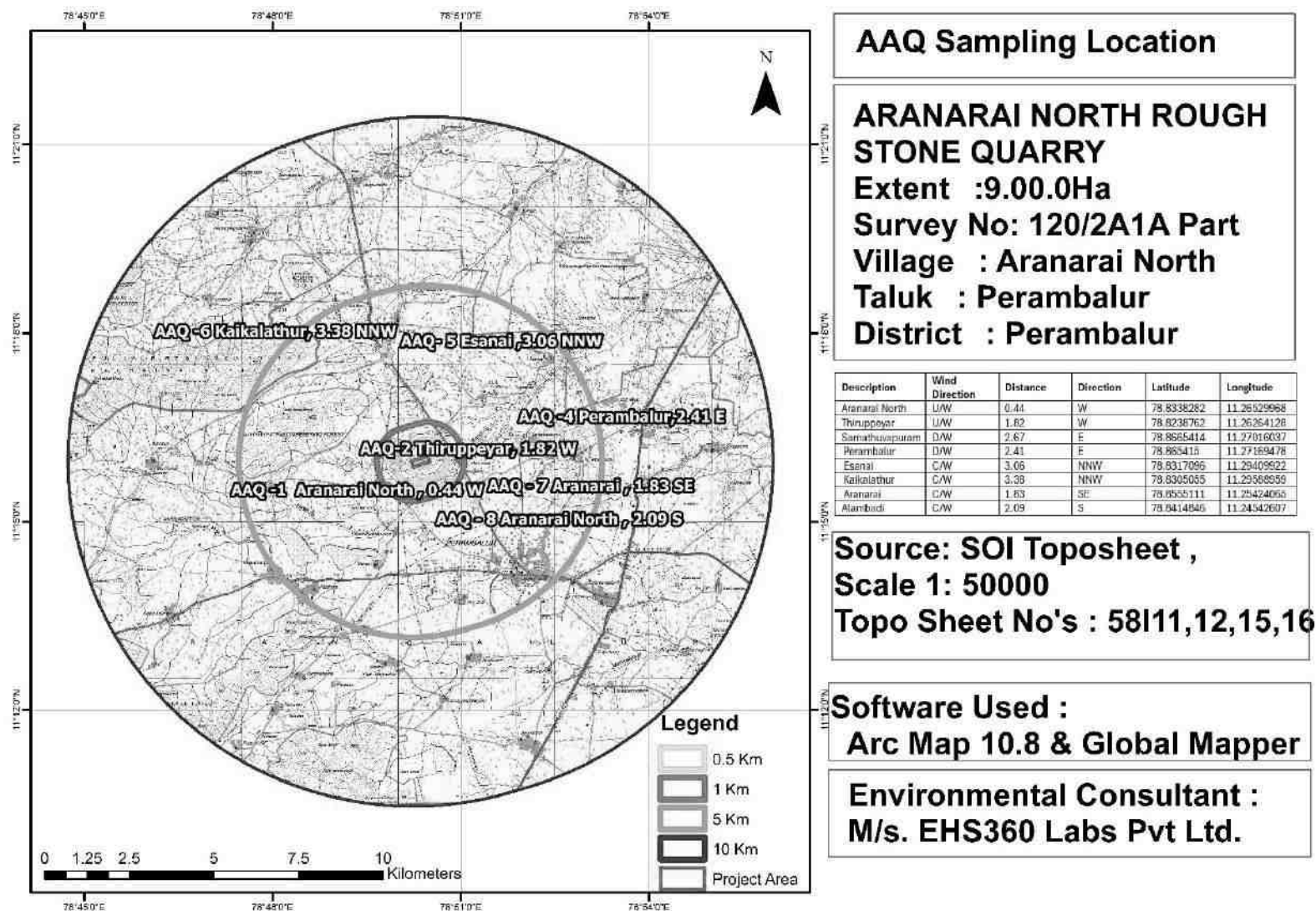


Figure 3-12 Ambient Air Quality monitoring locations

3.6.5 Ambient Air Quality Monitoring Techniques and Frequency

Ambient air quality was monitored twice a week for One (01) season (it covers 12 weeks), i.e., 3 months (**February 2026 – April 2026**). PM₁₀, PM_{2.5}, SO₂, NO_x, Pb, NH₃, C₆H₆, C₂₀H₁₂, As& Ni were monitored. Sampling was carried out as per the Central Pollution Control Board (CPCB), monitoring guidelines at each location. Analytical methods used for analysis of parameters are given in **Table 3-8** and the Summary of the average baseline concentrations of pollutants is given in **Table 3-9**.

Table 3-8 Analytical Methods for Analysis of Ambient Air Quality Parameters

S. No	Parameters	Analytical method
1	Sulphur Dioxide (SO ₂), µg/m ³	IS 5182(Part 2) : 2001 RA
2	Nitrogen Dioxide (NO ₂), µg/m ³	IS 5182(Part 6) : 2006 RA
3	Particulate Matter (PM _{2.5}), µg/m ³	SOP – EA -001- In house validated method
4	Particulate Matter (PM ₁₀), µg/m ³	IS 5182(Part 23) : 2006 RA
5	CO mg/m ³	NIOSH- 6014
6	Pb µg/m ³	IS 5182(Part 22): 2004 RA
7	O ₃ , µg/m ³	IS 5182(Part 9): 1974 RA
8	NH ₃ , µg/m ³	SOP – EA -009 - In house validated method (Based on CPCB Method)
9	Benzene, µg/m ³	IS 5182(Part 11): 2006 (RA 2012)
10	Benzo (a) pyrene, ng/m ³	IS 5182(Part 12) :2004 RA
11	Arsenic, ng/ m ³	SOP –In house validated method (Based on CPCB Guideline)
12	Nickel ng/ m ³	SOP –In house validated method (Based on CPCB Guideline)

Table 3-9 Summary of the average baseline concentrations of pollutants

Parameters	Conc.	NAAQ Standards	Locations							
			Aranarai North	Thiruppey ar	Samathuvapuram	Perambalur	Esanai	Kaikalathur	Aranarai	
			AAQ 1	AAQ 2	AAQ 3	AAQ 4	AAQ 5	AAQ 6	AAQ 7	
PM ₁₀ Conc. (µg/m ³)	Min.	100 (24 Hours)	47.9	42.8	39.7	43.4	44.7	42.7	45.4	43.5
	Max		57.2	52.1	49.0	52.7	54.0	52.0	54.7	52.8
	Avg.		52.7	47.6	44.5	48.2	49.5	47.5	50.2	48.3
	98th 'tile		57.1	52.0	48.9	52.6	53.9	51.9	54.6	52.7
PM _{2.5} Conc. (µg/m ³)	Min.	60 (24 Hours)	25.3	23.2	22.0	23.8	23.5	21.7	23.9	23.2
	Max		27.8	25.7	24.5	26.3	26.0	24.2	26.4	25.7
	Avg.		26.7	24.6	23.4	25.2	24.9	23.1	25.3	24.6
	98th 'tile		27.8	25.7	24.5	26.3	26.0	24.2	26.4	25.7
SO ₂ Conc. (µg/m ³)	Min.	80 (24 Hours)	8.8	7.7	7.6	7.3	8.3	7.9	7.4	7.7
	Max		11.3	10.2	10.1	9.8	10.8	10.4	9.9	10.2
	Avg.		9.7	8.6	8.5	8.2	9.2	8.8	8.3	8.6
	98th 'tile		11.2	10.1	10.0	9.7	10.7	10.3	9.8	10.1
NO ₂ Conc. (µg/m ³)	Min.	80 (24 Hours)	19.7	17.7	18.6	17.2	17.8	17.3	17.9	18.1
	Max		25.1	23.1	24.0	22.6	23.2	22.7	23.3	23.5
	Avg.		22.3	20.3	21.2	19.8	20.4	19.9	20.5	20.7
	98th 'tile		25.0	23.0	23.9	22.5	23.1	22.6	23.2	23.4
CO (mg/m ³)	Avg.	4 (1hour)	0.25	0.32	0.29	0.38	0.32	0.35	0.31	0.29
Pb (µg/m ³)	Avg.	1 (24 hour)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Parameters	Conc.	NAAQ Standards	Locations							Alambadi
			Aranarai North	Thiruppeyar	Samathuvapuram	Perambalur	Esanai	Kaikalathur	Aranarai	
			AAQ 1	AAQ 2	AAQ 3	AAQ 4	AAQ 5	AAQ 6	AAQ 7	
O ₃ (µg/m ³)	Avg.	180 (1hour)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NH ₃ (µg/m ³)	Avg.	400 (24 hours)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzene (µg/m ³)	Avg.	5 (Annual)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Benzo (a) pyrene, (ng/m ³)	Avg.	1 (Annual)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Arsenic (ng/ m ³)	Avg.	6 (Annual)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nickel (ng/m ³)	Avg.	20 (Annual)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL (Below detectable limit)

3.6.6 Interpretations of Results:

The ambient air quality monitoring data was compared with the National Ambient Air Quality Standards (NAAQS), as prescribed by the Ministry of Environment, Forest & Climate Change (MoEFCC), Government of India, in its 16.11.2009 notification.

- Particulate Matter (PM₁₀): 39.7 – 57.2 µg/m³ (within the NAAQS limit of 100 µg/m³ for 24-hour average).
- Fine Particulate Matter (PM_{2.5}): 21.7 – 27.8 µg/m³ (within the NAAQS limit of 60 µg/m³ for 24-hour average).
- Sulfur Dioxide (SO₂): 7.3 – 11.3 µg/m³ (well below the NAAQS limit of 80 µg/m³).
- Nitrogen Dioxide (NO₂): 17.2 – 25.1 µg/m³ (well below the NAAQS limit of 80 µg/m³).
- The air quality parameters monitored at different locations during the study period were within the permissible limits set by NAAQS.
- The concentration of pollutants in the study area does not exceed the regulatory thresholds, indicating that the air quality is acceptable.
- The findings suggest that the overall ambient air quality in the monitored locations is average, meaning it does not pose significant health risks based on the measured parameters.
- Since PM₁₀ and PM_{2.5} levels remain within the limits, the air pollution from dust and fine particulate emissions is controlled within regulatory standards.
- The low levels of SO₂ and NO₂ indicate minimal emissions from industrial activities, vehicular pollution, or combustion sources in the study area.

3.7 Noise Environment

Ambient noise levels have been established by monitoring noise levels at Eight (08) locations in and around 10Km distance from project area during the study period using precision noise level meter. Noise levels were recorded on an hourly basis for one complete day at each location using pre-calibrated noise levels. A map showing the noise monitoring locations is given in **Figure 3-13**.

3.7.1 Results and Discussions

Based on the recorded hourly noise levels at each monitoring location, the day equivalent (L_d) and night equivalent (L_n) were calculated.

- L_d: Average noise levels between 6:00 hours to 22:00 hours.
- L_n: Average noise levels between 22:00 hours to 6:00 hours.

The comparison of day equivalent noise levels (L_d) and night equivalent noise levels (L_n) with the respective CPCB stipulated noise standards for various land use categories are shown in **Table 3-10**.

Table 3-10 Day and Night Equivalent Noise Levels

S. No	Location	Location Code	Distance (km) from Project boundary	Azimuth Direction	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
					Day	Night	Lday (Ld)	LNight (Ln)	
1	Aranarai North	N1	0.44	-	51.5	42.8	55	45	Industrial
2	Thiruppeyar	N2	1.82	E	51.2	43.5	55	45	Residential
3	Samathuvapuram	N3	2.67	W	52.5	41.5	55	45	Residential
4	Perambalur	N4	2.41	W	49.6	40.3	75	70	Residential
5	Esanai	N5	3.06	SW	52.7	41.4	55	45	Residential
6	Kaikalathur	N6	3.38	SW	53.6	43.6	55	45	Residential
7	Aranarai	N7	1.83	NNW	48.5	39.6	55	45	Residential
8	Alambadi	N8	2.09	NE	54.0	44.2	55	45	Residential

3.7.2 Interpretations of Results:

The noise level monitoring results were compared against the **Central Pollution Control Board (CPCB) standards**, which define permissible noise levels for different environmental settings (Residential, Industrial, etc.).

Residential Areas (N1, N2, N3, N5, N6, N7, N8):

- The daytime noise levels (48.5 – 54.0 dB(A)) are within CPCB limits (55 dB(A)).
- The nighttime noise levels (39.6 – 44.2 dB(A)) are within CPCB limits (45 dB(A)).
- No significant noise pollution: levels remain under permissible limits.

Near Project Site (N4 - Industrial Area):

- Daytime noise level: 51.5 dB(A) (within the CPCB limit of 75 dB(A)).
- Nighttime noise level: 42.8 dB(A) (well below the CPCB limit of 70 dB(A)).
- Noise levels at the project site are considerably lower than the industrial limit, indicating minimal industrial noise impact.

The Noise levels recorded during the daytime (6:00 a.m to 10:00 p.m) and night-time (10:00 p.m to 6:00 a.m) at all stations are within the CPCB limits. The major source of noise in the study area is transportation and vehicular movement.

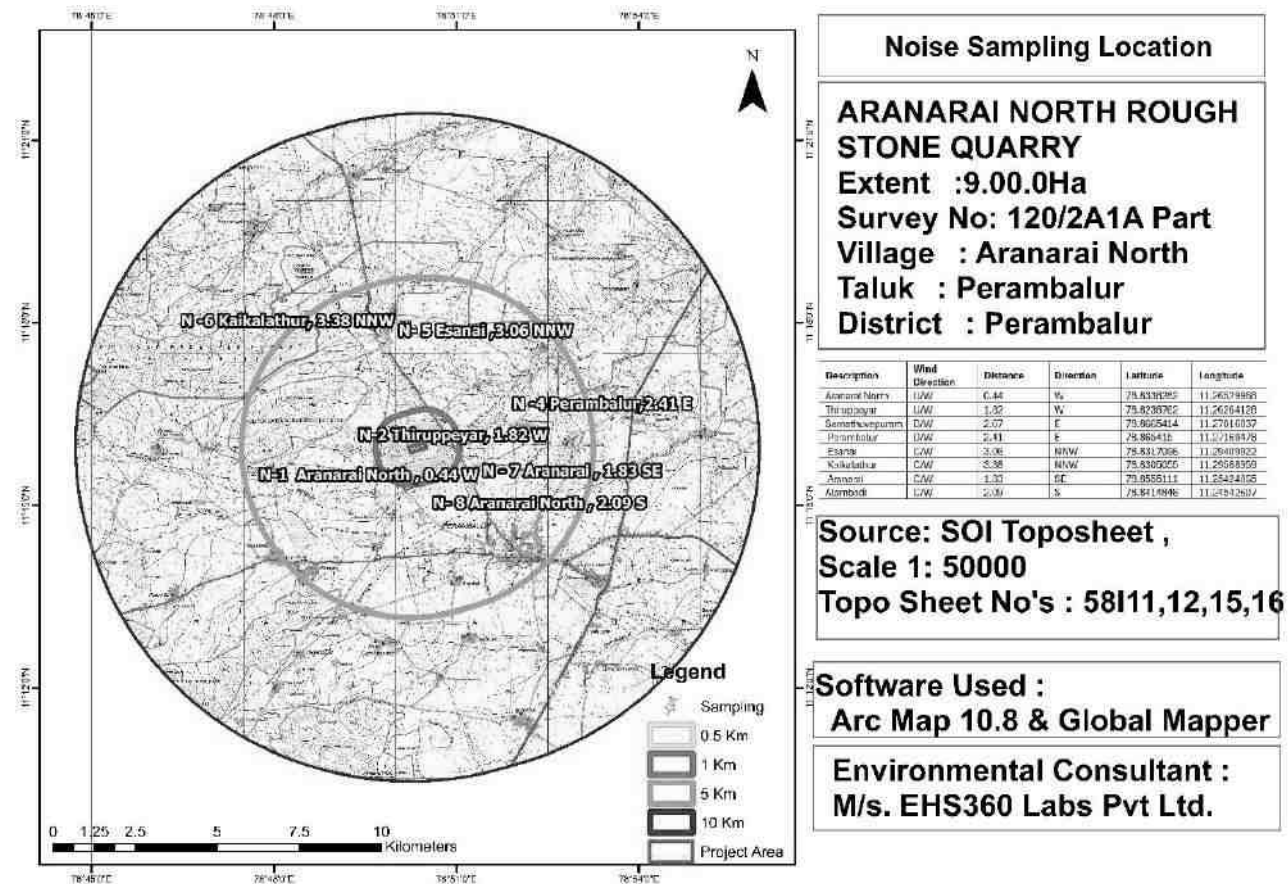


Figure 3-13 Noise Monitoring locations

3.8 Water Environment

3.8.1 Surface Water Resources of PIA district

Infiltration Galleries are capable of supplying large quantities of water, and are used where wells are unable to supply water needs, i.e. where an impermeable rock barrier affects well efficiency, or where surface water sources are too shallow for intake screens. Infiltration galleries are one or more horizontal screens placed adjacent to (on-shore), or directly underneath (bed-mounted), a surface water source.

Source: DH 2011 3314 PART A DCHB PERAMBALUR

3.8.2 Surface Water Quality Assessment

To establish the baseline status of water environment, the representative 08 sampling locations for surface water within a radial distance of 10 Km from project site have been selected as per CPCB guidelines of Water Quality Monitoring through an adequate survey of the project area. Test methods used for the analysis of water quality parameters are given in Table 3-11.

Table 3-11 Test methods used for the analysis of water quality parameters

S. No	Parameter Measured	Test Method
1	Turbidity	APHA 23rd Edition 2017 /2130B/P 2-9 Nephelometric Method/ IS 3025(Part 10): 1984 RA
2	Color	APHA 23rd Edition 2017 2120B /P2-2 Visual Comparison Method / IS 3025(Part 4) : 1983 RA
3	pH	APHA 23rd Edition 2017 4500 H+ / P 4-90 Electrometric Method/IS 3025(Part 11): RA
4	Conductivity	APHA 23rd Edition 2017/ 2510 B /P 2 – 47 Electrometric Method/IS3025(Part 14): 2013 RA
5	Total Dissolve Solids	APHA (23rd Edition) 2017/ 2540 C / P 2-58 Gravimetric Method/IS 3025 (part 16) :1984 RA
6	Total Suspended Solids	APHA 23rd Edition 2017/ 2540 D /2 -58 / IS 3025(Part 17) : 1984 (RA 2012) Gravimetric Method
7	Alkalinity as CaCO ₃	APHA 23rd Edition 2017/2320 B / P 2 – 27 Titrimetric Method/IS3025(Part 23) : 1986 RA
8	Total Hardness as CaCO ₃	APHA 23rd Edition 2017 /2340 C / P 2 – 37 EDTA Titrimetric Method/IS 3025(Part 21) : 2009 RA
9	Sodium	APHA 23rd Edition 2017/ 3500 Na B / P 3-98 Flame Emission Photometric Method/IS 3025(Part 45): 1993 RA
10	Potassium	APHA 23rd Edition 2017/ 3500 K B / P 3-98 Flame Emission Photometric Method/IS 3025(Part 45): 1993 RA
11	Calcium as Ca	APHA 23rd Edition 2017 3500 Ca B /P 3-65 Calculation Method /IS 3025(Part 40): 1991 RA
12	Magnesium as Mg	IS 3025(Part 46): RA /APHA 23rd Edition 2017 2340 C / P 3-84 Calculation Method
13	Chloride	IS 3025(Part 32): 1988 / APHA 23rd Edition 2017 4500 Cl- B / P 4-70 Argonometric Method

S. No	Parameter Measured	Test Method
14	Sulphate SO ₄	APHA 23rd Edition 2017 4500 SO42- E / P 4-188 Turbidity Method/IS 3025(Part 24) : 1986 RA
15	Nitrate as NO ₃	APHA 23rd Edition 2017 4500 NO3 B Ultraviolet Spectro Photometric Screening Method
16	Phosphate	IS 3025 Part 31: 1988 Chapter 12
17	Fluorides as F	APHA23rd Edition F-D: 2017
18	Cyanide	APHA 23rd Edition 2017 4500- CN- E/ P 4-42 Calorimetric Method
19	Arsenic	APHA 23rd Edition 2017 3500- As / P 3-61 Silver Diethyldithiocarbamate Method
20	Boron	APHA 23rd Edition 2017 :4500 BB/P4-23
21	Cadmium	IS 3025 (Part - 41)1991
22	Chromium, total	IS 3025(Part 52) RA / APHA 23rd Edition 2017/3500 Cr / P 3- 67 1,5Diphenylcarbazide Method
23	Copper	APHA 23rd Edition 2017 3500 Cu B/P 3-72 Atomic Absorption Spectrometric Method / IS 3025(Part42): 1992 RA
24	Iron	APHA 23rd Edition 2017 3500 Fe- B/ P 3-77 1,10 Phenanthroline Method /IS 3025(Part 53): 2003 RA
25	Lead	APHA 23rd Edition 2017 3500 Pb B / P 3 -80 Atomic Absorption Spectrometric Method / IS 3025(Part 47): 1994 RA
26	Manganese	IS 3025(Part 46): RA /APHA 23rd Edition 2017 2340 C / P 3- 84Calculation Method
27	Mercury	IS 3025 (Part48):1994 RA 1999
28	Nickel	IS 3025:(Part-54):2003(Reaff 2009)
29	Selenium	IS 3025 Part (56)2003
30	Zinc	APHA 22rd Edition 2017/ 3500 Zn B / P 3 – 106 Atomic Absorption Spectrometric Method/IS 3025(Part 49): 1994 RA
31	Dissolved Oxygen	IS:3025 (Part - 38)1989 (Reaff 2009)
32	BOD at 27Â°C for 3 days	IS:3025 (Part – 58): 2006
33	COD	IS:3025 (Part – 44): 1993

Classification of Surface Standard- IS 2296:

Class A – Drinking water without conventional treatment but after disinfection.

Class B – Water for outdoor bathing.

Class C – Drinking water with conventional treatment followed by disinfection.

Class D – Water for fish culture and wildlife propagation.

Class E – Water for irrigation, industrial cooling, and controlled waste disposal

The prevailing status of surface water quality has been assessed during the study period. Surface water sampling Locations and Its results are given in **Table 3-12** and **Table 3-13** respectively. A map showing the surface water monitoring locations is given in **Figure 3-14**.

Table 3-12 Details of Surface water sampling locations

S. No	Water bodies	Location code	Longitude	Latitude	Distance from project boundary (~Km)	Direction from project boundary
1	Athakkanur Lake	SW1	78.88414962	11.28932181	5.23	NE
2	Vella Thangiyamman Lake	SW2	78.86119943	11.2343574	4.22	SSE
3	Aranari lake	SW3	78.86119943	11.2343574	3.9	SSE
4	Thuraimangalam lake	SW4	78.88516511	11.22499025	5.97	SE
5	Avvaiyar Nager Village Pond	SW5	78.8961139	11.22979578	7.11	ESE
6	Brammadesam Lake	SW6	78.89389372	11.31479523	7.82	NE
7	Sengunam lake	SW7	78.91010534	11.26870376	7.41	E
8	Anukkur lake	SW8	78.86177711	11.33577888	8.79	NNE

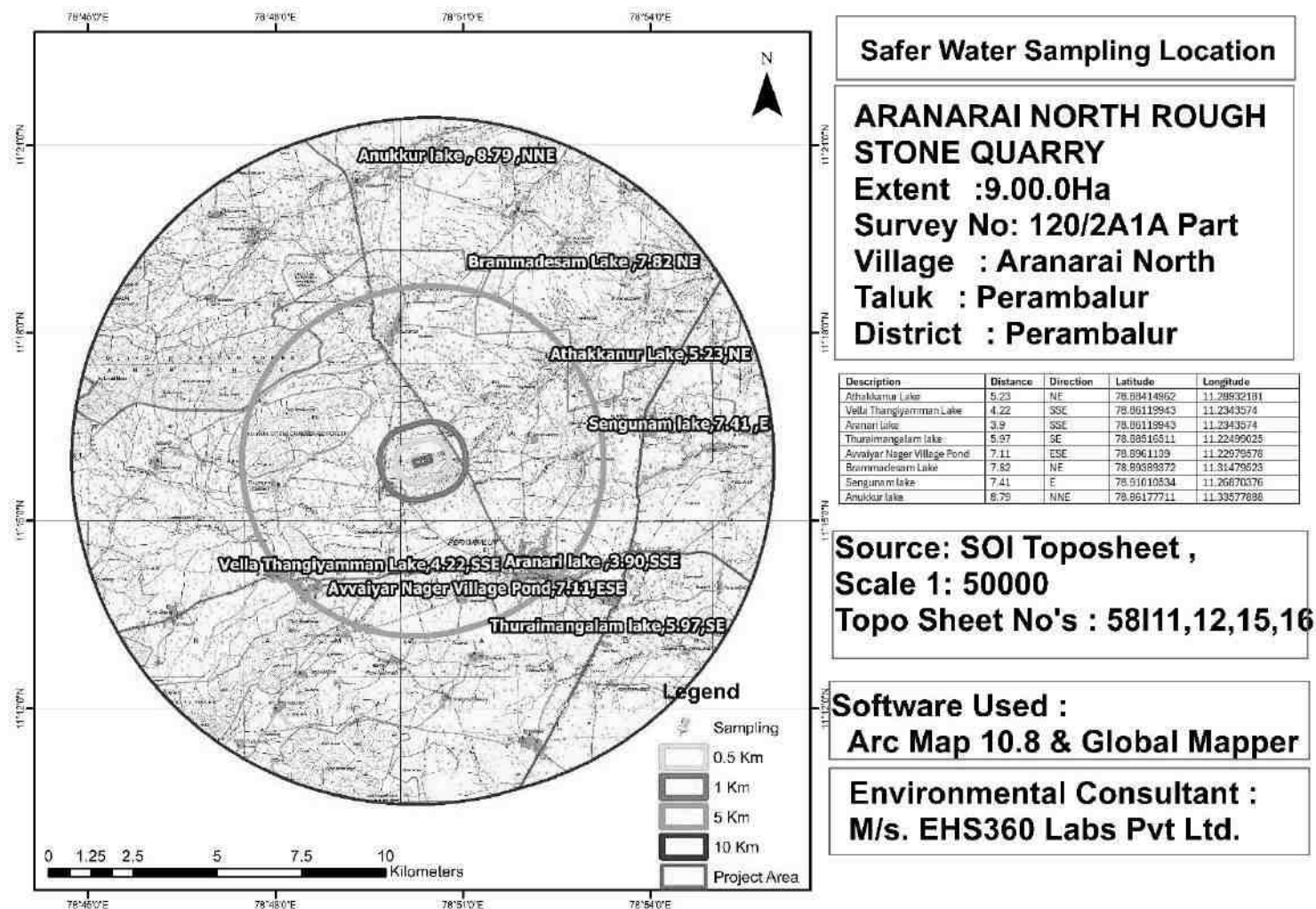


Figure 3-14 Surface water monitoring locations

Table 3-13 Surface water Monitoring Results

S. No	Parameter	Unit	Surface water standards (IS 2296 Class-A)	Athakkanur Lake	Vella Thangiyamma n Lake	Aranari lake	Thuraimangalam lake	Avvaiyar Nager Village Pond	Brammad esam Lake	Sengunam lake	Anukkur lake
				SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW7	SW8
1	Turbidity	NTU	1	8.1	7.6	7.5	7.9	6.9	7.2	7.2	8.2
2	pH (at 25°C)	--	6.5-8.5	7.79	7.4	7.46	7.32	8.1	7.81	7.25	7.37
3	Electrical Conductivity	µS/cm	-	1950	1560	1320	1760	1080	1870	1210	1035
4	Total Dissolved Solids	mg/l	500	1238	980	851	1135	697	1206	780	668
5	Total Suspended Solids	mg/l	-	42.3	31.2	17.8	38.9	23.5	38.9	31.2	42.3
6	Total Alkalinity as CaCO ₃	mg/l	-	216.6	372.3	323.5	431.4	264.7	458.3	296.6	216.6
7	Total Hardness as CaCO ₃	mg/l	300	520.1	411.5	357.6	510.8	313.5	542.8	351.2	520.1
8	Sodium as Na	mg/l	-	216.6	145.4	148.9	198.5	121.8	211.0	136.5	216.6
9	Potassium as K	mg/l	-	54.1	36.3	37.2	49.6	30.5	52.7	34.1	54.1
10	Calcium as Ca	mg/l	-	64.1	73.7	78.6	77.0	54.5	117.0	105.8	64.1
11	Magnesium as Mg	mg/l	-	34.0	55.4	38.9	77.8	42.8	61.3	12.6	34.0
12	Chloride as Cl	mg/l	250	408.6	274.3	281.0	374.6	229.9	398.0	257.5	408.6
13	Sulphate as SO ₄	mg/l	400	102.2	68.6	56.2	74.9	46.0	79.6	51.5	102.2
14	Nitrate as NO ₃	mg/l	20	3.3	4.9	3.7	6.8	3.2	6.3	4.9	3.3
15	Phosphate as PO ₄	mg/l	-	0.91	0.39	0.27	0.48	0.22	0.48	0.39	0.91
16	Fluorides as F	mg/l	1.5	0.62	0.48	0.29	0.56	0.21	0.57	0.48	0.62
17	Cyanide	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

18	Arsenic	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Boron as B	mg/l	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Chromium, Total	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Copper as Cu	mg/l	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Iron as Fe	mg/l	0.3	0.26	0.18	0.045	0.25	0.065	0.21	0.051	0.28
24	Lead as Pb	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25	Manganese as Mn	mg/l	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Mercury	mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Nickel as Ni	mg/l	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Selenium as Se	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	Zinc	mg/l	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30	Dissolved Oxygen	mg/l	6	4.3	4.7	4.9	5	5.3	5.6	5.2	5.7
31	Chemical Oxygen Demand as O ₂	mg/l	-	64.8	32.8	34.5	36.3	37.4	39.5	32.8	28.6
32	BOD, 3 days @ 27°C as O ₂	mg/l	2	12.6	5.8	4.2	6.1	4.1	6.1	5.8	3.1

Note: BDL- Below Detectable Limit

Interpretation of Surface Water Quality Monitoring Results

The surface water samples were analyzed and compared with IS 2296:1992 standards and CPCB Water Quality Criteria for designated best use. Based on the test results, the water quality of the studied locations falls under Class E, which means it is suitable for irrigation, industrial cooling, and controlled waste disposal, but not for drinking or direct human consumption.

Parameter	Observed Range	IS 2296:1992 Limits (Class A)	Interpretation
pH	7.25 – 8.1	6.5 – 8.5	Within Limits – Indicates neutral to slightly alkaline water.
Electrical Conductivity (EC)	1035 – 1950 $\mu\text{S}/\text{cm}$	No specific limit	Higher EC values suggest moderate dissolved solids, which may indicate mineral content.
Chloride (Cl^-)	220.3 – 408.6 mg/l	250 mg/l	Some locations exceed limits –.
Sulphate (SO_4^{2-})	44.1 – 102.2 mg/l	400 mg/l	Within Limits – Indicates low sulfate pollution.
Total Hardness	300.4 – 542.8 mg/l	300 mg/l	Exceed limits
Chemical Oxygen Demand (COD)	28.6 – 64.8 mg/l	No specific limit	Elevated COD levels indicate presence of organic matter and potential pollution.
Biochemical Oxygen Demand (BOD)	3.1 – 12.6 mg/l	2 mg/l (Class A)	Exceed limits, suggesting organic contamination, possibly from agricultural or industrial runoff.

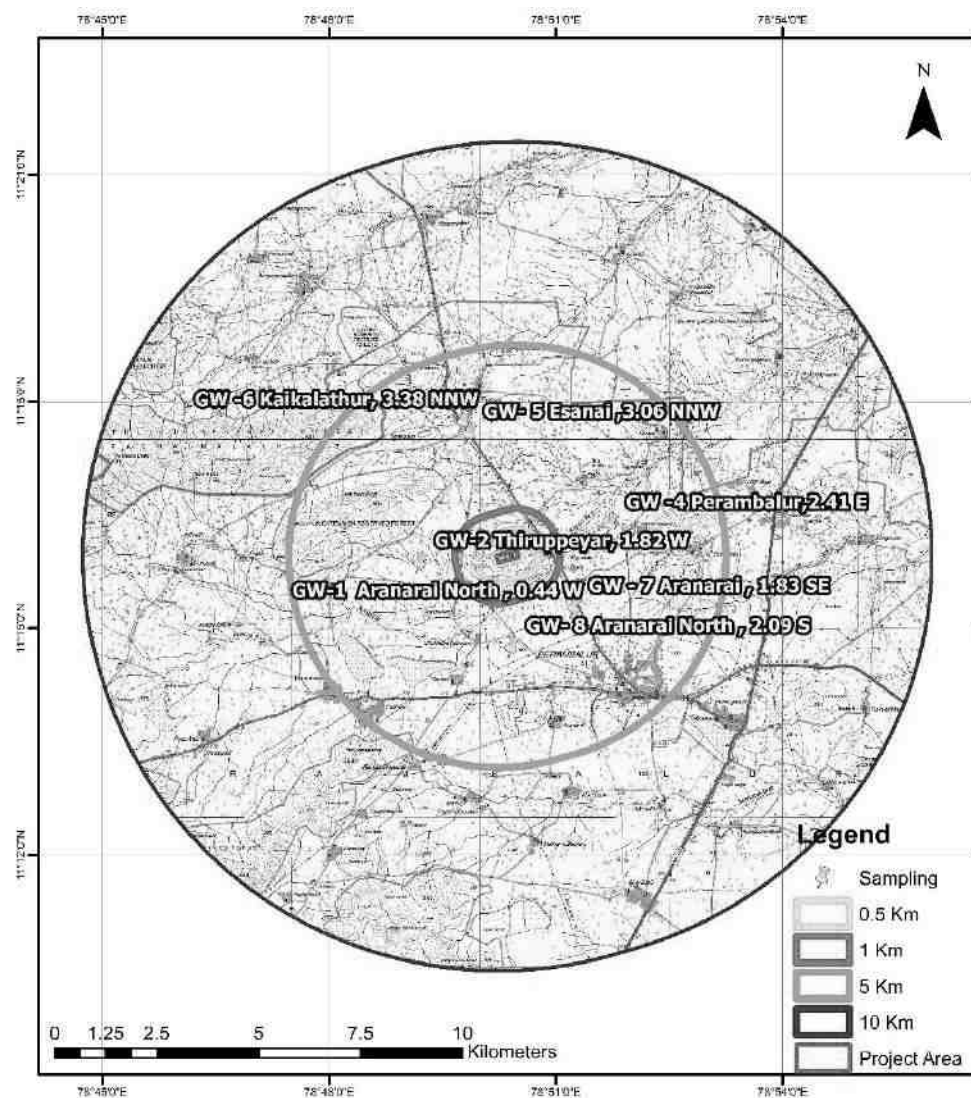
- pH, chloride, sulfate, and hardness levels are within acceptable limits, meaning the water does not have immediate chemical hazards.
- Higher EC values suggest moderate dissolved solids, indicating mineral presence but not necessarily harmful.
- COD and BOD levels are slightly elevated, suggesting some degree of organic pollution, likely due to agricultural runoff or nearby human activities.
- Since the water is classified as Class E, it is not fit for direct human consumption but can be used for industrial and irrigation purposes.

3.8.3 Ground Water Quality

Total **Eight (08)** ground water monitoring locations were identified for assessment in different villages around the project site. The groundwater results are compared with the acceptable and permissible water quality standards as per IS: 10500 (2012) for drinking water. Groundwater quality monitoring locations and results are given in **Table 3-14** and **Table 3-15** respectively. A map showing the groundwater monitoring locations is given in **Figure 3-15**.

Table 3-14 Details of Groundwater Quality Monitoring Locations

Location Code	Location	Distance (Km) w.r.t project site	Direction w.r.t project site	Longitude	Latitude
GW1	Aranarai North	0.44	W	78.8338282	11.26529968
GW2	Thiruppeyar	1.82	W	78.8238762	11.26264128
GW3	Samathuvapuram	2.67	E	78.8665414	11.27016037
GW4	Perambalur	2.41	E	78.865415	11.27169478
GW5	Esanai	3.06	NNW	78.8317096	11.29409922
GW6	Kaikalathur	3.38	NNW	78.8305055	11.29588959
GW7	Aranarai	1.83	SE	78.8555111	11.25424065
GW8	Alambadi	2.09	S	78.8414846	11.24542607



Ground Water Sampling Location

ARANARAI NORTH ROUGH STONE QUARRY

Extent : 9.00.0Ha

Survey No: 120/2A1A Part

Village : Aranarai North

Taluk : Perambalur

District : Perambalur

Description	Wind Direction	Distance	Direction	Latitude	Longitude
Aranarai North	U/W	0.44	W	78.8338282	11.26529988
Thiruppayar	U/W	1.82	W	78.8236762	11.26264128
Samathurapuram	D/W	2.67	E	78.8665414	11.27016037
Perambalur	D/W	2.41	E	78.865415	11.27169478
Esanai	C/W	3.06	NNW	78.8317096	11.25409522
Kaikalathur	C/W	3.38	NNW	78.8365055	11.2666659
Aranarai	C/W	1.83	SE	78.8555111	11.25424065
Alambadi	C/W	2.09	S	78.8414846	11.24542667

Source: SOI Toposheet ,

Scale 1: 50000

Topo Sheet No's : 58I11,12,15,16

Software Used :

Arc Map 10.8 & Global Mapper

Environmental Consultant :

M/s. EHS360 Labs Pvt Ltd.

Figure 3-15 Groundwater monitoring locations

Table 3-15 Ground Water Monitoring Results

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Aranarai North	Thiruppeyar	Samathuvapuram	Perambalur	Esanai	Kaikalathur	Aranarai	Alambadi
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1	Colour	Hazen	5	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
2	Turbidity	NTU	1	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
3	pH	--	6.5-8.5	NR	7.21	7.56	7.89	7.61	7.54	7.68	7.43	7.71
4	Conductivity	μS/cm	-	-	851	980	1060	1080	1170	960	1230	1125
5	Total Dissolve Solids	mg/l	500	2000	539	542	554	565	587	610	686	645
6	Total Suspended Solids		-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
7	Alkalinity as CaCO ₃	mg/l	200	600	167	190	172	175	182	189	240	200
8	Total Hardness as CaCO ₃	mg/l	200	600	205	282	249	215	223	232	288	245
9	Sodium as Na	mg/l	-	-	79.9	72.8	74.5	83.8	87.1	103.4	112.7	95.7
10	Potassium as K	mg/l	-	-	20.0	18.2	18.6	21.0	21.8	25.8	28.2	23.9
11	Calcium as Ca	mg/l	75	200	41.7	43.3	91.4	60.9	73.7	40.1	43.3	89.8
12	Magnesium as Mg	mg/l	30	100	24.3	41.8	4.9	15.6	9.7	32.1	43.8	4.9
13	Chloride as Cl	mg/l	250	1000	0	0	0	0	0	0	0	0
14	Sulphate SO ₄	mg/l	200	400	167	190	172	175	182	189	240	200
15	Nitrate as NO ₃	mg/l	45	NR	151	173	177	158	164	195	213	181

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Aranarai North	Thiruppeyar	Samathuvapuram	Perambalur	Esanai	Kaikalathur	Aranarai	Alambadi
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
16	Phosphate PO ₄	mg/l	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17	Fluorides as F	mg/l	1	1.5	0.33	0.28	0.31	0.27	0.21	0.24	0.19	0.36
18	Cyanide	mg/l	0.05	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19	Arsenic as As	mg/l	0.01	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20	Boron as B	mg/l	0.5	1.0	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21	Cadmium as Cd	mg/l	0.003	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
22	Chromium as Cr	mg/l	0.05	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Copper	mg/l	0.05	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Iron	mg/l	0.3	NR	0.06	0.09	0.15	0.09	0.1	0.11	0.1	0.21
25	Lead	mg/l	0.01	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	Manganese as Mn	mg/l	0.1	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27	Mercury	mg/l	0.001	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28	Nickel as Ni	mg/l	0.02	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29	Selenium as Se	mg/l	0.01	NR	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30	Zinc as Zn	mg/l	5		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Note: BDL- Below Detectable Limit; NR-No Relaxation

Interpretation of Groundwater Quality Monitoring Results:

The physico-chemical characteristics of groundwater samples were analyzed and compared with IS 10500:2012 drinking water standards. Based on the test results, the groundwater quality in the studied locations meets the permissible limits, making it safe for drinking purposes.

Parameter	Observed Range	IS 10500:2012 Limits	Interpretation
pH	7.21 – 7.89	6.5 – 8.5	Within Limits – Indicates neutral to slightly alkaline water.
Total Dissolved Solids (TDS)	539 – 686 mg/l	500 mg/l (Acceptable), 2000 mg/l (Permissible)	Within Limits – Slightly high but safe for consumption.
Chloride (Cl ⁻)	151 – 213 mg/l	250 mg/l (Acceptable), 1000 mg/l (Permissible)	Well Within Limits – No immediate concerns.
Sulphate (SO ₄ ²⁻)	37.7 – 53.2 mg/l	200 mg/l (Acceptable), 400 mg/l (Permissible)	Within Limits – No indication of sulfate-related contamination.

- pH levels are within the permissible range, indicating good water quality.
- TDS levels are slightly elevated but within the permissible limits, suggesting moderate mineral content, which is not harmful.
- Chloride and sulfate concentrations are within acceptable limits, confirming no significant contamination from industrial or agricultural sources.
- The groundwater is suitable for drinking, as per IS 10500:2012 standards.

These interpretations relate to the sample tested for location only. To prevent ground water contamination and improving the quality and Quantity, rainwater harvesting, and groundwater recharging may be helpful.

3.9 Soil quality

Eight locations in and around the proposed project were selected for soil sampling. At each location, soil samples were collected from three different depths viz. 30 cm, 60 cm and 90 cm below the surface. Soil analysis was carried out as per IS: 2720 methods. The methodology adopted for each parameter is described in. Soil quality monitoring locations & results are given in **Table 3-17** & **Table 3-18**. A map showing the soil monitoring locations is given in **Figure 3-16**.

Table 3-16 Test methods used for the analysis of Soil

S. No	Parameter Measured	Test Method
1	pH @ 25°C	IS 2720 (Part 26): 1987
2	Electrical Conductivity	IS 14767: 2000
3	Nitrogen as N	IS 14684: 1999 / FAO 2007 RA
4	Phosphorus	IS 14684: 1999 RA
5	Potassium	FAO-UN 2007 RA
6	Organic Carbon/ Organic Matter	IS 2720 (Part 22): 1972
7	Cation Exchange Capacity	In House SOP by Calculation Method

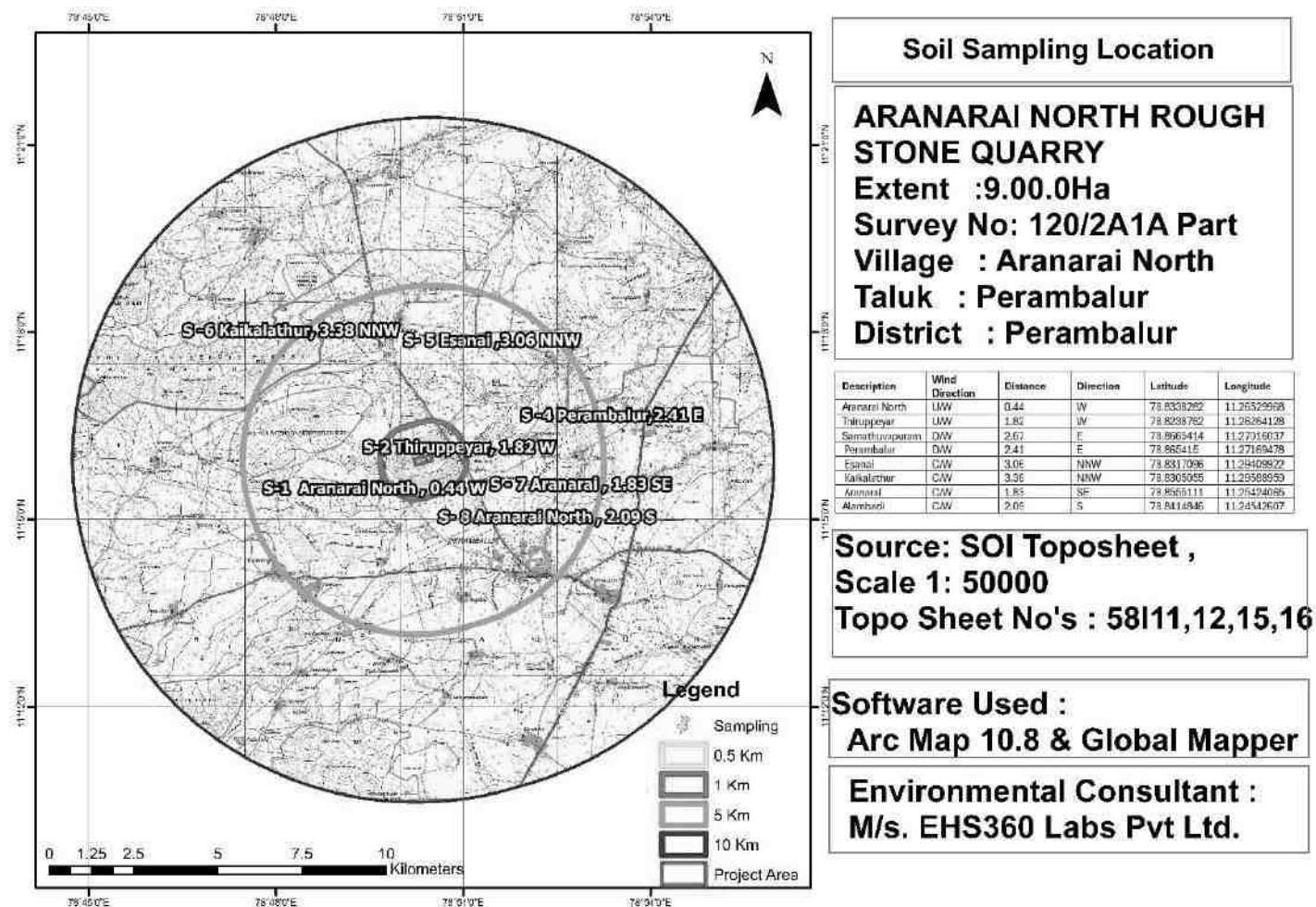


Figure 3-16 Soil monitoring locations

Table 3-17 Soil & Sediment Quality Monitoring Locations

Location Code	Location	Distance (Km) w.r.t project site	Direction w.r.t project site	Longitude	Latitude
S1	Aranarai North	0.44	W	78.8338282	11.26529968
S2	Thiruppeyar	1.82	W	78.8238762	11.26264128
S3	Samathuvapuram	2.67	E	78.8665414	11.27016037
S4	Perambalur	2.41	E	78.865415	11.27169478
S5	Esanai	3.06	NNW	78.8317096	11.29409922
S6	Kaikalathur	3.38	NNW	78.8305055	11.29588959
S7	Aranarai	1.83	SE	78.8555111	11.25424065
S8	Alambadi	2.09	S	78.8414846	11.24542607

Table 3-18 Soil & Sediment Quality Monitoring Results

S. No	Parameters	Units	Aranarai North	Thiruppeyar	Samathuvapuram	Perambalur	Esanai	Kaikalathur	Aranarai	Alambadi
			S1	S2	S3	S4	S5	S6	S7	S8
1	Sand	%	54.0	61.0	60.0	53.0	48.0	53.0	57.0	40.0
2	Silt	%	24.0	26.0	24.0	15.0	13.0	30.0	25.0	41.0
3	Clay	%	22.0	13.0	16.0	32.0	39.0	17.0	18.0	19.0
4	pH	-	7.46	7.11	7.2	7.68	7.76	7.45	7.34	7.81
5	Electrical conductivity	µmhos/cm	278	243	298	212	253	265	214	197
6	Nitrogen as N	Kg/ha	178	220	212	187	199	167	208	201
7	Phosphorus	Kg/ha	64	58	61	66	51	53	57	62
8	Potassium	Kg/ha	184	245	289	322	352	360	343	346
9	Cation Exchange Capacity	meq/100 gm	4.6	11.6	1.2	8.2	9.7	0.7	1.1	2.6
10	Organic Carbon	%	0.782	0.625	0.617	0.755	0.674	0.689	0.687	0.721
11	Organic matter	%	1.421	1.132	1.064	1.302	1.234	1.188	1.278	1.243

Interpretation of Soil Quality Monitoring Results:

- The **soil quality analysis** was conducted at eight locations and compared with **ICAR (Indian Council of Agricultural Research)** standards to determine the fertility and suitability of the soil for agriculture and environmental health.

Parameter	Observed Range	ICAR Standard Classification	Interpretation
pH	7.11 – 7.81	Neutral to Slightly Alkaline	Soils are suitable for agriculture but may require adjustments for specific crops.
Electrical Conductivity (EC)	197 – 298 μ mhos/cm	Average	Indicates low to moderate salinity, suitable for crop growth.
Nitrogen (N)	167 – 220 kg/ha	Better	Some locations have low nitrogen content, requiring fertilization for improved fertility.
Phosphorus (P)	51 – 66 kg/ha	on an average sufficient to Sufficient	Low phosphorus levels indicate a need for phosphorus fertilizers to support plant growth.
Potassium (K)	184 – 360 kg/ha	Medium to Better	Deficient potassium levels, requiring soil amendments for optimal agricultural productivity.
Organic Carbon (%)	0.617 – 0.782	On an average sufficient	Indicates low organic matter, suggesting the need for organic fertilizers or compost.

- Soil pH is suitable for agriculture, though slightly alkaline in some areas.
- Low nitrogen, phosphorus, and potassium levels indicate poor fertility, requiring soil enrichment through fertilization.
- Organic matter content is low, indicating the need for composting or organic farming practices.
- Moderate conductivity suggests that soil is not saline and can support plant growth.

3.10 Biological Environment

3.10.1 Introduction

An ecological study of the ecosystem is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the study area. Studies on various aspects of ecosystems play an important role in identifying sensitive issues for undertaking appropriate action to mitigate the impact, if any. The biological study was undertaken as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area, to compare it with past conditions with the help of available data, to predict changes in the biological environment because of present activities and to suggest measures for maintaining its health. Secondary source information was conducted to study the flora & fauna in the 10km radius. Some of the information was gathered from the local habitants. The entire secondary data were classified to interpret the impact of pollution on the flora and fauna of that region. A survey of the wild plants as well as cultivated crop plants was conducted, and all the available information was recorded.

During the collection of secondary information, the following aspects were considered for ecological studies:

- Assessment of the present status of flora and fauna.
- Identification of rare and endangered species of plants and animals (if any).
- Identification of ecologically sensitive areas within the study area.
- Assessment of migratory route of wildlife (if any); and
- Assessment of Aquatic Ecology with specific reference to aquatic birds and plankton resources.

Methodology

Terrestrial investigations for flora and fauna records were collected by secondary information like research articles, periodicals, floras, and forest checklists.

3.10.2 Flora Assessment

Plants species were identified based on their specific diagnostics characters of family, genus and species using available floral and other related literature. Besides the identification of plant species, information was collected on the vernacular names and uses of plants made by local inhabitants.

3.10.3 Fauna Assessment

Secondary information collected from published government data etc. List of the endangered and endemic species as per the schedule of The Wildlife Protection Act, 1972.

Emphasis is given to identifying available fauna and mammals to determine the presence and absence of Schedule-1 species, listed in the Wildlife Protection Act 1972, as well as in Red List of IUCN.

Floristic composition within the study area

For secondary information based on a total species found in the study area. The detailed list of

plant species found in each quadrat provided in **Table 3-19**.

Table 3-19 List of flora reported/observed in the study area

S. No.	Scientific Name	Common Name	Vernacular Name	Occurrence	IUCN Status
Trees					
1	<i>Albizia saman</i>	Rain tree	Amaivagai	Native	LC
2	<i>Areca catechu</i>	Betel palm	Ataikay	Native	LC
3	<i>Artocarpus heterophyllus</i>	Jackfruit tree	Pala Maram	Native	LC
4	<i>Azadirachta indica</i>	Neem	Veppai	Native	LC
5	<i>Bauhinia purpurea</i>	Orchid tree	Nilattiruvatti	Native	LC
6	<i>Borassus flabellifer</i>	Palm tree	Panaimaram	Native	LC
7	<i>Callistemon speciosus</i>	Bottle brush	Palasu	Invasive	LC
8	<i>Carica papaya</i>	Papaya tree	Pappali	Native	LC
9	<i>Caryota urens</i>	Fishtail palm	Kontalpanai	Native	LC
10	<i>Cassia auriculata</i>	Matura tea tree	Avaram	Native	LC
11	<i>Citrus limon</i>	Lemon	elumichai	Native	LC
12	<i>Cocos nucifera</i>	Coconut tree	Tennai	Native	LC
13	<i>Cordia dichotoma</i>	Fragrant manjack	Naruvili	Invasive	LC
14	<i>Cordia sebestena</i>	Geiger tree	Achinaruvili	Invasive	LC
15	<i>Cupressus macrocarpa</i>	Monterey cypress	-	Invasive	LC
16	<i>Delonix regia</i>	Flame of forest	Mayil kondrai	Native	LC
17	<i>Dracaena marginata</i>	Dragon tree	-	Native	LC
18	<i>Eucalyptus globulus</i>	Southern blue gum	Karpuramar am	Native	LC
19	<i>Ficus benghalensis</i>	Indian Banyan	Alamaram	Native	LC
20	<i>Ficus benjamina</i>	Indian fig	Nintamarav akai	Native	LC
21	<i>Ficus elastica</i>	Rubber fig	-	Native	LC
22	<i>Ficus racemosa</i>	Cluster fig	Athi	Native	LC
23	<i>Lagerstroemia indica</i>	Common crape myrtle	Pavalakkurin ji	Native	LC
24	<i>Leucaena leucocephala</i>	Whitelead tree	Periya-takara	Native	LC
25	<i>Madhuca longifolia</i>	Butter tree	Iluppai	Native	LC
26	<i>Mangifera indica</i>	Mango	Maamaram	Native	LC
27	<i>Manilkara zapota</i>	Sapota	chimaiyiluppai	Native	LC
28	<i>Melia azedarach</i>	Indian lilac	Kattuvembhu	Native	LC
29	<i>Millingtonia hortensis</i>	Tree jasmine	Maramalli	Native	LC

30	<i>Mimusopselengi</i>	Medlar tree	Magizhamb oo	Native	LC
31	<i>Morinda pubescens</i>	Indian Mulberry	Mannanunai	Native	LC
32	<i>Moringa oleifera</i>	Drumstick tree	Murungai	Native	LC
33	<i>Muntingiacalabura</i>	Singapore cherry	Ten pazham	Native	LC
34	<i>Peltophorumpterocarpum</i>	Copper pod	Perungkonra i	Native	LC
35	<i>Phoenix sylvestris</i>	Sugar date palm	icham	Native	LC
36	<i>Pithecellobium dulce</i>	Manila tamarind	Kodukkappu li	Native	LC
37	<i>Polyalthia longifolia</i>	False Asoka	Vansulam	Native	LC
38	<i>Pongamia pinnata</i>	Indian beech	Nattamalam	Native	LC
39	<i>Ptychosperma elegans</i>	Solitaire palm	-	Native	LC
40	<i>Ravenala madagascariensis</i>	Traveller's palm	Visirivazhai	Native	LC
41	<i>Roystonea regia</i>	Cuban royal palm	-	Native	LC
42	<i>Saracaasoca</i>	Ashoka tree	Ashogamara m	Native	LC
43	<i>Sterculia foetida</i>	Java olive tree	Kutiraippitu kku	Native	LC
44	<i>Stereospermum tetragonum</i>	Yellow snake tree	Punkali	Native	LC
45	<i>Syzygiumcumini</i>	Java plum	Nagai	Native	LC
46	<i>Terminalia cattappa</i>	Badam tree	Nattuvadum ai	Native	LC
47	<i>Thespesia populnea</i>	Portia tree	Poovarasu	Native	LC
Shrubs					
48	<i>Allamanda cathartica</i>	Golden trumpet	Allamanda	Invasive	LC
49	<i>Alpinia galangal</i>	Galangal	Perarathai	Native	LC
50	<i>Bougainvillea spectabilis</i>	Great bougainvillea	Kaakitha poo	Native	LC
51	<i>Caesalpinia pulcherrima</i>	Peacock flower	Mayilkonrai	Native	LC
52	<i>Calotropis gigantea</i>	Calotrope	Erukku	Native	LC
53	<i>Cestrum diurnum</i>	Day jasmine	-	Native	LC
54	<i>Cestrum nocturnum</i>	Night blooming jasmine	Pavazhamall i	Native	LC
55	<i>Datura metel</i>	Devil's trumpet	Karu oomathai	Native	LC
56	<i>Durantaerecta</i>	Golden dew drop	Aagayapoo	Native	LC
57	<i>Ecliptaprostrata</i>	False daisy	Karisilangan ni	Native	LC

58	<i>Euonymus japonicus</i>	Japanese spindle	-	Invasive	LC
59	<i>Euphorbia tithymaloides</i>	Redbird flower	Kannadikalli	Invasive	LC
60	<i>Ficus elastica</i>	Rubber fig	Seemaiaalai	Native	LC
61	<i>Hamelia patens</i>	Fire bush	Theepudhar	Native	LC
62	<i>Hibiscus Rosa sinensis</i>	Indian Hibiscus	Cembarutti	Native	LC
63	<i>Ixora coccinea</i>	Ixora	Vedchi	Native	LC
64	<i>Jasminum arborescens</i>	Navamallika	Kattumalligai	Native	LC
65	<i>Jasminum auriculatum</i>	Juhi	Uccimalligai	Native	LC
66	<i>Jasminum officinale</i>	Common jasmine	Jathi malli	Native	LC
67	<i>Jasminum polyanthum</i>	Pink Jasmine	Thalavam	Native	LC
68	<i>Jasminum sambac</i>	Arabian jasmine	Gundu malli	Native	LC
69	<i>Nerium oleander</i>	Nerium	Arali	Native	LC
70	<i>Piper longum</i>	Indian long pepper	Tippili	Native	LC
71	<i>Plectranthusamboinicus</i>	Indian borage	Karpuravalli	Native	LC
72	<i>Plumeria obtusa</i>	Singapore graveyard flower	Ponnalari	Native	LC
73	<i>Plumeria rubra</i>	Temple tree	Sampangi	Native	LC
74	<i>Pseuderanthemumcarruthersii</i>	Carruther's false face	-	Native	LC
75	<i>Punica granatum</i>	Pomegranate	madulai	Native	LC
76	<i>Symphoricarpos orbiculatus</i>	Coral berry	-	Native	LC
77	<i>Tecoma capensis</i>	Cape honey suckle	Velai	Invasive	LC
78	<i>Tecoma stans</i>	Trumpet bush	Sonnapatti	Invasive	LC
79	<i>Valeriana officinalis</i>	Garden heliotrope	Catamaci	Invasive	LC
80	<i>Volkameria inermis</i>	The glory bower	Sangam	Invasive	LC
Herbs					
81	<i>Acalypha indica</i>	Indian Acalypha	Kolippuntu	Native	LC
82	<i>Acalypha wilkesiana</i>	Copper leaf	Kuppaimeni	Native	LC
83	<i>Achyranthes aspera</i>	Chaff flower	Nayuruvi	Native	LC
84	<i>Allmanianodiflora</i>	Node flower	Kumattikkirai	Native	LC
85	<i>Aloe vera</i>	Indian aloe	Katralai	Native	LC
86	<i>Alternanthera sessilis</i>	Sessile joyweed	Ponnankanni	Native	LC
87	<i>Amaranthus viridis</i>	Green amaranth	Kuppaikeerai	Native	LC
88	<i>Andrographis paniculata</i>	Green chiretta	Nilavempu	Native	LC
89	<i>Apluda mutica</i>	Mauritian grass	Moongilpillu	Native	LC
90	<i>Aristida setacea</i>	Broom grass	Thudappampillu	Native	LC

91	<i>Bambusa bamboo</i>	Bamboo	Moongil	Native	LC
92	<i>Basella alba</i>	Indian spinach	Vasalakkirai	Native	LC
93	<i>Calliandra tergemina</i>	Powder puff	-	Native	LC
94	<i>Canna indica</i>	Indian shot	Kattuvalai	Native	LC
95	<i>Catharanthus pusillus</i>	Tiny periwinkle	Chetthai	Native	LC
96	<i>Catharanthus roseus</i>	Pink periwinkle	Nithyakalyani	Native	LC
97	<i>Centella asiatica</i>	Indian pennywort	Matanti	Native	LC
98	<i>Chloris barbata</i>	Swollen finger grass	Cevvarakumpu I	Native	LC
99	<i>Cleome viscosa</i>	Tick weed	Naikaduku	Native	LC
100	<i>Cyanodondactylon</i>	Bermuda grass	Arugam pillu	Native	LC
101	<i>Cyperus rotundus</i>	Nut grass	Korai pillu	Native	LC
102	<i>Dactyloctenium aegyptium</i>	Egyptian grass	Kavarapillu	Native	LC
103	<i>Euphorbia heterophylla</i>	Japanese poinsettia	Paal perukki	Invasive	LC
104	<i>Gardenia jasminoides</i>	Cape Jasmine	Parijatham	Native	LC
105	<i>Hemigraphis colorata</i>	Red Ivy	Vadaikutti	Native	LC
106	<i>Heteropogon contortus</i>	Spear grass	Oosipillu	Native	LC
107	<i>Hymenocallis littoralis</i>	Beach spider lily	-	Native	LC
108	<i>Kalanchoe pinnata</i>	Air plant	Runakkali	Native	LC
109	<i>Leucas aspera</i>	Common leucas	Thumbai	Native	LC
110	<i>Mimosa pudica</i>	Touch me not plant	Thottaccurungi	Native	LC
111	<i>Mollugo nudicaulis</i>	Naked stem carpet weed	Parpadagam	Native	LC
112	<i>Musa paradisiaca</i>	Banana	Vaazhai	Native	LC
113	<i>Ocimum gratissimum</i>	Clove basil	Vanatulasi	Native	LC
114	<i>Ocimum tenuiflorum</i>	Tulsi	Karuntulasi	Native	LC
115	<i>Phyllanthus amarus</i>	Gale of the wind	Kilhkainelli	Native	LC
116	<i>Phyllanthus virgatus</i>	Seed under leaf	Patar nelli	Native	LC
117	<i>Portulaca grandiflora</i>	Moss rose	Pattu rose	Native	LC
118	<i>Solanum nigrum</i>	Black nightshade	Manathakkali	Native	LC
119	<i>Solanum trilobatum</i>	Pea Eggplant	Thuthuvalai	Native	LC
120	<i>Sphagneticol trilobata</i>	Chinese wedelia	Manjalkarilam kanni	Native	LC
121	<i>Stylosanthes hamata</i>	Caribbean stylo	-	Native	LC
122	<i>Tephrosia purpurea</i>	Wild indigo	kavali	Native	LC
123	<i>Tradescantia spathacea</i>	Boat lily	-	Native	LC
124	<i>Trichodesma indicum</i>	Indian borage	Kavizhthumbai	Native	LC
Climbers/Creepers					
125	<i>Asparagus racemosus</i>	Satamuli	Shatavari	Native	LC

126	<i>Cardiospermum halicacabum</i>	Balloon plant	Mudakithan	Native	LC
127	<i>Cayratia pedata</i>	Birdfoot Grape vine	Panni kodi	Native	LC
128	<i>Cissus quadrangularis</i>	Veld grape	Pirandai	Native	LC
129	<i>Cissus vitiginea</i>	South indian treebine	Mutainari	Native	LC
130	<i>Coccinia grandis</i>	Ivy gourd	Kovai	Native	LC
131	<i>Cucumis melo</i>	Muskmelon	Thumattikai	Native	LC
132	<i>Dioscorea tomentosa</i>	Five leaf yam	Noora kizhangu	Native	LC
133	<i>Evolvulus sinoides</i>	Dwarf morning glory	-	Native	LC
134	<i>Hemidesmus indicus</i>	Indian sarsaparilla	Nannari	Native	LC
135	<i>Passiflora foetida</i>	Bush passion fruit	Siruppunaik kali	Invasive	LC
136	<i>Tylophora indica</i>	Indian Ipecac	Avaci	Native	LC

(Note: LC-Least Concern as per IUCN)

Source:

- ▶ Gamble, J.S. and C.E.C. Fischer. 1915-1935. Flora of Presidency of Madras, Adlard and Son, London. pp. 1-3.
- ▶ Nair, N.C. and A.N. Henry. 1983. Flora of Tamil Nadu, India. Series 1, Vol. 1, Botanical Survey of India, Southern Circle, Coimbatore. 1-184.
- ▶ Henry, A.N., Kumari, G.R. and Chitra, V. (1987) Flora of Tamil Nadu India. Series 1: Analysis. Vol. 2, Botanical Survey of India, Coimbatore.
- ▶ Hooker J.D. 1872-1897. Flora of British India. (Vol. 1-7), Ashford: Reeve and Company. 5568 p.
- ▶ Henry, A.N., Chithra, V.N. and Balakrishnan, P. (1989) Flora of Tamil Nadu India. Series 1: Analysis. Vol. III. Botanical Survey of India, Coimbatore.
- ▶ Treepedia Tamil Nadu: <https://www.tntreepedia.com/tree-location/>

3.10.4 Fauna Diversity

This area hosts common animals. Indian Dogs, Jungle and Domestic cat, Rhesus macaque, Domestic Cows, Buffaloes, Bullocks, and Goat etc. are found amongst mammals. Indian cobra, bande Kraits and other common snakes, and lizards like garden lizards are commonly found amongst reptiles. Fauna diversity was collected from secondary information and cross check with relevant literatures (Smith 1933-43, Ali and Ripley 1983, Daniel 1983, Prater 1993, Murthy and Chandrasekhar 1988).

3.10.4.1 Bird's species

A total of 57 species belonging different families have been identified from Agricultural and nearby forest area. A comparative chart of the total number of bird species belonging to different families along with their feeding preference and abundance are provided in

Table 3-20.

Table 3-20 List of Birds in the study area

S. No	Scientific name	Common name	IUCN status	Nativity	WPA 1972
1	<i>Acridotheres tristis</i>	Common myna	LC	Native	-
2	<i>Aerodramus unicolor</i>	Indian Swiftlet	LC	Native	-
3	<i>Alcedo atthis</i>	Common Kingfisher	LC	Native	-
4	<i>Amaurornis phoenicurus</i>	white-breasted waterhen	LC	Native	-
5	<i>Anastomus oscitans</i>	Asian openbill stork	LC	Native	-
6	<i>Ardeolagrayii</i>	Pond Heron	LC	Native	-
7	<i>Athene brama</i>	Spotted owl	LC	Native	-
8	<i>Bubo bengalensis</i>	Indian eagle-owl	LC	Native	-
9	<i>Bubulcus ibis</i>	Cattle Egret	LC	Native	-
10	<i>Caprimulgus indicus</i>	Jungle Nightjar	LC	Native	-
11	<i>Centropus sinensis</i>	Greater coucal	LC	Native	-
12	<i>Ceryle rudis</i>	Pied kingfisher	LC	Native	-
13	<i>Charadrius hiaticula</i>	Common ringed plover	LC	Native	-
14	<i>Chrysommasinense</i>	Yellow-Eyed Babbler	LC	Native	-
15	<i>Cinnyris asiaticus</i>	Purple sunbird	LC	Native	-
16	<i>Clamator coromandus</i>	Red-Winged	LC	Native	-
17	<i>Clamator jacobinus</i>	Pied Cuckoo	LC	Native	-
18	<i>Columba livia</i>	Blue rock pigeon	LC	Native	Sch - IV
19	<i>Copsychus saularis</i>	Magpie-robin	LC	Native	-
20	<i>Corvus splendens</i>	Hose crow	LC	Native	-
21	<i>Cuculus canorus</i>	Common cuckoo	LC	Native	-
22	<i>Cuculus micropterus</i>	Indian Cuckoo	LC	Native	-
23	<i>Dendrocitta vagabunda</i>	rufous treepie	LC	Native	-
24	<i>Dicrurus macrocercus</i>	Black drongo	LC	Native	-
25	<i>Ducula aenea</i>	Green Imperial Pigeon	NT	Native	-
26	<i>Egretta garzetta</i>	Little Egret	LC	Native	-
27	<i>Eudynamis scolopacea</i>	Koel	LC	Native	-
28	<i>Falco tinnunculus</i>	Common Kestrel	LC	Native	-
29	<i>Francolinus pondicerianus</i>	Grey francolin	LC	Native	-
30	<i>Fulica arta</i>	Common coot	LC	Native	-
31	<i>Gallicrex cinerea</i>	Watercock	LC	Native	-
32	<i>Glareola pratincola</i>	Collared Pratincole	LC	Native	-
33	<i>Haliastur indus</i>	Brahminy kite	LC	Native	-
34	<i>Leptocomazeylonica</i>	Sunbird	LC	Native	-
35	<i>Lonchura Malacca</i>	Black headed munia	LC	Native	-

36	<i>Lonchura punctulata</i>	Scaly breasted munia	LC	Native	-
37	<i>Lonchura striata</i>	White rumped munia	LC	Native	-
38	<i>Megalaimahaemacephala</i>	Copper smith barbet	LC	Native	-
39	<i>Megalaima zeylanica</i>	Brown headed barbet	LC	Native	-
40	<i>Merops orientalis</i>	Green bee eater	LC	Native	-
41	<i>Merops philippinus</i>	Blue-tailed bee-eater	LC	Native	-
42	<i>Microcarboniger</i>	Little Cormorant	NA	Native	-
43	<i>Milvus migrans</i>	Black kite	LC	Native	-
44	<i>Orthotomussutorius</i>	Common tailorbird	LC	Native	-
45	<i>Phaethon lepturus</i>	White-Tailed Tropicbird	LC	Native	-
46	<i>Phalacrocorax carbo</i>	Great Cormorant	NA	Native	-
47	<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	LC	Native	-
48	<i>Phalacrocorax niger</i>	Little cormorant	LC	Native	-
49	<i>Podiceps nigricollis</i>	Eared grebe	LC	Native	-
50	<i>Porphyrio poliocephalus</i>	Grey-Headed Swamphen	LC	Native	-
51	<i>Psittaculakrameri</i>	Rose ringed parakeet	LC	Native	-
52	<i>Rallinaeurizonoides</i>	Slaty-Legged Crake	NA	Native	-
53	<i>Sturniapagodarum</i>	Brahminy starling	LC	Native	-
54	<i>Tachybaptus ruficollis</i>	Dabchick	LC	Native	-
55	<i>Turdoidesaffinis</i>	Yellow-billed Babbler	LC	Native	-
56	<i>Turnixtanki</i>	Yellow-Legged Buttonquail	LC	Native	-
57	<i>Vanellus indicus</i>	Red wattled lapwing	LC	Native	-

(Note: LC- Least Concern, NA-Not Assessed, as per IUCN- International Union for Conservation of Nature, WPA-1972.

3.10.4.2 Mammals

The presence of mammals in the project influence area is documented based on secondary information. Mammals recorded from the secondary Survey in the Study area and their Conservation Status are provided in **Table 3-21**.

Table 3-21 List of Mammals recorded from the secondary Survey in the Study area and their Conservation Status

S. No	Species name	Family	Common name	IUCN Conservation Status	Schedule WPA1972
1	<i>Canis aureus</i>	Canidae	Naree	LC	-
2	<i>Felis chaus</i>	Felidae	Kaattupoonai	LC	-
3	<i>Funambulus pennanti</i>	Sciuridae	Anil	LC	-

4	<i>Bandicota benghalensis</i>	Muridae	Varappu Eli	LC	-
5	<i>Cynopterus sphinx</i>	Pteropodidae	Nari mookuVavval	LC	-
6	<i>Macaca radiata</i>	Cercopithecidae	kurangu	LC	-
7	<i>Herpetes edwardsi</i>	Herpestidae	Keeri Pillai	LC	-
8	<i>Sus scrofa cristatus</i>	Suidae	KattuPandri	LC	-
9	<i>Axis axis</i>	Cervidae	Pulli Maan	LC	-

LC- Least Concern as per IUCN- International Union for Conservation of Nature.

3.10.4.3 Reptiles & Amphibians

Reptiles and amphibian species were prepared with secondary information sourced from publications. List of Reptiles & Amphibians recorded from the Primary Survey in the Study area and their Conservation Status is given in the **Table 3-22**.

Table 3-22 List of Reptiles & Amphibians recorded from the Primary Survey in the Study area and their Conservation Status

S. No.	Scientific name	Common name	IUCN Status	WPA 1972
Reptiles				
1	<i>Hemidactylus sp.</i>	House lizard	LC	-
2	<i>Eutropismacularia</i>	Common skink	LC	-
3	<i>Ophisopsleschenault</i>	Snake-eyed lizard	LC	-
4	<i>Calotes versicolor</i>	Garden lizard	LC	-
5	<i>Naja naja</i>	Nalla Pambu	LC	Sch II (Part II)
6	<i>Ptyas mucosa</i>	Saaraipambu	LC	-
7	<i>Ophiophagus hannah</i>	King Cobra	VU	Sch II (Part II)
8	<i>Varanus bengalensis</i>	Common Indian Monitor	LC	-
Amphibians				
1	<i>Rana tigrina</i>	Common yellow frog	LC	-
2	<i>Rana hexadactyla</i>	Indian Green frog	LC	-
4	<i>Ozotyelphusaravi</i>	Field Crab	LC	-
5	<i>Nerodia sipedon</i>	ThanniPambu	LC	-
6	<i>Lissemys punctata</i>	Indian Flapshell Turtle	LC	-

Note: LC- Least Concern as per IUCN- International Union for Conservation of Nature.

3.10.4.4 Butterfly Species

Butterflies can also serve as useful indicators of habitat biodiversity. They are responsible for a large part of the complex interconnections that characterize natural ecosystems. The butterfly communities that are present in forests help to maintain crucial ecological processes and preserve biodiversity. They participate in most of the ecological processes that sustain

ecosystems. **A total of 35 species** belonging to five families of butterflies were recorded. List of Occurrence of butterfly species in buffer zone is given in the **Table 3-23**.

Table 3-23 List of Occurrence of butterfly species in buffer zone (Secondary Source)

S. No	Scientific Name	Family	Common Name
1	<i>Ariadne merione</i>	Nymphalidae	Common Caster
2	<i>Atrophaneura aristolochiae</i>	Papilionidae	Common Rose
3	<i>Acraea terpsicore</i>	Nymphalidae	Tawny coster
4	<i>Anthenelycaenina</i>	Polyommatainae	Pointed Ciliate Blue
5	<i>Athyma perius</i>	Nymphalidae	Common Sergeant
6	<i>Belenois aurora</i>	Pieridae	Pioneer
7	<i>Eurema andersonii</i>	Pieridae	One-spotgrass yellow
8	<i>Ceporonerissa dapha</i>	Pieridae	Common gull
9	<i>Catopsilia pomona</i>	Pieridae	Common Emigrant
10	<i>Catopsilia pyranthe</i>	Pieridae	Mottled Emigrant
11	<i>Cupitha purreea</i>	Hesperiidae	Wax Dart
12	<i>Colotis trida</i>	Pieridae	Small Orange Tip
13	<i>Curetis spp</i>	Curetinae	Indian Sunbeam
14	<i>Danaus chrysippus</i>	Nymphalidae	Plain Tiger
15	<i>Danaus genutia</i>	Nymphalidae	Striped Tiger
16	<i>Deudorix epijarbas</i>	Theclinae	Cornelian
17	<i>Eurema hecabe</i>	Pieridae	Common Grass Yellow
18	<i>Graphium teredon</i>	Papilionidae	Southern Bluebottle
19	<i>Graphium doson</i>	Papilionidae	Narrow-banded Bluebottle
20	<i>Hypolimnastolina</i>	Nymphalidae	Great Egg Fly
21	<i>Hypolimnastmisippus</i>	Nymphalidae	Danaid Egg Fly
22	<i>Junonia almana</i>	Nymphalidae	Peacock Pansy
23	<i>Junonia hiarta</i>	Nymphalidae	Yellow Pansy
24	<i>Junonia lemonias</i>	Nymphalidae	Lemon Pansy
25	<i>Junonia orithya</i>	Nymphalidae	Blue Pansy
26	<i>Leptosia nina</i>	Pieridae	Psyche
27	<i>Mycalesis perseus</i>	Nymphalidae	Common Bush Brown
28	<i>Neptis hylas</i>	Nymphalidae	Common Sailer
29	<i>Neptis nata hamponi</i>	Nymphalidae	Sullied Sailer
30	<i>Phalanta phalantha</i>	Nymphalidae	Common Leopard
31	<i>Pachliopta aristolochiae</i>	Papilionidae	Common Rose
32	<i>Pachliopta pandiyana</i>	Papilionidae	Malabar Rose
33	<i>Sarangesa purendra Moore</i>	Pyrginae	Spotted Small Flat
34	<i>Troides minos</i>	Papilionidae	Southern Birdwing
35	<i>Ypthima asterope</i>	Nymphalidae	Common Three-ring

Data source: Secondary from the references below:

- ▶ List of Birds: Ali, S. (2002). The Book of Indian Birds (13th Revised Edition). Oxford University Press, New Delhi, 326pp.
- ▶ List of Butterflies: Kehimkar I. The Book of Indian Butterflies. Bombay Natural History Society, 2008, 497.
- ▶ Evans WH. Identification of Indian butterflies. The Bombay Natural History Society, Bombay, 1927, 32.
- ▶ List of Mammals: Kamalakannan, M.& P.O.Nameer (2019). A checklist of mammals of Tamil Nadu, India. Journal of Threatened Taxa 11(8): 13992–14009; <https://doi.org/10.11609/jott.4705.11.8.13992–14009>.
- ▶ List of Reptiles: Aengals, R., Sathish Kumar, V.M., Palot, M.J. & Ganesh, S.R. (2018). A Checklist of Reptiles of India. 35 pp. Version 3.0. Online publication is available at www.zsi.gov.in (Last update: May 2018).
- ▶ S. S. Mishra, Laishram Kosygin, P. T. Rajan and K. C. Gopi, Zoological Survey of India in Venkataraman, K., Chattopadhyay, A. and Subramanian, K.A. (editors). 2013. Endemic Animals of India(vertebrates): 1–235+26 Plates. (Published by the director, Zoological Survey of India, Kolkata).
- ▶ Indian Reptiles, Amphibians and Insects in CITES Appendices. Maheshwar Hegde, S. Bhupathy*, K. R. Sasidharan, T. P. Raghunath and N. Krishnakumar Institute of Forest Genetics and Tree Breeding, R.S. Puram, Coimbatore-2

3.10.4.5 Fish Diversity presence

The study area transverse agricultural land, open shrub land, rivers etc. that support the presence of fish diversity. Fish in the area and their presence were reported with the help of secondary sources and from the literature available. Occurrence of fish in buffer zone is provided in the **Table 3-24**.

Table 3-24 List of Occurrence of fish in buffer zone

S. No	Scientific name	Family	Common name	Occurrence	IUCN status
1	<i>Oreochromis niloticus</i>	Cichlidae	Jilappi	Native	LC
2	<i>Labeoboga</i>	Cyprinidae	Kendai	Native	LC
3	<i>Tamarixmacrochir</i>	Cichlidae	Greenhead tilapia	Native	LC
4	<i>Channa marulius</i>	Channidae	Giant snakehead	Native	LC
5	<i>Oreochromis mossambicus</i>	Cichlidae	Tilapia	Native	LC
6	Chanos Chanos	Cichlidae	Madavai	Native	LC
7	Cirrhinamrigala	Cyprinidae	Kendai	Native	LC
8	<i>Catlacatla</i>	Cyprinidae	katla	Native	LC
9	<i>Labeorohita</i>	Cyprinidae	Roghu	Native	LC

10	Hypselobarbusperiyarensis	Cyprinidae	Periyar Barb	Native	LC
11	Hypselobarbuspulchellus	Cyprinidae	Jerdon's carp	Endemic	CR
12	Karalla dussumieri	Leiognathidae	Vari Kare	Native	LC
13	Arius maculatus	Ariidae	keluthi	Native	LC
14	Barbodescarnaticus	Cyprinidae	Cauvery kendai	Native	LC
15	Chanda nama	Ambassidae	Kakkachee	Native	LC
16	Channa marulius	Channidae	Iru viral	Native	LC
17	Channa striata	Channidae	Viral wrahl	Native	LC
18	Cirrhinuscirrhus	Cyprinidae	Ven Kendai	Native	LC
19	Ctenopharyngodonidella	Xenocyprididae	Pullukendai	Native	LC

LC- Least Concern, CR- Critical as per IUCN- International Union for Conservation of Nature.

Source:

- Tamil Nadu Reservoirs: <https://www.fao.org/3/v5930e/V5930E03.htm>
- S. S. Mishra, Laishram Kosygin, P. T. Rajan and K. C. Gopi, Zoological Survey of India in Venkataraman, K., Chattopadhyay, A. and Subramanian, K.A. (editors). 2013. Endemic Animals of India(vertebrates): 1–235+26 Plates. (Published by the director, Zoological Survey of India, Kolkata)
- Talwar, P.K. and A.G. Jhingran 1991 Inland fishes of India and adjacent countries. vol 1. A.A. Balkema, Rotterdam. 541 p.

Interpretation of Summary on Biological Survey:

This is a comprehensive biodiversity assessment covered flora, fauna, avifauna, mammals, reptiles, amphibians, butterflies, and fish diversity in the study.

1. Flora Diversity

- Study Area: 136 plant species (87% native, 13% invasive).
- 24 species (1 invasive - *Opuntia delleni*).
 - Dominance of native species indicates a healthy ecosystem.
 - Invasive plants (e.g., *Callistemon speciosus*, *Cordia dichotoma*) may threaten native biodiversity.
 - Presence of medicinal plants (*Neem*, *Tulsi*, *Amla*) shows economic and ecological value.
 - IUCN Status: All species are *Least Concern (LC)*.

2. Avifauna (Birds) Diversity

- 59 species recorded in the study area.
 - Birds represent diverse feeding groups (insectivores, frugivores, raptors).
 - Presence of water birds suggests good wetland health.
 - Conservation Concerns:
 - *Green Imperial Pigeon* is *Near Threatened (NT)* (IUCN).

- *Indian Peafowl* is under Schedule I of WPA, 1972 (high protection).

3. Mammalian Fauna

- 7 mammal species recorded in the study area.
 - Includes carnivores (Jackal, Jungle Cat), rodents, primates (Bonnet Macaque), and bats.
 - No immediate conservation threats (*IUCN: LC*), but human-wildlife interactions should be monitored.
 - Ecological Role:
 - Carnivores control pest populations.
 - Bats aid pollination and seed dispersal.

4. Mammals

- 21 species recorded with a mix of large mammals, herbivores, and carnivores.
- Conservation Concerns:
 - Endangered (EN): Asian Elephant, Lion-tailed Macaque, Dhole, Tree Shrew.
 - Vulnerable (VU): Leopard, Sloth Bear, Indian Bison, Nilgiri Langur, Sambar Deer.
 - Schedule I (WPA, 1972): 14 species, requiring strict legal protection.

5. Reptile & Amphibian Diversity

- 6 reptiles and 4 amphibians recorded.
 - Mostly common species (*IUCN: LC*).
 - Indian Cobra (*Naja naja*) is under Schedule II (WPA, 1972) – protected species.

6. Butterfly Diversity

- 35 species recorded, dominated by Nymphalidae family (14 species).
 - Indicates a healthy plant-pollinator network.
 - Presence of diverse butterfly families suggests good floral diversity.

7. Fish Diversity

- 19 species recorded, mostly from Cyprinidae family (9 species).
 - Presence of native fish species suggests a stable aquatic ecosystem.
 - Critically Endangered (CR) species: *Hypselobarbus pulchellus* (Jerdon's Carp) – requires urgent conservation.

3.11 Socio Economic Profile

3.11.1 Demographic details

An official Census 2011 detail of Ariyalur, a district of Tamil Nadu has been released by Directorate of Census Operations in Tamil Nadu. Enumeration of key persons was also done by census officials in Ariyalur District of Tamil Nadu.

Source

<https://cdn.s3waas.gov.in/s319f3cd308f1455b3fa09a282e0d496f4/uploads/2018/03/2018031335.pdf>

3.11.2 Population Density

Population density is an indicator for the assessment of the development of the area and the people. According to 2011 census, the density of population of the district was 389 per sq km, less than the State average of 555. In 2001 census, the density of population was recorded as 358.

Source:

<https://cdn.s3waas.gov.in/s319f3cd308f1455b3fa09a282e0d496f4/uploads/2018/03/2018031335.pdf>

3.11.3 Sex Ratio

The sex ratio of the population is calculated for number of females for every 1000 males, irrespective of age. The child sex ratio is also calculated in the same manner for the children aged upto 6 years. The total sex ratio in the district as per 2011 census was 1015. This was recorded as 1006 in 2001 census. The child sex ratio in the district during 2011 census was 897 and this was 949 in 2001 census.

Source:

<https://cdn.s3waas.gov.in/s319f3cd308f1455b3fa09a282e0d496f4/uploads/2018/03/2018031335.pdf>

3.11.4 Scheduled Castes and Scheduled Tribes

Scheduled Castes (SCs) population in the Ariyalur district was 21.7 per cent in 2001 census which has now increased to 23.3 per cent in 2011 census. The rural-urban composition of SCs was 24.4 per cent and 14.9 per cent respectively in 2011 census. The rural-urban SCs in 2001 census was 22.7 per cent and 13.9 per cent respectively. The Scheduled Tribes population in the district was 1.2 per cent in 2001 census and returned with 1.4 per cent in 2011 census. The rural-urban composition of STs in 2011 census was 1.5 per cent and 0.9 per cent respective.

Source :

<https://cdn.s3waas.gov.in/s319f3cd308f1455b3fa09a282e0d496f4/uploads/2018/03/2018031335.pdf>

3.11.5 Socio Economic Aspects

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status in the study area. The study provides information such

as demographic structure, population dynamics, infrastructure resources, and the status of human health and economic attributes like employment, per-capita income, agriculture, trade, and industrial development in the study area. The study of these characteristics helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. Socio economic Indicators of Perambalur District is given in **Table 3-25**.

Table 3-25 Social Indicators of Perambalur District

S. No	Social Indicators	Perambalur District
1	Decadal variation %	8.5
2	Urban population %	11.1
3	Population density (Persons per square Km)	389
4	Scheduled caste population %	23.3
5	Scheduled tribe population %	1.4
6	Literacy rate %	71.3%

Source

: <https://cdn.s3waas.gov.in/s319f3cd308f1455b3fa09a282e0d496f4/uploads/2018/03/2018031335.pdf>

3.11.6 Education & Literacy

In 2011 census, 0-6 years population has been treated as illiterate. Though the population (children) of 0-6 years read and write, they have been brought under the category of illiterate. The literacy rate in the district has increased in 2011 census compared to 2001 census. In 2011 census, the Ariyalur district returned 71.3 per cent as literates; males with 81.2 per cent and females with 61.7 per cent. The total literacy in 2001 was 64.1 per cent; males at 77.2 per cent and females at 51.2 per cent in the educational infrastructure in the Perambalur district from Secondary source is given in **Table 3-26**.

Source : <https://www.census2011.co.in/census/district/26-perambalur.html>

Table 3-26 Education Infrastructures in the Perambalur District

Type of school	Total schools
Primary school	269
Primary school with Upper Primary school	52
Primary school with Upper Primary school & Secondary and Higher Secondary school	6
Upper Primary school	5
Upper Primary school & Secondary and Higher Secondary school	1
Primary school with Upper Primary school & Secondary school	34
Upper Primary school & Secondary school	4

Source: District Information System on Education (DISE report card 2016-17)

3.11.7 Social Economic Profile of the study area

Table 3-27 provides the details on population profile within the study area. **Table 3-28** show the socio-economic indicator within the study area.

Table 3-27 Population profile within study area

Name	Household	Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
0-5 km							
Perambalur	1289	4740	2458	2282	420	405	7
Elambalur	384	1591	799	792	179	50	0
Esanai	554	2113	1071	1042	230	1127	0
Aranarai	1386	5390	2704	2686	567	2245	107
Senjeri	1298	4858	2413	2445	496	396	274
Thirupeyar	597	2075	997	1078	205	144	0
Konneripalayam	441	1751	862	889	160	268	7
Total	5949	22518	11304	11214	2257	4635	395
5-10 km							
Siruvachur	989	3723	1834	1889	433	560	0
Thoramangalam	1312	4844	2337	2507	519	439	0
Arumadal	1534	6165	3107	3058	613	818	238
Mettupalayam	1403	5565	2787	2778	557	1482	4
Veppanthattai	1360	5278	2645	2633	547	1334	0
Annamangalam	806	3158	1602	1556	316	468	0
Kuthur	1588	5807	2873	2934	612	542	234
Kurubalur	863	3503	1746	1757	415	1888	89
Total	9855	38043	18931	19112	4012	7531	565
Grand Total	15804	60561	30235	30326	6269	12166	960

(Source: Primary data correlated with secondary source i.e Census 2011)

Table 3-28 Summary of Socioeconomic indicators within the study area

S. No	Particulars	Study Area	Unit
1	Number of villages in the Study Area	11	Nos.
2	Number of Towns/Municipality in study area	04	Nos.
3	Total Households	15804	Nos.
4	Total Population	60561	Nos.
5	Children Population (<6 Years Old)	6269	Nos.
6	SC Population	12166	Nos.
7	ST Population	960	Nos.
8	Total Working Population	29337	Nos.
9	Main Workers	21789	Nos.
10	Marginal Workers	7548	Nos.
11	Literates	38785	Nos.

(Source: Primary data correlated with secondary source i.e Census 2011)

3.11.8 Employment and livelihood

Table 3-29 shows the classification of workers within the study area based on primary data, which has been further correlated with secondary data. Details of Literacy population in the study area based on primary data, which has been further correlated with secondary data is given in

Table 3-30.

Table 3-29 Classification of workers within study area

Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Main		Marginal	
				Main		Marginal					
				Cultivators	Agri.	Cultivators	Agri.	Household	Others	Household	Others
0-5 km											
Perambalur	2235	1450	785	453	413	65	619	196	388	4	90
Elambalur	995	820	175	161	499	15	119	17	143	23	11
Esanai	1134	1101	33	384	638	0	31	4	75	0	2
Aranarai	2816	2346	470	641	1481	19	417	19	205	0	33
Senjeri	2208	1800	408	588	695	23	326	30	487	7	35
Thirupeyar	1033	584	449	347	102	154	217	34	101	8	42
Konneripalayam	11257	8817	2440	2771	4229	282	1829	309	1508	42	225
Total											
5-10 km	1782	1012	770	289	500	106	504	10	213	13	147
Siruvachur	2652	1928	724	1240	392	133	527	35	261	4	60
Thoramangalam	2783	2121	662	549	641	12	173	51	880	76	401
Arumadal	2672	1943	729	760	841	42	602	24	318	11	74
Mettupalayam	2504	1510	994	696	487	164	743	19	308	10	77
Veppanthattai	1143	456	687	285	30	10	638	4	137	2	37
Annamangalam	2803	2682	121	1393	896	2	97	160	233	3	19
Kuthur	1741	1320	421	443	744	4	389	14	119	3	25
Kurubalur	1782	1012	770	289	500	106	504	10	213	13	147
Total	18080	12972	5108	5655	4531	473	3673	317	2469	122	840
Grand Total	29337	21789	7548	8426	8760	755	5502	626	3977	164	1065

(Source: Primary data correlated with secondary source i.e Census 2011)

Table 3-30 Details of Literacy population in the study area

Name	Literates Population	Male Literates	Female Literates	Literates %
0-5 km				
Perambalur	3099	1797	1302	7.99
Elambalur	1128	621	507	2.91
Esanai	1381	799	582	3.56
Aranarai	3211	1819	1392	8.28
Senjeri	2921	1711	1210	7.53
Thirupeyar	1179	651	528	3.04
Konneripalayam	14071	8050	6021	36.28
Total				
5-10 km				
Siruvachur	2245	1297	948	5.79
Siruvachur	3013	1692	1321	7.77
Thoramangalam	4479	2474	2005	11.55
Arumadal	3744	2093	1651	9.65
Mettupalayam	3496	1958	1538	9.01
Veppanthattai	1923	1102	821	4.96
Annamangalam	3673	2067	1606	9.47
Kuthur	2141	1232	909	5.52
Kurubalur	2245	1297	948	5.79
Total	24714	13915	10799	63.72
Grand Total	38785	21965	16820	100.00

(Source: Primary data correlated with secondary source i.e Census 2011)

Table 3-31 Summary of Socio-Economic Survey

S. No	Impact Zone	Number of villages	Total Population	Male%	Female%	SC population%	ST population%	Total Workers%	Main Workers %	Marginal Workers%	Literacy%	Non-Workers%
1	0-5km	6	22518	50.20	49.80	20.58	1.75	49.99	39.16	10.84	62.49	50.01
2	5-10km	5	38043	49.76	50.24	19.80	1.49	47.53	34.10	13.43	64.96	52.47
Total		16	14	49.92	50.08	20.09	1.59	48.44	35.98	12.46	64.04	51.56

Interpretation of Population Profile Results

5. Literacy Rate:

- The overall literacy rate in the study region is 64.04%, with slight variations between the 0-5 km zone (62.49%) and the 5-10 km zone (64.96%).
- The literacy rate is moderate, indicating the need for further educational initiatives.

6. Employment and Workforce:

- Non-workers constitute more than 40% of the population in both impact zones (50.01% in 0-5 km, 52.49% in 5-10 km).
- Main workers account for 20.03% of the total population, while marginal workers make up 12.46%, highlighting seasonal or temporary employment patterns.
- The high non-working population (41.2%) suggests a need for employment-generating industries to improve economic conditions.

7. Gender Distribution:

- The male-to-female ratio is relatively balanced, with males (49.92%) and females (50.08%) in the total study area.

8. Social Composition:

- The Scheduled Caste (SC) population accounts for 20.09%, while the Scheduled Tribe (ST) population is 1.59%.
- The presence of SC/ST communities indicates the need for inclusive developmental programs to enhance social and economic opportunities.

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The impacts due to mining operation and its mitigation measures adopted are detailed in this chapter. In general, the opencast mining operations cause environmental problems such as degradation of land, deteriorating air, water, and soil quality, affecting the biological and socio-economic environment of the area, if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause irreversible damage to the eco-system.

The opencast mining operations involve development of benches, approach roads, haul roads, Drilling, excavation, and handling & transportation of materials. If adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause environmental degradation and lead to irreversible damage to the ecosystem. Various environmental impacts, which have been identified due to the mining operations proposed project, are discussed in the following sections. The environmental parameters most affected by mining activities are:

- ▶ Air quality includes Climate
- ▶ Noise levels and ground vibrations
- ▶ Water resources and quality
- ▶ Land use Pattern.
- ▶ Soil quality
- ▶ Flora and Fauna
- ▶ Socio-Economic conditions
- ▶ Occupational Health

The objective of this chapter is to:

- ▶ Identify project activities that could beneficially or adversely impact the environment.
- ▶ Predict and assess the environmental aspects and impacts of such activities.
- ▶ Examine each environmental impact relationship in detail and identify its degree of significance.
- ▶ Identify possible mitigation measures for these project activities and select the most appropriate mitigation measure, based on the reduction in significance achieved and practicality in implementation.

This methodology is used in this chapter for preparing impacts and their listing evaluation. Mitigation measures are formulated based on the significance of the impact as discussed in Methodology; environmental impacts have been identified based on an assessment of environmental aspects associated with the project. The symbol 'a-Ve' indicates an adverse (negative) impact, and 'b+Ve' indicates a beneficial (positive) impact. Identified environmental impacts have been listed in **Table 4-1**.

Table 4-1 Impact Identification from proposed project

S. No	Project activities/Aspects	Potential Environmental attributes									Summary of Indication
		Land use/ Landcover (LU/LC)	Air Quality (AQ)	Noise and Vibration (NV)	Surface Water (SW)	Ground Water (GW)	Soil (S)	Ecology & Biodiversity (EB)	Socio-Economic (SE)	Occupational Health, Community Health & Safety	
1	Site selection-Land Acquisition	a-Ve	-	-	-	-	-	-	b +Ve	-	LU/LC (-): Potential change in land cover SE (+): Economic development and Employment to local
2	Preparation of site-Clearance of vegetation at site	a-Ve	-	-	-	-	a-Ve	a-Ve	-	-	LC (-): Change in land cover from vegetation cover to barren (since land use change will be long term /permanent being development operations) EB (-): Possible loss of vegetation cover SE (+): short time employment
3	Excavation	a-Ve	a-Ve	a-Ve	a-Ve	a-Ve	a-Ve	a-Ve	b +Ve		LU (-) Creation of pit and some areas will be converted to the reservoir. AQ (-) Dust emission due to mining activities, use of rock breakers, vehicular movement, and use of dewatering pump NV (-) Due to mining activities, use of compressor and use of machineries for mining

											SW, GW (-) use of water for dust suppression, domestic purpose and Greenbelt development EB (-) dust emission, Removal of vegetation and generation of noise SE (+) generation of employment
4	Stacking of Mineral Reject and Handling	-	a-Ve	a-Ve	-	-	-	a-Ve	-	-	AQ (-) generation of dust NV (-) generation of noise EB (-) generation of noise and dust emission
5	Transportation of mining material	-	a-Ve	a-Ve	-	-	-	a-Ve	b +Ve	-	AQ (-) generation of dust NV (-) generation of noise EB (-) generation of noise SE (+) Employment Generation
6	Land Reclamation	a-Ve	a-Ve	-	-	a-Ve	a-Ve	b +Ve	b +Ve	-	LU (-) some areas will be converted to water reservoir. AQ (-): Dust emission due to leveling. EB (+): Some areas will be converted to water reservoirs. SE (+): generation of water reservoir

4.1 Land Environment

The proposed site is located at S.F.No. 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District Tamil Nadu state. The lease area for mining of rough stone is 9.00 Ha. The quarry land is classified as Government Poramboke land.

Anticipated Impacts

- Removal of site vegetation will change Land cover.
- The topsoil and bushes observed on the hillside over the dyke will be completely removed. As a result, excavation of the hill ridge will take place, which may interrupt the aesthetic view of the locality.
- The proposed quarrying operations will alter the hillock slope and the natural drainage pattern.
- Generation of hazardous and non-hazardous waste is expected.
- The exposed topsoil will be vulnerable to wind and water erosion.
- Infrastructural facilities such as office buildings, rest shelters, a first-aid center, and other service facilities will be created.

Table 4-2 Land Use Pattern of the lease area

S. No	Description	During the Life of the Mine (Ha)
1	Mining (Quarry)	7.68.0
2	Infrastructure	0.01.0
3	Mine Road	0.01.0
4	Afforestation	0.18.2
5	Unutilized Aea	1.11.8
Total		9.00.0

Table 4-3 Impact and Mitigation Measures on Land Environment

S. No.	Project Activity/Aspect	Potential Environmental Impact on LU/LC	Summary of Impact	Mitigation Measures
1	Land Acquisition	Negative (-ve)	Change in existing land use from unused/hill terrain to mining zone.	Utilize barren or non-agricultural land.
2	Site Clearing/Vegetation Removal	Negative (-ve)	Conversion of vegetated/hill slope land to bare area; localized loss of vegetation.	Minimize vegetation clearance; implement greenbelt development using native species around the lease boundary and infrastructure.
3	Excavation	Negative (-ve)	Alteration of natural landform; formation of pits and benches in stone terrain.	Phased excavation with designated ultimate pit limits. Use benches and systematic quarry design to stabilize slopes.
4	Land Reclamation/Post-Mining Land Use	Negative (-ve)	Quarry pit remains as a permanent topographical change; some areas become water reservoirs.	Post-mining land use planning to include fencing of pit area and conversion to water storage. No backfilling is required due to hard rock nature.
5	Overburden Dumping	Negative (-ve)	Erosion risk, land degradation, and potential dump instability.	OB dumps will be properly leveled and stabilized with a max height <10 m, 26° slope, toe wall, and garland drains. Native grass and shrub plantation on slopes.
6	Surface Infrastructure Development	Neutral to Slight Negative	Minor changes to LU/LC due to site office, roads, and loading zones.	Use minimal land area for infrastructure. Include landscaping and vegetative cover around buildings and along haul roads.
7	Soil Stripping & Topsoil Stockpiling	Neutral	Temporary change in land cover; risk of erosion or compaction of topsoil.	Topsoil will be stored with bunds and reused for greenbelt and reclamation. Avoid long-term exposure of stockpiles.
8	Water Flow Alteration During Monsoon	Negative (-ve)	Risk of erosion, siltation, and localized flooding from stormwater runoff.	Construct garland drains, silt traps, and proper stormwater management structures around quarry and OB dumps. Maintain existing drainage pattern.

9	Abandonment and Site Safety Post-Closure	Negative (-ve)	Safety risk due to open pits; visual impact if not managed.	Quarry pits will be fenced after lease period. Signage and access restrictions to prevent accidental entry. Pits may serve as water storage or recharge structures.
10	Greenbelt Development (Progressive)	Positive (+ve)	Improvement in visual aesthetics, dust control, and ecological value over time.	Year-wise plantation of native trees and shrubs along the lease boundary, haul roads, OB dumps, and around infrastructure. Maintenance and monitoring for survival rate to be ensured.

4.2 Air Environment

Base line data reveals that ambient air quality in the study area for the Parameters PM₁₀, PM_{2.5} & NO₂, are well within the permissible Limits as prescribed by the National Ambient Air Quality Standards (NAAQS) for Industrial Area, Residential, Rural & Other areas.

The major air pollution sources from the mining operations are mining activities such as blasting, drilling, loading & unloading, Excavating and transportation etc. The particulate emissions & gaseous emissions mainly generated from the mining activities are Blasting, Drilling, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling. The sources of air emission are detailed below in **Table 4-4**.

Table 4-4 Sources of air pollution at quarry

S. No	Source of emission	Pollutant
1.	Excavation / Mining activity	PM
2.	Operation of diesel driven equipment	Gaseous emission/Fugitive emissions
3.	Transportation	PM, NOx, CO

4.2.1 Anticipated Impacts

- ▶ Emissions and Particulate matter from mining activities are primarily generated during operations such as blasting, drilling, excavation, loading, unloading, and transportation.
- ▶ Machinery such as compressors and jackhammers used for drilling also contribute to air pollution.
- ▶ The resulting air pollution may lead to respiratory issues in nearby populations.
- ▶ In addition, air pollutants can negatively impact surrounding ecosystems, vegetation, livestock habitats, and nearby water sources.

Table 4-5 Sources of Air Pollution, Impacts and Mitigation Measures

S. No.	Source of Emission	Primary Pollutants	Anticipated Impacts	Mitigation Measures
1	Excavation / Mining Activity	Particulate Matter (PM)	Dust emissions affecting air quality and visibility; potential respiratory health impacts to workers and nearby residents.	Water sprinkling at excavation sites; phased excavation; covering exposed surfaces; dust suppression using water tankers.
2	Drilling with compressors & jackhammers	PM, Noise, Minor Gaseous Emissions	Fine dust generation and local air quality degradation; occupational exposure for operators.	Use of dust aprons, wet drilling methods; regular maintenance of drilling equipment; PPE (masks, goggles) for workers.
3	Blasting Activities	PM, NOx, CO, SOx	Short-term high concentration of dust and gases; potential irritation, visibility reduction, and risk to nearby flora/fauna.	Use of controlled blasting techniques (e.g., NONEL detonators); proper stemming; use of adequate boosters/primers for complete detonation to minimize fumes.
4	Loading & Unloading of stone Blocks	PM	Dust generation at handling points; risk of fugitive dust emissions near stockpiles and transfer points.	Minimize drop heights; regular water spraying at loading points; shielding of transfer points; paved loading zones.
5	Transportation of Mined Material	PM, NOx, CO	Dust raised from haul roads and	Water sprinkling on haul roads; regular

			emissions from diesel trucks; dispersion of pollutants along the route impacting roadside vegetation and habitations.	maintenance of vehicles; use of covered trucks; limiting vehicle speed; scheduling movement to avoid peak human activity hours.
6	Operation of Diesel Machinery & Generators	NOx, CO, HC, PM	Emissions from fossil fuel combustion; minor contribution to ambient air pollution load.	Regular engine maintenance; use of low-sulfur diesel; shifting to fuel-efficient or electric equipment where feasible.
7	Wind Erosion from Topsoil/Overburden Dumps	PM	Airborne dust during dry and windy conditions; potential contribution to ambient particulate levels.	Compaction and covering of topsoil stockpiles; use of native grass cover ; bund construction; periodic water spraying.
8	Lack of Vegetation Cover (Initial Phase)	--	Less absorption of pollutants; enhanced dispersion of dust and heat.	Greenbelt development over 0.80.00 ha using native species (~1,200 saplings); planting along approach roads, lease boundaries, and around infrastructure using topsoil for nourishment .

Table 4-6 Fugitive dust & Particulate matter control in the proposed project

S. No	Activities	Fugitive Dust control Mitigation measure	Dust control Mitigation measure/Control options
1	Drilling	• Drills should be provided with dust extractors (wet system)	• Liquid injection (water or water plus a wetting agent) • Capturing and venting emissions to a control device.
2	Blasting	• Water sprinkling before blasting. • Water sprinkling on blasted material prior to transportation. • Use of control blasting technique.	
3	Excavation of site, Movement of JCBs, other machinery, workers / laborers etc.	• Water sprinkling will be carried out as and when required.	
4	Transportation of mined material	• Covering of the trucks/dumpers to avoid spillage. • Compacted haul road Speed control on vehicles • Development of a green belt of suitable width on both sides of road, which acts as wind break and traps fugitive dust	
5	Loading	• Water sprinkling	
6	Hauling (emissions from roads)	• Water spray, treatment with surface agents, soil stabilization, paving, traffic control.	

4.2.2 Meteorological Data

Site-specific meteorological data for the period **Feb (1.2.2026) to April (30.04.2026)** was considered for the study. The data used for AERMET processing included daily observations of wind speed, wind direction, temperature, relative humidity, air pressure, precipitation, and solar radiation. AERMET reformats this meteorological data to make it suitable for use as input in the AERMOD dispersion model. A wind rose for the study period was also generated and is presented in **Figure 4-1**.

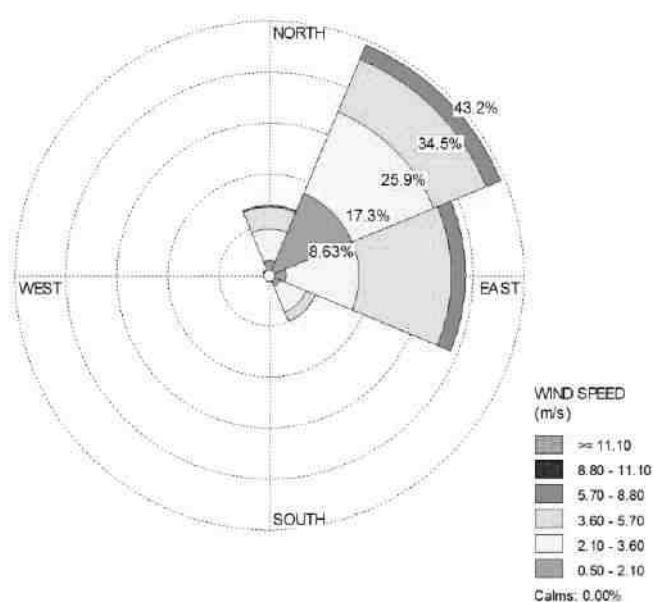


Figure 4-1 Wind rose of meteorology is considered for for Dispersion Modeling Feb (1.2.2026) to April (30.4.2026)

4.2.2.1 AERMET Process

For the 3 phase AERMET processing of meteorological data, specifications of the land use in the area are required to determine the terrain roughness for modelling. The land use was characterized in and around the site. The surface characteristics for the site and surroundings were selected and used to calculate the Albedo, Bowen ratio and surface roughness parameter. The meteorological data were processed in the AERMET software to generate wind flow pattern & to generate surface meteorological data and profile meteorological data in a prescribed format that can be fed to AERMOD for modelling.

4.2.2.2 AERMOD Process

AERMOD Software Version 22112 (11.0.1) was used for air dispersion modelling. AERMOD MPI is Lakes Environmental parallel version of the AERMOD model. AERMOD MPI Version 22112 is the parallel version for the US EPA AERMOD model dated 22112 released by the US EPA on June 27, 2022, and is applicable to a wide range of buoyant or neutrally buoyant emissions up to a range of 50 km. In addition to more straightforward cases, AERMOD is also suitable for complex terrain and urban dispersion scenarios.

AERMOD is a steady-state plume model. In the stable boundary layer (SBL), it assumes the concentration distribution to be Gaussian in both the vertical and horizontal. In the convective boundary layer (CBL), the horizontal distribution is also assumed to be Gaussian, but the vertical distribution is described with a bi-Gaussian probability density function (pdf). This behaviour of the concentration distributions in the CBL was demonstrated by Willis and Deardorff (1981) and Briggs (1993). Additionally, in the CBL, AERMOD treats "plume lofting," whereby a portion of plume mass, released from a buoyant source, rises to, and remains near the top of the boundary

layer before becoming mixed into the CBL. AERMOD also tracks any plume mass that penetrates the elevated stable layer and then allows it to re-enter the boundary layer when and if appropriate. For sources both the CBL and the SBL AERMOD treats the enhancement of lateral dispersion resulting from plume meander. The emissions from proposed stacks are estimated and these stack emissions are used for the air dispersion modeling as shown in **Table 4-7**.

Maximum concentration value for PM₁₀, PM_{2.5}, & NO_x obtained through modelling is shown in **Figure 4-2**, and **Figure 4-4** respectively and the first ten highest values of Ground Level Concentration (GLC) for proposed stacks is given in **Table 4-12**, **Table 4-13** & **Table 4-14** respectively.

4.2.2.3 Emission Calculations

Each mining activity acts as a source of air emissions, and the estimation of these emissions depends on several factors, including meteorological conditions, topography, and the characteristics of the material being handled. It is essential to calculate the quantity of emissions released into the atmosphere from each activity or source at the site. The following emission formulas are used to estimate the emission rates for various sources.

4.2.2.4 Mining Operational data

Table 4-7 Overview of the Source Parameters

S. No	Description	Symbol	Quantity
1.	Moisture Content (%)	M	0.35
2.	Silt Content (%)	s	3
3.	Production / Day (m ³)		9.8
4.	Production / Day (Ton)		13.8
5.	No. of vehicles with categorization		1 no. HW 2 no. 4W
6.	Working Hours per day (hrs)		8

4.2.2.5 Emission Factors

Table 4-8 Emission Factor

Activity	Uncontrolled Emissions Factor	Reference
Topsoil excavation	Activities: 1. Bulldozing 2. Loading 3. Unloading 4. Transportation	<i>Jose I. Huertas & Dumar A. Camacho & Maria E. Huertas, Standardized emissions inventory methodology for open-pit mining areas, Environ Sci Pollut Res,2012.</i>

4.2.2.6 Consider activities in Mining activities

Table 4-9 Emissions from Mining Activities

S. No	Activities	Emission rate (g/s)			
		PM10	PM2.5	SO2	NOx
1	Topsoil excavation	0.06023	0.02811	-	-
2	Wet drilling	0.00050	0.0002	-	-
3	Hauling	0.62200	0.39000	-	-
4	Conveyor loading	0.00112	0.00154	-	-
5	Unloading	0.00014	0.00040	-	-
Total (g/s)		0.68399	0.42025	-	-

Table 4-10 Vehicular Emissions

S.No	Activities	PM10 Emission rate (g/s)	PM2.5 Emission rate (g/s)	NOX Emission rate (g/s)
1	4Wheels (Tippers & tankers)-1 Nos	0.000215	0.000107	0.00156
2	HW (Excavator & Breaker)-2Nos	0.000489	0.000244	0.05247

Table 4-11 Emission considered for GLC

S. No	Activities	PM ₁₀ Emission rate (g/s)	PM _{2.5} Emission rate (g/s)	NO _x Emission rate (g/s)
1	Area Source			
	Topsoil excavation	0.06023	0.02811	-
	Wet drilling	0.00050	0.0002	-
	Conveyor loading	0.00112	0.00154	-
	Unloading	0.00014	0.00040	-
	Sub Total (g/s)	0.06199	0.03025	-
2	Line Source			
	Haulage	0.62200	0.39000	-
	4Wheels (Tippers & tankers)-1Nos	0.000274	0.000304	0.00154
	HW (Excavator)-2Nos	0.000215	0.000107	0.00156
	DG -125KVA	0.000489	0.000244	0.05247
	Sub Total (g/s)	0.622978	0.390655	0.05557

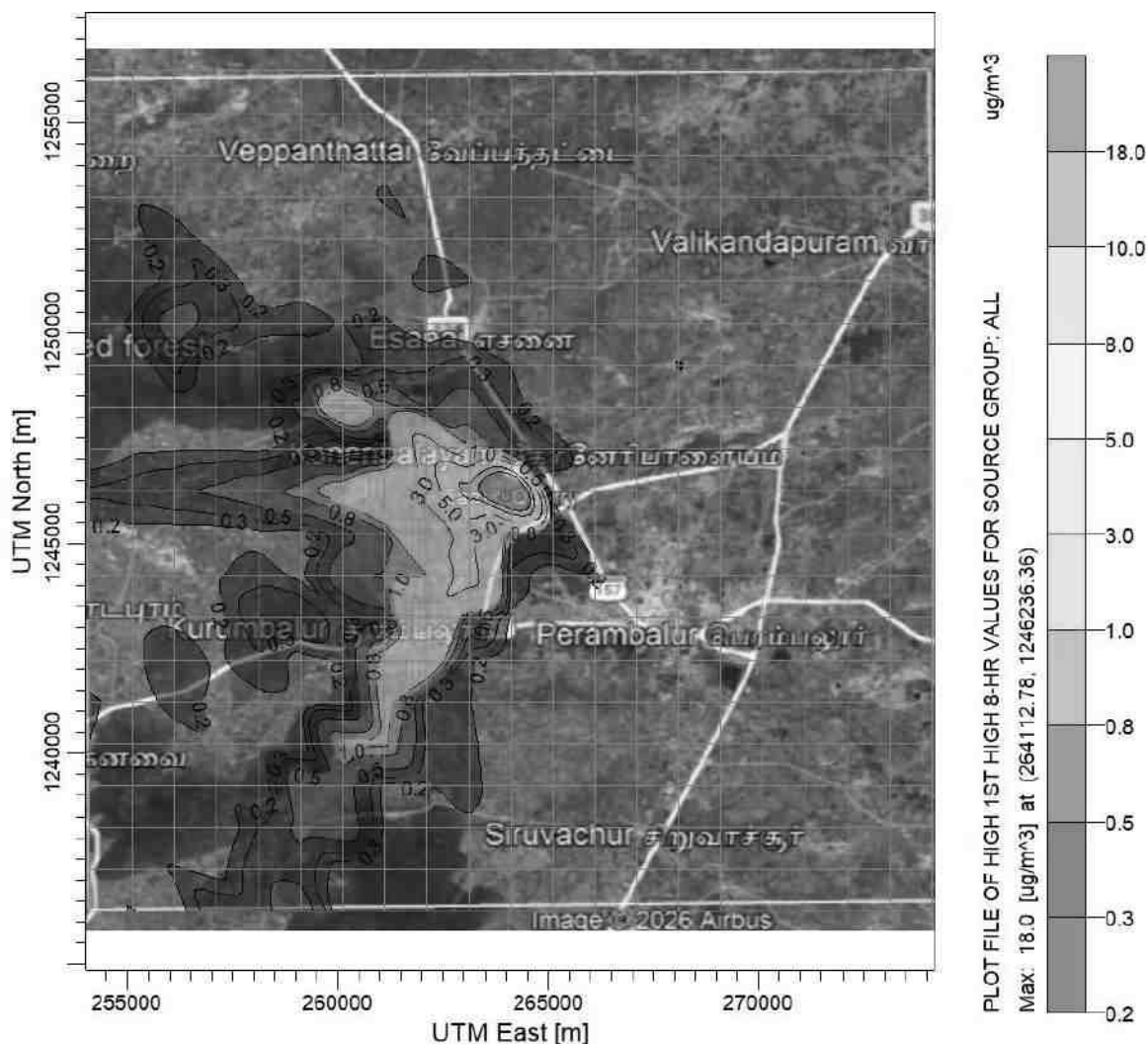


Figure 4-2 Predicted 24-Hrs GLC of PM₁₀ within 10 km Radius of the Study Area

Table 4-12 Predicted Highest and Habitation receptors Concentrations PM₁₀

S. No	UTM Coordinates		Conc. ($\mu\text{g}/\text{m}^3$)	Name of the habitation	Distance (km)	Direction
	E	N				
1	264112.8	1246236	17.99361	Project Site	-	-
2	263112.8	1246236	9.21481	-	0.43	SE
3	262112.8	1247236	4.24229	-	0.76	SW
4	263112.8	1244236	3.89639	-	1.95	NW
5	262112.8	1246236	3.43838	-	0.89	NE
6	263112.8	1245236	3.41188	-	1.36	SW
7	262112.8	1243236	2.40324	-	1.76	SW
8	262112.8	1245236	2.08966	-	1.5	SE
9	261112.8	1246236	1.90646	-	2.21	S
10	260112.8	1248236	1.76657	-	3.22	S

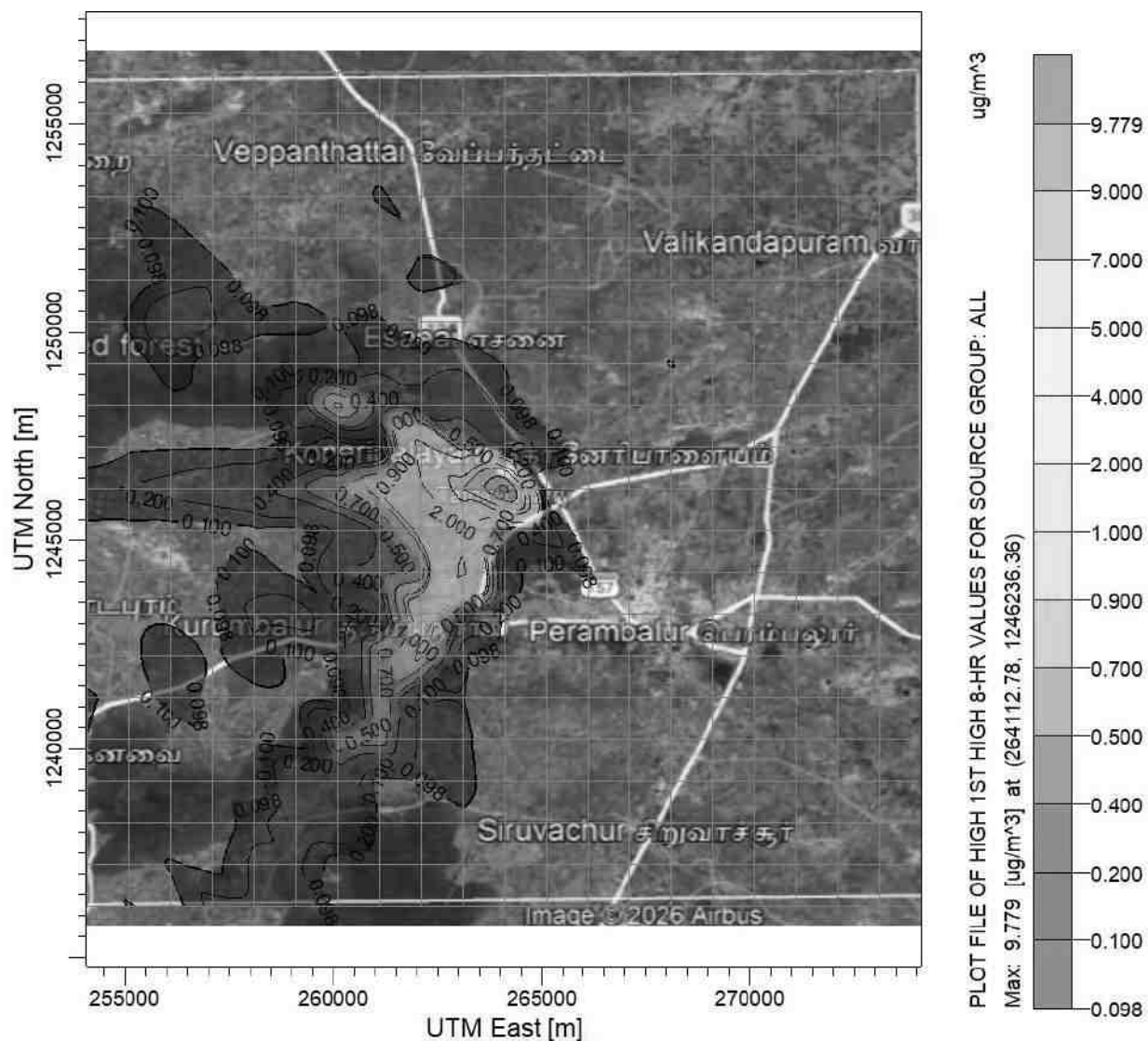


Figure 4-3 Predicted 24-Hrs GLC of PM_{2.5} within 10 km Radius of the Study Area

Table 4-13 Predicted Highest and Habitation receptors Concentrations PM_{2.5}

S. No	UTM Coordinates		Conc. (μg/m ³)	Name of the habitation	Distance (km)	Direction
	E	N				
1	264112.8	1246236	9.77913	Project Site	-	-
2	263112.8	1246236	5.00805	-	0.43	SE
3	262112.8	1247236	2.30559	-	0.76	SW
4	263112.8	1244236	2.1176	-	1.95	NW
5	262112.8	1246236	1.86868	-	0.89	NE
6	263112.8	1245236	1.85428	-	1.36	SW
7	262112.8	1243236	1.30611	-	1.76	SW
8	262112.8	1245236	1.13568	-	1.5	SE
9	261112.8	1246236	1.03612	-	2.21	S
10	260112.8	1248236	0.96009	-	3.22	S

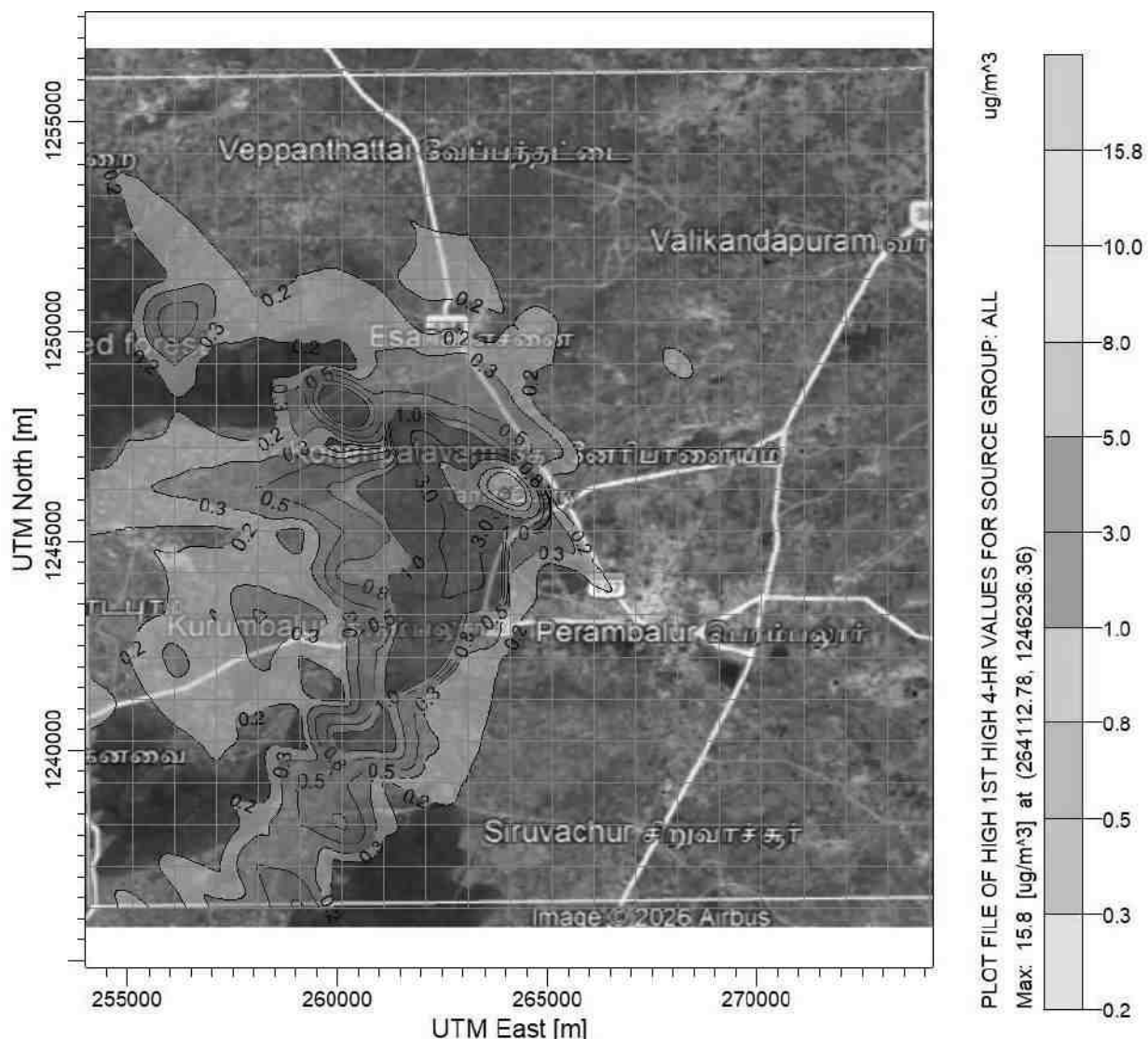


Figure 4-4 Predicted 24-Hrs GLC of NO_x within 10 km Radius of the Study Area

Table 4-14 Predicted Highest and Habitation receptors Concentrations NO_x

S. No	UTM Coordinates		Conc. ($\mu\text{g}/\text{m}^3$)	Name of the habitation	Distance (km)	Direction
	E	N				
1	264112.8	1246236	15.82457	Project Site	-	-
2	263112.8	1246236	6.86305	-	0.43	SE
3	262112.8	1247236	4.57377	-	0.76	SW
4	263112.8	1244236	4.56627	-	1.95	NW
5	263112.8	1245236	3.68628	-	0.89	NE
6	262112.8	1246236	2.51133	-	1.36	SW
7	262112.8	1245236	2.44983	-	1.76	SW
8	262112.8	1243236	2.37655	-	1.5	SE
9	262112.8	1242236	2.09903	-	2.21	S
10	260112.8	1248236	1.93158	-	3.22	S

4.2.2.7 Conclusion

It was observed that the maximum ground level concentration observed due to mining activities and traffic movement without control measures for PM₁₀, PM_{2.5} and NO_x are 1.08µg/m³, 0.542µg/m³ and 0.398µg/m³ respectively. The highest concentration levels identified at the project site only. So, it can be concluded that even during operation of quarry the impact envisaged is moderate. The total increase in concentrations above baseline status to estimate the percentage increase is summarized in **Table 4-15**.

Table 4-15 Total Maximum GLCs due to Mining Activities without Control measures

Pollutant	Max. Baseline Conc. (µg/m ³)	Estimated Incremental Conc. (µg/m ³)	Total Conc. (µg/m ³)	NAAQ standard	% Increase
PM ₁₀	57.2	18.0	75.2	100	31.4
PM _{2.5}	27.8	9.7	37.5	60	34.8
NO _x	25.1	15.8	40.9	80	62.9

4.2.3 Impacts due to Transportation

Stone will be transported directly to consumers based on market demand and buyer requirements. Transportation will be carried out using tippers via the existing approach roads.

The average annual production is estimated at 12960 m³ (approximately 12,960 metric tons) of stone. Based on an operating schedule of 240 working days per year, the average saleable production will be around 10.8m³ per day (or 36 metric tons per day). Assuming an average truck carrying capacity of 0.0127 tons, this translates to approximately 2–3 truck trips per day, depending on market conditions. This minimal level of traffic is not expected to have a significant impact on the existing transportation infrastructure.

4.2.3.1 Mitigation Measures

The increment in the dust emissions will be mainly due to Excavation & transportation activity. Therefore, emissions due to mineral handling during mining operation are not much and restricted to the lease area only. Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits are as follows:

- ▶ Regular water sprinkling on haul and access roads.
- ▶ Wet drilling will be followed.
- ▶ Watering of haul roads and other roads at regular intervals
- ▶ Provision of green belt by vegetation for trapping dust.
- ▶ Greenbelt development along the haul roads, dumps and along the boundaries of the lease area. Utmost care will be taken to prevent spillage of sand and stone from the trucks.

4.2.4 Impacts due to Carbon Emissions:

The proposed quarrying operations have the potential to generate various greenhouse gas (GHG) emissions, including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O),

fluorinated gases, water vapor, and ozone. These emissions may result from multiple phases of quarrying activities such as excavation, material transportation, energy consumption, and land-use changes.

Mitigation strategies have also been identified to minimize the environmental impact and to support sustainable quarrying practices. Impacts Due to Carbon Emissions and Mitigation Measures is provided in **Table 4-16**.

4.2.4.1 Above-Ground Carbon Stock

Deforestation and soil disturbance associated with quarrying activities result in the reduction of above-ground carbon stocks. This occurs due to the release of stored carbon from vegetation into the atmosphere during land clearing and biomass removal.

4.2.4.2 Below-Ground Carbon Stock:

Soil erosion and physical disturbance from quarrying activities lead to the loss of soil organic carbon. This not only contributes to greenhouse gas emissions but also compromises soil fertility and overall ecosystem health.

Table 4-16 Impacts Due to Carbon Emissions and Mitigation Measures

S. No	Activity	Impacts or Consequences	Mitigation Measures
1	Operation of Heavy Machinery and Equipment – Direct Emissions	Continuous operation of machinery releases CO ₂ directly into the atmosphere, contributing to increased carbon emissions.	Implementing energy-efficient technologies and practices, such as using low-emission equipment or transitioning to cleaner fuels, to reduce direct emissions.
2	Energy-intensive processes, such as drilling, cutting, and transportation	Combustion of fossil fuels releases CO ₂ and other GHGs, contributing to indirect emissions from quarry operations.	Transitioning to renewable energy sources, such as solar, to reduce indirect emissions associated with energy consumption.
3	Land-Use Changes and Deforestation	Deforestation releases stored carbon in trees and soil into the atmosphere, increasing carbon emissions. Loss of vegetative cover reduces the area's ability to sequester carbon through photosynthesis.	Plantation in and around the quarry area to help offset carbon emissions and restore ecosystem functions.
4	Soil Disturbance, Excavation, and Carbon Loss	Soil disturbance disrupts the natural carbon cycle, accelerating organic matter decomposition and releasing CO ₂ . Soil erosion further reduces the soil's ability to retain carbon.	Implementing sustainable land management practices, such as minimizing soil disturbance and using erosion control measures, to help preserve soil and reduce carbon loss.
5	All Operations – Impacts on Microclimate and Temperature	Quarry operations alter local microclimates, leading to temperature increases due to vegetation removal and	Plantation in and around the quarry area to mitigate temperature rise and restore ecosystem balance.

		exposure of bare rock surfaces. Heat generated by machinery further contributes to temperature rise.	
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4.2.5 Impact on climate change, temperature rise, pollution

The proposed quarry is expected to impact climate change, temperature rise, pollution, and carbon stocks, both above and below the soil. The detailed Climate change and temperature and its impacts, and mitigation measures are provided in **Table 4-17**. Impact of Mining due to GHG Emissions & Local Livelihood with Mitigation Measures is provided in **Table 4-18**.

Table 4-17 Climate Change and Temperature Rise – Impacts and Mitigation Measures

Sl. No	Activity	Impacts / Consequences	Mitigation Measures
1	Direct Emissions due to Heavy Machinery and other Equipment	Quarrying activities involving heavy machinery, diesel vehicles, and energy-intensive processes release greenhouse gases (GHGs) like carbon dioxide (CO ₂) and methane (CH ₄), contributing to climate change and increased carbon emissions.	Implement energy-efficient technologies and transition to renewable energy sources such as solar power to reduce dependency on fossil fuels. Additionally, use low-emission equipment to minimize direct emissions.
2	Vegetation removals/removal of Trees	Clearing of vegetation for quarrying reduces carbon sequestration capacity, leading to the release of stored carbon into the atmosphere and contributing to climate change.	Develop a greenbelt to restore vegetation and sequester carbon. Implement afforestation programs and rehabilitate degraded areas to offset deforestation impacts.
3	Change of Land Cover and Soil Composition	Changes in land cover and soil disturbance disrupt local microclimates, affecting temperature, humidity, and precipitation patterns in the surrounding areas.	Apply soil conservation techniques such as erosion control, reclamation, and stabilization to maintain soil carbon and ecosystem integrity. Reduce land disturbances to preserve the natural microclimate balance.

Table 4-18 Impact of Mining due to GHG Emissions & Local Livelihood with Mitigation Measures

Impact Area	Potential Effect	Consequences of Local Livelihood	Mitigation Measures	Monitoring Strategies
Air Pollution	Increased CO ₂ , NO _x , SO ₂ , PM10 & PM2.5 emissions	Respiratory diseases (asthma, bronchitis). Reduced agricultural productivity.	Use low-emission machinery & renewable energy sources. Implement dust suppression & greenbelt development.	Monitor air quality (PM10, CO ₂ , NO _x) near mining zones.
Water Pollution	Acid mine drainage,	Contaminated drinking water affecting human	Install water treatment plants & lined tailing storage.	Regularly Monitor og & groundwater

	leaching of heavy metals	and livestock health. Loss of aquatic biodiversity.	Regular treatment of mine water before discharge.	surface water quality. Monitor pH & heavy metal levels in nearby streams.
Soil Degradation	Land clearing, loss of soil fertility	Reduced crop yield impacting farmers' income. Increased dependency on external food sources.	Implement top-soil conservation & land reclamation.	Track vegetation regrowth using satellite imagery. Conduct periodic soil quality testing.
Climate Change	Temperature rise due to CO ₂ and land-use change	Erratic rainfall patterns affecting crops. Higher cooling costs and stress-related health issues.	Reduce deforestation & implement plantation Introduce energy-efficient mining operations.	Regular Monitoring
Livelihood Shift	Displacement and job loss in traditional sectors	Loss of income sources for farming. Increased migration for alternative jobs.	- Promote alternative employment (eco-tourism, skill training). Provide compensation & resettlement support.	Conduct livelihood impact assessments yearly. Implement CER/ CSR programs for affected communities.

4.3 Water Environment

There are no surface sources viz. rivers/ lake within the proposed quarry lease area. There will not be any ground water withdrawal, as the total water requirement will be met through authorized vendors or local panchayat. the economically workable average depth of 48.47 m from the top of the hill works (above ground level). Hence, there will not be any groundwater level intersect. Therefore, ground water regime will be undisturbed. The list water bodies available within the 15km radius from the project site is provided in **Table 4-19**. The Detailed Hydrological Report is Final EIA Persensation the enclosed. Water balance Chart is provided in

Figure 4-5.

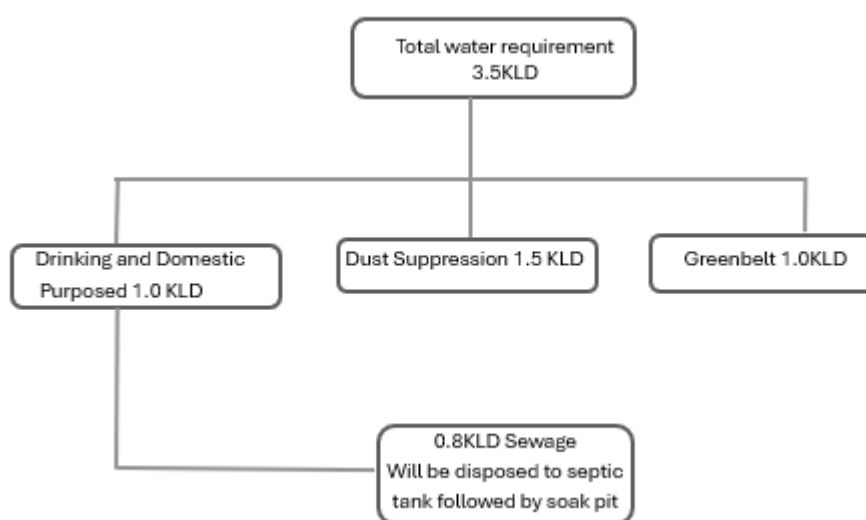


Figure 4-5 Water balance Chart

The existing water environment quality has been studied, and the study results are discussed in **Chapter 3**, which show that generally the water quality in the area is well within statutory standards.

Table 4-19 List of waterbodies within the 15km radius of the project site

Description	Dist. (~Km)	Dir.
Sweta Nadi	13.64	NNE
Kallar R	14.06	NNW
Canal	14.22	NW
Konmathura Pond	13.87	NNW
Vengalam lake	12.01	NNW
Siruvayalur pond	9.4	NNE
anukkur Pond	7.47	N
Palaiyur pond	8.77	N

Mettupalayam Pond	11.41	NE
Tambai Pond	11.66	ENE
Koneri Ar	0.51	ESE
Kil Puliyur pond	12.48	ENE
Sirukudai Pond	9.41	ENE
Elumur Lake	14.49	E
Elumur Ar	11.58	ESE
Marudaiyar R	7.77	SSE
Toramangalam Pond	5.65	SE
Kavulpalayam	7.18	SE
Sengunam Pond	7.29	E
VRS Puram Pond	7.63	NE
MGR Nager Pond	4.97	ENE
ayilur Pond	10.08	SSE
Varaguppadi Pond	11.96	SSE
Karai Market Pond	14.12	SSE
Pudukkuruchi Pond	14.09	S
Marudati Pond	10.73	S
alattur Pond	14.75	S
Pudunaduvalur Pond	8.13	S
Punnampatti Pond	13.18	SW
Velur Pond	11.64	SW
Nattarmangalam Eri	14.18	SSW
Kalarampatti Big Lake	14.22	WSW
Ladapuram Lake	8.53	WSW
Ladapuram West Lake	11.92	W
Canal	11.43	W
Canal	11.43	WSW
KOneri ar	5.92	WSW
Annamagalam Lake	6.93	NW
Kurumbaur Lake	4.11	WSW
Senjeri Lake	3.31	SW
Alambadi Lake	0.85	W
Esanai Lake	3.65	NNW
Somandapudur Eri	1.96	N
Koneripalaiyam Eri	2.82	ESE
Elambalur Lake	4.02	E
Vella Thangiyamman Lake	4.22	SSE
Aranarai Eri	3.75	SSE
Senjeri lake	3.12	SSE
Check Dam	1.07	S

4.3.1 Anticipated Impacts

There are no surface sources and ground water regime will not be altered during mining. The mine surface runoff along with the chemicals, lubricants and stone particle sediments may enter the canal which will affect the water quality. Impact Identification and Mitigation Measures is provided in **Table 4-20**.

The major sources of water pollution due to this quarry operation will be as below:

- ▶ Domestic sewage from mine.
- ▶ Deterioration in surface/groundwater quality of receiving body.
- ▶ Change to hydraulic regime.

Table 4-20 Impact Identification and Mitigation Measures on Water Environment

Sl. No	Source of Water Pollution	Potential Impact	Mitigation Measures
1	Domestic Sewage from Mine	Untreated sewage from mining activities can contaminate nearby water bodies and soil, leading to waterborne diseases and environmental degradation.	Implement a proper sewage treatment system such as a septic tank or bio-toilets to manage domestic wastewater efficiently.
2	Surface Runoff Carrying Pollutants	Runoff from mining activities may contain chemicals, lubricants, and stone particle sediments, which can enter nearby canals and affect water quality.	Construct settling ponds to trap sediments, use oil-water separators for hydrocarbons, and implement proper drainage channels to prevent contamination of surface water.
3	Impact on Surface/Groundwater Quality	Seepage of mining-related pollutants into groundwater or surface water bodies may alter water quality and make it unfit for consumption.	Regular monitoring of water quality, adoption of controlled chemical usage, and ensuring proper storage of lubricants and fuels to prevent spills.
4	Changes to Hydraulic Regime	Excessive water extraction and quarrying activities may alter the natural flow of groundwater, affecting nearby wells and water resources.	Use stored rainwater from quarry pits for dust suppression and mining operations instead of relying on groundwater sources. Implement water recharge pits to maintain the water table.

4.3.2 Mitigation Measures

4.3.2.1 Surface Water Pollution Control Measures

- ▶ No process effluent is generated. Domestic sewage of 0.63 KLD is treated through a septic tank followed by a soak pit.
- ▶ Construct garland drains of suitable size around the mine area and dumps to prevent rainwater from entering active quarry zones.
- ▶ During the monsoon season, rainwater is naturally collected in a water-fed tank and utilized for dust suppression and greenbelt development.
- ▶ Dump tops will have inner slopes to control water flow and prevent erosion from washouts.
- ▶ Active dump areas will be covered with grass, shrubs, and mulching to prevent erosion.

until Draft backfilling is completed.

- ▶ Retaining walls will be provided at dump tops and unstable benches to prevent material wash-off and landslides, reducing siltation of water channels.
- ▶ Rainwater channels/drainage will have baffles and settling pits to arrest suspended solids before the water flows out of the mine area.
- ▶ Mine water will be regularly tested for contaminants, and corrective measures will be implemented if any element exceeds CPCB-prescribed limits.
- ▶ Worked-out slopes will be stabilized by planting appropriate shrubs and grasses to reduce erosion risks.

4.3.2.2 Ground Water Pollution Control Measures

- ▶ Domestic sewage from toilets will be directed to septic tanks to prevent groundwater contamination.
- ▶ Regular monitoring of water levels and quality in nearby open wells and bore wells will be conducted to detect any potential impacts.

4.3.2.3 Rainwater Harvesting

- ▶ Rainwater is diverted to the middle of the quarry to prevent excessive water from ingredients into the working areas.
- ▶ Seasonal water flows carrying fine particles from the surface and waste dumps are controlled using settling structures.
- ▶ Barriers will be installed at appropriate intervals along drainage paths.
- ▶ Water will be diverted to a de-silting cum rainwater harvesting pond within the mine area.
- ▶ An overflow system will be incorporated to ensure the natural drainage system remains unaffected.

Table 4-21 Hydrothermal/Geothermal Effect Due to Mining Activities

Impact Area	Potential Environmental Impact	Mitigation Measures	Monitoring Strategies
Hydrothermal/Geothermal Effect	Disruption of subsurface temperature flow	Conduct geothermal impact assessments before mining.	Regular monitoring of subsurface temperature using thermal sensors.
	Localized groundwater temperature changes	Maintain buffer zones around geothermal hotspots.	Install groundwater monitoring wells and measure temperature fluctuations
	Alteration of underground water flow	Implementation of water recharge structures to maintain balance.	Periodical hydrogeological studies
Bio-Geochemical Processes & Stress	Heavy metal leaching into soil and water	Implement tailing pond systems for controlled discharge.	Regular testing of soil and water for heavy metals
	Altered carbon, nitrogen, and sulfur cycles	Implementing afforestation programs.	Periodic soil fertility test
	Loss of vegetation impacting carbon sequestration	Plantation of native plants during and post-mining activities.	Verification of satellite imagery for vegetation cover changes.
	Increased air and soil pollution	Implementation of dust suppression measures	Regular air quality monitoring.
Sediment Geochemistry in Surface Streams	Increased erosion and runoff	Construct sediment control ponds and check dams.	Conduct sediment load analysis in nearby streams if available
	Disruption of aquatic ecosystems	Establish buffer zones and maintain minimum water flow levels.	Conduct regular biological surveys for aquatic biodiversity health.

4.4 Noise Environment

The primary sources of noise pollution during mining operations include:

- Drilling
- Blasting
- Loading operations (which are intermittent)
- Vehicular movement (which occurs sporadically throughout working hours)

These activities contribute to increased background noise levels, particularly within the active mining zone. While noise levels tend to diminish over distance, they may still pose concerns for workers and nearby communities.

Table 4-22 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)

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

4.4.1 Potential Impacts of Increased Noise Levels:**Occupational Health Effects**

- Prolonged exposure to high noise levels may lead to hearing impairment, fatigue, and stress among workers.
- Communication difficulties may arise, increasing the risk of workplace accidents.

Disruption to Surrounding Environment

- Elevated noise levels may cause disturbances to local wildlife, potentially altering their habitat and behavioral patterns.
- Increased noise may also affect livelihoods and quality of life in nearby residential or agricultural areas.

Community Disturbance

- Blasting and heavy machinery operations may generate vibration and noise that could cause discomfort to nearby communities.
- Schools, healthcare facilities, and households near the mine lease area may experience noise-related disruptions.

Since noise levels attenuate over distance, the impact is expected to reduce significantly beyond the mine lease boundary. However, effective mitigation measures must be implemented to minimize its effects on workers and nearby settlements. Impact and Mitigation Measures for Noise Pollution is provided in **Table 4-24**.

Table 4-23 Aspect – Impact identification on Noise Levels

S. No.	Project Activity	Identify Aspects	Impacts
1	Clearance of vegetation at site	Noise due to vehicular movement	One time temporary
2	Drilling, Blasting and Excavation	▪ Due to mining activities compressor and use of machinery for mining. ▪ Noise induced Hearing Loss (NIHL) to ▪ workers exposed to higher noise levels.	Moderate & Temporary Impact and it will be restricted to the mining activities duration
3	Stacking of mineral reject and handling	Generation of noise	Moderate & temporary impact and it will be restricted to the mining activities duration
4	Transportation of mining material	▪ Generation of noise due to mining activities ▪ Temporary Threshold Shift /	Moderate & Temporary impact and it will be restricted to the mining activities duration.

		Permanent Threshold Shift to workers exposed to higher noise levels. ▪ Disturbance in communication. ▪ Annoyance/irritation to the residents in nearby villages. ▪ Disturbance to the fauna residing in the area. ▪ Sleep disturbance to the residents in nearby villages	
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Table 4-24 Impact and Mitigation Measures for Noise Pollution

S. No.	Source of Noise	Potential Impacts	Mitigation Measures
1	Drilling	- High noise levels affecting workers - Noise-induced hearing loss - Stress and fatigue	- Use of sharp drill bits to reduce noise - Provide earmuffs/earplugs to workers
2	Blasting	- Sudden high-intensity noise - Vibration affecting nearby areas - Disturbance to local communities	- Develop a green belt to reduce noise propagation - Conduct controlled blasting
3	Excavation & Material Handling	- Continuous noise from heavy machinery - Increased ambient noise in the mining zone	- Maintain equipment regularly to reduce noise - Periodic monitoring as per CPCB
4	Transportation of Materials	- Noise from vehicles - Temporary and permanent hearing damage - Disturbance to residents & wildlife	- Restrict vehicle speed to 25 kmph - Avoid unnecessary honking
5	Machinery Operation	- Prolonged noise exposure causing worker fatigue and communication issues	- Proper maintenance and lubrication of machinery - Install silencers on equipment
6	Community Disturbance	- Noise from mining affecting nearby schools, hospitals, and residential areas	- Develop a green belt buffer zone - Schedule high-noise activities during non-sensitive hours
7	Worker Health & Safety	- Hearing impairment - Increased accident risk due to communication difficulties	- Provide PPE (earmuffs, earplugs) - Rotate workers in high-noise areas

4.5 Impact of Vibration

The main sources of vibration in the proposed mine are as follows:

- Drilling
- Blasting
- Loading and Unloading
- Transportation
- Ramp developments

Impact and Mitigation Measures for Vibration is provided in **Table 4-25**.

Table 4-25 Impact and Mitigation Measures for Vibration

S. No.	Aspect	Potential Impact	Mitigation Measures
1	Drilling	Ground vibrations due to drilling operations.	Use controlled drilling techniques to minimize vibrations. Maintain safe distances from sensitive structures.
2	Blasting	High-intensity ground vibration and air overpressure due to explosives.	Use appropriate stemming and delay systems. Avoid overcharging of blast holes. Maintain safe blasting zones around the quarry.
3	Loading & Unloading of Minerals	Short-term, localized vibrations.	Implement proper handling techniques. Use low impact loading equipment where feasible.
4	Transportation Vehicles	Continuous low-frequency vibrations affecting surrounding areas.	Maintain speed limits within the quarry. Ensure proper vehicle maintenance to minimize vibration levels.
5	Proximity to Infrastructure	Structural damage to facilities within the mine lease area.	Maintain safe distances from infrastructure. Use vibration-dampening measures like greenbelt development along sensitive areas.
6	Ground Subsidence	Risk of soil destabilization over time.	Conduct geotechnical surveys before excavation. Implement controlled blasting and excavation methods.
7	Human Health Effects	Fatigue, muscle strain, joint pain, sleep disturbances, and cardiovascular problems due to vibration.	Provide workers with proper PPE (earplugs, anti-vibration gloves). Implement job rotation schedules to reduce prolonged exposure.

Biological Environment

Summary of Existing Biological Environment

- Flora: 136 species (87% native). Includes ecologically important and medicinal plants. No endangered species, but 16 invasive species are present.
- Avifauna: 57 bird species, including Indian Peafowl (Schedule I, WPA) and Green Imperial Pigeon (Near Threatened, IUCN).
- Mammals: 7 species observed. All are of Least Concern (IUCN).
- Hosts 21 major species, including Endangered and Vulnerable ones like Asian Elephant, Sloth Bear, and Dhole.
- Reptiles & Amphibians: 10 species recorded. Only Indian Cobra is protected (Schedule II, WPA).
- Butterflies: 35 species. Dominance of nectar-feeding Nymphalidae indicates floral richness.
- Fish: 19 species, mostly native. Jerdon's Carp (Critically Endangered & Endemic) needs urgent conservation.

Most of these species fall under the 'Least Concern' category in study areas, but certain species require conservation measures based on ecological roles, conservation status, and local threats and the conservation plan is prepared based on the biological baseline data collected from the study area of the proposed project site. The objective is to ensure the safeguarding of ecologically significant and sensitive species observed in the project impact zone. provided in Table 4-26.

Table 4-26 Identified Species for Conservation plan

S. No.	Species Name	Ecological Importance / Status	Conservation Measures
1	Ducula aenea (Green Imperial Pigeon)	Near Threatened (IUCN)	Protect fruiting trees, avoid habitat disturbance, conduct periodic monitoring.
2	Pavo cristatus (Indian Peafowl)	Schedule I (WPA), Ecologically significant bird	Ensure nesting and foraging ground protection, avoid hunting, raise awareness.
3	Hypselobarbus pulchellus (Jerdon's Carp)	Critically Endangered (IUCN), Endemic fish	Prevent water pollution, restrict overfishing, habitat restoration in streams.
4	Azadirachta indica (Neem)	Medicinal, native tree species	Promote plantation in buffer areas, protect existing trees.
5	Ocimum tenuiflorum (Tulsi)	Medicinal herb	Encourage cultivation in greenbelt areas and awareness programs.
6	Cynopterus sphinx (Fruit Bat)	Pollinator and seed disperser	Preserve fruit trees, reduce night-time disturbances.

A dedicated team should periodically monitor the status of the identified species and habitats. Adaptive management strategies should be implemented to ensure the success of the conservation efforts. This conservation plan aims to support biodiversity and ecological balance

in the project area. Continued commitment and stakeholder involvement are critical to safeguarding the flora and fauna identified.

The Impacts on Biological Environment due to mining activities are provided in **Table 4-27**.

Table 4-27 Impacts and Mitigation Measures on Biological Environment and Biodiversity

S. No.	Activity / Aspect	Examples of Aspects / Causes	Potential Biodiversity Impacts	Mitigation Measures
1	Land Extraction / Clearing	Land clearing	Loss of habitat, introduction of plant diseases, siltation of water bodies	Limit land clearing to required areas only; afforestation with native species; implement soil erosion control measures
2	Blasting, Digging, Hauling	Dust, noise, vibration, water pollution	Disruption of water courses; impact on aquatic ecosystems due to altered hydrology and water quality	Controlled blasting; water sprinkling for dust suppression; noise mitigation; sedimentation ponds to manage runoff
3	Waste Dumping / Handling	Land disturbance, soil & water contamination	Loss of habitat, contamination of soil and water, increased sedimentation	Designated waste disposal areas with liners; retaining walls and runoff barriers; regular monitoring of soil and water quality
4	Air Emissions from Operations	Air pollution (dust and gaseous emissions)	Dust deposition on leaves, reduced photosynthesis, habitat degradation	Greenbelt development; regular maintenance of machinery; use of dust suppression systems (sprinklers, water tankers)
5	Waste Disposal (hazardous/non-hazardous)	Oil spills, contaminated runoff	Encouragement of pests, spread of disease, groundwater contamination	Secure storage of chemicals/oils; spill containment systems; proper treatment of waste; pest control measures.
6	Infrastructure Development (e.g., Power Lines)	Land clearing	Fragmentation of habitats, displacement of species	Avoid ecologically sensitive zones, replanting native flora post-construction
7	Accommodation & Worker Facilities	Land clearing, sewage, domestic waste	Habitat loss, pollution from sewage, spread of diseases	Installation of STP/soak pits for sewage; waste segregation and disposal; plantation around facilities
8	Access Roads Construction	Clearing vegetation, altering natural drainage	Habitat fragmentation; waterlogging upslope, reduced drainage downslope	Route roads along existing clearings; design proper cross-drainage structures; restore vegetation along roadsides
9	Population Growth / Human Activity	Land pressure, hunting, increased resource use	Pressure on flora/fauna; introduction of	Community awareness programs; habitat restoration initiatives;

			invasive species; loss of native biodiversity	avoid illegal poaching and grazing
10	Water Use / Abstraction	Groundwater extraction, mine dewatering	Alteration in aquatic habitat; species displacement due to reduced water levels	Controlled water extraction; water harvesting structures; recharge pits; monitoring of water levels
11	Noise from Operations	Drilling, blasting, transport noise	Disturbance to fauna; migration of birds and ani fugitive emissions mals	Noise barriers; limit noisy operations to daytime; maintenance of silencers and mufflers
12	Dust Deposition on Vegetation	Movement of vehicles and mining operations	Reduced photosynthesis; leaf damage; stunted growth	Regular water spraying on haul roads; roadside plantations using dust-tolerant native species

4.5.1 Green Belt Development

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

- ▶ Noise abatement
- ▶ Reuse of wastewater to the extent possible
- ▶ Prevention of soil erosion
- ▶ Ecological restoration
- ▶ Aesthetic, biological, and visual improvement of area due to improved vegetative and plantation covers.
- ▶ Green belt around mine, dumps, etc:
 - ✓ Tall growing, closely spaced, evergreen trees native to the area.
 - ✓ Easy, quick early growth and establishment
 - ✓ Trees with high foliage density, leaves with larger leaf area.
 - ✓ Attractive appearance with both good flowering and fruit bearing.
 - ✓ Bird and insect attracting species.
 - ✓ Suitable green cover with minimal maintenance
- ▶ Avenue Trees:
 - ✓ Trees with conical canopy and with attractive flowering
 - ✓ Trees with medium spreading branches to avoid obstruction to the traffic.
 - ✓ Trees with branching at 10feet and above.

The green belt plantation programme will be continued till the end of the mining operation in the area. In framing out this programme on a sustainable and scientific base, due consultation and coordination with the forest department will be sought.

The greenbelt development during first 5 years of mining plan, at the end of life of quarry; TAMIN proposed to plant 4500 No's of trees around the lease area and Rs. 30,000/- per year will spend for proposed greenbelt development and maintenance.

Table 4-28 Proposed Greenbelt development Plan

Local Name of the Tree	Scientific Name of the Tree	Survival	No. of Species
Vaagai	Albizia Lebbeck	80 %	4500
Manjadi	AdenaantheraPavonina		
Aatru Poovarasu	Hibiscus Tiliaceous		
Panai	Borassus Flabellifer		
Yetti	Strychnos Nuxvomica		
Purangai Naari, Pudanga Naari	Premna Tomentosa		
Magizha Maram	MimusopsElengi		
Puthranjivi	PuthranjivaRoxburghii		
Pisin Pattai	LitseaGlutinosa		
Sandhana Vembu	Toona Ciliate		
Eachai	Phoenix Sylvestre		

Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action. Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action.

4.6 Social Environment

4.6.1 Anticipated Impacts

The proposed project site is free from any habitations or settlements within the core zone. Therefore, no resettlement or rehabilitation concerns are anticipated. During the operational phase, adherence to the prescribed Environmental Management Plan (EMP) will ensure that environmental parameters such as air, water, noise, and ecological quality remain within permissible limits.

Socio-economic Benefits:

- Positive socio-economic impacts are expected in the buffer zone through employment and ancillary business opportunities.
- Indirect employment generation in support sectors such as transport, mechanical services, loading/unloading, and food supply.
- Upliftment in the standard of living through economic inflow to local communities.

Environmental Commitments:

- The buffer zone will be preserved and monitored regularly to ensure compliance with environmental norms.

The quarry will be operated using sustainable practices to minimize environmental damage. Impacts with Mitigation and Monitoring Measures on Socio-Economic Environment is summarized in **Table 4-29**. Corporate Environmental Responsibility (CER) Plan is provided in **Table 4-30**.

Table 4-29 Impacts with Mitigation and Monitoring Measures on Socio-Economic Environment

Impact Area	Potential Effects	Consequences on Local Livelihood / Community	Mitigation Measures	Monitoring Strategies
Air Pollution	Increased CO ₂ , NO _x , SO ₂ , PM10 & PM2.5 emissions	Respiratory diseases; reduced agricultural productivity	Use low-emission machinery; dust suppression; greenbelt development	Air quality monitoring (PM10, CO ₂ , NO _x) near mining zones
Water Pollution	Acid mine drainage, heavy metal leaching	Contaminated drinking water; aquatic biodiversity loss	Water treatment plants; lined tailing storage; pre-discharge mine water treatment	Ground and surface water quality monitoring; pH, metals
Soil Degradation	Land clearing, loss of fertility	Reduced crop yield; dependence on external food sources	Topsoil conservation; land reclamation	Satellite vegetation tracking; soil quality testing
Climate Change	CO ₂ emissions, land-use change	Erratic rainfall; higher cooling costs; health issues	Reduce deforestation; energy-efficient mining operations	Monitoring of climate-related indicators
Health & Safety	Dust, noise, and traffic-related issues	Respiratory and hearing problems; accident risks	PPEs, dust control, traffic safety	Health audits; accident tracking
Traditional Occupation Shift	Loss of farming and grazing jobs	Livelihood loss; forced occupational shift	Skill development; green jobs; eco-tourism promotion	Employment audits; training participation records
Resource Competition	Increased use of water and local utilities	Local scarcity; price inflation	Sustainable resource use; recycling	Resource consumption tracking
Cultural Disruption	Influx of migrant labor	Cultural dilution; social conflicts	Local hiring preference; community programs	Social cohesion surveys; stakeholder consultations
Livelihood Displacement	Shift away from agriculture and small-scale trade	Income instability; out-migration	Compensation; alternate livelihood; CSR-based support	Livelihood impact assessments; CSR program reviews

4.6.2 Corporate Environmental Responsibility

TAMIN Aranarai North site had no Relocation and Rehabilitation. Most villages have benefitted mutually at Aranarai North where the mining industry has provided indirect jobs for labour and villages provide accommodation for the labour and staff. Supportive industries like food supply and essential shops are economic growth in the villages. The site has provided road access to a few nearby village sites. 2% from the Total Project cost will be used for CER activities as follows:

Table 4-30 Corporate Environmental Responsibility (CER) Plan

S. No	CER Activities for Aranarai North Village Government Hr. Sec. School	Amount (Lakhs)
1.	Govt High School- Toilet facilities	1.00
2.	Govt High School- Providing Library Books in connection with Environmental	0.50
3	Govt High School-Drinking Water facility (Portable RO System with Cooling facility)	0.50
Total		2.00

4.6.3 Other benefits to Community

- ▶ Project related logistical operations.
- ▶ Various trading services for consumer goods, spare parts, sundry items, etc.,
- ▶ Contractual services connected with the project.
- ▶ Green belt works in the project.
- ▶ Casual labour is needed for various activities.

The proposed project may create opportunities for indirect employment in the field of vehicle hiring, labours, trading of construction materials, carpenters etc.,

4.7 Impacts on Occupational Health due to project operations

Mining operations may cause potential occupational health risks to workers due to prolonged exposure to dust, noise, and vibration associated with quarry activities. These health concerns can have both short-term and long-term implications on the well-being of the workforce. Occupational Health Impacts and Mitigation Measures are provided in **Table 4-31**.

Table 4-31 Occupational Health Impacts, Mitigation Measures

S. No	Impact Area	Anticipated Impacts	Mitigation Measures
1	Dust Exposure	Dust-related pneumonia, tuberculosis	Water sprinkling on haul roads, wet drilling systems, greenbelt development
2	Physical Strain	Rheumatic arthritis due to heavy labor	Ergonomic work practices, regular breaks, training in safe handling methods
3	Vibration from Equipment	Segmental vibration syndrome from long-term use of vibrating tools	Use of anti-vibration tools, scheduled breaks, health monitoring for vibration-related symptoms
4	Noise Pollution	Noise-induced hearing loss	Use of earplugs/muffs, acoustic enclosures for equipment, regular noise level monitoring
5	Fire and Emergency Risks	Injuries and fatalities from fire/explosions	Emergency Response Plan (ERP), installation of fire extinguishers, mock drills, and training
6	Hazardous Material Handling	Exposure-related health issues	PPEs suited for materials handled, training in safe chemical handling procedures
7	Medical Emergencies	Lack of immediate care can worsen injuries	On-site first aid facilities, tie-ups with local hospitals, trained medical personnel
8	Worker Health Monitoring	Chronic illnesses going undetected	Periodic health check-ups, occupational health surveillance, medical records maintenance
9	Community Health Linkages	Potential spread of occupational diseases to nearby communities	Extension of emergency medical support to communities, awareness programs
10	Blasting Operations	Increased risk of injuries due to flying debris and air shock	Restricted entry, sirens, cordoning of the blast zone, proper training and SOPs

4.7.1 Physical Hazards

- ▶ Traumatic injury remains a significant problem and ranges from the trivial to the fatal. Common causes of fatal injury include rock fall, mobile equipment accidents, falls from height, entrapment, and electrocution.
- ▶ Noise is almost ubiquitous in mining. It is generated by drilling, blasting, materials handling and transportation. Controlling noise has proven difficult in mining and noise-induced hearing loss remains common.
- ▶ Whole body vibration is commonly experienced whilst operating mobile equipment, such as load, haul, dump units, trucks, scrapers, and diggers.
- ▶ Poorly maintained roads and vehicles contribute to the problem. Hand arm vibration

syndrome is also encountered with the use of vibrating tools such as air leg rock drills.

4.7.2 Biological Hazards

- ▶ The risk of tropical diseases such as malaria and dengue fever are substantial at some remote mining locations. Leptospirosis and ancylostomiasis were common in mines, but eradication of rats and improved sanitation has controlled these hazards effectively.

4.7.3 Ergonomic Hazards

- ▶ Although mining has become increasingly mechanized, there is still a substantial amount of manual handling. Cumulative trauma disorders continue to constitute the largest category of occupational disease in mining and often result in prolonged disability. Broken ground is often encountered and can cause ankle and knee injuries.

4.7.4 Psychological Hazards

- ▶ Drug and alcohol abuse has been a difficult issue to deal with in mining. Debate continues about how to measure psychophysical impairment. Nevertheless, mining operations commonly require the measurement of urinary drug metabolites and breath or alcohol on pre-employment and following accidents. Remote locations are common in mining with mine employees separated from their families and communities during work periods.
- ▶ Expatriate placements are also common in mining and the associated psychosocial hazards have been reviewed recently. Unfortunately, fatal, and severe traumatic injuries continue to occur in mining and often have a profound impact on morale. Post-traumatic stress disorders sometimes develop in witnesses, colleagues, and managers. Registered managers often feel personally responsible for such injuries, even in the absence of negligence, and face the ordeal of government inquiries and legal proceedings.

4.7.5 Mitigation Measures

- ▶ To reduce pollution emanation from quarry operations by carrying out splitting of sheet rock by diamond wire saw which largely reduces the dust and noise generation.
- ▶ Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- ▶ Water sprinkling on haul roads and dumping yards, etc.
- ▶ Green belt creation wherever possible to arrest dust and reduce noise propagation.
- ▶ All staff and workers will be provided with PPE to guard against excess noise levels.
- ▶ To provide appropriate instruction, training, retraining, vocational training, etc.
- ▶ Organization of safety contests and safety campaigns regularly to update knowledge of safe operational procedures, etc.
- ▶ Plantation
- ▶ Avoid blasting during unfavorable wind & atmospheric conditions.
- ▶ An emergency response plan that includes installation of emergency response equipment to combat events such as fire.

- ▶ On-site first aid facilities will be provided, and employees will be extended to the local community in emergencies.
- ▶ Health Check programs periodically (1 Year Once).

4.8 Study on Plastic & Microplastic Pollution in Mining Activities

Plastic and microplastic pollution from mining operations can significantly affect terrestrial and aquatic ecosystems. These pollutants originate from routine mining activities such as the use of packaging materials, PPE, drilling fluids, and waste disposal. If unmanaged, they can lead to bioaccumulation in aquatic species, soil contamination, and human exposure risks. Sources of Plastic & Microplastic Pollution- Impacts and Mitigation Measures are provided in **Table 4-32**.

Table 4-32 Sources of Plastic & Microplastic Pollution- Impacts and Mitigation Measures

Source	Anticipated Impacts	Mitigation Measures
Plastic packaging & waste	Land litter, blockage of drainage systems, ingestion by animals	Implement plastic waste management plans & recycling programs
Personal protective equipment (PPE)	Improper disposal may lead to environmental accumulation of synthetic materials	Use biodegradable alternatives; educate workers on disposal practices
Explosives & drilling residues	Contamination of soil and water by plastic-based chemicals	Promote use of eco-friendly blasting and drilling materials
Conveyor belts & pipes	Release of plastic microparticles through wear and tear	Regular equipment maintenance and material upgrades
Wastewater discharge	Dispersal of microplastics in aquatic ecosystems, bioaccumulation in fish	Strict wastewater treatment before discharge

4.9 Traffic Density

The average annual production is estimated at 4,58,428 Tonnes (approximately 4,58,428 Tonnes) of rough stone. Based on an operating schedule of 240 working days per year, the average saleable production will be around 9.8 m³ per day (or 18 metric tons per day). Assuming an average truck carrying capacity of 10 tons, this translates to approximately 2–3 truck trips per day, depending on market conditions. This minimal level of traffic is not expected to have a significant impact on the existing transportation infrastructure. The detailed impacts and mitigation Measures are provided in **Table 4-33**.

Table 4-33 Impacts of Traffic and Transportation, Mitigation Measures

Impact Area	Anticipated Impacts	Mitigation Measures
Increased Truck Movement	Slight increase in traffic load on approach roads and nearby highways.	Schedule transport during non-peak hours. Use covered trucks to prevent spillage.
Road Safety at Junctions	Possibility of congestion or minor accidents at junction points.	Deploy trained flaggers at junctions. Install traffic signage and road markings.

Vehicular Emissions	Emissions from trucks can marginally contribute to air pollution.	Ensure PUC compliance of all vehicles. Encourage regular maintenance of trucks.
Dust Generation	Dust emission due to movement on unpaved roads or loading operations.	Water sprinkling on haul roads. Paving of frequently used internal roads.
Noise from Vehicle Movement	Noise disturbance to nearby areas due to truck engine operations and honking.	Use of well-maintained vehicles with silencers. Avoid use of air horns.

5 ANALYSIS OF ALTERNATIVES

5.1 Introduction

The proposed rough stone Quarry is over 9.00 Ha, located at 120/2A1A Aranarai North Village, Perambalur Taluk, Perambalur District

5.2 Alternate Technology

Semi mechanized opencast method will be used for mining. No alternative technology will be envisaged for this proposed project. The alternative Technology analysis details are provided in Table 5-1.

Table 5-1 Alternative Technology Analysis

S. No	Mining Activity	Available Technologies	Potential Impact	Preferred Technology to be followed
1	Drilling	Jackhammer Manual Drilling	Emission of dust and noise generation	-
		Wet Drilling	Minimal dust emissions	Wet Drilling
		Tamrac Machine Drilling	Insignificant dust and noise levels	-
		Wagon Drill	Produces dust and noise	-
		LD Bore	Dust emission	-
		PRD Drilling	Low dust emissions	-
2	Blasting	Conventional Blasting	Generates noise	-
		Muffle Blasting	Reduced noise impact	-
		Expansive Mortar / Rock Breaking Powder	Negligible noise impact	-
		Controlled Blasting	Reduces ground vibrations and noise	Controlled Blasting
		Hydraulic Splitting	No noise or vibration, water-pressure based	Hydraulic Splitting
		Chemical Blasting	Non-explosive, slow rock breakage, minimal impact	Chemical Blasting
		Shock Tube Blasting	Controlled explosion, reduced fly rock	-
		Silent Blasting (Gas-Expansion Systems)	Fractures rock with gas expansion, no noise	-

5.3 Site Justification and Connectivity

Since the project is site-specific due to the natural availability of rough stone deposits in this location, alternative sites were not considered. The proposed area is classified as Government Poramboke Land, and a lease has been secured for rough stone mining using the Open Cast Semi-Mechanized Method.

Open cast, semi-mechanized mining with 5m vertical bench with a bench width is 5m with vertical slope. Under regulation 106(2) (a) of the Metalliferous Mines Regulation 1961 in all open cast working in hard ore body, the benches and sides should be properly benched and sloped. The height of any bench shall not exceed 5m and the width thereof shall not be less than the height. The benches shall be sloped at an angle of more than 45° from the horizontal.

A detailed site inspection was conducted by the project proponent and the approved Geologist to assess the occurrence of rough stone deposits, geological features, and feasibility for safe, economical, and environmentally sustainable mining. Comprehensive rough stone mapping was carried out, followed by a section-wise estimation of reserves. Road connectivity is shown in Figure 5-1.

Table 5-2 Site Connectivity and Features

Feature	Details
Latitude & Longitude	11°15'57.70"N to 11°15'52.05"N 78°50'12.63"E to 78°50'14.32"E
Site Elevation (AMSL)	85.0m AMSL
Topography	Hilly terrain
Lease Area - Topo Sheet	58I/15,16,11,12
Land Classification	Government Poramboke Land
Nearest Highway	SH 142 Thuraiyur Perambalur Rd, 3.13, S NH45 Chennai Trichy Hwy, 6.68, SE
Nearest Railway Station	Ariyalur Railway Station, 27.81, ESE
Nearest Airport	Tiruchirappalli International Airport, 55.93, S
Nearest Town/City	Town: Perambalur, 4.91 SE City/ District HQ: Perambalur, 4.91 SE

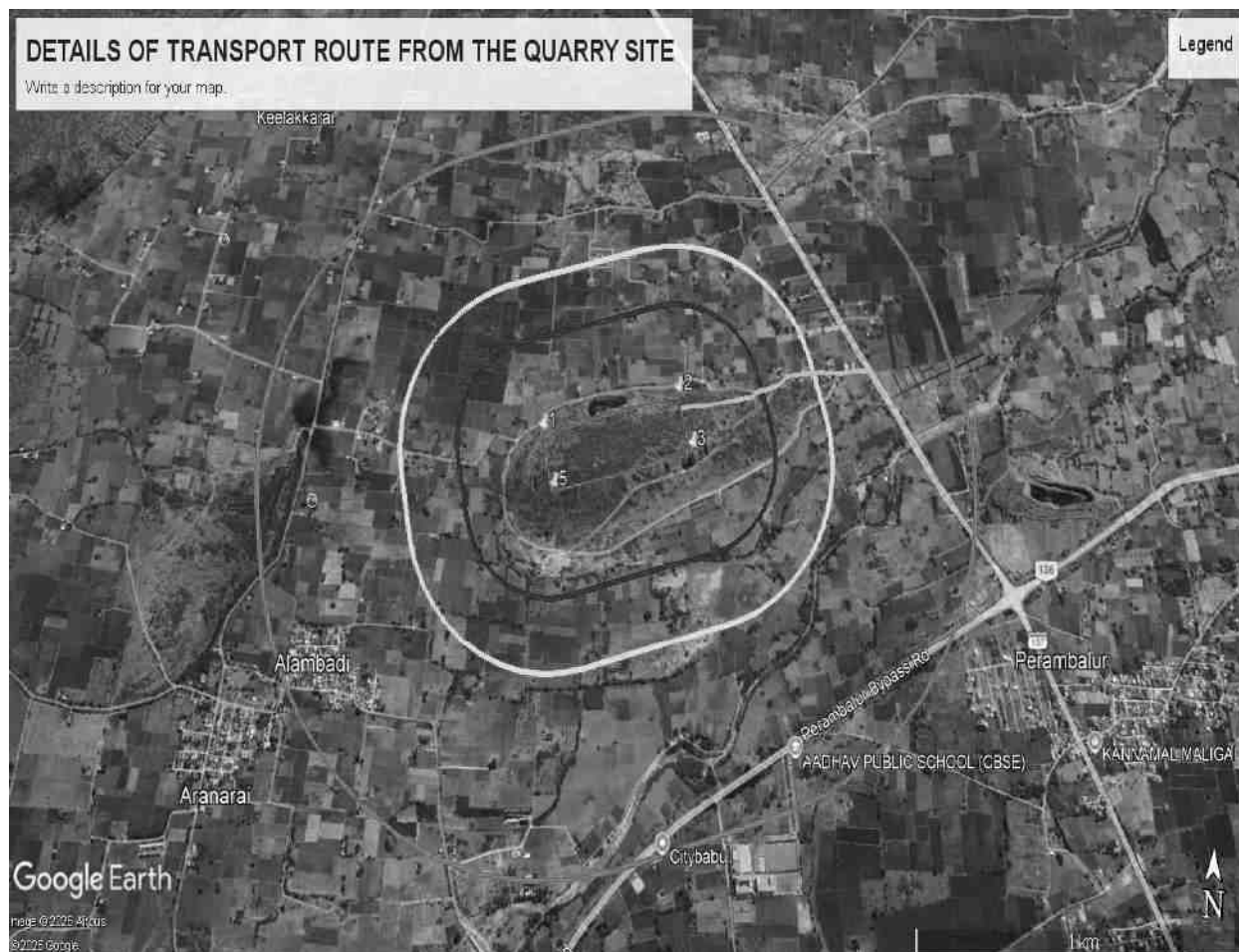


Figure 5-1 Road Connectivity for quarry area

6 ENVIRONMENTAL MONITORING PROGRAMME

6.1 General

Environmental monitoring refers to the systematic observation and measurement of environmental indicators over time. This process helps track ecological changes and evaluate the effectiveness of the project's environmental safeguards. To ensure proper implementation of the Environmental Management Plan (EMP), all operational activities will be periodically reviewed. Monitoring will cover critical parameters like air and water quality, noise levels, and other relevant indicators to ensure they remain within acceptable limits set by regulatory bodies. The mitigation measures outlined in Chapter 4 will be implemented to minimize environmental impacts. The monitoring plan is aligned with the guidelines of the Ministry of Environment, Forest and Climate Change (MoEF&CC), the Central Pollution Control Board (CPCB), and the State Pollution Control Board (SPCB). It includes scheduled evaluations using approved methodologies to maintain compliance and promote sustainable operations throughout the project duration. The project proponent will take overall responsibility for monitoring and ensuring environmental compliance throughout the lifecycle of the project. The primary responsibilities include:

- ▶ Overseeing the implementation of environmental management and pollution control measures as proposed.
- ▶ Ensuring the afforestation and plantation activities are carried out as planned, including survival rate monitoring and maintenance.
- ▶ Maintaining comprehensive records of environmental monitoring activities for submission to statutory authorities and for audit purposes.
- ▶ Periodically reviewing the performance of pollution control systems and initiating corrective actions wherever deficiencies are identified.
- ▶ Conducting routine safety audits and awareness programs to enhance safety consciousness among workers and staff.
- ▶ Monitoring of slope stability of benches and overburden (OB) dumps, maintenance of garland drains, check dams, and timely de-silting.
- ▶ Assessing the potential environmental impact of ongoing project activities to identify areas of concern.
- ▶ Liaising with concerned State and Central Government departments to ensure regulatory compliance and communication.
- ▶ Taking immediate remedial measures in case of any unexpected environmental issue attributable to project operations.
- ▶ Conducting safety training sessions and regular emergency drills for workers to build preparedness.
- ▶ Ensuring that all firefighting and emergency equipment is always maintained in a ready-to-use state.

For each environmental component, the monitoring plan will define the specific parameters, monitoring locations, frequency, duration, applicable standards, and assign responsibility for implementation and supervising responsibilities.

6.2 Monitoring Schedules for Various Environmental Parameters

The proponent shall adopt the following monitoring schedule for environmental parameters. However, based on the need and priority it may be suitably modified / improved. the proponent is monitoring, fulfilling of all the statutory obligations and maintaining records are to be carried out separately by the proponents.

Post-project monitoring is an equally important aspect in the Environmental Management Plan. To verify the outcome on the implemented mitigation measures and to alter the proposed mitigation, Post project monitoring becomes inevitable. An environment monitoring plan is given in **Table 6-1**.

Table 6-1 Post Environmental Monitoring Plan

S. No	Parameters	Measurement Methodology	Frequency	Location	Data Analysis	Reporting Schedule	Monitoring Cost Projected
1	Ambient Air Monitoring (PM10, PM2.5) as per CPCB consent conditions	IS 5182 & CPCB Guidelines Vol. 1 (Gravimetric Method)	Monthly	2 stations (downwind)	Comparison with specified limits and previous baseline data (if available)	Compliance report of EC to MoEF&CC on a six-monthly basis and consent compliance to CPCB as required. Reports to be shared with top management and process manager.	12,000
2	Exhaust Gases from Vehicles and Machinery	PUC Certificate compliance	As per validity	At site	Ensure compliance with vehicular emission norms	Same as above	2,000
3	Water Consumption Records	SOP for maintaining water usage record (dust suppression)	Daily	Site & approach road	Comparison of actual consumption against EC commitment	Compliance report of EC to MoEF&CC (6-monthly) and CPCB as per requirement. Reports to be shared with top management and process manager.	1,000
4	Ground Water Quality Monitoring	IS 3025	Twice a year	Nearest habitation	Comparison with prescribed limits	Compliance report of EC to MoEF&CC and consent to CPCB as per requirement	6,000
5	Noise Monitoring	EPA / CPCB Guidelines	Monthly	2 locations (site & nearest habitation)	Comparison with specified CPCB noise standards	Same as above. Reports to top management and process manager.	5,000
6	Greenbelt Development	Survival rate of plants	Regular	At site	Replantation of dead saplings and	Same as above	4,000

					monitoring water usage		
7	Soil Quality Monitoring	IS: 2720 & standard lab methods	Once a year	2 locations (site & nearest cultivation land)	Comparison with prescribed limits	Same as above	4,000
8	Terrestrial Ecology	As per DFO conditions/NOC	Once a year	10 km radius of project site	Comparison with baseline biological data	Compliance report to MoEF&CC (six-monthly) or as per Forest Department/stakeholder requirements	6,000
9	Emergency Response Preparedness	Mock drill in presence of observer	Once a year	Various locations within mining lease area	Mock drill report to identify deficiencies and improvements	Report submitted to management after each drill	5,000
10	Occupational Health Programs	As per Mine Regulations, 1961 and DGMS circulars	Entry-level and once in 3 years	At site	Audiometry, pre-placement, and periodic medical checkups	Compliance with DGMS and Mine Regulation requirements	5,000
Total							50,000

6.3 Monitoring Procedures/ Methodology

The monitoring schedule is designed to regularly assess pollution levels such as air quality, water quality, and noise to ensure they meet the standards set by the Environmental Protection Act, as well as the guidelines of the Central and State Pollution Control Boards. The methods and frequency of monitoring follow the procedures recommended by the Ministry of Environment, Forest and Climate Change (MoEF&CC), CPCB, and SPCB.

6.4 Emergency Procedures for Reporting and documentation

All necessary records and reports will be prepared in full compliance with applicable legal and regulatory frameworks. It is essential to strictly follow the guidelines prescribed by competent authorities to ensure transparency and accountability. Periodic and systematic documentation will be maintained to support clear tracking of performance over time, including historical trends and future projections.

The project authorities will maintain dedicated records for water usage, wastewater discharge, solid waste generation, air quality, and emissions. These records will be updated routinely to support effective environmental oversight and prompt corrective action, if needed.

Once reports are compiled, they will be submitted without delay to the relevant statutory bodies for evaluation. The management will ensure that all documentation is consistent with the applicable norms, and that no deviation from the approved procedures occurs.

Regular audits and evaluations will be conducted on these records. Any inconsistencies or gaps observed in environmental controls, operational practices, or implemented technologies will be addressed immediately. Suitable corrective measures will be undertaken to rectify issues and ensure continued compliance.

6.5 Occupational Health and Safety

Periodic occupational health check-ups will be conducted for staff and permanent workers, at least once every three years, to facilitate early detection of health issues and enable timely medical intervention. Audiometric testing will be carried out regularly for employees working in high-noise zones. Safety protocols and performance will be reviewed from time to time by the designated safety officer.

Occupational health and safety play a vital role in enhancing productivity and maintaining a healthy employer-employee relationship. In mining operations, dust and noise are the primary occupational health concerns. Safety measures during blasting, equipment maintenance, and the handling of explosives will strictly adhere to the Mines Act, 1952, Mines Rules, 1955, The Metalliferous Mines Regulations, 1961, and relevant DGMS Circulars.

To minimize risks arising from exposure to dust, heat, noise, and vibration, several safeguards have been included in the Environmental Management Plan (EMP), including:

- Use of wet drilling techniques or dust collection systems
- Provision of rest shelters equipped with essential amenities such as drinking water, fans, and sanitation facilities
- Distribution of personal protective equipment (PPE) to all workers
- Job rotation strategies for workers exposed to high-noise areas
- Availability of fully equipped first-aid facilities on site

7 ADDITIONAL STUDIES

7.1 Introduction

The additional studies involved in this project will consist of the following aspects:

- ▶ Public consultation
- ▶ Risk Identification and Management/Occupational Health and safety studies have been conducted, and a safety plan was prepared.
- ▶ Disaster Management Plan
- ▶ Mine closure plan as per GCDR 1999

7.1.1 Public Consultation

The proposed project is categorized as 'B1' category Schedule 1(a) as per EIA Notification 2006 and its amendments thereafter. The total area of the quarry is 9.00 Ha. However, the proposed project falls under 'B1' category, Public Hearing is Mandatory. So, the EIA report has been prepared as per the obtained ToR vide Identification No. TO26B0108TN5513073N, dated **11/05/2026**. The Baseline studies are carried out during the period of **Feb (1.2.2026 to March 30.4.2026)**. Draft EIA report will be submitted for Public Hearing (PH). After PH, the minutes obtained will be incorporated in the EIA report along with an action plan by the proponent towards issues raised during Public Hearing. Final EIA will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

7.1.2 Risk Identification & Management

7.1.2.1 Introduction

Mining and related activities pose various potential hazards to both workers and the public. It is essential that mine workers operate in a safe and healthy environment without compromising their efficiency. The safety measures required to ensure the well-being of employees, and the security of mining operations, are outlined in the Mines Act, 1952.

Risk assessment in mining involves identifying potential hazards, evaluating possible failure scenarios, and determining the extent of potential damage. The risk assessment study includes the following key aspects:

- ▶ Identification of potential hazard areas.
- ▶ Identification of representative failure cases.
- ▶ Evaluating the extent of damage and impact zones arising from hazardous incidents.
- ▶ Assessing the suitability of the site concerning hazard prevention and disaster mitigation.
- ▶ Providing recommendations to minimize the likelihood of severe accidents.
- ▶ Developing a Disaster Management Plan (DMP), including On-site and Off-site Emergency Plans.
- ▶ Formulating an Occupational Health and Safety Plan.

All mining operations will be conducted under the supervision of a qualified mine manager holding a First-Class Manager's Certificate of Competency. To ensure workers remain vigilant, they will participate in regular refresher training programs. However, certain hazards may arise during routine operations, including:

- ▶ Accidents involving explosives.
- ▶ Mishaps due to heavy mining equipment.

To mitigate these risks, the following safety measures will be strictly implemented:

- ▶ Full compliance with the Mines Act, 1952, Metalliferous Mines Regulations, 1961 (MMR 1961), and Mines Rules, 1955.
- ▶ Restricted access to unauthorized personnel.
- ▶ Provision of firefighting equipment and first-aid facilities in the mine's office and work areas.
- ▶ Distribution and mandatory use of safety gear (helmets, boots, goggles, gloves, etc.) with regular inspections.
- ▶ Mandatory training and periodic refresher courses for all employees working in hazardous areas.
- ▶ Conducting mining operations as per approved plans, with regular plan updates.
- ▶ Routine cleaning of working faces to ensure safe operations.
- ▶ Regular maintenance and inspection of all mining equipment following manufacturer guidelines.
- ▶ Implementation of dust suppression measures along haul roads.
- ▶ Promoting safety awareness through training programs, posters, and safety competitions.
- ▶ Establish a trained emergency response team to handle any mining-related

incidents.

7.1.2.2 Emergency Preparedness

The proposed quarry site does not present risks of major land-related disasters. In case of natural calamities such as floods or cyclones, the project proponent will coordinate with local Revenue and Disaster Management authorities.

- ▶ The site does not fall within an earthquake-prone zone.
- ▶ There is no risk of flooding as the quarry is located away from rivers and water bodies.
- ▶ The geological formation of the area consists of stable rock masses with gentle slopes, minimizing the risk of landslides.
- ▶ If any unforeseen hazards arise, appropriate safety measures will be implemented following statutory requirements.

A First Aid Room equipped with emergency medical supplies has been set up to address minor workplace injuries. Additionally, adequate transportation facilities are available to transfer injured or unwell workers to the nearest healthcare facility if needed.

7.1.2.3 Identification of Hazards in Open Cast Mining

There are various factors which can cause disaster in the mines. These hazards are as follows:

- ▶ Drilling
- ▶ Blasting
- ▶ Handling of materials (Product)
- ▶ Heavy Machinery

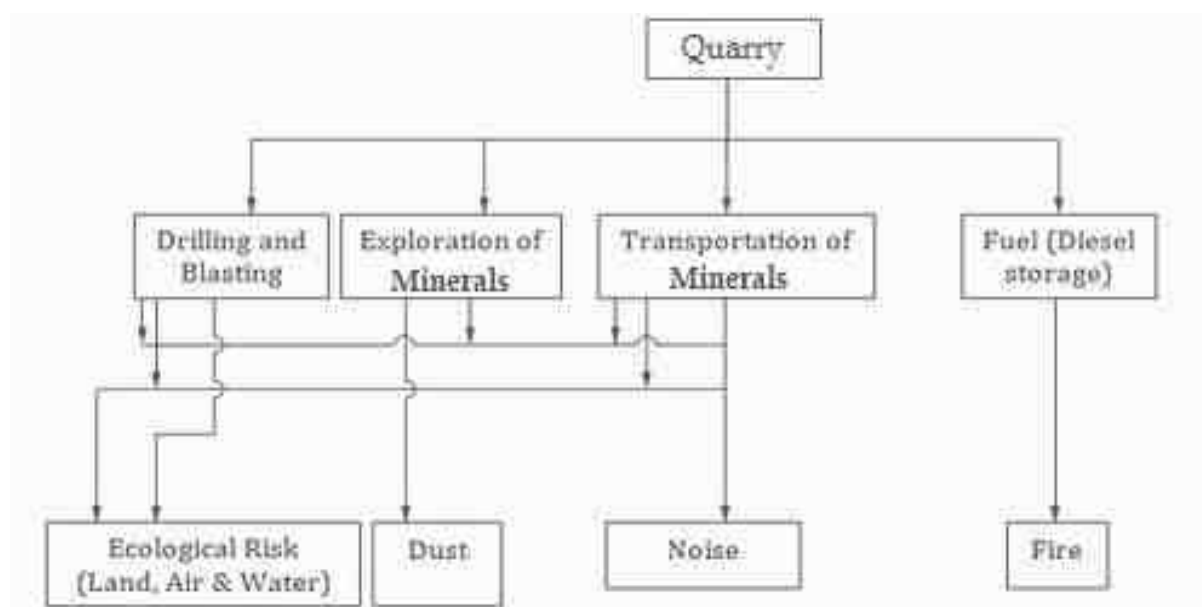


Figure 7-1 Identification of hazards in opencast mine

7.1.2.4 Drilling -Mitigation measures during Drilling

Drilling specifications:

- Drill hole diameter: 32mm up to 1.2–1.5 m long. Depth and inclination of drill hole is Generally drilled vertically in Alignment. Interval between holes is 3m.
- Explosive type: Detonator Fuse

Drilling is a main operation in mining and is associated with the generation of particulate matter and elevated noise levels in the surrounding area. For the excavation of hard rock strata, drilling and controlled blasting will be employed. Drilling will be carried out using jackhammers to a depth of approximately 1.2 to 1.5 meters, with a hole diameter of 35mm.

Precautionary Measures to Prevent Accidents during Drilling:

- To control dust emissions during drilling, effective measures such as the use of dust extractors and wet drilling systems are recommended.
- Utilizing high-quality drill bits also helps in minimizing dust generation.
- Additionally, noise produced during drilling can be reduced by employing dust extraction systems and acoustically enclosed compressors, which aid in controlling both particulate matter and noise levels at the source.
- Preferably schedule drilling during daylight hours and limit operations during high-wind conditions to reduce the dispersion of dust.
- Regular maintenance of drilling equipment ensures efficient operation and reduces emissions of noise and dust due to worn-out parts.

7.1.2.5 Blasting/Primary Cutting

Blasting activities involve the systematic separation of the horizontal (bottom) and vertical (side) planes using serial blasting techniques. This is typically executed with 32 mm diameter blast holes charged with detonating agents, carried out simultaneously along both planes. The objective is to efficiently dislodge substantial volumes of stone from the parent rock mass while minimizing environmental disturbance—a process known as Primary Cutting.

Blasting poses several safety and environmental risks, including the ejection of rock fragments beyond the intended safety perimeter. This is often due to overcharging or specific geological anomalies of the site. Flying debris is particularly prevalent during initial and Draft blasts. Additionally, ground vibrations can destabilize adjacent areas, and dust and noise pollution are persistent by-products of the process.

Precautionary Measures to Prevent Accidents during Blasting/ Primary Cutting:

- Controlled blasting techniques will be employed to regulate the direction and intensity of blasts, thereby reducing the risk of fly-rock and ground vibrations.
- Accurate charge calculations will be conducted to avoid overcharging and to ensure the effectiveness and safety of the blasts.
- Acoustic barriers and dust suppression systems will be installed to mitigate noise and airborne particulate matter generated during blasting.

- Personal protective equipment (PPE) will be mandatorily provided and used by all personnel involved in blasting operations, while access to the blasting zone will be restricted to authorized staff only.
- Strict adherence to mining safety regulations and standard operating procedures (SOPs) will be ensured throughout all blasting activities.
- A competent person will be appointed to supervise all blasting operations, in accordance with the Metalliferous Mines Regulations, 1961.
- A danger zone with a radius of 300 meters from the blast site will be clearly marked, and access will be controlled with security guards stationed at all entry points.
- Prior to each blast, all personnel and machinery will be evacuated from the designated danger zone and moved to safe locations.
- Audible warning signals (sirens or whistles) will be used to alert workers, visitors, and neighboring residents before the initiation of any blast.
- To prevent damage to nearby structures, only controlled blasting will be conducted using pre-approved techniques and safety practices.

7.1.2.6 Secondary Splitting

The Secondary Splitting process is employed to achieve the desired dimensions of stone blocks following the initial primary cutting. This method involves long-hole drilling along pre-determined planes extending to the base of the previously detached stone mass. For the actual splitting, rock-breaking agents such as expansive mortar, chemically identified as Calcium Hydroxide $[Ca(OH)_2]$, are used. These compounds exert pressure upon curing, enabling controlled fracturing of the rock without the use of high-impact explosives.

Subsequent to the splitting process, defective or fractured segments of the stone are removed. The remaining stone is manually dressed into consistent, rectangular blocks using traditional tools like feathers, wedges, and chisels. This step is performed by skilled artisans, ensuring precision in shaping and optimal material recovery.

To maintain the quality and safety of operations, the entire process is conducted under the supervision of qualified personnel, including a Mining Geologist and a Mining Engineer. Their oversight ensures the delivery of defect-free dimensional stones that comply with industry standards and customer requirements.

Precautionary Measures to Prevent Accidents during Secondary Splitting:

- Use of non-explosive expanding agents to minimize noise, vibration, and flying debris.
- Manual dressing instead of mechanical cutting to reduce dust and avoid over-breakage.
- Supervised operations by trained personnel to maintain safety standards and minimize material loss.
- Proper training for workers in handling expansion compounds and manual tools safely.
- Use of personal protective equipment (PPE) such as gloves, goggles, and dust masks during manual dressing.
- Regular monitoring of work practices to ensure compliance with safety and environmental guidelines.

7.1.2.7 Risks during Heavy Machinery Handling

Handling and operation of heavy machinery such as dumpers, dozers, and other earthmoving equipment pose significant safety risks in mining operations. A majority of accidents involving such machinery are often the result of mechanical failures (e.g., brake, hydraulic, or steering system malfunctions) or human errors like poor visibility, operator fatigue, lack of proper training, or negligence.

Precautionary Measures to Prevent Accidents due to Trucks & Dumpers and other machinery handling

- Routine inspection and preventive maintenance of all heavy machinery.
- Operation only by certified and experienced personnel.
- Regular refresher training for all equipment operators.
- Installation of reverse alarms, proximity sensors, and rear-view cameras.
- Clearly marked speed limits within the project area, especially near curves and slopes.
- Parking only on level ground with parking brakes applied; use of wheel chocks where required.
- Proper shift schedules and rest breaks to avoid operator fatigue.
- Mandatory use of personal protective equipment (PPE) like helmets, reflective vests, and safety boots.
- All machinery to be equipped with fire extinguishers and first-aid kits.
- Operators trained in emergency shutdown and first-response procedures.
- All transportation activities to be supervised and controlled by site management.
- Weekly mechanical checks of vehicles by an authorized competent person.
- Road signs to be placed at all turning and hazardous points.
- Reversing areas to be kept man-free, especially near embankments and tipping points.
- Use of statutory fencing, training, and safety awareness to reduce accidents.
- Oversized rocks to be handled in the pit using secondary blasting.
- Loads with large rocks must not be placed near bench edges to avoid hazards.
- Dumper movement governed by a pre-established Code of Traffic Rules implemented at the site.

7.1.2.8 Overburden and Dump Handling

There is no wastage encountered during the quarrying operation; the entire rough stone will be utilized. There is no toxic effluent expected to generate in the form of solid or liquid gases and no requirement of treatment of waste.

No waste or sub-grade mineral is anticipated during the mining plan period, as all excavated material is saleable and fully utilized. Hence, no waste dump is proposed, and waste dump management is not applicable for this lease area.

The handling and disposal of overburden can result in several environmental and operational impacts. These include alteration of the natural land surface and topography due to the accumulation of waste, potential dust emissions during handling and transport, and adverse visual impacts on the surrounding landscape. There is also a risk of erosion and sedimentation, particularly during monsoon seasons, and occupational hazards associated with the manual and mechanical handling of waste.

Precautionary Measures to Prevent Accidents due to Overburden handling and Dumps Management

- Regular sprinkling of water on haul roads and during waste handling to minimize dust.
- Effective sorting and reuse of usable stone fragments wherever possible.
- Provision of garland drains and silt traps to control runoff and sedimentation during rains.
- Ensuring the use of personal protective equipment (PPE) and safe waste handling practices for workers.
- In flat areas where the dumping operations have come to an end The dumps will be maintained not exceeding 5m height and the angle of slope of dumps will be at 45° from horizontal. Planting vegetation as early as possible over the overburden dump slopes.
- Provide drainage channels along the overburden dump toe for additional protection, in such a way that 15m should be maintained left between the overburden dump and the bench.
- Maintaining a safe distance (minimum 15 meters) between the dump toe and active mining benches.
- The dumps will be maintained not exceeding 5m height and the angle of slope of dumps will be at 45° from horizontal.
- Early-stage vegetative stabilization of dump slopes to prevent erosion.
- Construction of drainage channels along the dump toe to manage stormwater and prevent washouts.
- Regular monitoring of dump stability, especially during the monsoon season, to identify and correct any early signs of failure.

7.1.2.9 Storage of Explosive

The explosive requirement of the quarry operation is minimal. The blasting requirement will be carried out using contractors approved by the Controller of Explosives. No Explosive storage is envisaged in this quarry.

7.1.2.10 Fuel Storage

Most of the HEMM will operate on diesel. However, no major storage is envisaged at the mine Lase area. A diesel tanker will be provided for the crawler mounted machines operating in the mine.

7.1.2.11 Water Logging

Water logging in the mine site have been avoided by adopting following measures.

- ▶ Correct marking of position of water bodies with their highest flood level and keeping the mine protected by suitable bunds.
- ▶ Water from the surface water bodies shall not enter the mines.
- ▶ Draining of mine water by suitable capacity pumps.

Table 7-1 Impacts and Mitigation Measures for Storage of Explosives, Fuel Storage and Water logging

Activity	Potential Impacts	Mitigation Measures
Storage of Explosives	Risk of fire, explosion, and safety hazard during handling and use	-No explosive storage proposed on-site -Blasting to be carried out by licensed contractors only
Fuel Storage	Risk of spillage, fire hazard, soil contamination	-No permanent fuel storage within lease area -Mobile diesel tankers used for refueling machinery
Water Logging	Flooding of mine pit, equipment damage, unsafe working conditions	- Proper identification of nearby water bodies and flood levels -Construction of bunds for protection - Mine water to be pumped out using suitable capacity dewatering pumps -Surface runoff prevented from entering mine area

7.1.2.12 Safety Measures at the Proposed Open Cast Mining Project

- ▶ The benches are properly sloped at an angle of 60 degrees to avoid any spillage of benches.
- ▶ The opencast mine is designed to operate using a shovel-dumper system, which necessitates proper benching to ensure slope stability and to facilitate the safe movement of dumpers and other heavy machinery. The Draft quarry slope, at its deepest point, will not exceed 45° from the horizontal. (This angle is measured between the line connecting the toe of the bottommost bench and the crest of the topmost bench, relative to the horizontal plane).
- ▶ Garland drains will be constructed around the periphery of the quarry to manage stormwater and prevent water accumulation within the working area.
- ▶ A minimum safety buffer of 100 meters will be maintained between the quarry's surface edge and any nearby public buildings, roads, or infrastructure. If the quarry edge comes within 200 meters of any road or public building, special permission from the Directorate General of Mines Safety (DGMS) will be obtained to carry out controlled blasting operations, ensuring no harm to public life or property.
- ▶ All mining activities will strictly adhere to the guidelines and conditions set by DGMS and will be carried out under the supervision of competent personnel appointed in accordance with the Metalliferous Mines Regulation Act, 1961.

7.1.3 Disaster Management Plan

The disaster management plan is aimed at ensuring safety of human life, protection of the environment, safeguarding of infrastructure, and restoration of operations, in that specific order. For its effective implementation, the plan must be widely circulated among all personnel and reinforced through regular training, rehearsals, and mock drills.

The primary objective of the plan is to utilize all available resources both within the mining operation and from external agencies to achieve the following goals:

- ▶ Rescue and provide medical treatment to casualties.

- ▶ Safeguard all personnel present in the mining area.
- ▶ Minimize damage to property and the surrounding environment.
- ▶ Contain the incident immediately and bring it under control as swiftly as possible.
- ▶ Identify and document any fatalities.
- ▶ Provide accurate and timely information to the news media and authorities.
- ▶ Ensure the safe rehabilitation of the affected area.
- ▶ Preserve all relevant records, evidence, and equipment for inquiry into the cause and circumstances of the incident.
- ▶ Optimize response efficiency to enable rescue, rehabilitation, medical support, and a return to normalcy.

Emergency Organization (EO)

It is recommended to set up an emergency organization. A senior executive (Mine Manager) who has control over the affairs of the mine would be heading the emergency organization. He would be designated as site controller. As per the general organization chart, in the mines, the Mines Foreman would be designated as the Incident Controller (IC). The incident controller would be reporting to the site controller. Emergency coordinators would be appointed who would undertake the responsibilities like firefighting, rescue, rehabilitation, transport and provide essential and support services.

Emergency Communication (EC)

Whoever notices an emergency such as fire, growth of fire etc. would inform the Mines Foreman. The Mines Foreman would appraise the site controller. Site Controller verifies the situation from the incident controller takes a decision about an impending on-site emergency. Simultaneously, the emergency warning system would be activated on the instructions of the site controller. To handle disaster/emergency situations, the following personnel shall deal with the disaster/Emergency.

- ▶ Mines Manager-site controller
- ▶ Mines Forman-incident controller
- ▶ Mine mate –Fire controller
- ▶ Senior most Driver-Transport coordinator
- ▶ Senior most operator- Medical coordinator

7.1.3.1 Emergency Services

This includes the fire-fighting system, first aid center, etc. Alternate sources of power supply for operating fire pumps, communication with local bodies, fire brigade etc. will also be clearly identified. An adequate number of external and internal telephone connections should be installed.

- ▶ Fire Protection System
- ▶ Off Site Emergency Plan

7.1.3.2 Fire Protection System

The fire protection system for the project will consist of portable hand-held fire extinguishers of suitable types and capacities, strategically placed for extinguishing small fires in critical areas such as mine operational zones, diesel storage areas, and explosive storage points (if any).

7.1.3.3 Off-Site Emergency Plan

An off-site emergency plan, outlining the steps to address potential emergencies that could impact the areas surrounding the project site, must be prepared in consultation with local authorities such as the Panchayat officials, Revenue Department, and the Assistant Commissioner (Excise). As per the Draftized plan, in the event of any off-site emergency, immediate and coordinated actions must be initiated in consultation with the District Collector and other relevant revenue officials to effectively manage the situation and minimize risk to the public and environment.

7.1.4 Progressive Quarry/Mine Closure Plan

As a Petrogenetic character, the depth persistence of the rough stone in the mine area is beyond the workable limits. However, it is very difficult to operate rough stone mines economically below an average depth of 48.47m by observing the statutory provisions of Mine Safety Rules and Regulations. Hence, in the proposed Mining Plan, only 48.47m average depth has been envisaged as 'Workable depth' for safe and economic mining.

However, it is proposed not to back fill the ultimate pit, in as much as good quantity of reserves is available below the workable depth of 48.47m and there is possibility of upgradation in rough stone mining for greater depths in course of time for safe mining at economic cost beyond 48.47m depth. The pit boundaries shall be safely fenced and used for agricultural purposes when the pit is filled with underground see page or rain waters.

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7.1.4.2 Water Quality Management

The groundwater quality in the region has been observed to be within a neutral pH range, indicating good quality. Most of the analytical results for both groundwater and surface water samples reveal that the parameter concentrations are well within permissible limits as per applicable standards.

To ensure continued protection of water resources, garland drains will be constructed along the periphery of the mining pit and at the toes of the side dumps. These drains will be strategically aligned to channel all surface runoff away from the mining zone, thereby preventing waterlogging and contamination.

The surface drainage will be directed to settling tanks for sediment removal. Additionally, any catchment water collected in the mining pit will be directed to a main sump, which will serve as a source of water for dust suppression, green belt development, and plantation activities, promoting sustainable water use within the quarry lease area.

7.1.4.3 Mine Seepage Water

Negligible seepage of water into the mining pit is anticipated. This seepage will be collected in a well-guarded sump or pond, allowing adequate time for settling of suspended solids. The treated water will be reused for dust suppression on working faces, haul roads, and dump surfaces, thereby promoting water conservation within the quarry.

The altitude of the area is 85.0m (Maximum) above MSL and average annual rainfall of about 823 mm, the Average ground water level is at 8.12m depth from ground level. The height of the hill is 85m from the ground level. The Production faces are operated at shallow depths.

During the rainy seasons, both surface runoff and groundwater seepage are directed to a common sump located at a lower point in the mine. The collected water is then dewatered and discharged to nearby agricultural fields using 10 HP oil engine pumps, ensuring beneficial reuse of water and avoiding any stagnation within the mining area.

7.1.4.4 Air Quality Management

Ambient air quality was monitored twice a week over a 12-week period during the pre-monsoon season (Season 01). The parameters monitored included PM₁₀, PM_{2.5}, SO₂, and NO_x, and all sampling activities were conducted as per Central Pollution Control Board (CPCB) monitoring guidelines at designated locations.

To mitigate air pollution in the proposed mining area, the following measures have been considered:

- ▶ Water sprinkling will be carried out regularly at active working faces, haul roads, and dump surfaces to suppress dust.
- ▶ Regular cleaning and removal of spilled stone from haul roads and weighbridge areas to prevent dust resuspension.
- ▶ Routine maintenance of mining equipment to ensure efficient operation and minimal emissions.
- ▶ Development of a green belt around the overburden dumps to reduce fugitive dust emissions and promote a clean and healthy environment.

7.1.4.5 Solid waste Management

As stated earlier, mining will be carried out using the opencast semi-mechanized method involving conventional equipment such as hydraulic excavators/shovels and dumpers, along with ancillary equipment like compressors, wire cutting machines, generators, etc.

There is no wastage encountered during the quarrying operation; the entire rough stone will be utilized. There is no toxic effluent expected to generate in the form of solid or liquid gases and no requirement of treatment of waste.

7.1.4.6 Mine Drainage

The lease applied area is a hillock rising to a height of 85meters. The region receives an average annual rainfall of approximately 823 mm, during both the Southwest and Northeast monsoon seasons. Despite this, the rainfall is considered scanty, and the groundwater table lies at around 8.12 meters depth.

During the rainy seasons:

- ▶ Surface runoff and minor groundwater seepage are collected in a designated sump within the quarry area.
- ▶ The collected water is dewatered using 10 HP oil engines and redirected to nearby agricultural fields.
- ▶ This arrangement helps in preventing waterlogging in the mining area and utilizes the water beneficially for irrigation purposes.

7.1.4.7 Disposal of Waste

No waste or sub-grade mineral is anticipated during the mining plan period, as all excavated material is saleable and fully utilized. Hence, no waste dump is proposed, and waste dump management is not applicable for this lease area.

7.1.4.8 Topsoil Management

Topsoil will be carefully removed and stacked at designated locations within the earmarked dump site, with appropriate preventive and protective measures in place to avoid erosion and nutrient loss.

The following measures will be followed:

- ▶ Topsoil will be used for plantation activities along the haul roads, lease boundary, and for the reclamation of external dumps and backfilled areas (if any).
- ▶ Topsoil stockpiles will be maintained at low heights to minimize compaction and will be vegetated with grass to preserve fertility.
- ▶ In addition to permanent topsoil stacks, temporary stacks will be placed near excavation and reclamation areas to facilitate concurrent utilization, avoiding the need to transport topsoil to the main stack near the overburden dump.

7.1.4.9 Disposal of Mining Machinery

Mining operations are proposed to be carried out using company-owned machinery, which includes excavators, mining tippers, compressors, wire saw machines, jackhammers, and other essential mining equipment. All equipment complies with RTO regulations and Central Pollution Control Board (CPCB) norms.

The company also operates a centralized workshop at Salem to handle major repairs and rectification of its equipment.

Machinery that reaches the end of its operational life is written off and disposed of in accordance with the guidelines prescribed by the Government and the TAMIN Board. Surplus equipment that remains in working condition will be reallocated to other ongoing projects of the company.

7.1.4.10 Other Infrastructure

Semi-permanent structures will be established within the lease area to support mining operations. These will include mine offices, a storeroom, and a first-aid room, ensuring smooth administrative functioning and prompt response to any minor health incidents.

7.1.4.11 Safety & Security

Quarrying operations are proposed in elevated areas, thereby minimizing the risk of pit-related hazards. To ensure the safety of both humans and animals, barbed wire fencing will be installed around the quarry boundaries to prevent unauthorized entry and avoid untoward incidents in the quarry area.

7.1.4.12 Social Impact Assessment R & R Action plan

No Rehabilitation and Resettlement (R&R) is required for the proposed project, as there is no displacement of people or structures involved.

8 PROJECT BENEFITS

8.1 Benefits in Physical Infrastructure

- ▶ Developmental activities will be undertaken in nearby areas, aligned with the needs and priorities of the local communities.

8.2 Benefits in the Social Infrastructure

- ▶ Improvement in per capita income of the local population.
- ▶ Enhancement of the overall socio-economic conditions of nearby villages due to the proposed project.
- ▶ The project is environmentally compatible, financially viable, and will support the construction industry indirectly benefiting the wider community.
- ▶ Community development initiatives under Corporate Social Responsibility (CSR) and Corporate Environmental Responsibility (CER) will benefit nearby villages.
- ▶ As per O.M. F.No. 22-65/2017-IA.III dated 01.05.2018, 2.0% of the project cost is to be allocated for Corporate Environment Responsibility (CER) activities. Accordingly, an amount of Rs. 2.0 Lakhs will be spent towards the development of Aranarai north Village Government Higher Secondary School. Corporate Environmental Responsibility (CER) Plan details are provided in **Table 4-30**.
- ▶ The State Government will also benefit directly from the proposed mine, through increased revenue from royalties, CESS, DMF, GST etc.
- ▶ Improvement in communication, transport, education, community development and medical facilities and overall change in employment and income opportunity.

8.3 Employment potential- Skilled, Semi-Skilled and Unskilled

- ▶ The quarrying activity will generate employment opportunities, contributing to the economic development of the local population.
- ▶ Approximately 35 people will be directly employed in the quarry operations as skilled and unskilled workers.
- ▶ Around 20 individuals will benefit indirectly through allied services and support activities.
- ▶ The direct beneficiaries will include local people employed in mining operations in roles such as equipment operators, laborers, and maintenance staff.
- ▶ Provision for implementing fish culture (optional) will help in developing additional skills among local communities, especially for those in need.

9 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Introduction

After the approval of the Environmental Impact Assessment (EIA) Management Plan, the following administrative framework will be established to ensure effective implementation of mitigation measures and monitoring of their effectiveness:

9.1.1 Environmental Management Cell (EMC)

A dedicated Environmental Management Cell will be formed, comprising qualified personnel responsible for coordinating all environmental protection and management activities.

9.1.2 Roles and Responsibilities

Clear roles and responsibilities will be assigned to designated staff for implementation of specific mitigation measures, compliance with legal requirements, and regular environmental monitoring.

9.1.3 Standard Operating Procedures (SOPs)

SOPs will be developed for all major activities such as dust suppression, waste disposal, afforestation, noise and vibration control, and water quality management to ensure consistency and effectiveness.

9.1.4 Monitoring Program

A comprehensive environmental monitoring schedule will be followed to track air, water, noise, and soil parameters, and assess the effectiveness of mitigation measures as provided in Chapter 6 of the EIA Report.

9.1.5 Periodic Review and Reporting

Environmental performance will be reviewed periodically through internal audits and reports will be submitted to regulatory authorities as per stipulated timelines.

9.1.6 Training and Capacity Building

Regular training sessions and awareness programs will be conducted for all levels of staff to ensure their involvement in environmental protection and sustainability.

9.1.7 Grievance Redressal Mechanism

A structured system will be in place for recording and addressing public or worker grievances related to environmental aspects of the project.

9.1.8 Third-party Audits and Review

Independent audits and reviews will be carried out periodically to ensure transparency, assess compliance, and recommend improvements where required.

9.2 Environmental Management Cell (EMC)

The Environment Monitoring Cell will ensure effective implementation of the environment management plan and ensure compliance of environmental statutory guidelines through Mine Management Level of the proposed quarry. The following responsibilities are provided to the team of EMC.

Table 9-1 TAMIN Quarry Project: Designation and Responsibilities

S. No.	Designation	Responsibility / Remarks
1	General Manager (Quarries)	Zonal oversight; reporting to TAMIN HQ; overall monitoring of all quarry units under the division.
2	Project Officer / Agent	Statutory head of the specific quarry lease as per MMR 1961; responsible for overall management and compliance.
3	Mines Manager (First Class / Second Class)	Day-to-day quarry operations, safety, manpower, and reporting to Project Officer.
4	Geologist	Supervision of stone quality, mapping, and geological documentation for mining and export purposes.
5	Mining Engineer	Production planning, drilling/blasting supervision, and haulage operations.
6	Environmental Officer / EMC In-Charge/Duputy Manager	Implementation of EMP, baseline data monitoring, compliance with EC/CTO, liaison with TNPCB & SEIAA.
7	Surveyor (Licensed)	Lease boundary demarcation, surface plan preparation, and volume calculation as per mining plan.
8	Mechanical Engineer	Maintenance of machinery like excavators, compressors, cranes, DG sets, etc.
9	Electrical Supervisor	Quarry lighting, DG sets, electrical panels, and ensuring statutory compliance under CEA rules.
10	Safety Officer (Certified)	Ensuring safety in blasting, slope stability, PPE usage; compliance under Metalliferous Mines Regulation.
11	CSR & Admin Officer	Monitoring CSR initiatives (like fencing, green belt), admin and public hearing coordination.
12	Blaster / Shot Firer (Licensed)	Handling and usage of explosives in stone blocks extraction, with DGMS license.
13	Medical / First Aid Officer	Onsite health care, medical records, and emergency preparedness.
14	Accountant / Stores Officer	Handling quarry expenses, machinery logs, spare procurement, and statutory payment documentation.
15	Data Entry / EMC Support Staff	Compilation of air, water, and noise monitoring data, health records, and compliance file maintenance.
16	Green Belt Supervisor / Plantation Caretaker	Supervising survival rate of saplings, watering and maintenance of green belt.

9.2.1 Environmental Policy of TAMIN

M/s. Tamil Nadu Minerals Ltd believes that good safety, Health & Pollution control practices contribute to individual well-being and organization morale. Our commitment to Safety, Health and Environment stretches beyond statutory obligations and we are committed to managing and continually improving overall safety, Health, and Environmental performance. We M/s Tamil Nadu Minerals Ltd are committed to ensure that:

- ▶ We develop safe working methods and practices, with the objective of having no injuries and accidents in the workplace and providing a safe workplace for our employees, contractors and others who perform their duties. We shall provide adequate Health care to our employees and create processes to reduce the adverse effect of the operations on the health of the employees.
- ▶ We provide safety appliances and continuous training in safety to our employees and contract workmen to ensure safe production and achieve the target of zero accidents. We are committed to supporting actions aimed at increasing employees' safety outside work hours.
- ▶ We continuously evaluate and improve our conduct and carry out regular audits, analysis, and studies to eliminate potential concerns and continuously improve upon our Safety, Health, and Environmental standards.
- ▶ We communicate our Safety, Health, and Environmental Policy to all our employees' contractors and to the public for better understanding and practice.
- ▶ Management has knowledge of relevant issues regarding Safety, Health and Environment and provides a foundation for setting objectives and targets. Management shall fulfill its responsibility to inform, educate and motivate employees and others to understand and comply with this policy and applicable laws.

The TAMIN has formulated well-planned and integrated Environmental policies as shown below:

- ▶ M/s. Tamil Nadu Minerals Ltd is committed to welfare and development needs of the society around it.
- ▶ All rules and conditions prescribed in the Indian Mines Act, Metalliferous Mines Regulation etc., will be adopted to ensure risks-free and safe mining operations. All personal protective devices supplied to workers and staff should be used while they work in the mines and any in this respect will be dealt with, inflicting warnings first, followed subsequently by punitive punishments including fines and ultimately dismissal, if repeated continuously.
- ▶ Any infringement / of any rule or unsafe mining operations should be reported to Mines Manager / Mine Foremen / Mine Mate/ Blaster who will take immediate corrective measures for avoiding major disasters. The report will ultimately reach the Board of Directors through hierarchical communicative channels from the lowest level to superior levels in a quick time bound duration.
- ▶ The EC conditions and stipulations will be strictly followed by all supervisory staff of the

mine, and will co-ordinate in various issues like prescribed environmental monitoring schedules, vibration monitoring studies during blasting, green belt development, management of dumps etc.

- ▶ Penal actions will be taken by the company in cases of continuous negligence resulting in and deviations in this respect.
- ▶ A time schedule of once in 15 days for review of all operational factors as mentioned above is in force, for proper and quick corrective actions.

Hierarchical System of the TAMIN is shown in **Error! Reference source not found.**

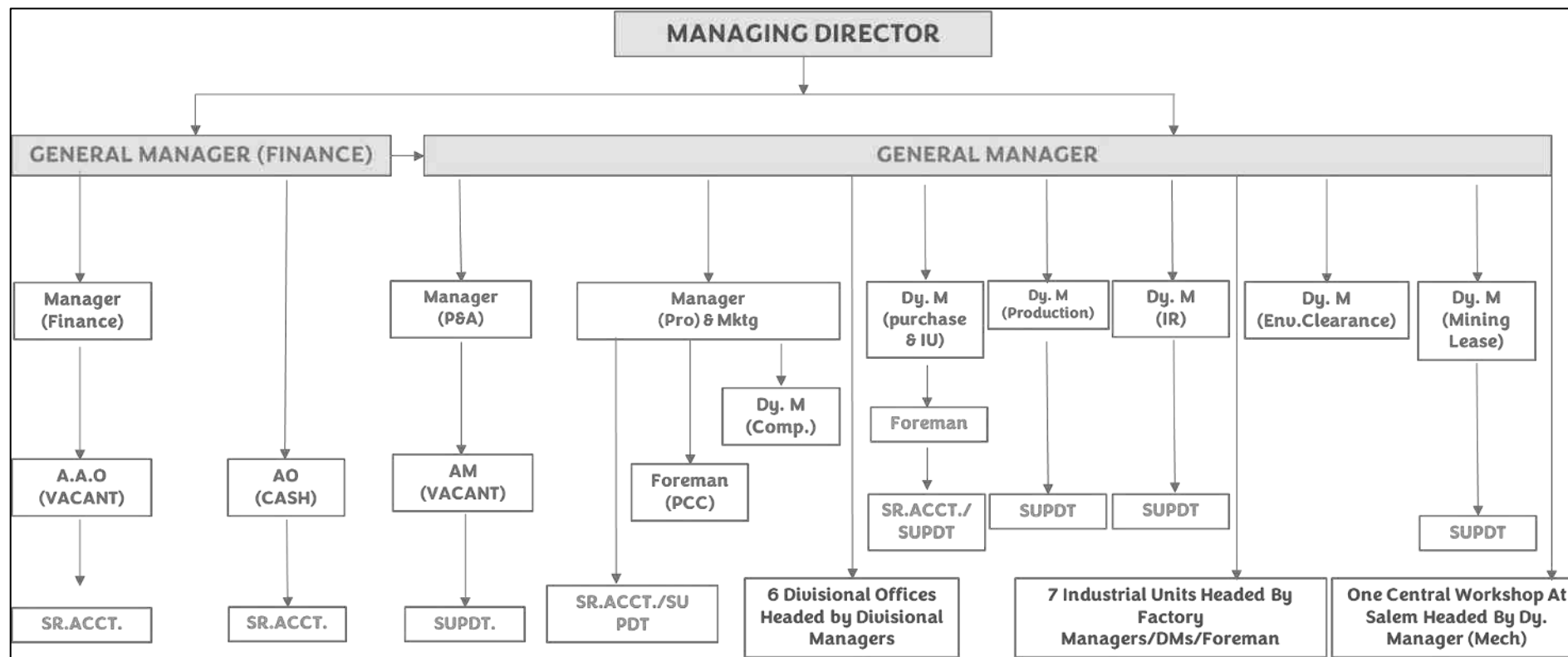


Figure 9-1 Hierarchical System of the TAMIN

9.3 Land Environment

The landscape will be slightly changed due to open cast quarry. There will be no land subsidence as the area is made up of hard rock. The aesthetic environment will not be affected, as the quarry is in hilly terrain. Soil cover and the weathered material accounts for the Over Burden. Agriculture is seen mainly in the plains far away from the lease area. A few bushes will be cleared to facilitate mining and other related activities and there are no big trees. The control measures and responsibility of EMC are provided below:

Table 9-2 Responsibilities under EMC Land Environment Management

Control	Responsibility
Designing vehicle wash-down system so that all washed water is captured and passed	Mines Manager
Re-fuelling will be carried out in a safe location, away from vehicle movement pathways	Mine Foreman & Mining Mate
No external dumping i.e., outside the project area	Mine Foreman
Greenbelt on dumps and its maintenance	Environment Officer
Garland drains with catch pits to be provided all around the project area to prevent	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 species will be carried out on the backfilled area	Mines Manager
There will be formation of a small surface water body in the mined-out area, which can be used for watering the greenbelt at the conceptual stage	Environment Officer

9.4 Air Quality Management

The Project Proponent proposes Open Cast Semi-mechanized mining operations involving both machinery and labor. Air pollution, particularly dust, will be generated during activities such as site preparation, drilling, blasting, mining, hauling, handling, and transportation of materials. Additionally, emissions from diesel vehicles and machinery will release pollutants such as SO₂ and NO_x. The objective of the Environmental Management Plan (EMP) is to minimize air emissions and reduce their impact on ambient air quality in and around the mining site through well-implemented mitigation measures.

9.4.1 Emission Source Identification

The primary emission sources include:

- Activities related to pits and quarries include overburden operations, drilling, hauling, loading, and stockpiling.
- Emissions of PM and road dust due to HEMM & Mining Tippers.
- Emissions from generators, vehicles, and machinery.

9.4.2 Measures for Dust Suppression

- Water sprinkling on mine haulage roads and waste dumps using tankers at regular intervals.
- Drilling blast holes (32 mm dia) under wet conditions to prevent dust emissions.
- Water sprinkling at Tipper unloading points.
- Provision of respirators and dust masks to workers, especially drillers and loaders.
- Use of PUC-certified vehicles for transportation.
- Wet working faces before drilling and excavation.
- Periodic health checkups for workers.
- Plantation along approach roads and the periphery of the quarry lease area.
- Use of water tankers with spraying arrangements for dust suppression on haul roads.

9.4.3 Haulage Controls

- Regular maintenance of haul roads.
- Enforcement of speed limits for transport vehicles.
- Daily water spraying on roads using tankers.
- Periodic maintenance of transport trucks to reduce emissions.
- Avoidance of truck overloading.

9.4.4 Emission Controls for Material Handling

- Regularly wetting working faces before drilling and excavation.
- Provision of dust masks to drillers and loading workers.
- Periodic health checkups for workers.
- Plantation along approach roads and surrounding the quarry lease area.
- Use of water tankers with spraying arrangements for regular haul road sprinkling.

Table 9-3 Responsibilities under EMC Air Environment Management

Measures	Responsibility
Water sprinkling on roads, dumps, and unloading points	Environment Officer
Wet drilling and face preparation	Mines Manager
Provision of dust masks and respirators	Mine Foreman
Health check-ups and safety measures for workers	Environment Officer
PUC checks and maintenance of vehicles and equipment	Mining Mate
Plantation and greenbelt development	Environment Officer
Monitoring speed limits and preventing overloading	Mine Foreman

9.5 Noise Pollution Control and Ground Vibration and Fly Rock Control

In an operational mine major noise sources are the operation of mine machinery, equipment & playing vehicles. Noise generation may be for an instant, intermittent or continuous period, with low to high decibels.

Table 9-4 General noise levels generated at mines

Equipment	Noise Level (dB(A))
Rotary Drills	72-100
Compressor (85M ³ /min)	50-55
Excavator	75-90
Diesel Tipper	74-109
Diesel Generator	80-94

Control Measures to be followed to control the level of Incremental Noise

- **Minimize Drilling Operations**
Avoid unnecessary drilling and limit it to essential operational requirements only.
- **Use of PPEs (Earmuffs/Earplugs)**
Provide earmuffs or earplugs to all workers operating in or near high-noise zones, particularly around drilling and generator areas.
- **Maintain Proper Haul Road Gradients**
Designing and maintaining gentle gradients to reduce vehicle engine strain and associated noise.
- **Greenbelt Development**
Dense plantations along the mining lease boundary to function as a natural sound barrier.
- **Use of Noise-Reducing Technology**
Adoption of low-noise equipment such as crack powder in place of conventional blasting, wherever feasible.
- **Restrict Noisy Activities to Daytime**
Conduct drilling and blasting strictly during daytime hours and use sharp bits and optimized air pressure to reduce noise.

- **Acoustic Enclosures for Machinery**

Enclose noise-emitting machines (e.g., compressors, diesel generators) in soundproof housings to limit ambient noise.

Table 9-5 Responsibilities under EMC for Noise Level control in the project

Control Measure	Responsible Person
Limiting unnecessary drilling operations	Mines Manager
Issuance and monitoring of earmuff usage	Mine Foreman / Safety Officer
Design and maintenance of haul road gradients	Mines Manager
Implementation and upkeep of greenbelt	Environment Officer
Deployment of low-noise technologies	Mining Engineer / Mines Manager
Scheduling of blasting and ensuring optimal drilling practices	Mining Mate / Drilling Supervisor
Installation and inspection of acoustic enclosures	Environment Officer / Maintenance In-Charge

Table 9-6 Proposed Management Controls for Ground Vibration & Fly Rocks

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

9.6 Water Pollution Control Measures

Mining operations have minimal potential to impact surface water sources due to the absence of major streams or rivers in the vicinity. However, proactive control measures will be implemented to ensure that water quality in and around the lease area is preserved. The following measures are proposed to manage and mitigate water pollution risks.

Surface Drainage Management

- Construct surface water ditches or channels to divert rainwater runoff toward agricultural lands, thus preventing water stagnation and erosion within the mine lease area.

Use of Mine Water Reuse mine water efficiently for:

- Mechanized cutting operations
- Wet drilling
- Dust suppression on haul roads and work areas
- Greenbelt development

Dump Runoff Channelization

- Properly design and maintain drainage around overburden and waste dumps to prevent runoff from contaminating nearby areas.

Domestic Wastewater Management

- Install a septic tank followed by a soak pit to manage wastewater from sanitation facilities.
- Ensure regular maintenance and cleaning of the septic system to avoid overflow or leakage.

Table 9-7 Responsibilities under EMC for Water Pollution and Management

Control Measure	Responsible Person
Construction and maintenance of surface drains and channels	Mines Manager / Civil Supervisor
Management and reuse of mine water for operational needs	Mine Foreman / Water Management Officer
Monitoring and guiding controlled runoff from dumps	Environment Officer
Planning and execution of wet drilling and dust suppression	Mining Mate / Drilling Supervisor
Maintenance of septic tank and soak pit system	Housekeeping Supervisor / Environment Officer
Monitoring water quality in and around the site	Environment Officer

9.7 Biological Environment

Mining activities may lead to habitat disruption, soil erosion, and loss of flora and fauna if not managed properly. To minimize these impacts and promote ecological sustainability, the following mitigation measures are proposed under the Environmental Management Plan (EMP).

► Wildlife Protection Measures

- The project site is not located within any notified Wildlife Sanctuary, National Park, Tiger Reserve, or Elephant Corridor.
- A barbed wire fence will be erected around the mining area to prevent unintended wildlife entry and enhance safety.
- Mining activities will be conducted strictly between 6:00 AM to 6:00 PM to avoid disturbance to any nocturnal fauna.
- Controlled blasting techniques and restrictions on high-noise activities will be implemented to reduce vibrations and sound levels.
- Avoidance of forest roads for transportation of mining materials to protect forest integrity.

► Greenbelt Development

- A greenbelt with a minimum of 4500 native saplings annually will be developed around the lease boundary.

- Plantation will serve as a buffer for wildlife movement and help in dust and noise attenuation.
- Lighting will be avoided during nighttime to prevent light pollution and disturbance to fauna.

► **Biodiversity Enhancement**

- As no major wildlife is reported within the lease area, focus will be on improving local biodiversity through afforestation and habitat restoration.

9.8 Afforestation along the Lease Area

Tree planting will be carried out along the boundary of the mining lease area and other disturbed zones. The plantation will be done using native species suited to local agro-climatic conditions.

► **Plantation Targets**

- As per the Mining Scheme, 4500 trees will be planted.
- Considering an average survival rate of 50%, proper maintenance including watering, protection, and gap filling will be carried out.

► **Soil and Site Preparation**

- Available topsoil will be used to nourish plantations.
- Use of organic manure and mulching to enhance plant survival.

Table 9-8 Responsibilities under EMC for conservation of Biological Environment and Afforestation

Control Measure	Responsible Person
Barbed wire fencing and protection of quarry boundary	Site Supervisor / Mines Manager
Ensuring working hours compliance (6 AM to 6 PM)	Mines Manager / Shift In-Charge
Implementation of controlled blasting techniques	Blasting Supervisor / Mining Engineer
Avoiding forest road usage by mining vehicles	Logistics/Transport In-Charge
Greenbelt and afforestation program planning	Environment Officer / Plantation Consultant
Procurement and planting of native species	Horticulture Consultant / Environment Officer
Monitoring plant survival and replacing dead saplings	Plantation Supervisor

9.9 Socio Economic Environment

Mining projects, while economically beneficial, can lead to socio-economic changes within nearby communities. The proposed plan aims to enhance the quality of life of residents in the surrounding villages through inclusive development initiatives, while minimizing any adverse effects.

Proposed Control Measures and Initiatives

Social Development

- Employment opportunities for local residents in skilled and unskilled jobs related to mining and site maintenance.
- Support for skill development programs (e.g., masonry, tailoring, driving) to enhance long-term livelihoods.

Health & Hygiene

- Organize health camps and periodic medical check-ups for workers and nearby villagers.
- Provide Personal Protective Equipment (PPE) to all site workers.
- Implement and maintain safe drinking water facilities at the mine site and in nearby communities.
- Regular vector control and sanitation programs.

Infrastructure Development

- Assist in the repair or construction of rural roads, culverts, and community water storage.
- Upgradation of educational facilities like benches, books, or school maintenance in affected villages.
- Support for solar lighting, especially in public areas or community centers.
- Development of rainwater harvesting structures in collaboration with village panchayats.

Minimizing Disruptions

- Maintain regular communication with villagers to address grievances proactively.
- Ensure that transport routes avoid village centers to reduce traffic, dust, and noise.
- Restrict working hours to daytime operations only to maintain peace in surrounding habitations.

Table 9-9 Responsibilities under EMC for Socio Economic Environment improvements

Initiative/Measure	Responsible Person
Community liaison and grievance handling	CSR/Community Relations Officer
Local employment and skill training coordination	HR Manager / Site Manager
Health check-ups and sanitation drives	Medical Officer / EMC Health & Safety In-Charge
Infrastructure support initiatives	CSR/Community Relations Officer
Monitoring transport-related disturbances	Logistics Supervisor / Environment Officer
PPE distribution and usage compliance	Safety Officer
Reporting and auditing of socio-economic initiatives	Deputy Manager/ EMC Coordinator / CSR Lead

9.10 Occupational Health & Safety Measures

The rough stone mining operations in the proposed semi-mechanized open cast setup are expected to have minimal health hazards, as rough stone does not contain toxic elements, and the mechanization level limits direct exposure. However, occupational health and safety (OHS) remain a critical component of environmental management and worker welfare.

Workplace Hazard Awareness

- Regular awareness programs on occupational risks and best practices.
- Display of safety instructions and emergency response charts at strategic locations.

Dust & Air Quality Control

- Conduct periodic air quality monitoring at work sites to ensure exposure levels remain within permissible limits.

- Use of wet drilling techniques and regular water sprinkling to suppress dust.

Respiratory and PPE Provisions

- Provide and enforce the use of adequate respiratory protection (masks, respirators).
- Ensure workers are equipped with helmets, ear plugs, gloves, and safety shoes based on job type.

Medical Surveillance

- Conduct pre-employment and periodic medical check-ups for all workers to track occupational health trends.
- Maintain individual medical records and ensure early detection of potential illnesses.

Training & Capacity Building

- Organize regular safety training sessions covering, proper use of Personal Protective Equipment (PPE)
- First aid and emergency response
- Safe handling of equipment and tools

Emergency Preparedness

- Equip the site with first-aid kits, fire extinguishers, and emergency contact info.
- Appoint a trained First Aid Officer at the site during all operational hours.

Table 9-10 Responsibilities under EMC for Occupational Health and Safety

OHS Measure	Responsible Person
Air quality monitoring and reporting	Environment Officer / Health & Safety In-Charge
Distribution and enforcement of PPE usage	Site Safety Officer
Periodic medical check-ups and record maintenance	Medical Officer / Site Health Supervisor
Worker safety training sessions	EMC Coordinator / Safety Officer
Emergency preparedness & first aid readiness	First Aid Officer / Shift Supervisor
Hazard awareness and signage implementation	Environment Officer / Health & Safety In-Charge

9.10.1 Care and Maintenance during Temporary Discontinuance

In the event of temporary discontinuance of quarry operations, the project will strictly adhere to the provisions of the Mines Act, 1952 and Rule 17 of the stone Conservation and Development Rules, 1999 to ensure safe and secure maintenance of the site. The site will be properly secured and maintained in compliance with legal regulations during any period of inactivity.

9.10.2 Safety and Security

Once quarrying operations are complete, the excavated area will be properly fenced with controlled access, ensuring worker safety during the closure phase. A designated single entry/exit point will be created to regulate site access.

9.10.3 Corporate Social Responsibility

The project will allocate 2.5% of its annual profit towards CSR initiatives that directly benefit the neighborhood villages. These funds will be used for:

- Educational programs, such as scholarship funds for local students.
- Healthcare and sanitation improvement in the surrounding communities.

- Infrastructure development, such as road repairs and water supply systems.

9.10.4 Corporate Environmental Responsibility

As per the MOEFCC Office Memorandum F-22-65/2017IA.III dated 1st May 2018, the project proponent has earmarked an investment of Rs. 1,99,940 (Say 2,00,000/-) (2% of total capital cost) for Corporate Environmental Responsibility (CER). and this budget is allocated for Aranarai North Village Government High School.

Table 9-11 Responsibilities under EMC for Socio economic benefit implementation

Socio-Economic Measure	Responsible Person
Employment generation and skill development	HR Manager / Community Liaison Officer
Compliance with Mines Act during temporary discontinuance	Mines Manager / Site Supervisor
Safety and security during closure	Safety Officer / Site Manager
CSR fund allocation and project implementation	CSR Manager / EMC Coordinator
Implementation of CER activities	Environment Officer / CSR Manager

9.10.5 Budget for Environmental Protection

To ensure effective implementation of the Environmental Management Plan (EMP), a total budget has been allocated as follows:

- **Capital Cost:** Rs. 1565000/-
- **Recurring Cost:** Rs. 851500/- per annum

This allocation covers expenses for pollution control measures, environmental monitoring, greenbelt development, occupational health and safety, waste management, and other environmental protection activities. Environmental Management costs are given in **Table 9-12**.

Table 9-12 Environmental Management Plan Cost

Environmental Attribute	Mitigation Measure	Provision for Implementation	Capital	Recurring	Remarks
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	90000	90000	Depends on area; both capital and recurring costs should be multiplied by the number of hectares
	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	50000	25000	
	Air Quality will be regularly monitored as per norms within ML area & Ambient Area	Yearly Compliance as per CPCB norms	50000	5000	
	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts	0	0	
	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	150000	15000	Depends on number of jack hammers deployed; capital and recurring costs are shown for 2 units
	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	5000	

	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governors @ Rs. 5000/- per Tipper/Dumper deployed	10000	10000	Depends on number of tipper/dumpers deployed; capital costs are shown for 2 unit
	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	47500	
	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50000	20000	
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	Provision made in Operating Cost	0	0	
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0	
	Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0	
	It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0	

	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0	
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Provision made in Operating Cost	0	0	
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Competent Person	0	0	
	Provision for Portable blaster shed	Installation of Portable blasting shelter	50000	0	
	Shot hole Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0	0	
Water Environment	Water management	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	90000	45000	Only capital costs depend on area; capital costs should be multiplied with number of hectares
Waste Management	Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency (Spent Oil, Grease etc.,)	25000	10000	
		Installation of dust bins	5000	1000	

	Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	0	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	3000	
	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)	140000	35000	Capital and recurring costs are shown for 35 employees; should be adjusted as per the actuals
	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	35000	35000	Recurring costs are shown for 35 employees; should be adjusted as per the actuals
	First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	0	18000	Depends on area; recurring costs should be multiplied with number of hectares
	Mine will have safety precaution signages, boards.	Provision for signages and boards made	10000	2000	
	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	0	90000	Depends on area; both capital and recurring costs should be multiplied by the number of hectares
	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMS.	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs. 10,000/- as maintenance cost	450000	90000	Depends on area; both capital and recurring costs should be multiplied by the number of hectares

	Flaggers will be deployed for traffic management				
	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	40000	
Green Belt Development	Green belt development - 500 trees per one hectare (200 Inside Lease Area & 300 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)	20000	100000	
		Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	300000	150000	
			1565000	851500	

10 SUMMARY & CONCLUSION

10.1 Justification for the Project Implementation

An Environmental Impact Assessment (EIA) has been conducted to evaluate the proposed rough stone quarry project. This assessment was carried out in alignment with the Terms of Reference (ToR) and based on collected baseline environmental data for the region. The EIA identified potential environmental impacts and outlined appropriate mitigation strategies through a comprehensive Environmental Management Plan (EMP).

The impacts anticipated from the proposed quarrying activities are relatively minor and can be effectively managed through well-planned control measures. Given the project's limited environmental risks and its potential socio-economic benefits, the initiative is considered both feasible and advantageous for regional development.

The Environmental Management Plan for the project will address the following components:

- Soil Pollution and Control Measures
- Air Pollution Management
- Noise Control Measures
- Solid and Hazardous Waste Management
- Water Pollution Prevention and Management

To ensure systematic and effective implementation, an Environmental Management Cell (EMC) will be established.

10.2 Mitigation of Anticipated Adverse Impacts

The proposed stone quarry is expected to generate moderate environmental impacts, all of which can be effectively mitigated through a comprehensive Environmental Management Plan (EMP). Key concerns include emissions of particulate matter from operations like drilling, blasting, and transportation, as well as runoff-induced water pollution and habitat disturbances.

To address air quality impacts, measures such as wet drilling, controlled blasting, and routine water sprinkling on roads and work areas will be adopted. Dust and noise will be further controlled through greenbelt development within and around the lease area using native species. Surface runoff will be managed through the construction of garland drains, catch pits, and stormwater bunds, while rainwater harvesting structures will help in groundwater recharge. Noise levels are currently within the prescribed CPCB standards, and the use of noise-compliant equipment and PPE like earplugs and earmuffs will ensure occupational safety. In terms of biodiversity, the project site does not intersect with any ecologically sensitive zones, and protective steps such as afforestation and fencing will help reduce any localized disturbances. From a socio-economic standpoint, the project promises direct and indirect employment, improved local infrastructure, and community development through CSR and CER commitments.

To further enhance environmental safeguards, advanced methods like diamond wire saw cutting, NONEL blasting, and non-explosive rock-breaking agents will be employed to reduce vibrations, fly rock, and dust. With baseline environmental parameters well within permissible limits, the planned mitigation strategies aim to maintain environmental quality and ensure regulatory compliance throughout the quarry lifecycle.

Additionally, as discussed in Chapter 10, an Environmental Management Cell (EMC) will be constituted. This cell will be responsible for:

- Monitoring and implementing EMP measures
- Ensuring compliance with environmental regulations
- Overseeing environmental performance across air, water, and land components

With minimal anticipated impacts and robust mitigation in place, the project is expected to foster employment, improve local infrastructure, and enhance the socio-economic condition of nearby communities. Considering these benefits, the proposed project may be recommended for Environmental Clearance.

11 DISCLOSURE OF CONSULTANTS

11.1 Consultant Details

For obtaining Environmental Clearance from the State Environment Impact Assessment Authority (SEIAA), Tamil Nadu, the project proponent has engaged Environmental Consultants accredited by the National Accreditation Board for Education and Training (NABET) under the Quality Council of India (QCI), New Delhi. The responsibility for conducting baseline studies and preparing the EIA/EMP report under the B1 category has been assigned to M/s. EHS360 Labs Pvt. Ltd., Chennai, which holds NABET accreditation for Schedule 1(a): Mining of Minerals, Category B projects, and vide Certificate No. NABET/EIA/25-28/RA0418, valid up to July 16, 2028.

The Terms of Reference (ToR) for the project were granted under Identification No. TO26B0108TN5513073N, dated **11/05/2026** for the preparation of EIA/EMP report. The draft EIA/EMP report will be submitted for Public Hearing (PH). After completion of Public Hearing, the minutes issued will be incorporated in the EIA report along with action plan by the proponent. Final EIA will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

11.2 Brief and Nature of Consultancy

M/s. EHS360 Labs Pvt. Ltd. (EHS) is a leading environmental consultancy firm in India, offering comprehensive solutions in the field of environmental management. The organization is accredited by the National Accreditation Board for Education and Training (NABET) for conducting Environmental Impact Assessment (EIA) studies and facilitating Environmental Clearances across multiple sectors, including Sectors 1, 7, 8, 21, 37, 38, and 39.

In addition to EIA consultancy, EHS provides a wide array of services, including environmental monitoring and analysis, environmental audits, risk assessment studies, turnkey environmental solutions, operation and maintenance (O&M) of environmental systems, and facilitation of statutory approvals from regulatory bodies such as the Ministry of Environment, Forest and Climate Change (MoEFCC) and State Pollution Control Boards (SPCBs).

The valid NABET accreditation certificate is appended at the end of this chapter for reference.

11.3 Team Member for EIA report

In addition to the approved experts for NABET, the following members are also involved in the EIA as Team Member/FAA to build their competencies for handling sector1 projects and functional areas

11.4 EIA Team Members

Name of Internal Team Member	Activity / Area	Involvement – Actual Work Performed	Under Approved Expert
Mr. Santhosh Kumar A	Air Quality Modelling & prediction (AQ)	Assisted with FAE & Coordination for data collection, Secondary data analysis, and validating primary data. coordination with FAEs and team members.	Ms. TushaliJagwani
Mrs. Tatiparthi Rajani	Air Quality Modelling & prediction (AQ)	Assisted with FAE & Coordination for data collection, Secondary data analysis, and validating primary data. coordination with FAEs and team members.	Ms. TushaliJagwani

11.5 Copy of QCI NABET Accreditation




National Accreditation Board for Education and Training

Certificate of Accreditation

EHS360 Labs Private Limited, Chennai

Old No.8/2, New No. 10/2, 50th Street, 7th Avenue, Ashok Nagar, Chennai- 600083

EHS360 Labs Private Limited, Chennai is Accredited (NAB) in Category-B organization under the QCI-NABET scheme for Accreditation of Civil Engineering Organizations (Version-1) for the preparation of EIA/EMP reports in the sectors listed below, in per the specified categories.

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals including both opencast and underground both	1	1 (a) (i)	A
2.	Mineral beneficiation	7	2 (b)	B
3.	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	B
4.	Synthetic organic chemicals industry	21	5 (f)	A
5.	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
6.	Building and construction projects	38	8 (a)	B
7.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved experts and projects are mentioned in NAAC Minutes dated July 31, 2025, posted on QCI-NABET website.

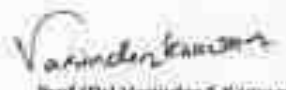
The Accreditation shall remain in force subject to continuous compliance in the terms and conditions stipulated in QCI-NABET's letter of accreditation issued by QCI/NAAT/0360/NAET/25/3808 dated August 05, 2025. The accreditation needs to be renewed before the expiry date as EHS360 Labs Annual Report. Thereafter following due process of assessment.

Valid up to
July 16, 2028

Issue Date
August 05, 2025



Certificate No.
NABET/EA/25-28/NA 0418


Prof. (Dr) Varinder S. Kanwar
(CEO – NABET)

For the updated list of accredited EHS360 Labs Private Limited Organizations with approved sector/sectors refer to QCI-NABET website

END OF THE REPORT