DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

For

SULAMALAI GREY GRANITE QUARRY OVER AN EXTENT OF 34.35.5 Ha

At

Survey No.: 283 (Part)
Sulamalai Village
Bargur Taluk
Krishnagiri District
Tamil Nadu State

By

M/s. Tamil Nadu Minerals Limited
No. 31, Kamarajar Salai
Chepauk
Chennai – 600 005

(Project sector – 1, Schedule of 1(a) Mining of Minor Minerals 'B1' category as per EIA Notification 2006 and its Amendments & Project falls under Violation category as per S.O. 804 (E) dated 14th March 2017)

Proposal No: SIA/TN/MIN/453082/2023, Dated: 14.12.2023
ToR: SEIAA-TN/F.No.10547/2023/Violation/ToR-1649/2023 Dated: 10.01.2024
Baseline Period : January 2024 - March 2024

EIA Consultant & Laboratory

HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI

NABET Certificate No & Validity: NABET/EIA/24-27/RA0335, valid up to 31.03.2027

NABL Certificate No: TC-12310 Dated: 25.09.2023 Valid Till 24.09.2025

July 2024

Revision Status

Name of the Client	:	**M/s. Tamil Nadu Minerls Limited**
Name of the Project	:	Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha
Name of the Report	:	Draft EIA Report
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Revision details:

Rev No.	Date	Details	Prepared by: Name	Prepared by: Sign	Checked by: Name	Checked by: Sign	Approved by: Name	Approved by: Sign
R1	10.07.2024	1st Submission	PVRS Surendra	PVRSSurendra	Vamsee Krishna		Dr JR Moses	
R0	02.07.2024	1st Submission	PVRS Surendra	PVRSSurendra	Vamsee Krishna		Dr JR Moses	

ACKNOWLEDGEMENT

The following personnel are gratefully acknowledged for their fullest support in collection, compilation of needful data regarding the project and kind cooperation in fulfilling the report on Environmental Impact Assessment (EIA) report of Revised Scheme of Mining for **Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha** at Survey No.283 (Part), Sulamalai Village, Bargur Taluk, Krishnagiri District, and Tamil Nadu State.

M/s. Tamil Nadu Minerals Limited,

1) Dr. E Ganesan- Deputy Manager (ML)

M/s. Hubert Enviro Care Systems Private Limited,

1. Dr. J R Moses (CEO)
2. Dr. Raj Kumar Samuel (Director – Technical)
3. Mr. Vamsee Krishna Navooru (Head Consultant)
4. Mr PVRS Surendra (EIA Coordinator)

Declaration by the Project Proponent

I, Dr. E Ganesan, Deputy Manager (ML) of M/s Tamil Nadu Minerals Limited, declaration/ undertaking that owing the contents (information and data) of the EIA report preparation has been undertaken in the compliance with Terms of Reference (ToR) for the "**Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha"** at Survey No.283 (Part), Sulamalai Village, Bargur Taluk, Krishnagiri District, and Tamil Nadu State and the information and content provided in the report are factually correct.

for **Tamil Nadu Minerals Ltd,**

Authorised signatory
Deputy Manager (ML)
TAMIN - Chennai

Declaration by the Head of the Accredited Consultant Organization

I, Dr.J.R. Moses, hereby, confirm that the below mentioned experts prepared the EIA/EMP report for "**Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha"** at Survey No.283 (Part), Sulamalai Village, Bargur Taluk, Krishnagiri District, and Tamil Nadu State. I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Signature:

Date: 11.07.2024

Name: Dr.J.R.Moses

Designation: Chief Executive Officer

Name of the EIA Consultant Organization: M/s. Hubert Enviro Care Systems (P) Ltd, Chennai

NABET Certificate No & Validity: NABET/EIA/24-27/RA 0335, valid up to 31.03.2027.

Declaration of Experts contributing to the EIA

I, hereby, certify that I was involved in the EIA report for the project titled for "**Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha"** at Survey No.283 (Part), Sulamalai Village, Bargur Taluk, Krishnagiri District, and Tamil Nadu State. I was a part of the EIA team in the following capacity that developed the above EIA with the support of the following Functional Area Experts.

EIA Coordinator	
Name:	Mr. PVRS. Surendra
Signature:	PVRSSurendra
Date:	11.07.2024
Period of Involvement:	November 2023 to Till date

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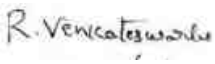
Functional Area Experts (FAEs)

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
1.	WP	Mr. Vamsee Krishna Navooru	**Period: November 2023 to Till date** **Task:** Selection of surface and ground water quality monitoring locations, and interpretation of analysis results. Identification and quantification of impacts and proposed suitable control measures and Environmental Management Plan.	
2.	SE	Mr. V. Dhivakar	**Period: November 2023 to Till date** **Task:** Site visit, Collection of secondary data, discussion with stake holders and Preparation of socio - economic status of the study area. Review of demographic characteristics, and supervision of baseline data collection. Collection	

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
			and analysis of perception study carried out for the proposed project.	
3.	EB	Dr. Rajkumar Samuel	**Period: November 2023 to Till date** **Task:** Primary ecological survey and assessment of flora and fauna with respect to the core and buffer zone in study area and development of EMP. Collection of data from secondary sources and comparing with field data, compilation of Ecology and bio diversity data and their impact assessment on the study area.	
4.	LU	Mr. Venkateswarlu	**Period: January 2024 to March 2024** **Task :** Development of land use maps of study area using GIS / related tools, site visit for ground reality survey, finalization of land use maps and studying the ecologically sensitive details in the study area as per Topo map and Gazette notifications.	
5.	AP	Mr. Tamil Selvan B	**Period: November 2023 to Till date** **Task:** Selection of air quality monitoring location, and interpretation of ambient air quality results. Estimation of fugitive emissions, identification and assessing of impacts due to air pollution and suggested suitable mitigation measures.	
6.	AQ	Mr. Tamil Selvan B	**Period: November 2023 to Till date** **Task:** Collection and developing of micro-meteorological data from secondary sources, preparing site specific wind rose pattern, prediction of dispersion of pollutants and incremental pollution levels with air quality modelling. Identification of impacts and proposed the suitable control measures, development of EMP.	
7.	NV	Mr. Vamsee Krishna Navooru	**Period: January 2024 to March 2024** **Task:** Identification of noise monitoring locations and measured the ambient noise levels & vibrations generated due to various activities.	

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
			Identifying the probable impacts due to noise & vibrations and suggested noise pollution control measures along with environmental management plan.	
8.	GEO	B. Mallikarjuna Rao	**Period: January 2024 to March 2024** **Task:** Studying the site topography, geology, geomorphological analysis, and existing available mineral resources. Studying of ground profile, assessing of environmental impacts due to proposed activity and proposed suitable mitigation measures	
9.	HG	Mr.PVRS Surendra	**Period: November 2023 to Till date** **Task**: Identification of ground water potential in the study area, analysis of surface hydrogeological data, its flow rate and direction. Preparation of report with respect to hydrogeological condition in and around the study area	
10.	SC	Dr. B.C. Nagaraja	**Period: January 2024 to March 2024** **Task:** Identification of soil quality monitoring locations, assessing of soil nutrients/characteristics in the study area, assessing the impacts on soil and proposing the soil management practices during construction and operation phase of project.	
11.	SHW	Mr. Vamsee Krishna Navooru	**Period: November 2023 to Till date** **Task:** Quantification of Municipal solid waste and hazardous waste generation and suggesting management measures, methodologies for handling, treatment, disposal and storage of generated wastes.	
12.	RH	Dr. J R Moses	**Period: November 2023 to Till date** **Task:** Identification of hazardous materials, fire accidents within the facility and validation of existing risk assessment & Disaster management	

S. No.	Functional Areas	Name of the Expert	Period of Involvement	Signature
			plan along with the preparation of risk assessment report for the proposed unit with consequence analysis and mitigation measures.	

EIA Team Members:

S. No	Name	Role
1.	Pravina Rachel Moses	TM for WP & EB
2.	Raj MP	TM for LU & WP
3.	Dr Ramrajan S	TM for EB
4.	Praveenkumaar R	TM for EC
5.	Mahadevi T	FAA for AP & AQ
6.	Mona devi M	TM for EC & AP
7.	P. Umamaheswari	TM for LU & HG
8.	M.Prabu	TM for SHW

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 - Socio-economics

HG - Hydrology, ground water and water conservation

GEO - Geology

RH - Risk assessment and hazards management

SHW - Solid and hazardous waste management

SC - Soil Conservation

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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
CSR	Corporate Social Responsibility
DMP	Disaster Management Plan
EAC	Expert Appraisal Committee
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Plan
GLC	Ground Level Concentration
GO	Government Order
ISO	International Organization for Standardization
kWh	Kilowatt Hour
MMR	Metalliferous Mines Regulations
NAAQ	National Ambient Air Quality
PCU	Passenger Car Unit
R & D	Research & Development
RA	Risk Assessment
ROM	Run of Mines
SOM	Scheme of Mining
SEIAA	State Environmental Impact Assessment Authority
SEAC	State Expert Appraisal Committee
TAMIN	Tamil Nadu Minerals Limited
TDS	Total Dissolved Solids
TNPCB	Tamil Nadu Pollution Control Board
TOR	Terms of Reference
TSDF	Treatment, Storage and Disposal Facility
kVA	kilo Volt Ampere

Executive Summary

1. Introduction

The project proponent TAMIN has obtained mining lease for the existing Grey granite quarry over an extent of 55.22.55 Ha vide G.O. (3D) No.268, Industries Department (MME.1), dated: 21.06.1999 to 20.06.2019 at S.F.No.283 & 247 of Sulamalai Village, Krishnagiri Taluk, Dharmapuri District. Subsequently, TAMIN has surrendered the mining lease area of 6.13.0 Ha vide G.O. (4D) No.2. Industries Department (MME1), dated: 07.06.2002 at S.F.No. 247 of Sulamali Village, Krishnagiri Taluk, Dharmapuri District and the total extent of mining lease area reduced to 49.09.5Ha.

After that the mining plan approved for mining lease area of 34.35.5Ha by Commissioner of Geology and Mining vide Letter No. 13592/MM2/2001, dated: 31.12.2002. The project proponent obtained ToR with public hearing vide letter No. SEIAA-TN/3889/SEACLXVIII/ToR-231/2015, dated: 06.11.2015 in regard to the application submitted vide Rc.No.3445/ML3/2015, dated: 08.09.2015. Public hearing conducted on 15.02.2017 and submitted final EIA report for seeking Environmental Clearance dated: 17.04.2017.

As per MoEF&CC notification vide S.O.804(E) Dt.14.03.2017 & MoEF&CC notification S.O.1030 (E) Dt.08.03.2018, the quarry operate without EC comes under Violation. Hence the proponent has applied for in the violation window i.e., 14.03.2017 to 18.04.2018 to MoEF&CC vide online proposal No.IA/TN/MIN/68063/2017 dated: 07.09.2017.

The quarry operation is done without prior Environmental Clearance from 15.01.2016 to 10.01.2017.

Table- 1 Excavated details during violation period 15.01.2016 to 10.01.2017

S.No	Type of Mineral	Excavated Quantity (m^3)	Depth (m)
1.	Grey Granite	300396	12

Subsequently, MoEF&CC transferred the file to SEIAA vide online proposal No.SIA/TN/MIN/23926/2018 dated: 09.04.2018. SEIAA issued ToR under violation category vide Lr No. SEIAA-TN/F.No.3889/ToR-439/2018 dated: 30.05.2018 and validity of the ToR issued expired as on 29.05.2023. In meanwhile the lease period was expired on 20.06.2019 so the proponent was unable to continue the EC process.

TAMIN applied for quarry lease of 20 years on 06.06.2018 for the proposed Sulamalai Grey granite quarry over an extent of 34.35.5 Ha located at S.F.No.283 (P) of Sulamalai Village, Bargur Taluk and Krishnagiri District. The District Collector and the Commissioner of Geology and Mining have recommended the quarry lease application for a period of 20 years under Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959. The Government after carefully examined the recommendation of the District Collector and the Commissioner of Geology and Mining, have decided to communicate the precise area for the above said area vide Government letter No.3821994/MME.1/2022-1, dated: 14.02.2023 under sub-rule (3)(b) of Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959 for grant of quarry lease. The mining plan was approved by the Director of Geology and Mining, Guindy, Chennai vide letter Rc. No.6262/MM4/2019 dated 19.09.2023. Based on MoEF&CC OM , dated 09.09.2019 (Para No. 8 & 9).

Subsequently ToR application submitted to TN-SEIAA vide online proposal No. SIA/TN/MIN/453082/2023, dated: 23.11.2023 under violation category as lateral entry for the proposed production capacity of ROM 30,000 m^3(Recovery @ 25%-7,500m^3 & Rejects @ 75%-22,500m^3)of grey granite for the depth of 29m from top of hill as per the approved mining plan for the period of five years.

The proposal was appraised during 431st SEAC meeting held on 12.12.2023 and 688th SEIAA meeting held on 10.01.2024 and Violation, ToR was issued vide Letter No. SEIAA-TN/F.No.10547/2023/Violation/ToR-1649/2023, dated: 10.01.2024.

The Draft EIA/EMP report is submitted for Public Hearing (PH). After completion of Public Hearing, the minutes raised will be incorporated in the EIA report along with action plan. Final EIA report will be uploaded in the Parivesh portal for further appraisal of the project and obtaining Environmental Clearance.

Table-2 Salient Features of the Project Site

Survey No	S.F.No.283 (Part)
Village	Sulamalai Village
Taluk and District	Bargur Taluk, Krishnagiri District
State	Tamil Nadu
Toposheets No.	D44S2,3,6&7
Latitude	12°29'30.83230"N to 12°30'0.25552"N
Longitude	78°17'28.61642"E to 78°18'0.33892"E
Extent Area	34.35.5 Ha
Land Classification	Govt Poramboke Land
Lease Period	20 years
Estimated Geological Reserves (ROM) m^3	Grey Granite-4,38,325 m^3

Estimated Mineable Reserves (ROM) m^3	Grey Granite-2,18,631 m^3
Production Capacity	Grey Granite-30,000 m^3
Annual peak production in m^3	12,000 m^3
Depth of Mining	29m from the surface level and the top surface of the granite body
Method of Mining	Open cast semi mechanized method
Nearest town	Krishnagiri~7km, W
Nearest railway station	Patchur ~20.80km, ENE
Nearest railway line	Patchur-Mulanur Railway line~16.14km, NE
Nearest airport	➢ Hosur Airport ≃58.30km (WNW) ➢ Kempegowda International Airport, Bengaluru 96.87km (NW)
Water Requirement	1.5 KLD
Power Requirement	125kVA
Fuel Requirements	200 liters per day

2. PROJECT DESCRIPTION

2.1 Method of Quarrying

An open cast quarrying by semi-mechanized method will be adopted to operate the quarry. Total production will be Grey Granite-7,500m^3 (@ 25% recovery). 1 No. of Excavator having 300LC capacity Tata Hitachi will be used for excavation and 2 no of 25 tones capacity Ashok Leyland Dumpers will be used during loading.

2.2 Reserves of Granite

The Geological reserves of grey granite have been computed based on the Geological Plan & Sections up to the economically workable average depth of 29m from the top of hill was 4,38,325 m^3.

Mineable Reserves have been computed as 2,18,631 m^3 after leaving the reserves locked up in safety barrier and benches based on the Conceptual Plan and sections, the effective(Saleable) Mineable Reserves have been worked out as 54,658 m^3 by applying the recovery factor 25%. The total proposed ROM is 30,000m^3. The annual peak production per year would be 12,000 m^3 of ROM.

Table-3 Year wise production as per Mining Plan

S. No	Year	ROM (m^3)	Recovery@ 25% (m^3)	Granite Waste @ 75 % (m^3)
1	1st Year	6,000	1,500	4,500
2	2nd Year	12,000	3,000	9,000
3	3rd Year	4,000	1,000	3,000

4	4thYear	4,000	1,000	3,000
5	5thYear	4,000	1,000	3,000
Total		**30,000**	**7,500**	**22,500**

2.3 Waste Management

The waste generated during the mining operation like side burden, granite rejects and the non-recoverable/un sized boulders and rubbles etc, will be dumped in the suitable area already selected. The area of disposal waste rock has been identified in northern portion of the lease area. The unsold blocks are kept within the boundary on the country rock area.

2.4 Greenbelt Details

The total area for the proposed green belt is 0.10.0 Ha during 5 years of the proposed quarrying activity and it is proposed to plant 200 no's of trees within the 7.5m safety buffer zone mine lease area.

Table-4 Proposed Greenbelt Development Details

Year	No of trees proposed to be planted	Area to be covered in m^2	Name of the species to be plant	Survival rate expected in %	No of trees expected to be grown
I to V year	200	1000	Neem, Vilvam, Aathi, Panai	80	160

2.5 Land use Pattern of the quarry area

Table-5 Land use pattern of the study area

S.No	Description	Present area (Ha)	Mining plan period (Ha)
1.	Area Under Quarrying	4.34.5	0.18.5
2.	Waste dump	2.62.5	3.83.0
3.	Infrastructure	0.02.0	-
4.	Roads	0.42.0	-
5.	Green Belt	1.64.5	0.10.0
6.	Un-utilized	25.30.0	21.18.5
	Total	**34.35.5**	**25.30.0**

3. IMPACTS AND MITIGATION MEASURES

Impacts due to Mining Activity

Various environmental impacts, which have been identified due to the mining operations, are discussed in the following sections. The environmental parameters most commonly affected by mining activities are:

3.1. Soil Environment

3.1.1. Impacts

Potential impacts 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.

3.1.2. Mitigation Measures

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

3.2 Land Environment

3.2.1 Land Degradation

The impact will be due to the following:

- Land degradation due to disposal of large volume of waste materials.
- Creation of infrastructural facilities like office, rest shelter, first-aid centre and other service facilities.

3.2.2 Mitigation Measures

- Dust suppression using water tankers.
- Contour overburden dump to minimize erosion
- Greenbelt around infrastructures within the mine lease area and along the road by using native plants.

3.3 Air Environment

3.3.1 Impacts on Air Environment

The major air pollution sources from the mining operations are DG sets, mining activities like drilling, and transportation. The DG sets are provided with stacks of adequate height to disperse the emanating flue gases containing suspended particulate matter, oxides of Sulphur and nitrogen without affecting the ground level concentrations. The emissions mainly generated from the

mining activities are Controlled 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-6**.

Table-6 Sources of air pollution at quarry

S. No	Source of emission	Pollutant
1.	Excavation of Granite	PM
2.	Operation of diesel driven equipment	Gaseous emission
3.	Transportation of product	PM

3.3.2 Mitigation measures

- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Using controlled blasting, the impact of air pollution was mitigated.
- The production of blast fumes containing noxious gases will be reduced by the following methods:
    - Use of adequate booster/primer.
    - Proper stemming of the blast hole.
    - Development of greenbelt.

Table-7 Dust control measures in quarry

S. No	Activities	Best practices
1	Drilling	➢ Drills should be provided with dust extractors (dry or wet system)
2	Blasting	➢ Water spray before blasting ➢ Water spray on blasted material prior to transportation ➢ Use of control blasting technique
3	Loading	➢ Water spray
4	Hauling (emissions from roads)	➢ Water spray, treatment with surface agents, soil stabilization, paving, traffic control.
5	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

3.3.3 Air Quality Modelling

Total maximum GLCs from emissions are given in below Table-8.

Table-8 Total maximum GLCs from emissions

Pollutant	Max. Base Line Conc. (µg/m³)	Estimated Incremental Conc. (µg/m³)	Total Conc. (µg/m³)	NAAQ standard
PM	69.60	0.10	69.70	100
SO_2	11.19	0.09	11.28	80
NO_X	23.01	0.57	23.58	80

The maximum ground level concentration observed due to mining activities and traffic movement through Air Modelling for PM, SO_2 and NO_x are 69.70µg/m³, 11.28µg/m³, 23.58µg/m³ and 23.58 µg/m³ respectively.

3.4 Impacts due to Transportation

The Granite is transported to consumer directly as per buyer's requirement. The granite will be transported through existing road by tippers and approx. no. of trips required is 2 times per week. This minimum trip does not create impact on existing transportation. The vehicular movement for the proposed project is given in **Table-9.**

Table-9 Traffic Volume after Implementation of the Project

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	322	343	15000	0.02	"A"	Free Flow Traffic
After implementation	330	435	15000	0.02	"A"	Free Flow Traffic

*LOS (Level of Service) categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow

Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.

3.4.1 Mitigation Measures

- Regular water sprinkling on haul and access roads.
- Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
- Utmost care will be taken to prevent spillage of sand and stone from the trucks.

3.5 Wastewater Generation

There is no effluent generation. The domestic sewage of 0.4 KLD will be disposed through septic tank followed by soak pit.

3.5.1 Mitigation Measures

3.5.1.1 Surface Water Pollution Control Measures

- Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas.
- During monsoon season, the rain water will be collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development.
- The dump tops will be provided with inner slopes to control water flow to prevent erosion washouts. The dumps tops and slopes of in active areas will be covered with grasses, shrubs, mulching, etc, to prevent erosion, till final backfilling of dumps into mined out areas.

3.5.1.2 Ground Water Pollution Control Measures

- The domestic sewage from the toilets will be routed to septic tanks.
- Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.

3.5.1.3 Rain Water Harvesting

The rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities.

3.5.1.4 Mitigation Measures

- Construct barriers at suitable intervals along the path of the drains.
- Provide necessary overflow arrangement to maintain the natural drainage system.

3.6 Noise Environment

3.6.1 Impact of Noise

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

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

3.6.1.1 Noise due to Drilling, Excavation and Transportation

The noise levels in the working environment will be maintained within the standards prescribed by Occupational Safety and Health Administration (OSHA). These standards were established with the emphasis on reducing the hearing loss. The permissible limits, as laid down by OSHA, are presented in **Table-10.**

Table-10 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)

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

3.6.1.2 Noise Due to Blasting

Blasting activities are involved in this Quarry as green belt will be developed around the mine which restricts the propagation of noise. The main source of noise in quarrying is due to usage of machinery like excavators, mining tippers and compressors and diesel generators.

3.6.2 Mitigate Measures

Following mitigation measures should be taken to control noise pollution:

- Wherever the noise levels exceed 85 dB (A), workers should be provided with earmuffs, ear plugs etc.
- All vehicles and machinery will be properly lubricated and maintained regularly.
- Speed of the Vehicles entering and leaving the quarrying lease will be limited to 25 kmph.
- Unnecessary use of horns by the drivers of the vehicles shall be avoided.
- Controlled blasting with proper spacing, burden and stemming will be maintained
- No secondary blasting.
- Minimum quantity of detonating fuse will be consumed by using alternatively Excel non-electrical initiation system.
- The blasting will be carried out during favourable atmospheric condition and less human activity timings.

3.7 Impact of Vibration

Blasting activities are involved in Granite Quarry operations. The vibration during the moment of machinery will be minimal for a short span that will be well within the prescribed limits.

3.7.1 Mitigation Measures

- Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting.
- Using controlled blasting techniques.
- Safe blasting zones are kept around the periphery of the quarry.

- Overcharging will be avoided. The charge per delay will be minimized and preferably more number of delays will be used per blasts.
- Proposed peripheral green belt will be developed in 7.5m safety zone around the quarry

3.8 Impact on Human Settlement

There are no monuments or places of worships in mine area. Ground vibration and noise pollution is maintained minimal and confined to the mine area. The quality of water both surface and ground water is good and all parameters of drinking water are as per IS standards. Water quality analysis will be carried out at periodical intervals during post project monitoring.

The PM, NOx and SO_2 have been observed to be below the prescribed limit. Noise levels have also been found to be below the permissible limits at all the locations.

3.8.1 Mitigation Measures

- The noise generated in the lease area will get attenuated due to plantation all around the lease area.
- As preventive measures, greenbelt development around the mine lease area will be further strengthening for control of air emission to environment.
- All the employees when inducted will be medically examined.

3.9 Biological Environment

3.9.1 Mining activities and their impact on biodiversity

Table-11 Impacts on Biodiversity

S. No	Activity	Examples of aspects	Examples of biodiversity impact
1	Excavation	Land clearing	Loss of habitat, introduction of plant diseases, Siltation of water courses
2	Blasting, Digging and hauling	Dust, noise ,vibration, water pollution	Disruption of water courses ,impacts on aquatic ecosystems due to changes in hydrology and water quality
3	Waste dumping	Clearing, water and soil pollution	Loss of habitat, soil and water contamination, sedimentation.
4	Air emissions	Air pollution	Loss of habitat or species
5	Waste disposal	Oil and water pollution	Encouragement of pests, disease transfer, contamination of groundwater and soil
6	Access roads	Land clearing	Habitat loss or fragmentation, water logging upslope and drainage shadows down slope

7	Water supply (potable or industrial)	Water abstraction or mine dewatering	Loss or changes in habitat or species composition

3.9.2 Mitigation Measures

To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

3.10 Impacts on Occupational Health due to project operations

Anticipated occupational illness sequel to mining activities involved in the project. Occupational health problems due to dust & noise and Occupational illness by quarry activities are as follows;

- Dust related pneumonia
- Tuberculosis
- Rheumatic arthritis
- Segmental vibration

3.10.1 Mitigation Measures for Occupational Health

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- Plantation
- Avoid blasting during unfavourable wind & atmospheric conditions.
- Use of personal protective equipment. Compliance with DGMS circulars.
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.

Table-12 Mitigation for occupational health and safety

S. No	Activity	Mitigation measures
1	Excavation	➢ Planned excavation, avoid haphazard mining
2	Drilling and blasting	➢ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs. ➢ Using controlled blasting techniques
3	Safety zone	➢ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width. ➢ Restricted entry, use of sirens and cordoning of the lasting area are some of the good practices to avoid accidents.

4	Overburden stabilization	➢ Accidents are known to happen due to overburden collapse. ➢ Therefore, slope stabilization and dump stability are critical issues for safety and environment. Proper measures will be taken care.
5	Worker's health surveillance	➢ Health survey programmes for workers and local community. ➢ Regular training and awareness of employees to be conducted to meet health and safety objectives.

3.11 Mitigate Measures for Safety Aspects

- To reduce pollution emanation from quarry operations, carry out splitting of sheet rock by diamond wire saw which largely reduces the dust and noise generation.
- Water sprinkling on haul roads and dumping yards, etc.
- Green belt creation wherever possible to arrest dust and reduce noise propagation.
- All staff and workers will be provided with PPE to guard against excess noise levels
- Provision of safety Helmets, goggles, safety boots, ear muffs, gas masks, etc.
- To provide appropriate instruction, training, retraining, vocational training, etc.
- Organization of safety contests and safety campaigns regularly to update knowledge of safe operational procedures, etc.
- Observation and compliance of all precautions, control measures and stipulations on above lines will ensure that in this project, health and safety problems will be minimal.

4. PROJECT COST & ESTIMATED TIME OF COMPLETION

4.1. Project Cost

The estimated project cost is given below Table-13.

Table-13 Project cost

S. No	Description of the Cost	Amount in Rs.
A.	**Fixed Cost**	
1	Land Cost	Nil. Because Govt. land
2	Labour shed	50,000/-
3	Sanitary facilities	50,000/-
4	Fencing Cost	1,25,000/-
	Total	**2,25,000/-**
B.	**Operational Cost**	
1	Jack Hammers	1,98,000/-
2	Compressor	19,82,000/-
3	Diamond wire saw	4,87,000/-
4	Diesel General	4,00,000/-
5	Excavators	6,00,000/-
6	Tippers	58,00,000/-
7	Drinking water facilities for the labours	50,000/-
8	Safety kits	50,000/-
	Total Operational Cost	**95,67,000/-**
C.	**EMP Cost**	

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

4.2. Proposed schedule for approval and implementation

The time schedule for the completion of the proposed mining project is given in the below as,

Table-14 Project schedule

Particulars	Time Schedule
Submission of Draft EIA/EMP to TNPCB for Public Hearing	July 2024
Conducting Public Hearing and submitting final EIA/EMP	August 2024
Presentation before SEAC and Obtaining EC	October 2024

The project will be implemented after Obtaining EC from SEIAA and CTO from PCB.

5. MINING CLOSURE PLAN

Progressive Mine Closure Plan

The quarry is not proposed to back fill the ultimate pit, in as much as good quantity of reserves is available below the workable depth of 29m and there is possibility of technology of up gradation in granite mining for greater depths in course of time for safe mining at economic cost beyond 29m depth. At the end of the quarry, pit boundaries shall be safely fenced with 7.5m buffer safety zone and rain water or seepage water stored in the pit will be used for agriculture purpose.

6. REHABILITATION AND RESETTLEMENT

There will be no Rehabilitation and Resettlement in this proposed project

7. SITE ANALYSIS

Environmental sensitive such as water bodies, reserved forest, wildlife sanctuary, national park, human settlements and other ecological features are given below.

7.1 Environmentally/Ecologically Sensitive areas

The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in below Table-15.

Table-15 Lists of Waterbodies

S.No	Water bodies	Distance (~km)	Direction
1.	Odai	Adjacent to Site	N

2.	Gettur Lake	0.49	E
3.	Mattur Ar	2.35	NE
4.	Badatalav Eri	7.31	NW
5.	Bargur Ar	7.90	ENE
6.	Canal near Malaiyandahalli	7.91	SW
7.	Timmapuram Lake	8.26	SW
8.	Badatalav Supply Channel	9.20	NW
9.	Ponnaiyar R	9.51	WSW
10.	Baleguli Eri	9.82	S
11.	Darai Cheruvu Vanka	10.56	NNE
12.	Krishnagiri Dam/Krishnagiri Reservoir Project(KRP) Dam	11.20	W
13.	Thirthamadugu Ar	13.45	NNE

Table-16 List of Reserved Forests

S.No	Reserved Forests	Distance(km)	Direction
1	Togarappalli RF	4.40	SE
2	Varatanapalli RF	6.18	NNE
3	Bargur RF	9.20	ENE
4	Tattakkal RF	10.83	S
5	Neralakotta RF	11.27	NE
6	Nandi Banda RF	12.35	ENE
7	Maharajagadai Ext RF	12.36	N
8	Naralapalli RF	12.99	NNW
9	Maharajagadai RF	13.35	N
10	Kothur RF	14.98	NE

8. BASELINE STUDY

8.1 Study Period

The baseline environmental surveys were carried out during **(January 2024 – March 2024)** within the study area.

8.2 Ambient Air Quality

Table-17 Summary of Ambient Air Quality Monitoring

S.No	Parameters ($\mu g/m^3$)	Minimum of Average	Maximum of Average	NAAQ Standards
1.	PM10 ($\mu g/m^3$)	56.35	58.57	100
2.	PM2.5 ($\mu g/m^3$)	33.18	35.50	60
p3.	SO2 ($\mu g/m^3$)	6.24	9.42	80
4.	NO2 ($\mu g/m^3$)	12.70	19.37	80

The ambient air quality has been monitored at 8 locations for 13 parameters as per NAAQS, 2009 within the study area.

8.3 Noise Environment

Ambient noise levels were monitored using precision noise level meter in and around the project site at 10 km radius at 8 locations during study period.

- In residential area day time noise levels varied from 50.4 dB (A) to 53.9 dB(A) and night time noise levels varied from 40.1 dB(A) to 42.9 dB(A)across the sampling stations. The field observations during the study period the ambient noise levels except one Residential area noise is not within the limit prescribed by MoEF&CC (55 dB(A) Day time & 45 dB(A) Night time).

8.4 Water Quality

The prevailing status of water quality at 8 locations for surface water and 8 locations for ground water have been assessed during the study period. The standard methods prescribed in IS 2296:1992 were followed for sample collection, preservation and analysis in the laboratory for various physiochemical parameters.

8.4.1 Surface water quality

Table-18 Summary of Surface Water Quality Monitoring

S.No	Parameters	Minimum	Maximum	IS 2296:1992 Standards
1.	pH	7.21	7.81	6.5 – 8.5
2.	TDS (mg/l)	283	365	500
3.	COD (mg/l)	16	32	-
4.	BOD (mg/l)	2	4	2
5.	Total Hardness(mg/l)	175	211	-

8.4.2 Ground Water Quality

Table-19 Summary of Ground Water Quality Monitoring

S.NO	Parameters	Minimum	Maximum	IS 10500: 2012 Standards	
				Acceptable Limit	Permissible Limit
1.	pH	7.31	7.79	6.5 – 8.5	NR
2.	Chloride	18.34	52.14	500	2000
3.	Total Hardness (mg/l)	151	257	200	600
4.	Sulphate	12	49	200	400
5.	TDS	278	497	500	2000

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

8.5 Soil Quality

Assessment of soil characteristics is of paramount importance for the soil fertility and quality. Soil sampling was carried out at eight locations in the study area. The summary of the soil quality is given below,

Table-20 Summary of Soil Quality Monitoring

S.No	Parameters	Minimum	Maximum
1.	pH	6.78	8.31
2.	Electrical conductivity (µs/cm)	218	389
3.	Nitrogen (mg/kg)	124.92	408.42
4.	Phosphorus (mg/kg)	18.98	33.05
5.	Potassium (mg/kg)	73.30	144.31

9. WASTE HANDLING

9.1 Solid Waste Management

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

Table-21 Municipal Solid Waste generation & Management

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

As per CPHEEO guidelines: MSW per capita/day =0.45

9.2 Hazardous waste Management

The type of hazardous waste and the quantity generated are detailed in **Table-21**.

Table-22 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.

10. POST PROJECT MONITORING

10.1 Post Project Environmental Monitoring

The Project proponent set up regular monitoring stations to assess the quality of the environment.

Table-23 Post Project Environmental Monitoring Program

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed
1.	Meteorology	One	Hourly and Daily basis.	Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall.
2.	Ambient Air Quality	2 Stations (In downwind)	Twice a week:24 hourly period	PM10, PM2.5, SO2, and NO2
3.	Noise	2 (two within core area and two in buffer area)	Once every season	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4	Exhaust from DG set	Stack of DG set	Quarterly	PM10, PM2.5, SO2 & CO
5	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU
6	Soil	Two Locations within the Project Site	Yearly Once	Physico chemical properties, Nutrients, Heavy metals
7	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants
8	Surface/ Ground water quality	Two Locations Within Project Site	Yearly Once	As per IS 2296: 1992 & ISO 10500:2012 Standard parameters

11. DAMAGE ASSESSMENT REPORT

The TAMIN has operated this grey granite quarry (overa an area of 34.35.5 Ha) without prior Environment clearance from the period of 15.01.2016-10.01.2017 within the existing quarry depth of 12m and excavated quantity of 3,00,396 m^3,as per the letter given by Director of Department of Geology and Mining, vide Rc.No. 550/MM4/2019 dated: 27.07.2020. Hence The Damage Assessment for the violation period has been calculated for the period from 15.01.2016-10.01.2017 as per MOEF&CC SOP O.M F.No. 19-125/2019-IA.III Dated 5th March 2020. Based on

the above said notification guidelines the Damage Assessment has been calculated on six following aspects.

1. Air Environment
2. Water Environment
3. Green Belt
4. Noise and Vibration Environment
5. Solid Waste Management
6. Land Environment

Also the economic benefits based on the turnover of the quarried quantity and the arrived Damage Cost. The penalty provision has been calculated based on the O.M F.No. 22-21/2020-IA.III Dated 07.07.2021. A maximum of 3.0% of the net profit as computed will be added to the total damage cost and will be used for community resource augmentation. The proponent did not sell any quarried granite blocks. Hence the turnover is zero. The Damage Assessment cost, Penalty need to be paid to TNPCB for the violation were summarized in below **Table -24.**

Table -24 Summary of Damage Assessment

S. No	Damage Assessment Cost in Lakhs (Rs)	Remediation Plan, Natural Resource & Community Resource Augmentation Plan Cost in Lakhs (Rs)	Penalty for violation cost in Lakhs (Rs)
1.	2,10,716	2,10,716	0.9

12. CONCLUSION

The proposed **"Sulamalai grey granite quarry"** will be beneficial for the development of the nearby villages. Due to this proposed quarry, 30 no's of employment potential will be deployed which increase the social benefits of nearby villages. Environmental aspects like dust emission, noise, siltation due to surface run-off, etc. will have to be controlled within the permissible limit to avoid impacts on the surrounding environment. Necessary pollution control equipment like water sprinkling, plantation, personal protective equipment, etc., will form regular practice in the project. Additional pollution control measures and environmental conservation measures will be adopted to control/minimize impacts on the environment and socio-economic environment of the area. Measures like development of green belt and plantation along with transport road will be created. The CER measures proposed to be adopted by the proponent will improve the social and economic status of the nearby villages.

1 INTRODUCTION OF THE PROJECT

1.1 Purpose of the Report

The Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha is located at S.F.No.283 (Part), Sulamalai Village, BargurTaluk, Krishnagiri District, Tamil Nadu State. The land use classification of the project site is government Poramboke land. The quarry lease was applied vide Letter No. 3821994/MME.1/2022-1, dated 14.02.2023 for 20 years. Precise area communication letter enclosed as **Annexure –2.**

The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per MoEF&CC notification and its amendment vide S. O. 804(E) dated 14th March 2017 and MoEF&CC notification S.O.1030 (E) dated 08.03.2018. TAMIN commenced the mining operation without prior environmental clearance. Hence, this is a violation project. ToR application submitted to TN SEIAA vide online proposal No. SIA/TN/MIN/453082/2023, dated: 23.11.2023. The total proposed production capacity of the quarry is 30,000 m^3 for the period of five years, for the depth of 29m from top of hill as per the approved mining plan. Total Geological Reserves in the area is 4,38,325m^3 & the Updated Mineable Reserves is 2,18,631m^3, as on 28.02.2023. Based on MoEF&CC OM , dated 09.09.2019 (Para No. 8 & 9), TAMIN has requested SEAC/SEIAA to approve ToR under violation category, since the ToR application has been submitted with detailed request letter vide Rc No.1342/ML5/2023,dt.21.11.2023 as lateral entry for ToR under Violation.

The proposal was appraised during 431st SEAC meeting held on 12.12.2023 and 688th SEIAA meeting held on 10.01.2024 and Violation ToR was issued vide **Letter No. SEIAA-TN/F.No.10547/2023/Violation/ToR-1649/2023, dated: 10.01.2024.** The ToR is attached as **Annexure-1.**

The Draft EIA/EMP report will be submitted for Public Hearing (PH). After completion of Public Hearing, the minutes raised will be incorporated in the EIA report along with action plan. Final EIA report will be uploaded in the Parivesh portal for further appraisal of the project and obtaining Environmental Clearance.

1.2 Project Back Ground

Originally, the project proponent TAMIN has obtained mining lease for the existing Grey granite quarry over an extent of 55.22.55 Ha vide G.O. (3D) No.268, Industries Department (MME.1), dated: 21.06.1999 to 20.06.2019 at S.F.No.283 & 247 of Sulamalai Village, Krishnagiri Taluk, Dharmapuri District. Subsequently, tamin has surrendered the mining lease area of 6.13.0 Ha vide

G.O. (4D) No.2. Industries Department (MME1), dated: 07.06.2002 at S.F.No. 247 of Sulamalai Village, Krishnagiri Taluk, Dharmapuri District and the total extent of mining lease area reduced to 49.09.5Ha.

After that the mining plan approved for mining lease area of 34.35.5Ha by Commissioner of Geology and Mining vide Letter No. 13592/MM2/2001, dated: 31.12.2002. The project proponent obtained ToR with public hearing vide letter No. SEIAA-TN/3889/SEACLXVIII/ToR-231/2015, dated: 06.11.2015 in regard to the application submitted vide Rc.No.3445/ML3/2015, dated: 08.09.2015. Public hearing conducted on 15.02.2017 and submitted final EIA report for seeking EC dated: 17.04.2017.

Table 1-1 Excavated details

S.No	Type of Mineral	Excavated Quantity (m^3)	Depth (m)
1.	Grey Granite	300396	12

As per MoEF&CC notification vide S.O.804(E) Dt.14.03.2017 & MoEF&CC notification S.O.1030 (E) Dt.08.03.2018, the quarry operated without prior EC comes under Violation. Hence the proponent has applied for in the violation window i.e., 14.03.2017 to 18.04.2018 to MoEF&CC vide online proposal No.IA/TN/MIN/68063/2017 dated: 07.09.2017. The quarry operation is done without prior Environmental Clearence from 15.01.2016 to 10.01.2017.

The excavated details are given below:

S.No	Type of Mineral	Excavated Quantity (m^3)	Depth (m)
1.	Grey Granite	300396	12

Subsequently, MoEF&CC transferred the file to SEIAA vide online proposal No.SIA/TN/MIN/23926/2018 dated: 09.04.2018. SEIAA issued ToR under violation category vide Lr No. SEIAA-TN/F.No.3889/ToR-439/2018 dated: 30.05.2018 and validity of the ToR issued expired as on 29.05.2023. Meanwhile the lease period was expired on 20.06.2019 so the proponent was unable to continue the EC process.

Tamin applied for quarry lease of 20 years on 06.06.2018 for the proposed Sulamalai Grey granite quarry over an extent of 34.35.5 Ha located at S.F.No.283 (P) of Sulamalai Village, Bargur Taluk and Krishnagiri District. The District Collector and the Commissioner of Geology and Mining have

recommended the quarry lease application for a period of 20 years under Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959. The Government after carefully examined the recommendation of the District Collector and the Commissioner of Geology and Mining, have decided to communicate the precise area for the above said area vide Government letter No.3821994/MME.1/2022-1, dated: 14.02.2023 under sub-rule (3)(b) of Rule 8-C of the Tamil Nadu Minor Mineral Concession Rules, 1959 for grant of quarry lease. The mining plan was approved by the Director of Geology and Mining, Guindy, Chennai vide letter Rc. No.6262/MM4/2019 dated 19.09.2023.

Based on MoEF&CC OM , dated 09.09.2019 (Para No. 8 & 9), TAMIN has requested SEAC/SEIAA to approve tor under violation category, since the ToR application has been submitted with detailed request letter vide Rc No.1342/ML5/2023,dt.21.11.2023 under proposal no. SIA/TN/MIN/453082/2023 as lateral entry for ToR under Violation.

1.3 Identification of Project & Project Proponent

1.3.1 Identification of Project

The proposed quarry is over an extent of 34.35.5 ha located in S.F.No.283 (Part), located at Sulamalai Village, Bargur Taluk, Krishnagiri District, lies in the latitude of 12°29'30.83230"N to 12°30'0.25552"N and longitude of 78°17'28.61642"E to 78°18'0.33892"E. The area is marked in the survey of India Topo sheet No. D44S2,3,6&7. The Grey granite quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & width bench not less than the height. The area applied for quarry lease is hilly terrain; the altitude of the area is above ~622 m AMSL.

1.3.2 Project Proponent

Tamil Nadu Minerals Ltd also called TAMIN (An Undertaking of Government of Tamil Nadu) has been established in the year 1978 and it entered the international granite market in the year 1979 and has secured a steady market for dimensional blocks of black and other color materials in countries like Japan, Germany, Italy, Australia, UK, Switzerland, Holland, USA etc. TAMIN is only organization recognized by Bureau of Indian Standard for manufacture and supply of I.S. Sand all over the country. TAMIN has developed expertise in the mining of granite dimensional stones of different varieties including black granite (Dolerite), Kashmir white (Leptynite), Paradiso (Migmatite gneiss), Green onyx (Syenite - porphyry) Red wave (Pink Feldspathic gneiss) Colombo Juparana (Pegmatitic granite gneiss of migmatitic origin), Raw silk (Yellow feldspathic Lepthnite) and a number of other colored granite varieties apart from other industrial minerals viz. quartz and feldspar, graphite, lime stone, silica sand, vermiculite, etc.

1.4 Brief Description & Nature of the Project

The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per MoEF&CC notification. The project falls under violation category due to the mining operation of the subject area without prior environmental clearance as per MoEF&CC gazette notification no. S.O.804 (E) dated 14th March, 2017.

1.4.1 Size of the Project

The total extent area of the lease for this quarry is 34.35.5 Ha.The updated geological reserve of Grey granite estimated based on the geological cross-sections was 4,38,325 m^3 as on 28.02.2023. The updated mineable reserves for Grey granite have been arrived as 2, 18,631 m^3 on 28.02.2023. By applying 25% recovery, the updated minerable effective reserves as 54,658m^3. The proposed production capacity is 30,000m^3.

1.4.2 Location of the Project

The Grey granite mine is over an extent of 34.35.5 ha located in S.F.No.283 (Part), located at Sulamalai Village, Bargur Taluk, Krishnagiri District, lies in the latitude of 12°29'30.83230"N to 12°30'0.25552"N and longitude of 78°17'28.61642"E to 78°18'0.33892"E. The area is marked in the survey of India Topo sheet No. D44S2,3,6&7. Site Elevation is ~622m AMSL. The boundary coordinates of the project site are given in **Table 1-2.**

Table 1-2 Boundary Co-Ordinates of the Project site

S. No	Latitude (N)	Longitude (E)
BP1	12° 29' 30.83230"	78° 17' 58.46921"
BP2	12° 29' 40.32772"	78° 17' 53.26701"
BP3	12° 29' 45.96651"	78° 17' 48.21582"
BP4	12° 29' 47.34120"	78° 17' 45.27692"
BP5	12° 29' 43.43552"	78° 17' 33.15903"
BP6	12° 29' 47.70110"	78° 17' 32.60561"
BP7	12° 29' 47.91213"	78° 17' 33.01623"
BP8	12° 29' 50.44532"	78° 17' 31.39601"
BP9	12° 29' 49.92322"	78° 17' 30.76171"
BP10	12° 29' 50.84212"	78° 17' 29.99920"
BP11	12° 29' 53.09561"	78° 17' 28.61642"
BP12	12° 29' 52.91061"	78° 17' 29.11142"
BP13	12° 29' 55.90221"	78° 17' 29.15482"
BP14	12° 29' 57.65600"	78° 17' 31.91432"
BP15	12° 30' 0.25552"	78° 17' 39.67172"
BP16	12° 29' 59.89032"	78° 17' 44.99731"
BP17	12° 29' 59.17321"	78° 17' 53.70111"
BP18	12° 29' 55.22770"	78° 17' 56.95122"
BP19	12° 29' 47.67871"	78° 17' 59.82561"
BP20	12° 29' 44.60383"	78° 18' 0.33892"
BP21	12° 29' 42.72401"	78° 18' 0.31972"
BP22	12° 29' 42.74362"	78° 17' 59.66142"
BP23	12° 29' 33.81702"	78° 17' 59.72392"

1.5 EIA Study

As a part of compliance to the regulatory requirement i.e., to obtain Environmental Clearance from SEIAA-TN, TAMIN has appointed Environmental Consultant 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 EIA/EMP report under B1 category was assigned to M/s Hubert Enviro Care Systems (P) Ltd. (HECS) Chennai by the project proponent. HECS is accredited by NABET, vide possession of Certificate No.NABET/EIA/24-27/RA 0335, valid up to 31.03.2027.

1.6 EIA Cost

EIA study was undertaken by HECS for an amount of Rs. 2,67,500 Lakhs. The base line monitoring was done by HECS lab, Chennai, an NABL and MoEF Accredited Laboratory.

1.7 Scope of the Study

The scope of the work mentioned includes an assessment study of Granite mining 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 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.

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may rise during the quarry operational phases of the project. This report also highlights the Environmental Monitoring Program during the operation phase of the project and the post mined quarry 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:

Chapter 1: Introduction

Introductory information is presented in this Chapter. The introduction chapter provides background to the project, project proponent and describes the objective of this document. The purpose and organization of the report is also presented in this chapter.

Chapter 2: Project Description

This Chapter includes project description and infrastructure facilities delineating all the quarry operations and environmental aspect of the granite quarry operation phase activities.

Chapter 3: Description of the Environment

This Chapter provides baseline environmental status of environmental components (Primary data) delineating meteorological details of the project site and surrounding area.

Chapter 4: Anticipated Environmental Impacts & Mitigation Measures

This Chapter presents the analysis of impacts on the environmental and social aspects of the project as a result of establishment of plan and thereby suggesting the mitigation measures.

Chapter 5: Analysis of Alternatives (Technology and Sites)

This chapter includes the justification for the selection of the project site from environmental point of view as well as from economic point of view.

Chapter 6: Environmental Monitoring Program

This chapter will include the technical aspects of monitoring, the effectiveness of mitigation measures which will include the measurement methodologies, frequency, location, data analysis, reporting schedules etc.

Chapter 7: Additional Studies

This chapter will detail about the Public Consultation sought regarding the project. It will also identify the risks of the project in relation to the general public and the surrounding environment during quarry operation phase and thereby presents Disaster Management Plan. Social impact assessment and R&R action plans (if any).

Chapter 8: Project Benefits

This chapter deals with improvement in physical and social infrastructures, employment potential and other tangible benefits.

Chapter 9: Environmental Cost Benefit analysis

Not recommended during scoping

Chapter 10: Environmental Management Plan

This is the key Chapter of the report and presents the mitigation plan, covers the institutional and monitoring requirements to implement environmental mitigation measures and to assess their adequacy during project implementation.

Chapter 11: Summary and Conclusion

This chapter summarizes the information given in Chapters in this EIA/EMP report and the conclusion based on the environmental study, impact identification, mitigation measures and the environmental management plan.

Chapter 12: Disclosure of the Consultant

Names of consultants engaged in the preparation of the EIA/EMP report along with their brief resume and nature of Consultancy rendered are included in this Chapter.

1.8 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 10 km radius from the project.

1.9 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.

1.10 Applicable Regulatory Framework

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

1. Study of project information.
2. Screening & Scoping.
3. Environmental pre-feasibility study & application for approval of TOR.
4. Collection of detailed project management plan/report.
5. Baseline data collection.
6. Impact identification, Prediction & Evaluation.
7. Mitigation measures & delineation of EMP.
8. Risk assessment and safety & disaster management plan.
9. Review & finalization of EIA Report based on the TOR requirements.
10. Submission of EIA report for implementation of mitigation measures & EMP as well as necessary clearances from relevant Authority.

1.11 Legal Complicability

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

- The Water (Prevention and Control of Pollution) Act, 1974 as amended
- The Water (Prevention and Control of Pollution) Cess Act, 1977, as amended
- The Air (Prevention and Control of Pollution) Act, 1981 as amended (Air Act).
- The Noise Pollution and Regulation Act: 2000
- The Environment (Protection) Act, 1986 (EPA)
- The Wildlife (Protection) Act, 1972 as amended
- The Forest (Conservation) Act, 1980 as amended
- The Public Liability Insurance Act, 1991
- The Mines and Minerals (Regulation and Development) Act, 1957 as amended
- Circulars issued by the Director-General Mines Safety (DGMS).
- Contract Labor Regulation and Abolition Act 1970
- The Motor Vehicles Act – 1989
- PESO – Explosives and handling of Hazardous Material: 1934 amended in 2021.

1.12 Terms of Reference Compliance

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

Table 1-3 ToR Compliance

Additional TOR Specified by the SEAC to deal with violation aspects of the mining projects		
Section A		
As per the MoEF & CC Notification S.O.1030 (E) dated 08.03.2018		
S. No	**ToR details**	**Compliance**
1.	The Project proponent shall conduct and furnish minutes of Public hearing as per ToR issued and accordingly, the PP shall submit revised EIA/EMP for then life of the mine including progressive/final mine closure plan.	Public Hearing will be conducted and the respective PH minutes will be incorporated in the final EIA along with the compliance and action plan. The EMP details are given in **Chapter 10, Section 10.4, and Table 10-1**.
2.	The PP shall ensure that the waste/reject blocks dumped outside the mine lease area are removed.	The waste generated during the mining operation like side burden, granite rejects and the non recoverable/un sized boulders and rubbles etc, will be dumped in the suitable area already selected. The area of disposal waste rock has been identified in northern portion of the lease area. The unsold blocks are kept within the boundary on the country rock area.
3.	Copy of total penalty levied by the AD/DD, Dept of Geology and Mining, Krishnagiri District and copy of remittance of total penalty by PP.	TAMIN has obtained NOC letter from Director of Department of Geology and mining regarding the penalty levied, remittance and recommended to obtain Environmental Clearance from SEAC/SEIAA vide Rc. No. 550/MM4/2019 dated: 27.07.2020 and the same has been attached as Annexure 7.

<table>
<tr><td>4.</td><td>Details of status of credible action under EPA Act, 1986.</td><td>TAMIN has obtained NOC letter from Director of Department of Geology and mining regarding the status of Credible action and recommended to obtain Environmental Clearance from SEAC/SEIAA vide Rc. No. 550/MM4/2019 dated: 27.07.2020 and the same has been attached as Annexure 7.</td></tr>
<tr><td>5.</td><td>Details of dimension of existing pits within the existing area from AD/DD Dept of Geology and Mining, Dharmapuri District</td><td>The quarry operation is done without prior Environmental Clearence from 15.01.2016 to 10.01.2017
The excavated details are given below:
<table>
<tr><th>S.No</th><th>Type of Mineral</th><th>Excavated Quantity (m^3)</th><th>Depth (m)</th></tr>
<tr><td>1.</td><td>Grey Granite</td><td>300396</td><td>12</td></tr>
</table>
The AD mines letter will be submitted during final EIA submission.</td></tr>
<tr><td>6.</td><td>Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.</td><td>The nearest habitation is Gettur Village at distance of 0.32km in East Direction of the proposed project site

The VAO letter will be submitted during final EIA report.</td></tr>
<tr><td>7.</td><td>The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas. Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.</td><td>DFO letter is incorporated with Final EIA report. Reserved Forests, Protected Areas, Sanctuaries, and Tiger reserve etc., up to a radius of 15 km from the proposed site are provided in Chapter 3, Section 3.3, and Table 3-1.</td></tr>
<tr><td>8.</td><td>In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall prepare and submit an 'Action Plan' for carrying out the realignment of the benches in the proposed quarry lease after it is approved by the concerned Asst. Director of Geology and Mining during the time of appraisal for obtaining the EC.</td><td>Benches have been formed in this proposed quarry under Regulation 106 of MMR,1961. Hence, the question of 'Action Plan' for carrying out the realignment of the benches does not arise.</td></tr>
<tr><td>9.</td><td>The proponent shall submit a conceptual Slope Stability Plan for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30m.</td><td>Benches have been formed in this proposed quarry under Regulation 106 of MMR,1961. Hence, the question of 'Action Plan' for carrying out Slope stability study does not arise.</td></tr>
<tr><td>10.</td><td>The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster. mining mate, mine foreman, II/1 Class mines manager appointed by the proponent.</td><td>Blasting Affidavit is enclosed as Annexure-6.
The proponent will appointment Geologist/Agent , mine manager, Mine foreman, Mining Mate cum Blaster, machinery operators, Diesel Mechanic, Skilled workers and drivers, Semi-skilled & Unskilled workers for the execution of the quarry.</td></tr>
</table>

<table>
<tr><td>11.</td><td>The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.</td><td>The existing quarry videos will be submitted along with final EIA report.</td></tr>
<tr><td>12.</td><td>If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,
a) What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines.
b) Quantity of minerals mined out.
c) Highest production achieved in any one year.
d) Detail of approved depth of mining
e) Actual depth of the mining achieved earlier.
f) Name of the person already mined in that lease area.
g) If EC and CTO already obtained, the copy of the same shall be submitted.
h) Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.</td><td>The quarry operation is done without prior Environmental Clearence from 15.01.2016 to 10.01.2017
The excavated details are given below:
<table><tr><th>S.No</th><th>Type of Mineral</th><th>Excavated Quantity (m^3)</th><th>Depth (m)</th></tr><tr><td>1.</td><td>Grey Granite</td><td>300396</td><td>12</td></tr></table>
The AD mines letter will be submitted during final EIA submission.</td></tr>
<tr><td>13.</td><td>All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).</td><td>All corner coordinates are given in Chapter 1, Section 1.4.2, and Table 1-1.
Topo Map of the study area is given in Figure 3-1.
Geomorphology is given in Chapter 3,Section 3.4.11
Geology of the study area is given in Chapter 3, Section 3.4.14 & Figure 3-12.
Land use & Land cover is given in Chapter 3, Section 3.4.9, Table 3-2, Figure 3-4, Figure 3-5.</td></tr>
<tr><td>14.</td><td>The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,</td><td>The entire mine lease area along with green belt shall be video graphed through Drone will be submitted during final EIA submission.</td></tr>
</table>

15.	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	Photographs of adequate fencing, green belt along the periphery including replantation of existing trees will be submitted during final EIA submission.
16.	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	➢ The details of mineral reserves and mineable reserves are given in **Chapter 2, Section 2.5.2 and Table 2-4.** ➢ Yearwise production details are given in **Chapter 2, Table 2-5.** Method of mining is given in **Chapter 2, Section 2.8.** Mitigation of measures is given in **Chapter 4.**
17.	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act 1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.	The organization chart hierarchy is dicussed in **Chapter 10** and **Figure 10-1.**
18.	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD/TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.	Hydrogeological study will be conducted and report will be provided along with final EIA report. The depth of mining is 29m from the top of hill. Ground water occurrence in this area is 25m depth below from the ground level. The quarry operation restricted well above the water table, hence the quarry operation will not be affected by the ground water in any manner.
19.	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality &	The baseline data for the environmental and ecological parameters with regard to surface water / groundwater quality, air quality, soil quality & flora / fauna study are discussed in **Chapter 3**.

	flora/fauna including traffic/vehicular movement study.	Ambient Air Quality details are provided in **Chapter 3, Section 3.6,** The day and night equivalent noise levels are mentioned in **Section 3.7,** Surface Water Quality Assessment is given in **Section 3.8,** Ground Water Quality Assessment is given in **Section 3.9,** Soil quality assessment are given in **Section 3.10** Biological Environment is given in **Section 3.11.** The traffic / vehicular movement study are discussed in **Chapter 4** and **Section 4.6.**
20.	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quanty and the surrounding habitations in the mind.	Cumulative impact study due to mining operations carried out in the quarry in terms of air pollution, water pollution, soil, noise, transportation and occupational health are provided in **Chapter 4, Section 4.2.** Environmental Management Plan & its Control Measures are provided in **Chapter 10, Section 10.2.**
21.	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Rain water Harvesting provided in **Chapter 4, Section 4.12.6.**
22.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use pattern is given in **Chapter 3** and **Section 3.4.9, Figure 3-4, Figure3-5, Table3-2.** Land use plan of mine lease area is given in **Chapter 2, Section 2.5 & Table 2-3.**
23.	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any. should be provided.	The waste generated during the mining operation like side burden, granite rejects and the non-recoverable/un sized boulders and rubbles etc, will be dumped in the northern portion of the lease area. There is no R&R prosess.
24.	Proximity to Areas declared as 'Critically Polluted (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required. clearance certifications	There is no critically polluted area within 15km radius of the project site.

<table>
<tr><td></td><td>from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.</td><td></td></tr>
<tr><td>25.</td><td>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.</td><td><table><tr><th>S. No</th><th>Description</th><th>Water Requirement (KLD)</th></tr><tr><td>1.</td><td>Domestic</td><td>0.5</td></tr><tr><td>2.</td><td>Wire Saw Cutting</td><td>0.3</td></tr><tr><td>3.</td><td>Dust suppression</td><td>0.3</td></tr><tr><td>4.</td><td>Green belt</td><td>0.4</td></tr><tr><td colspan="2">Total</td><td>1.5</td></tr></table>The water requirement for the project is 1.5 KLD and breakup is addressed in Chapter 2 and Section 2.9.2 & Table 2-9.</td></tr>
<tr><td>26.</td><td>Impact on local transport infrastructure due to the Project should be indicated.</td><td>Impact on local transport infrastructure due to the proposed project is discussed in Chapter 4, Section 4.6.</td></tr>
<tr><td>27.</td><td>A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.</td><td>A tree survey study will be carried out both within the mining lease applied area & 300m buffer zone and will be submitted during final EIA.</td></tr>
<tr><td>28.</td><td>A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.</td><td>Mine Closure Plan:
➢ There is no proposal for back filling reclamation and rehabilitation. The Quarried pits after the end of the life of lease will be fenced using Barbed wire fencing to prevent inherent entry of public and cattles.
➢ Measures will be taken as per the Acts and Rules.
➢ Drilling will be carried out by wet drilling mode to control the dust propogation into the air.
➢ Blasting will be carried out on limited scale. Mist water spraying on haul road is proposed to prevent the dust propagation into the air.

Mine closure plan is given in Chapter 2, Section2.14</td></tr>
<tr><td>29.</td><td>Public Hearing points raised and commitments of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project and to be submitted to SEIAA/SEAC with regard to the Office Memorandum of MoEF& CC accordingly.</td><td>The Draft EIA will be submitted for Public Hearing.
After obtaining PH minutes, the concerns raised by the public will be addressed by the Project Proponent along with action plan in the Final EIA report, Chapter 7.</td></tr>
</table>

<table>
<tr><td>30.</td><td>The Public hearing advertisement shall be published in one major National daily and one most circulated Tamil daily.</td><td>Yes, The Public hearing advertisement will be published in one major National daily and one most circulated Tamil daily.</td></tr>
<tr><td>31.</td><td>PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing in Tamil Language also.</td><td>Yes, PP shall produce/display the EIA report, Executive summary and other related information with respect to public hearing in Tamil Language also.</td></tr>
<tr><td>32.</td><td>As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.</td><td>The EIA coordinator educated the local students on the importance of preserving local flora and fauna and involving them in the study, wherever possible.</td></tr>
<tr><td>33.</td><td>The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.</td><td>The total area for proposed green belt is 0.10.0 Ha during 5 years of the proposed quarrying activity and it is proposed to plant 200 no’s of trees per year and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance.
<table>
<tr><th>Year</th><th>No of trees proposed to be planted</th><th>Area to be covered in m²</th><th>Name of the species to be plant</th><th>Survival rate expected in %</th><th>No of trees expected to be grown</th></tr>
<tr><td>5 years</td><td>200</td><td>1000</td><td>Neem, Vilvam, Aathi, Panai</td><td>80</td><td>160</td></tr>
</table></td></tr>
<tr><td>34.</td><td>Taller/one year old Saplings raised in appropriate size of bags, preferably eco-friendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner</td><td>As per committee recommendations, taller / one year old saplings raised in eco-friendly bags, will be planted in proper escapement as per the advice of local forest authorities / botanist / horticulturist with regard to sites specific choices.
The total area for proposed green belt is 0.10.0 Ha during 5 years of the proposed quarrying activity and it is proposed to plant 200 no’s of trees per year and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance.</td></tr>
<tr><td>35.</td><td>A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.</td><td>The disaster management plan is given in Chapter 7, Section 7.3.</td></tr>
</table>

36.	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	The Risk Assessment plan is given in **Chapter 7, Section 7.2.**
37.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed. Mitigation measures with required facilities.	An impact on Occupational Health is given in **Chapter 4, Section 4.10.** Mitigate measures for occupational health is given in **Chapter, 4 Section 4.12.10.**
38.	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.	Public health implications of the Project and related activities are provided in **Chapter 4, Section 4.11.** The proponent M/s. TAMIN proposes proper mititgation measures and Environmental management Plan during the operation of the quarry. Total capital cost of Rs. **38,71,560/-** and recurring cost of Rs. **29,41,080** allocated for environmental protection activities.
39.	The Socio-economic studies should be carried out within a 5km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	The socio-economic study was carried out within a 10 km buffer zone from the mining activity. The detailed measures of socio-economic significance are discussed in **Chapter 3**, **Section 3.11.**
40.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Not applicable. No litigation pending against the project
41.	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:** • The quarrying activities in this belt will benefit to the local people 30 Nos. • Improvement in Per Capita Income. • The socio economic conditions of the village will enhance due to the project.
42.	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC with the site photographs which shall duly	Not Applicable

	be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	
43.	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	EMP is provided in **Chapter 10**. Sworn Affidavit will be provided in Final EIA report.
44.	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	All the information provided by the project proponent is true and no false information has been submitted.

S. No	ToR details	Compliance
Remarks by SEIAA		
	Annexure B	
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.	There is no cluster mines located with in 500m radius. Hence Cluster Management Committee is not required.
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.,	There is no cluster mines located with in 500m radius. Hence Cluster Management Committee is not required..
3.	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	Since there is no cluster mines, the Cluster Management Committee is not applicable.
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.	There is no cluster mines located with in 500m radius. Hence Cluster Managaement Committee is not required.
5.	The committee shall deliberate on risk management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan.	There is no cluster mines located with in 500m radius. Hence Cluster Managaement Committee is not required.
6.	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the environmental policy devised shall be given in detail.	There is no cluster mines located with in 500m radius. Hence Cluster Management Committee is not required.
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.	There is no cluster mines located with in 500m radius. Hence Cluster Management Committee is not required.
8.	The committee shall furnish the Emergency Management plan within the cluster.	There is no cluster mines located with in 500m radius. Hence Cluster Management Committee is not required.
9.	The committee shall deliberate on the health of the	There is no cluster mines located with in 500m radius. Hence Cluster

S. No	ToR details	Compliance
	workers/staff involved in the mining as well as the health of the public.	Management Committee is not required.
10	The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety,	There is no cluster mines located with in 500m radius. Hence Cluster Management Committee is not required.
11	The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	There is no cluster mines located with in 500m radius. Hence Cluster Management Committee is not required.
Impact Study of MIninng:		
12	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following a) Soil health & soil biological, physical land chemical features. b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health. e) Agriculture, Forestry & Traditional practices. f) Hydrothermal/Geothermal effect due to destruction in the Environment. g) Bio-geochemical processes and its foot prints including environmental stress.	The detailed impact study due to mining activity around the proposed mine lease area were discussed in **Chapter 4, Section 4.2.** and the mitigation measures are given in **Section 4.12.**

S. No	ToR details	Compliance
	h) Sediment geochemistry in the surface streams.	
Agriculture & Agro-Biodiversity		
13	Impact on surrounding agricultural fields around the proposed mining Area.	There will be minimal air emission from the proposed mining area. So the impact on surrounding agricultural land and vegetation's will be mitigated by greenbelt development and water sprinkling..
14	Impact on soil flora & vegetation around the project site.	Impact and mitigation measures of soil given in **Section 4.2.** Impact and mitigation measures of flora & vegetation given in **Section 4.12.1.**
15	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	As per the mining plan there are no trees in the proposed mining lease area. Hence transplantation is not required for the proposed mining area.
16	The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural ecosystem.	The details of Flora and fauna are discussed in **Chapter 3, Section 3.10.** Impacts due to the proposed project is envisaged in **Chapter 4, Section 4.2** and the suggested mitigation measures to maintain the natural ecosystem and biodiversity is provided in **Chapter 4, Section 4.12.**
17	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	A detailed action plan on sustainable management of the area and restoration of ecosystem for flow of goods and services are discussed in **Chapter 4.**
18	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.	The details of Flora and fauna are discussed in **Chapter 3, Section 3.10.** Impacts due to the proposed project is envisaged in **Chapter 4, Section 4.2** and the suggested mitigation measures to maintain the natural ecosystem and biodiversity is provided in **Chapter 4, Section 4.12.**
Forests		

<table>
<tr><th>S. No</th><th>ToR details</th><th>Compliance</th></tr>
<tr><td>19</td><td>The project proponent shall detailed study on impact of mining on Reserve forests free ranging wildlife.</td><td>The proposed mining lease area of 34.35.5Ha does not cover any forest land.
The nearest Reserved forest is Togarapalli RF located at 4.40km away from the proposed mining lease area. Hence there will be no impact on the nearby reserved forest.
Reserved Forest
<table>
<tr><th>S.No</th><th>Places</th><th>Distance (≈km)</th><th>Direction</th></tr>
<tr><td>1</td><td>Togarappalli RF</td><td>4.40</td><td>SE</td></tr>
<tr><td>2</td><td>Varatanpalli RF</td><td>6.18</td><td>NNE</td></tr>
<tr><td>3</td><td>Bargur RF</td><td>9.20</td><td>E</td></tr>
<tr><td>4</td><td>Tattakkal RF</td><td>10.83</td><td>S</td></tr>
<tr><td>5</td><td>Neralakotta RF</td><td>11.27</td><td>NE</td></tr>
<tr><td>6</td><td>Nandi Banda RF</td><td>12.35</td><td>ENE</td></tr>
<tr><td>7</td><td>Maharajagadai Ext RF</td><td>12.36</td><td>N</td></tr>
<tr><td>8</td><td>Naralapalli RF</td><td>12.99</td><td>NNW</td></tr>
<tr><td>9</td><td>Maharajagadai RF</td><td>13.35</td><td>N</td></tr>
<tr><td>10</td><td>Kothur RF</td><td>14.98</td><td>NE</td></tr>
</table></td></tr>
<tr><td>20</td><td>The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.</td><td>An impact on Flora and Fauna is discussed in Chapter 4, Section 4.9.</td></tr>
<tr><td>21</td><td>The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.</td><td>The impacts and mitigation measures of Biological environment is discussed in Chapter 4, Section 4.9.

Action suggested for protection:
An area of 0.10.0 Ha land was alloted for greenbelt development during 5 years of mining plan, TAMIN Sulamalai Grey Granite quarry proposed to plant 200 No’s of trees for five year and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance.

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. The plantation will be developed around 7.5m safety zone of the quarry.</td></tr>
</table>

S. No	ToR details	Compliance
22	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors; Tiger/ Elephant Reserves is located within 10km of the mine lease area. Three Reserved forest Togarappalli RF (~4.40km, SE) and Varatanapalli RF (~6.18km, NNE) and Bargur RF (9.20km,ENE) are located within 10km of the mine lease area.
Water Environment		
23	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period.	The depth of mining is 29m from the top of hill. Ground water occurrence in this area is 25m depth below from the ground level. The quarry operation restricted well above the water table, hence the quarry operation will not be affected by the ground water in any manner. Hydrogeological study will be conducted and will be provided along with final EIA report.
24	Erosion Control measures.	Green belt development is one of the important control measures of erosion which is discussed in **Chapter 4 in Section 4.12.6.**
25	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	Detailed impact study on nearby water bodies and rivers around the proposed mining area was carried and the results are provided in **Chapter 3, Section 3.8**. An impact due to proposed mining activity on water environment is mentioned in **Chapter 4, Section 4.7.**
26	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and reservoir.	The project surrounding the water body is seasonal, with common aquatic fish and flora found. Thus, no cumulative effects on aquatic species or habitats relative to project activities.
27	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	The potential fragmentation impact of natural environment, by the activities is discussed in **Chapter 4, Section 4.2.**

S. No	ToR details	Compliance
28	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	The project surrounding the water body is seasonal, with common aquatic fish and flora found. So the project will not impact the ecological character of the aquatic plants and animals in water bodies. No nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.
29	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	**Impacts of soil erosion:** The effects of soil erosion go beyond the loss of fertile land. It has led to increased pollution and sedimentation in streams and rivers, clogging these waterways and causing declines in fish and other species. And degraded lands are also often less able to hold onto water, which can worsen flooding. Physical properties of soil include color, texture, structure, porosity, density, consistence, aggregate stability, and temperature. These properties affect processes such as infiltration, erosion, nutrient cycling, and biologic activity. **Mitigation measures** • Excavated top soil will be spread out over and sides of the inactive waste dump also tree saplings will be carried out for increasing the stability and to prevent erosion during rainy season. • Quarried out waste will be backfilled and separately preserved top soil will be spread out over the backfilled area and also plantation will be carried out in the backfilled area. • Garland drain will be constructed around the quarry area to prevent surface runoff rain water entering to the pit.
30	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	Detailed impact study on nearby water bodies and rivers around the proposed mining area was carried and the results are provided in **Chapter 3, Section 3.8.** An impact due to proposed mining activity on water environment is mentioned **in Chapter 4, Section 4.7.**
Energy:		
31	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilize the energy shall be furnished,	Control Measures of Noise, Air, Water, Dust are provided in **Chapter 4, Section 4.12.**

S. No	ToR details	Compliance
Climate change		
32	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities.	Operating a granite quarry can have several impacts on increasing carbon emissions and contributing to temperature rise, primarily through direct and indirect mechanisms. The proposed Granite Quarry covering an area of 34.35.5 hectares of Govt land has the potential to generate various GHG emissions, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases, water vapour, and ozone. These emissions can arise from different phases of quarrying operations, such as excavation, transportation, energy consumption, and land-use changes. A detailed study has been conducted to analyze and mitigating these emissions for minimizing environmental impact and promoting sustainable quarrying practices the same has been discussed in Chapter Section The mitigation measure of Air Environment is discussed in **Chapter 4, Section 4.4.1.**
33	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	The operation of the proposed granite quarry can have various impacts on climate change, temperature rise, pollution, and carbon stocks, both above and below the soil. A detailed study has been conducted the results are discussed in **Chapter 4, Section 4.5.**
Mine Closure Plan		
34	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Mine Closure Plan is provided in **Chapter 2, Section 2.14.**
EMP		
35	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued.	Environment Management Plan is provided in **Chapter 10, Table 10-1.**

<table>
<tr><th>S. No</th><th>ToR details</th><th>Compliance</th></tr>
<tr><td>36</td><td>The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.</td><td>The budgetary allocation for Green belt development and maintenance and other aspects of environment is given below. However there is no EMP for Mine Closure Plan as the quarried pit will be left open and the rainwater will be diverted by garland drains to the sump area within the mine lease. The stored water will be used for agriculture activities.
<table>
<tr><th>S.No</th><th>Description</th><th>Capital Cost</th><th>Recurring Cost</th></tr>
<tr><td>1.</td><td>Air Environment</td><td>12,58,550</td><td>11,67,050</td></tr>
<tr><td>2.</td><td>Noise Environment</td><td>60,000</td><td>8,05,030</td></tr>
<tr><td>3.</td><td>Water Environment</td><td>3,43,550</td><td>25,000</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5,000</td></tr>
<tr><td>5.</td><td>Implementation of EC, Mining Plan & DGMS Condition</td><td>19,94,460</td><td>9,27,000</td></tr>
<tr><td>6.</td><td>Greenbelt Development</td><td>1,05,000</td><td>12,000</td></tr>
<tr><td colspan="2">Total</td><td>38,71,560</td><td>29,41,080</td></tr>
</table></td></tr>
<tr><td colspan="3">Risk Assessment</td></tr>
<tr><td>37</td><td>To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.</td><td>Risk Identification & Management plan are provided in Chapter 7, Section 7.2.</td></tr>
<tr><td colspan="3">Disaster Management Plan</td></tr>
</table>

S. No	ToR details	Compliance
38	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Disaster Management Plan is provided in **Chapter 7, Section 7.3.**
Others		
39	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc.	The nearest habitation is Gettur Village at distance of 0.32km in East Direction of the proposed project site. The VAO certificate with reference to 300m radius regard will be submitted during final EIA submission.
40	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 draft EIA will be submitted for public hearing. After obtaining minutes of public hearing from the TNPCB, the issues will be incorporated in the EIA along with action plan in **Chapter 7.**
41	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	No plastics are involved in the proposed project.

STANDARD TERMS OF REFERENCE

<table>
<tr><th>S.No</th><th>ToR Point</th><th>Compliance</th></tr>
<tr><td>1.</td><td>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 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.</td><td>The quarry operation is done without prior Environmental Clearence from 15.01.2016 to 10.01.2017
The excavated details are given below:
<table>
<tr><th>S.No</th><th>Type of Mineral</th><th>Excavated Quantity (m^3)</th><th>Depth (m)</th></tr>
<tr><td>1.</td><td>Grey Granite</td><td>300396</td><td>12</td></tr>
</table>
The production details are provided in Chapter 2, Section 2.6., and Table 2-5.</td></tr>
<tr><td>2.</td><td>A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.</td><td>The Additional Chief Seceretary of Governement has given Precise Area Communication Letter Vide LetterNo.3821994/MME.1/2022-1, Dated14.02.2023.</td></tr>
<tr><td>3.</td><td>All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mines lease area, production levels, waste generation and its management, mining technology e
.tc. and should be in the name of the lessee.</td><td>Yes. All documents including approved mine plan, EIA and Public Hearing is compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. in the name of TAMIN (lessee).</td></tr>
<tr><td>4.</td><td>All corners co-ordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheets, topographic sheets, 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).</td><td>1. All corners co-ordinates of the mine lease area are given in Chapter 1, Section 1.4.2 &Table 1-1.

2. All corner co-ordinates of the mine lease area, superimposed in a High Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area has been provided in Chapter 3.

3. Such a Imagery of the proposed area and land use and other ecological features of the study area (core and buffer zone) has been clearly shown in Chapter 3.</td></tr>
</table>

5.	Information should be provided in Survey of India Toposheets 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 prepared in 1:50000 scale and given as **Figure 3-1** in **Chapter 3.** Water bodies are given in **Chapter-3, Table 3-1.** Geomorphology of the study area is given in **Chapter 3, Section 3.4.11 and Table 3-3.Figure 3-8 and Figure 3-9.**
6.	Details about the land proposed for mining activities should be given with information as to whether mining confirms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The proposed quarry is Government Poramboke land. The Government of Tamil Nadu has proposed to grant lease to TAMIN for 20 years vide GoTN, IIPC (MME.1) Department, Lr. No.3821994/MME.1/2022-1,dated: 14.02.2023 i.e., Precise area communication letter is enclosed as **Annexure-2.** Director of Geology and Mining has approved the Mining Plan to carry out the mining activities. Mining Plan approval letter is enclosed as **Annexure -3** and Mining Plan is enclosed as **Annexure-4**. The proposed Production Capacity of the quarry was 30,000m^3, for the depth of 29m from the top of hill. The production details are provided in **Chapter 2, Section 2.6.**
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 environment or forest norms/condition? 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-compliance/ violations of environmental norms to	The Environment Policy of TAMIN is discussed in **Chapter 10, Section 10.2.** The hierarchical systems or administrative order of the Company to deal with the environmental issues and for ensuring compliances with the EC conditions has been given in **Chapter 10, Figure 10-1.**

<table>
<tr><td></td><td>the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA report.</td><td></td></tr>
<tr><td>8.</td><td>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.</td><td>Mine Saftey and Mitigation Measures:
<table>
<tr><th>S. No</th><th>Activity</th><th>Mitigation measures</th></tr>
<tr><td>1.</td><td>Excavation</td><td>➢ Planned excavation, avoid haphazard mining</td></tr>
<tr><td>2.</td><td>Drilling and blasting</td><td>➢ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs.
➢ By using controlled blasting techniques.</td></tr>
<tr><td>3.</td><td>Safety zone</td><td>➢ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width.
➢ Restricted entry, use of sirens and cordoning of the lasting area are some of the good practices to avoid accidents.</td></tr>
<tr><td>4.</td><td>Overburden stabilization</td><td>➢ Accidents are known to happen due to overburden collapse.
➢ Therefore, slope stabilization and dump stability are critical issues for safety and environment.</td></tr>
<tr><td>5.</td><td>Worker’s health surveillance</td><td>➢ Health survey programs for workers and local community.
➢ Regular training and awareness of employees to be conducted to meet health and safety objectives.</td></tr>
</table>
It is a granite quarry; an open cast Mining methodology will be followed. The proposed depth of mining will be 29m from top of the hill as per the ToR issued.

The production of granite in this mine involves the following methods.
1. Splitting of rock mass of considerable volume from the parent sheet rock carefully avoiding any kind of damage in the form of cracks in the deposit by adopting the following methods.
2. The secondary splitting in to required size involves long hole drilling up to the bottom of the separated block and mild blasting along the required plans. The blocks split as above are separated and removed from the pit using hydraulic excavators.
3. The primary boulders thus spitted are removed from the</td></tr>
</table>

<table>
<tr><td></td><td></td><td>pits by excavators and further made to smaller sizes by rock breakers attached in excavators.
Open cast, semi-mechanized mining with 6m vertical bench with a bench width of 6m has been proposed.
Mining methodology is provided in Chapter 2 and Section 2.8.</td></tr>
<tr><td>9.</td><td>The study area will comprise of 10km 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.</td><td>The study area of 10km zone around the mines lease from lease periphery and furnished in Chapter 3.
The production and waste generation details are provided in Chapter 2, Section 2.6 & Table 2.5.</td></tr>
<tr><td>10.</td><td>Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass, preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.</td><td>Land use pattern of the study area is given in Chapter 3 and Section 3.4.9, Figure 3-4, Figure 3-5 and Table3-2.</td></tr>
<tr><td>11.</td><td>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.</td><td>The rejected granite wastes will be dumped in the Northern portion of the lease boundary. The details of granite waste are given below.
<table>
<tr><th>S.No</th><th>Year</th><th>Overburden</th><th>Sideburden (m³)</th><th>Granite Reject @75% (m³)</th></tr>
<tr><td>1</td><td>First</td><td>-</td><td>3,720</td><td>4,500</td></tr>
<tr><td>2</td><td>Second</td><td>-</td><td>13,022</td><td>9,000</td></tr>
<tr><td>3</td><td>Third</td><td>-</td><td>--</td><td>3,000</td></tr>
<tr><td>4</td><td>Fourth</td><td>-</td><td>--</td><td>3,000</td></tr>
<tr><td>5</td><td>Fifth</td><td>-</td><td>13,017</td><td>3,000</td></tr>
<tr><td colspan="2">Total</td><td>-</td><td>29,759</td><td>22,500</td></tr>
</table></td></tr>
<tr><td>12.</td><td>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.</td><td>Not applicable. Since there is no Forest land involved in the proposed project area.</td></tr>
</table>

	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 of 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.	
13.	Status of forestry clearance for the broken up area and virgin forest land involved in the project including deposition of Net Present Value (NPV) & Compensatory Afforestation (CA) should be indicated. A copy of the forest clearance should also be furnished.	Not applicable. Forest Clearance is required since there is no forest land involved in the proposed project area.
14.	Implementation status of recognition of forest right under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Acts, 2006 should be indicated.	Not applicable. No scheduled tribes and other traditional forest dwellers are observed.
15.	The vegetation in the RF/PF areas in the study area, with necessary details, should be given.	The details of environmental sensitive areas & Reserve forests covering within 15 km from project boundary are given in **Chapter 3** and **Section 3.3 & Table 3-1.**
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	The proposed project will not have any impact on terrestrial ecology of the area as there are no protected wildlife areas within the 15km radius of the project. A detailed mitigation measure for biological environment is furnished in **Chapter 4, Section 4.12.8.**

<table>
<tr><td></td><td>mitigate measures required, should be worked out with cost implications and submitted.</td><td></td></tr>
<tr><td>17.</td><td>Location of National Parks, Sanctuaries, Biosphere Reserves, wildlife Corridors, Ramsar site Tiger/Elephant Reserves (existing as well as proposed), if any, within 10km of the mines 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.</td><td>There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors; Ramsar site Tiger/ Elephant Reserves is located within 10km of the mine lease area.</td></tr>
<tr><td>18.</td><td>A detailed biological study area [core zone and buffer (10km radius of the periphery of the mines lease)] shall be carried out. Details of the flora and fauna, endangered, endemic and RET species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the schedule of the fauna present. In case of any scheduled I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with state forest and Wildlife Department and details furnished. Necessary</td><td>Details of the flora and fauna, endangered, endemic and RET species for core and buffer zone is given in Chapter 3 and Section 3.10.
• During secondary information, following aspects were considered for ecological studies:
• Assessment of 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).
Schedule 1 Species:
<table>
<tr><th>S.No</th><th>Common Name</th><th>Species Name</th><th>IUCN</th><th>WPA 1972</th></tr>
<tr><td colspan="5">Birds</td></tr>
<tr><td>1</td><td>Shikra</td><td>Accipiter badius</td><td>LC</td><td>Schedule I</td></tr>
<tr><td>2</td><td>Brahminy Kite</td><td>Haliastur indus</td><td>LC</td><td>Schedule I</td></tr>
<tr><td colspan="5">Butterfly</td></tr>
<tr><td>3</td><td>Crimson Rose</td><td>Atrophaneura hector</td><td>LC</td><td>Schedule I</td></tr>
<tr><td colspan="5">Reptiles</td></tr>
<tr><td>4</td><td>Bengal Monitor Lizard</td><td>Varanus bengalensis</td><td>LC</td><td>Schedule I</td></tr>
</table></td></tr>
</table>

<table>
<tr>
<td></td>
<td>allocation of funds for implementing the same should be made as part of the project cost.</td>
<td>Conservation plan:
<table>
<tr><th rowspan="2">S.No</th><th rowspan="2">Work or Activity</th><th colspan="5">Approximate Cost. Rs.</th></tr>
<tr><th>Year 1</th><th>Year 2</th><th>Year 3</th><th>Year 4</th><th>Year 5</th></tr>
<tr><td>1</td><td>Plantation-350 tree plants (@ 150/-per plant)</td><td>52,500</td><td>52,500</td><td>52,500</td><td>52,500</td><td>52,500</td></tr>
<tr><td>3</td><td>One awareness programme</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td><td>20,000</td></tr>
<tr><td>3</td><td>Habitat improvement</td><td>6,00,000</td><td>5,00,000</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Total</td><td>702500</td><td>572,500</td><td>72,500</td><td>72,500</td><td>72,500</td></tr>
</table>
</td>
</tr>
<tr>
<td>19.</td>
<td>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.</td>
<td>There is no critical polluted area within 15km radius of the project site.</td>
</tr>
<tr>
<td>20.</td>
<td>Similarly, for coastal projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mines 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</td>
<td>There is no Coastal Zone within 15km radius of the project site.</td>
</tr>
</table>

	Zone Management Authority).	
21.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SC's/ST's 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 their action programmes prepared and submitted accordingly, integrating the sectoral programmes of the line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	There is no Rehabilitation and resettlement is involved. Land classified as a Government poramboke land. Precise Area communication Letter was Obtained for the proposed mine area- Ref: Letter No. 3821994/MME.1/2022-1, Dated 14.02.2023.
22.	One season (non monsoon) i.e. March-May (summer season), October-December (post monsoon season), December-February (Winter season) primary baseline data on ambient air quality as per CPCB notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so complied presented date wise in the EIA and EMP report. Site specific meteorological data should also be collected.	The primary baseline data monitored covered three (3) months i.e., from **Jan 2024 – March 2024**, and secondary data was collected from Government and Semi-Government organizations. Ambient Air Quality details are provided in **Chapter 3, Section 3.6,** The day and night equivalent noise levels **Section 3.7,** Surface Water Quality Assessment **Section 3.8,** Ground Water Quality Assessment **Section 3.9,** Soil Monitoring Locations are given **in Section 3.10**

<table>
<tr><td></td><td>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 500m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM_{10}, particularly for free silica, should be given.</td><td></td></tr>
<tr><td>23.</td><td>Air quality modeling should be carried out for prediction of impacts of the project on the air quality of the area. It should also take into account the impact of the movement of vehicles for transportation of minerals. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on allocation 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 be also indicated on the map.</td><td>
<table>
<tr><th>Pollutant</th><th>Max. Base Line Conc. (µg/m³)</th><th>Estimated Incremental Conc. (µg/m³)</th><th>Total Conc. (µg/m³)</th><th>NAAQ standard</th></tr>
<tr><td>PM</td><td>69.60</td><td>0.10</td><td>69.70</td><td>100</td></tr>
<tr><td>SO_2</td><td>11.09</td><td>0.09</td><td>11.28</td><td>80</td></tr>
<tr><td>NO_X</td><td>23.01</td><td>0.57</td><td>23.58</td><td>80</td></tr>
</table>
Air quality modeling carried out for prediction of impacts of the project on the air quality of the area. The details are given in Chapter 4 and Section 4.3.
</td></tr>
<tr><td>24.</td><td>The water requirement for the project, its availability and sources should be furnished. A detailed water balance should be provided. Fresh water requirement for the project should be indicated.</td><td>
<table>
<tr><th>S. No</th><th>Description</th><th>Water Requirement(KLD)</th></tr>
<tr><td>1.</td><td>Domestic</td><td>0.5</td></tr>
<tr><td>2.</td><td>Wire Saw Cutting</td><td>0.3</td></tr>
<tr><td>3.</td><td>Dust suppression</td><td>0.3</td></tr>
<tr><td>4.</td><td>Green belt</td><td>0.4</td></tr>
<tr><td colspan="2">Total</td><td>1.5</td></tr>
</table>
The water requirement for the project is 1.5 KLD and breakup is addressed in Chapter 2 and Section 2.9.2 & Table 2-9.
</td></tr>
<tr><td>25.</td><td>Necessary clearance from the Competent Authority for drawl of requisite</td><td>No ground water withdrawn to met the water requirement. The total water requirement is sourced from Private tank suppliers.</td></tr>
</table>

	quantity of water for the project should be provided.	
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.	**Surface Water Pollution Control Measures:** • Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas. • During monsoon season, the rain water will be collected by natural slope of area to water fed tank of the mine and it will be utilized for dust suppression and greenbelt development. • Retaining walls of adequate dimensions will be provided at the top of dumps and the unstable OB benches within the mine to prevent wash off from dumps and sliding of material from benches. This will help in preventing silting of water drains/channels. • The water channels/drains carrying the rain water from the mine will be provided with baffles and settling pits to arrest the suspended solids, if any, present in this water. • The worked out slopes will be stabilized by planting appropriate shrub/grass species on the slopes. • The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB. **Ground Water Pollution Control Measures:** • The domestic sewage from the toilets will be routed to septic tanks. • Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out. **Water conservation measures:** • No wastewater will be generated by quarry operation except domestic sewage. Domestic sewage will be disposed to septic tank followed by soak pit. • After the excavation of Multi colour granite & Country rock will be directly loaded into tipper to the needy buyers for road project and construction works for filling and leveling of low lying areas.so there is no disposal of waste in the water bodies. • The total water requirement is sourced from Private tank suppliers so the proposed quarry does not damage the water quality. • One of the strategies in water conservation is rain water harvesting. **Rainwater Harvesting:** • Construct barriers at suitable intervals along the path of the drains. • Divert the water to sump in the mine area. • Provide necessary overflow arrangement to maintain

		the natural drainage system.
27.	Impact of the project on the water quality, both surface and ground water, should be assessed and necessary safeguard measures, if any required, should be provided.	The result of surface and ground water is discussed in **Chapter 3, Section 3.8 and 3.9** Impacts on water environment & water conservation measures are proposed in **Chapter 4 Section 4.7**.
28.	Based on actual monitored data, it may clearly be shown whether working will intersect ground water. Necessary data and documentation in this regard may be provided. In case the working will intersect ground water 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 groundwater should also be obtained and copy furnished.	The mining activity proposed in depth of 29m from the top of hill as per mining Plan. Water table is found at a depth of 25m below ground level as per mining Plan. Hence there is a possibility to intersect the ground water table while crossing mining operation at a depth of 29m. TAMIN will get necessary permission from uthority concerned at the time of operation Water requirement is met through private water supply. There is no withdrawl of ground water.
29.	Details of any stream, seasonal or otherwise, passing through the lease area and modification/diversion proposed, if any, and the impacts of the same on the hydrology should be brought out.	Not Applicable. There is no stream, or seasonal streams are passing through project area.
30.	Information on site elevation, working depth, groundwater table etc. should be provided both in AMSL and bgl. A scientific diagram may also be provided for the same.	Site Elevation: ~622m AMSL The proposed depth of mining will be 29m from the top of hill. Ground water table is available at 9.5m. Section plates are enclosed as **Annexure-5.**
31.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating	The total area for proposed green belt is 0.10.0 Ha out of 34.35.5Ha during 5 years of the proposed quarrying activity and it is proposed to plant 200 no's of trees and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance.

	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 already done should be given. The plant species selected for greenbelt should have greater ecological value and should be of good utility value to local population with emphasis on local and native species and the species which are tolerant to pollution.	The details are given in **Chapter 4, Section 4.12.9.**
32.	Impact on local transport infrastructure due to the project should be indicated. Projected increase in truck traffic as a result of the project in the present road network (including those outside the project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as state government) should be covered. Project proponent shall conduct impact of Transportation study as per Indian Road Congress Guidelines.	The Granite dimensional blocks are transported to consumer directly as per buyer's requirement. The granite is being transported through existing road by tippers and approximate number of trips required is 2 times per week. This minimum trip does not create impact on existing transportation. Impacts and mitigation measures on transportation is given in **Chapter 4, Section 4.12.3.**
33.	Details of the onsite shelter and facilities to be provided to the mines workers should be included in the EIA Report.	The quarry office, first aid room, store room, rest shed, toilet etc., will be constructed as semi-permanent structures within the lease area.
34.	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of	There is no proposal for back filling reclamation and rehabilitation in the proposed project as per the mining plan.

	sections) should be given in the EIA report.	
35.	Occupational Health impacts of the project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational Health impacts & preventive measures detail given in **Chapter 4 and Section 4.10. and Section 4.12.7.** The EMP details are given as a separately as **Chapter 10** along with EMP Cost details are provided in **Section 10.4.**
36.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Public health implications of the Project and related activities are provided in **Chapter 4, Section 4.11.** The proponent M/s. TAMIN proposes proper mititgation measures and Environmental management Plan during the operation of the quarry. Total capital cost of Rs. **38,71,560/-** and recurring cost of Rs. **29,41,080** allocated for environmental protection activities.
37.	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be	**Impacts & Measures of Socio Economic:** • The entire lease area of the project has no habitations or hutments in the core zone area, no rehabilitation or resettlement problems are involved. • By adopting various mitigation measures, the

<table>
<tr><td></td><td>indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.</td><td>environmental scenario in respect of ambient air quality, water quality, Noise levels, water aspects, biological aspects etc. during the operation of the project will be maintained within the statutory prescribed levels.
• As such, impact due to the projects will be positive on socio-economic aspects. It will be ensured that the buffer zone of the quarry will be properly preserved environmentally in all respects within sustainable limits through necessary monitoring.
• The project will be operated with care for minimizing environmental impacts with proper EMP measures for pollution control.
• Sulamalai Grey granite Quarry project is not going to have any negative impact on the social or cultural life of the villagers in the near vicinity. The quarry activity will provide job opportunities, which will help them to develop economically.
• The proposed project will be done with the vision of leaving a positive impact on socio-economics of people living in the nearby villages. A first-aid centre to meet the basic medical needs of employees will be provided.
• Employment potential will be generated, general financial status and socio economic condtions of approx. 48 labors will be improved.
• Various developmental works will be carried out in the nearby region based on the need of the locals.</td></tr>
<tr><td>38.</td><td>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.</td><td>The EMP details are given as a separately as Chapter 10 along with EMP Cost details.
Environmental Management Plan Cost
<table>
<tr><th>S.No</th><th>Description</th><th>Capital Cost</th><th>Recurring Cost</th></tr>
<tr><td>1.</td><td>Air Environment</td><td>12,58,550</td><td>11,67,050</td></tr>
<tr><td>2.</td><td>Noise Environment</td><td>60,000</td><td>8,05,030</td></tr>
<tr><td>3.</td><td>Water Environment</td><td>3,43,550</td><td>25,000</td></tr>
<tr><td>4.</td><td>Waste Management</td><td>1,10,000</td><td>5,000</td></tr>
<tr><td>5.</td><td>Implementation of EC, Mining Plan & DGMS Condition</td><td>19,94,460</td><td>9,27,000</td></tr>
<tr><td>6.</td><td>Greenbelt Development</td><td>1,05,000</td><td>12,000</td></tr>
<tr><td colspan="2">Total</td><td>38,71,560</td><td>29,41,080</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>39.</td><td>Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.</td><td>The Draft EIA will be submitted for Public Hearing After obtaining PH minutes, the concerns raised by the public will be addressed by the Project Proponent in the Final EIA report, Chapter 7.</td></tr>
<tr><td>40.</td><td>Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the project should be given.</td><td>There is no litigation pending against the project.
But, TAMIN has started the quarry activites without prior EC, the project falls under Violation category.</td></tr>
<tr><td>41.</td><td>The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.</td><td>The project Cost is addressed in Chapter 2 and Section 2.7.
<table>
<tr><th>S. No</th><th>Description of the Cost</th><th>Cost in Lakhs</th></tr>
<tr><td colspan="3">I. Fixed Asset Cost</td></tr>
<tr><td rowspan="4">1</td><td>Land Cost</td><td>Nil because of Govt. Land</td></tr>
<tr><td>Labours Shed</td><td>50,000/-</td></tr>
<tr><td>Sanitary facilities</td><td>50,000/-</td></tr>
<tr><td>Fencing Cost</td><td>1,25,000/-</td></tr>
<tr><td></td><td>Sub Total</td><td>2,25,000/-</td></tr>
<tr><td colspan="3">II. Operational cost</td></tr>
<tr><td rowspan="8"></td><td>Jack Hammers (6 nos)</td><td>1,98,000/-</td></tr>
<tr><td>Compressor (2 nos)</td><td>19,82,000/-</td></tr>
<tr><td>Diamond wire sa (1 no)</td><td>4,87,000/-</td></tr>
<tr><td>Diesel General 120KVA</td><td>4,00,000/-</td></tr>
<tr><td>Excavator (1 no). hire</td><td>6,00,000/-</td></tr>
<tr><td>Tippers (2 nos)</td><td>58,00,000/-</td></tr>
<tr><td>Drinking water facility for the labours</td><td>50,000/-</td></tr>
<tr><td>Safety kits</td><td>50,000/-</td></tr>
<tr><td></td><td>Sub Total</td><td>95,67,000/-</td></tr>
<tr><td>III</td><td>EMP Cost</td><td></td></tr>
<tr><td rowspan="7"></td><td>Afforestation</td><td>30,000/-</td></tr>
<tr><td>Water Sprinkling</td><td>50,000/-</td></tr>
<tr><td>Water Quality Test</td><td>25,000/-</td></tr>
<tr><td>Air Quality Test</td><td>25,000/-</td></tr>
<tr><td>Noise/Vibration Test</td><td>25,000/-</td></tr>
<tr><td>CSR activities</td><td>50,000/-</td></tr>
<tr><td></td><td>Sub Total</td><td>2,05,000/-</td></tr>
<tr><td colspan="2">Grand Total</td><td>99,97,000/-
≃Rs.1 Crore</td></tr>
</table></td></tr>
<tr><td>42.</td><td>A Disaster management Plan shall be prepared and</td><td>Disaster Management Plan is given in Chapter 7 and Section 7.3.</td></tr>
</table>

	included in the EIA/EMP report.	
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:** • The quarrying activities in this belt will benefit to the local people 30 Nos. • The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers. • Improvement in Per Capita Income. • The socio economic conditions of the village will enhance due to the project.
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 is given as separate book let.
b)	All documents to be properly referenced with index and continuous page numbering.	All documents addressed with properly referenced with index and continuous page numbers.
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.	Yes, sources for all tables are addressed.
d)	Project Proponent shall enclose all the analysis/testing reports of Water, Soil, Air, 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 accredited laboratories. The disclosure of Consultant is given in **Chapter 12.**
e)	Where the documents provided are in a language other than English, an English translation should be provided.	The total 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.	Questionnaire for environmental appraisal of mining projects is prepared as per prescribed format.
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,	Yes, EIA Prepared as per generic structure prescribed in **Appendix –III** of EIA Notification 2006 and covered the all ToR Compliance.

	which are available on the website of this Ministry, should be followed.	
h)	Changes if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H process) will entail conducting the PH again with the revised documentation.	The basic scope and project parameters were not changed.
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 condition 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.	As TAMIN has started the quarry activites without prior EC, the project falls under Violation category.
j)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	All Sectional Plates of Quarry are given in **Annexure -5.**

2 PROJECT DESCRIPTION

2.1 Condensed description of those aspects of the project (based on project feasibility study), likely to cause environmental effect

Type of project including interlinked and interdependent projects

The Grey granite quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & width bench not less than the height. The area applied for quarry lease is hilly terrain; the altitude of the area is above ~622m AMSL. Total Geological Reserves in the area is 4,38,325m^3 & the Updated Mineable Reserves is 2,18,631m^3, Updated as on 28.02.2023.

2.2 Need for the Project

The proposed granite quarrying project falls in the area of Krishnagiri District, Tamil Nadu where scanty agricultural activities are been carried out and the new industries are springing up in the district and more specifically the area applied for quarry lease is devoid of any major industries and agricultural activities. The earning source in the targeted area is limited, most of the people in and around the area depend upon the seasonal agriculture and much of the people migrate to nearby towns where good and industries and factories are growing up.

This project will provide direct employment for about 30 persons and indirect employment chisel workers one gang for about 20 persons specifically for dressing of granite blocks. This material is well known in the international supermarket of granite which will fetch a good foreign exchange to the nation.

Mineral Industries of the state of Tamil Nadu provides employment opportunities for the people of the state as well as in the specific project area. The Mining and Quarrying is one among the major core sector industries which plays a vital process of country's economic development and foreign exchange.

2.3 Quarry Location

The Grey granite mine is over an extent of 34.35.5 Ha located in S.F.No.283 (Part), located at Sulamalai Village, Bargur Taluk, Krishnagiri District, lies in the latitude of 12°29'30.83230"N to 12°30'0.25552"N and longitude of 78°17'28.61642"E to 78°18'0.33892"E. The area is marked in the survey of India Topo sheet No. D44S2,3,6&7. Site Elevation is above ~622m AMSL. The boundary Coordinates of the site given in **Table 2.1.** The project location map is given in **Figure 2.1.** 300 m Radius Google Imagery of the lease area boundary is given in **Figure 2.2.** 500m Radius

Google Imagery of the project site is given in **Figure 2.3**. 10km radius village map of the project site is shown in **Figure 2.4**.

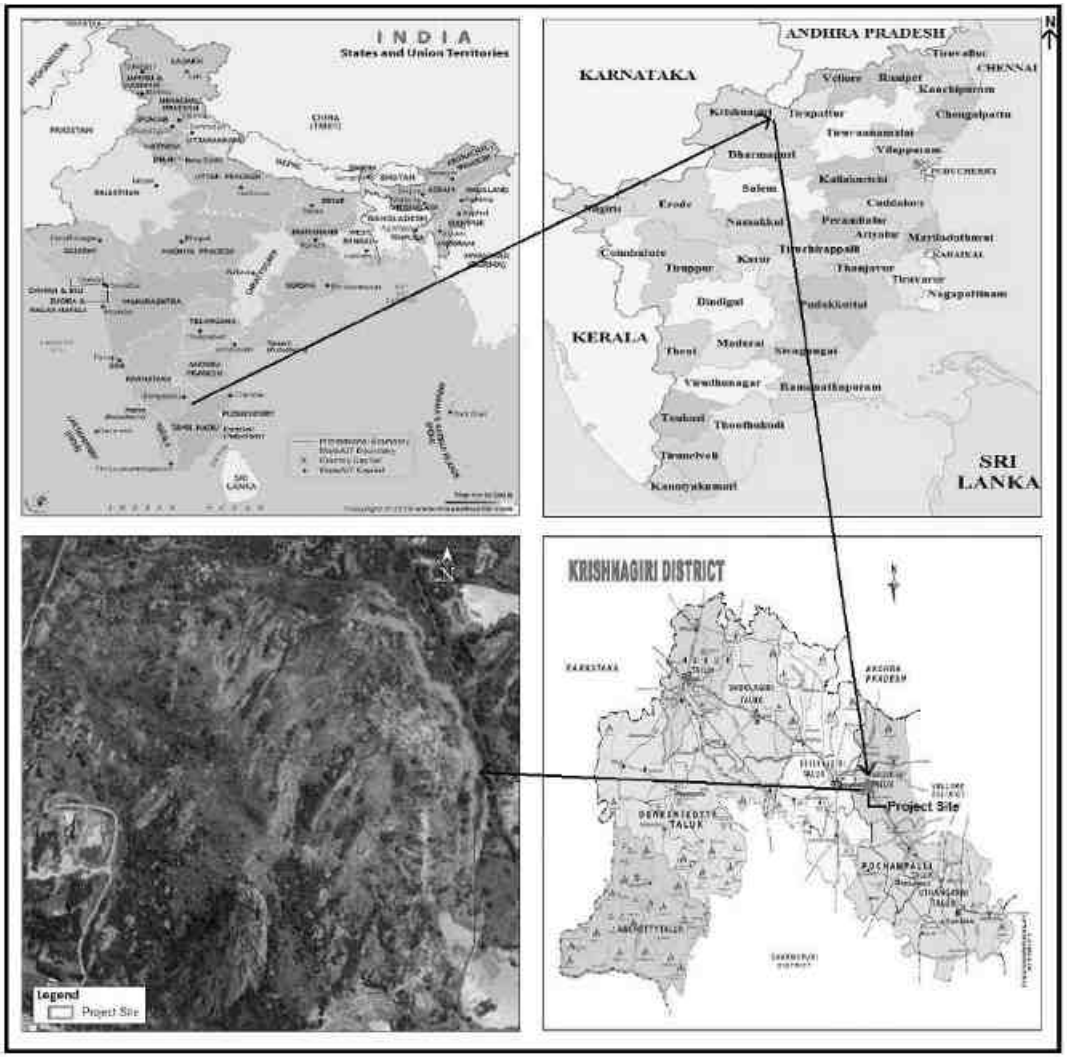

Figure 2-1 Project Location Map

Figure 2-2 300 m Google Imagery of the lease area boundary

Figure 2-3 500m Radius Google Imagery of the project site

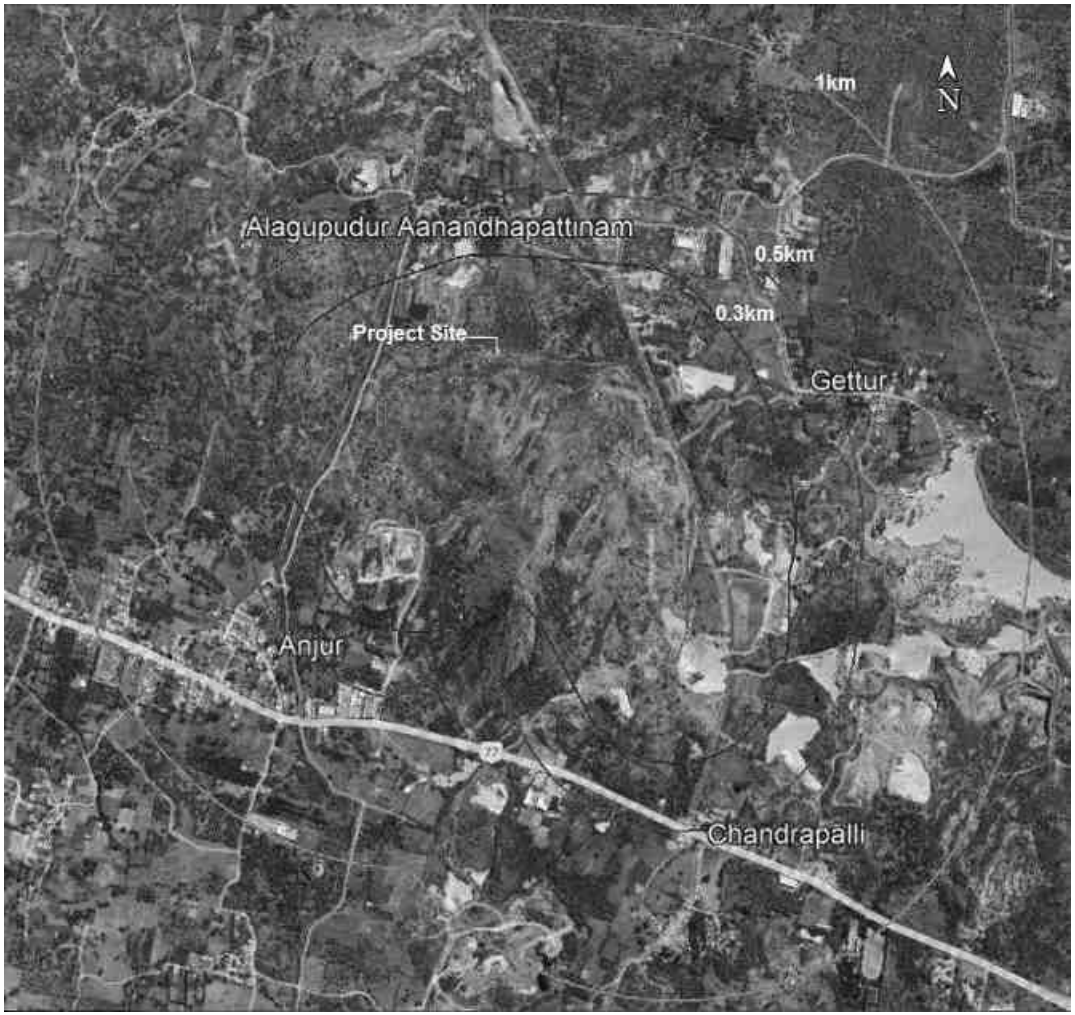

Figure 2-4 1 km Radius Google Imagery of the project site

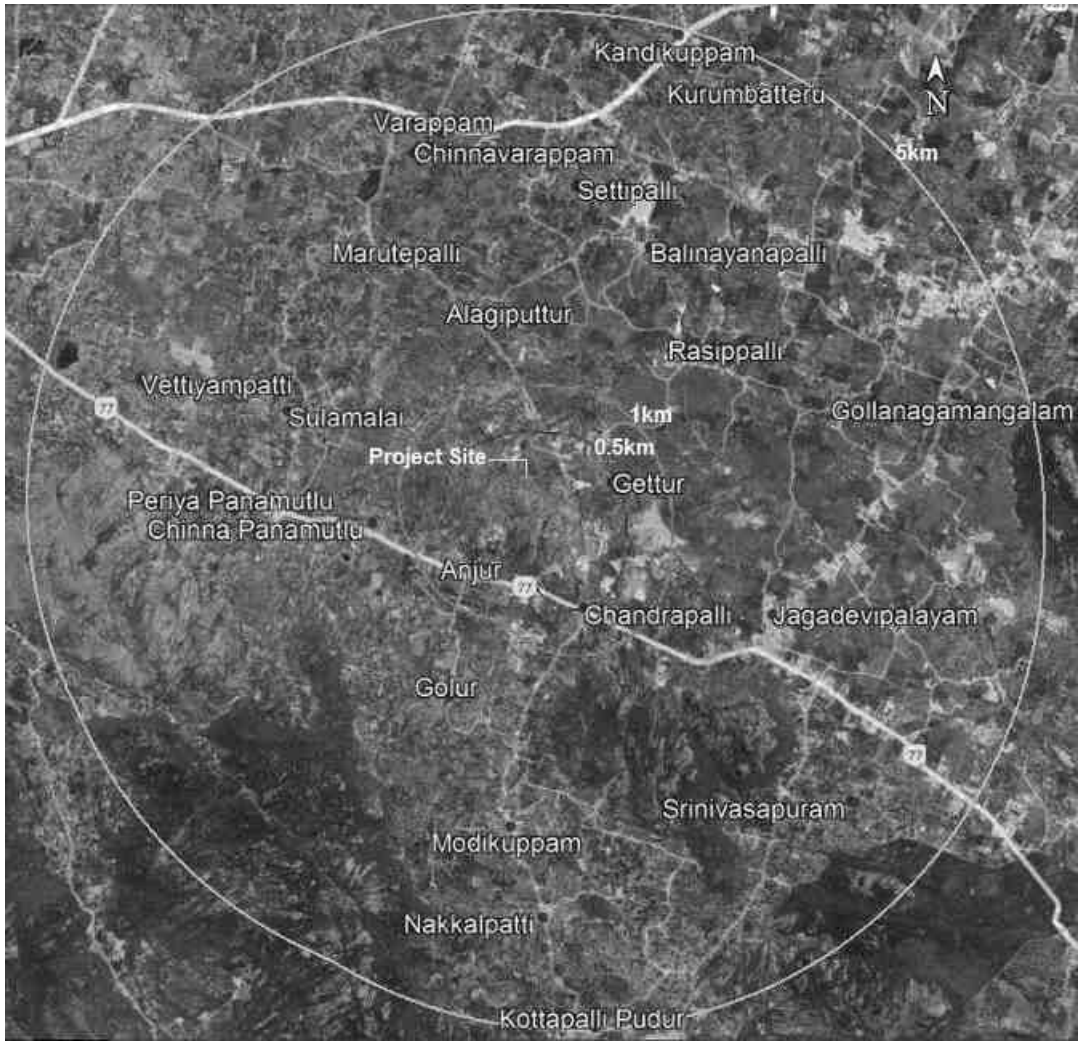

Figure 2-5 5 km Radius Google Imagery of the project site

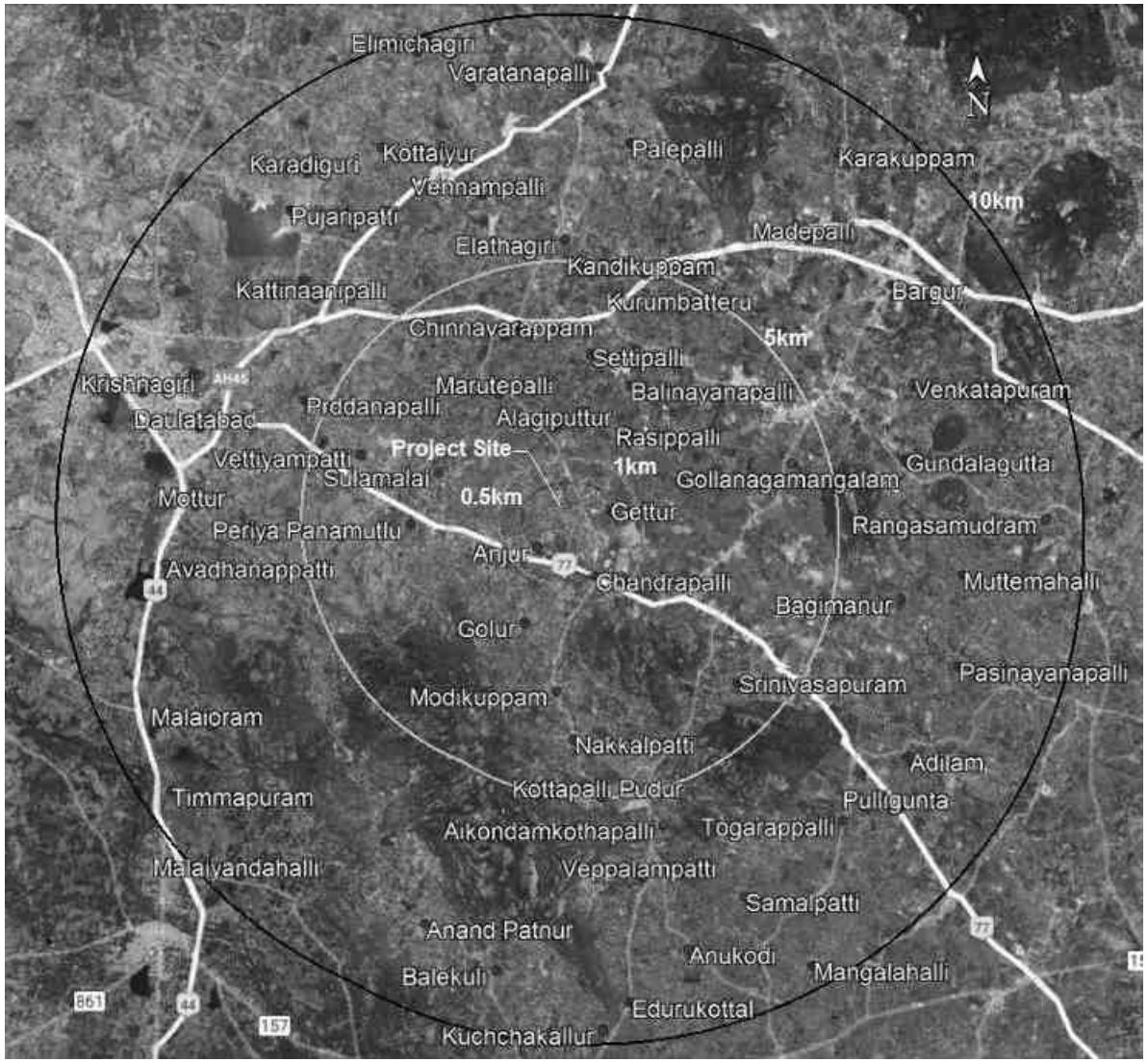

Figure 2-6 10km radius Google Imagery of the project site

2.4 Project Summary & Salient Features

Project Summary & Salient Features within 15km radius of the project boundary is shown in **Table 2-1.**

Table 2-1 Project Summary & Salient Features within 15km radius of the lease area boundary

S.No	Particulars	Details
1.	Latitude	12°29'30.83230"N to 12°30'0.25552"N
2.	Longitude	78°17'28.61642"E to 78°18'0.33892"E
3.	Site Elevation above MSL	~622 m AMSL
4.	Topography	Hilly Terrain
5.	Land use of the site	Government Poramboke land
6.	Extent of lease area	34.35.5 Ha
7.	Precise area Communication Letter	20 Years,Letter No.3821994/MME.1/2022-1, dated:14.02.2023
8.	Mining Plan Approval Letter	Rc.No. 6262/MM4/2019, Dated 19.09.2023
9.	Water Requirement	1.5 KLD
10.	Power requirement through DG Set	60 KVA (DG Set 1*125 kVA)
11.	Fuel requirements (Lts/Day)	200
12.	Manpower	Direct-30
13.	Municipal Solid waste Generation (Kg /day	13.5
14.	Waste Oil generation (Lts/Y)	3.0
15.	Project Cost in Lakh	Rs. 99.97/-
16.	Nearest highway	➢ SH-131 (Bargur-Tirupathur Road) ~6.59km, NE ➢ NH-77(Krishnagiri - Tindivanam) ~ 0.43 km, S
17.	Nearest railway station	➢ Railway line-(Patchur-Mulanur Railway line) ~16.14km, NE ➢ Railway station- Patchur ~20.80km, ENE
18.	Nearest airport	➢ Hosur Airport ≃58.30km (WNW) ➢ Kempegowda International Airport, Bengaluru 96.87km (NW)
19.	Nearest town / city	**Nearest Town:** Krishnagiri ≃7 Km (W)
20.	Water body	**S. No** / **Water bodies** / **Distance (km)** / **Direction** 1 / Odai / Adjacent to Site / N 2 / Gettur Lake / 0.49 / E 3 / Matturar / 2.35 / N 4 / Badatalav Eri / 7.21 / NW 5 / Bargur Ar / 7.90 / ENE 6 / Canal near Malaiyandahalli / 7.91 / SW 7 / Timmapuram Lake / 8.26 / SW 8 / Badatalav Supply Channel / 9.20 / NW 9 / Ponnaiyar R / 9.51 / WSW 10 / Baleguli Eri / 9.82 / S 11 / Darai Cheruvu Vanka / 10.56 / NNE

		12	Krishnagiri Dam/Krishnagiri Reservoir Project(KRP) Dam	11.20	W
		13	Thirthamadugu Ar	13.45	NNE
21.	Archaeologically places	**S.No**	**Monuments**	**Distance (km)**	**Direction**
		1.	Krishnagiri Hill Fort	8.93	WNW
22.	Reserved / Protected Forests	**S.No**	**Reserved Forests**	**Distance (km)**	**Direction**
		1	Togarappalli RF	4.40	SE
		2	Varatanapalli RF	6.18	NNE
		3	Bargur RF	9.20	ENE
		4	Tattakkal RF	10.83	S
		5	Neralakotta RF	11.27	NE
		6	Nandi Banda RF	12.35	ENE
		7	Maharajagadai Ext RF	12.36	N
		8	Naralapalli RF	12.99	NNW
		9	Maharajagadai RF	13.35	N
		10	Kothur RF	14.98	NE
23.	Seismicity	Seismic zone-II			
24.	Defense Installations	Nil within 15 km radius			
25.	State Boundary	Nil			

2.4.1 Nearest Human Settlement

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

Table 2-2 Nearest Human Settlement

S. No	Name of the Village	Distance in km	Direction	Population (census 2011)
1	Gettur	0.32	E	300
2	Anjur	0.35	SSW	750
3	Alagupudur Aanandhapattinam	0.37	N	150
4	Chandrapalli	0.50	S	6,467
5.	Chinna Panamutlu	1.15	WSW	400

2.5 Size or magnitude of operation

The proposed quarry is over an extent of 35.34.5 ha located in S.F.No.283 (Part), located at Sulamalai Village, Bargur Taluk, Krishnagiri District, lies in the latitude of 12°29'30.83230"N to 12°30'0.25552"N and longitude of 78°17'28.61642"E to 78°18'0.33892"E. The area is marked in the survey of India Topo sheet No. D44S2,3,6&7

The Grey granite quarrying operation is proposed to carry out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m & width bench not less than the height. Proposed production capacity is 30,000m^3 with a depth of Mining of 29m from the top of the hillock for the period of 20 years. The area applied for quarry lease is exhibits hilly terrain; the altitude of the area is ~622 AMSL.The Land Use Break up summarized as **Table 2-3.**

Table 2-3 Land use Pattern of the quarry area

S.No	Description	Present area (Ha)	Mining plan period (Ha)
1.	Area Under Quarrying	4.34.5	0.18.5
2.	Waste dump	2.62.5	3.83.0
3.	Infrastructure	0.02.0	--
4.	Roads	0.42.0	--
5.	Green Belt	1.64.5	0.10.0
6.	Un-utilized	25.30.0	21.18.5
	Total	**34.35.5**	**25.30.0**

2.5.1 Grey Granite Reserves

The available mineable reserves calculated by deducting 7.5m safety distance and bench loss. The updated geological reserve of granite estimated based on the geological cross-sections was 4, 38,325m^3 as on 28.02.2023. The updated mineable reserves for granite is 2,18,631m^3 as on 28.02.2023 after consideration of mineral locked-up in benches and safety barrier. By applying 25% recovery, the updated mineable effective reserves as 54,658 m^3.

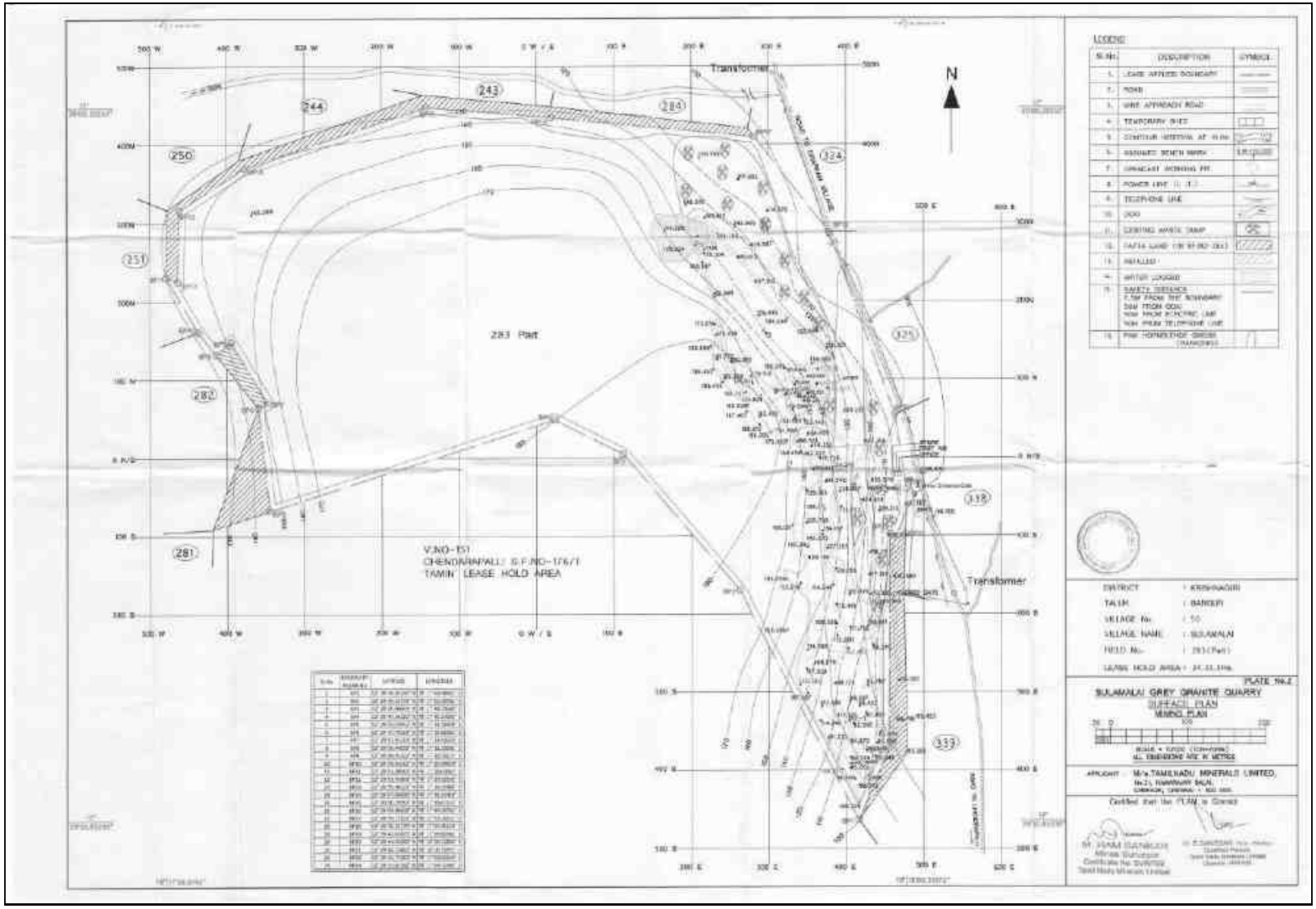

Figure 2-7 Surface Plan of the Granite Quarry

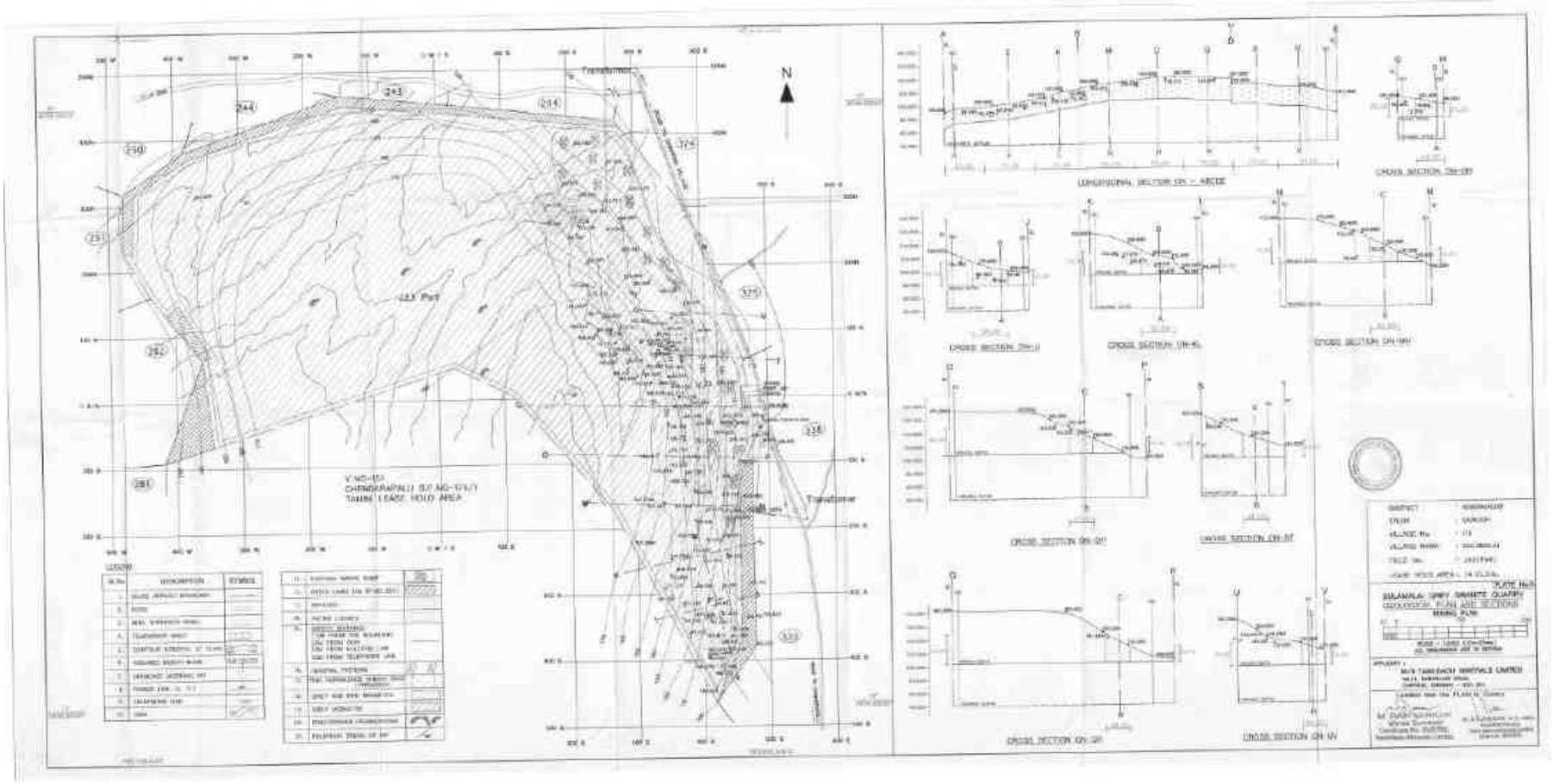

Figure 2-8 Geological Plan of the Quarry

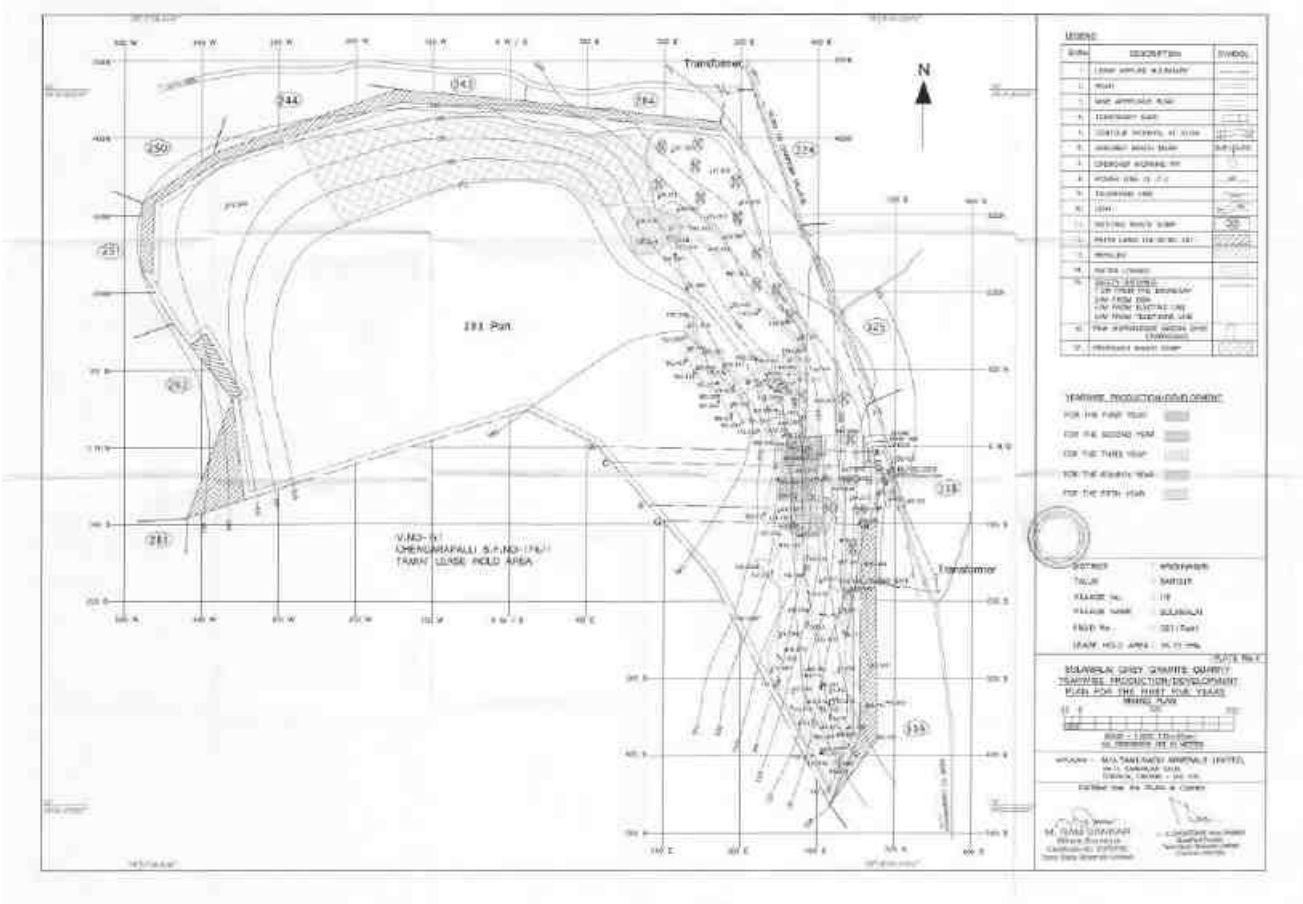

Figure 2-9 Year wise production/Development plan of the Quarry

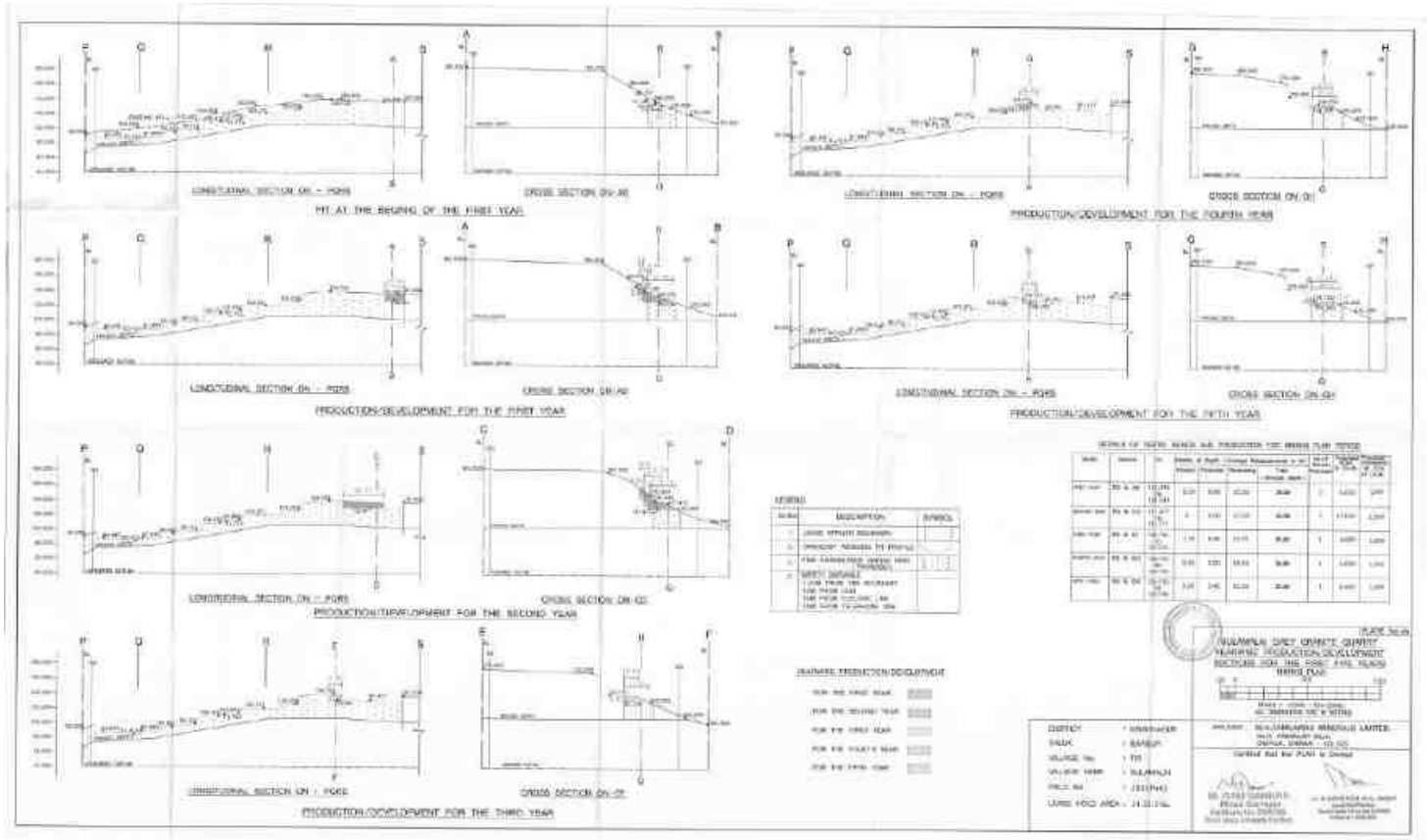

Figure 2-10 Year wise production/Development section of the quarry

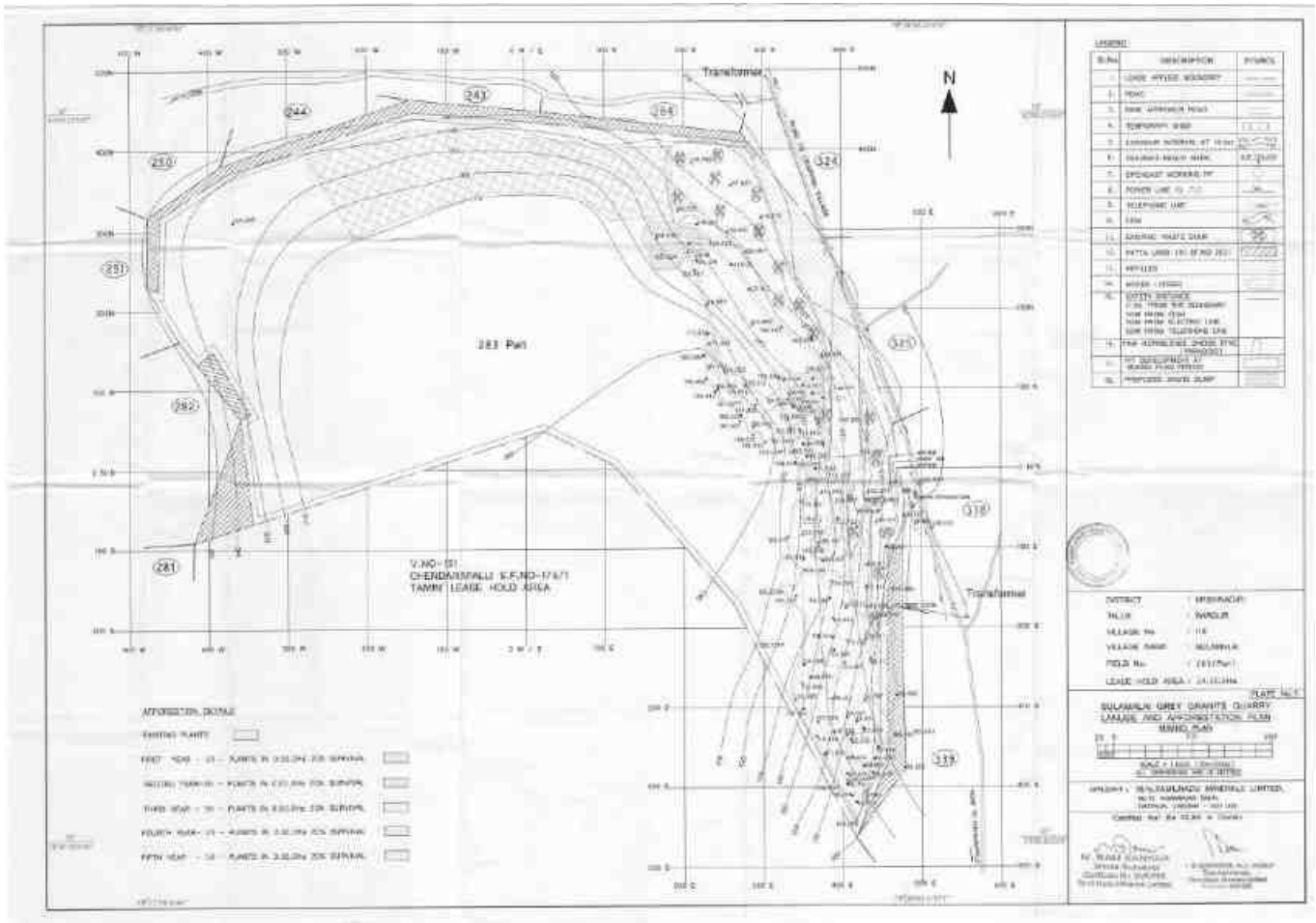

Figure 2-11 Land Use and Afforesation plan of the quarry

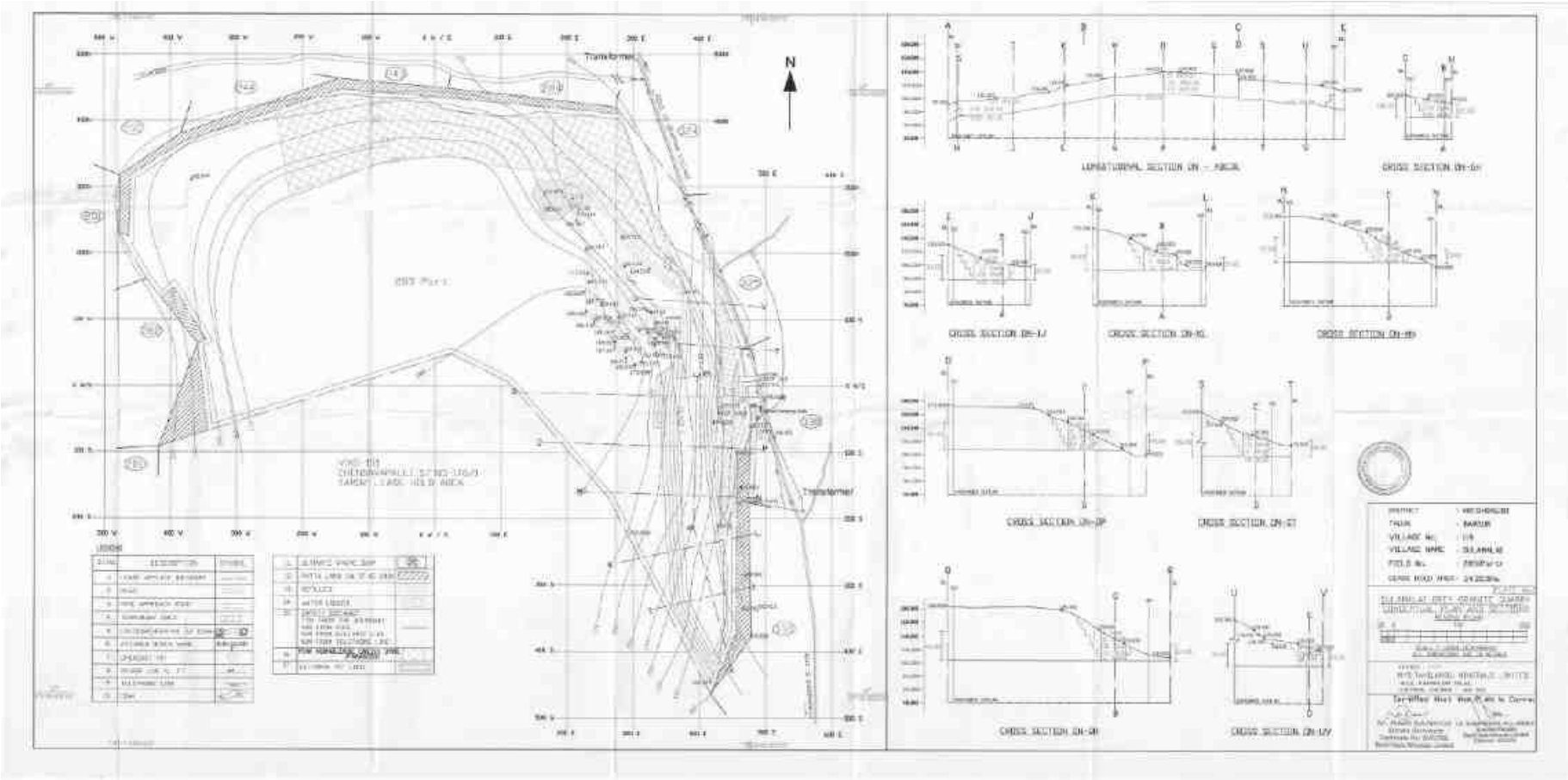

Figure 2-12 Conceptual Plan of the quarry

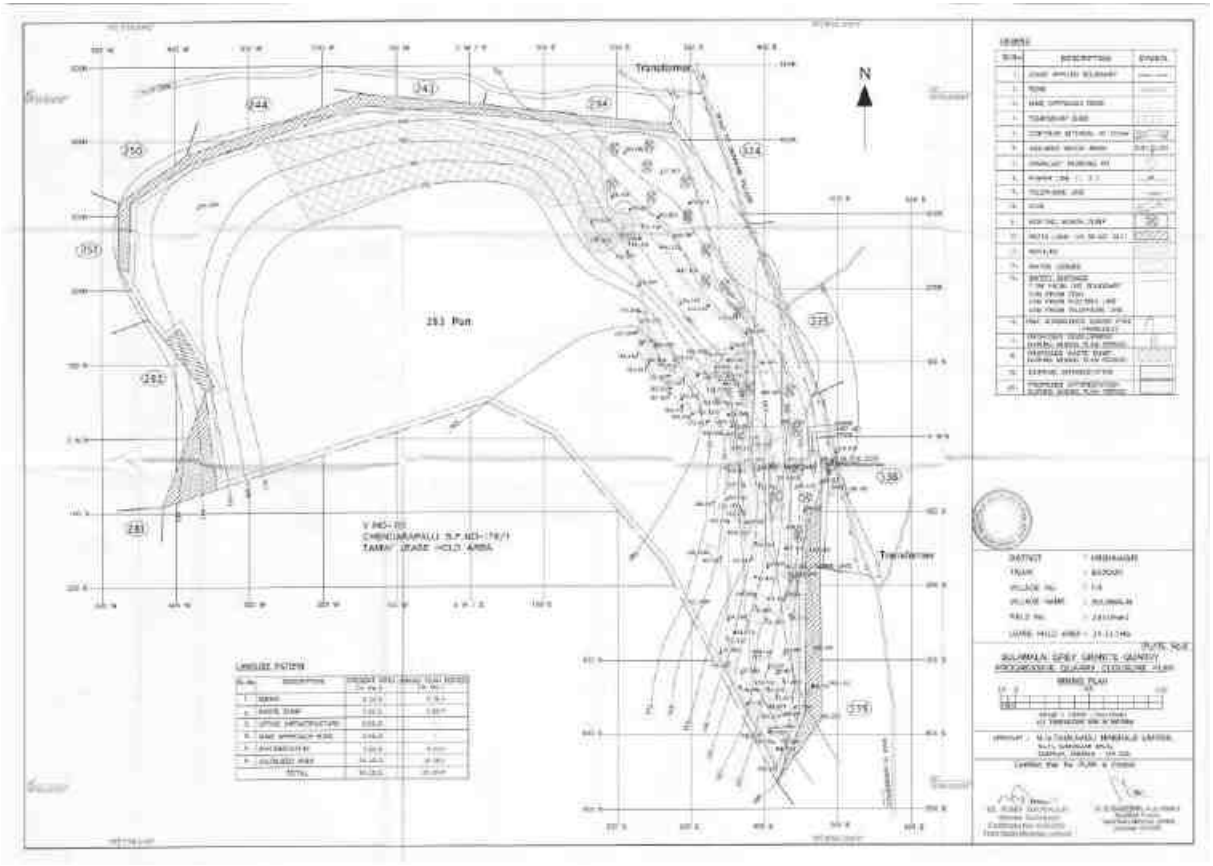

Figure 2-13 Mine Closure Plan of the quarry

2.5.2 Excavated Quarry Details:

The quarry operation is done without prior Environmental Clearence from 15.01.2016 to 10.01.2017

Table 2-4 Excavated details

S.No	Type of Mineral	Excavated Quantity (m^3)	Depth (m)
1.	Grey Granite	300396	12

2.5.3 Additional reserves established category wise

No additional reserves established during the Modified Scheme of Mining Period.

Table 2-5 Updated reserves as on 28.02.2023

S.No	Updated Geological Reserves (m^3)	Updated Mineable Reserves (m^3)	Mineable Saleable Reserves @25% Recovery (m^3)
1.	4,38,325	2,18,631	54,658

2.6 Summary of the Magnitude of Operation

The Mining plan was approved by the Director of Geology & mining, Chennai vide letter No.6262/MM4/2019, dated 19.09.2023 for 34.35.5Ha.

Year wise production details for 5 years is summarized in **Table 2-5.**

Table 2-6 Yearwise Development/Production for the Five Years

S. No	Year	ROM (m^3)	Production @ 25% Recovery (m^3)	Granite waste @ 75% (m^3)
1	1st Year	6000	1500	4500
2	2nd Year	12000	3000	9000
3	3rd Year	4000	1000	3000
4	4th Year	4000	1000	3000
5	5th Year	4000	1000	3000
Total		**30,000**	**7,500**	**22,500**

2.7 Project Cost

Project cost of the project is shown in **Table 2-6.**

Table 2-7 Project cost of the project

S. No	Description of the Cost	Cost in Lakhs
I. Fixed Asset Cost		
1	Land Cost	Nil because of Govt. Land
	Labours Shed	50,000/-
	Sanitary facilities	50,000/-
	Fencing Cost	1,25,000/-
	Sub Total	**2,25,000/-**
II. Operational cost		
	Jack Hammers (6 nos)	1,98,000/-
	Compressor (2 nos)	19,82,000/-
	Diamond wire saw (1 no)	4,87,000/-
	Diesel General 120KVA	4,00,000/-
	Excavator (1 no). hire	6,00,000/-
	Tippers (2 nos)	58,00,000/-
	Drinking water facility for the labours	50,000/-
	Safety kits	50,000/-
	Sub Total	**95,67,000/-**
III	**EMP Cost**	
	Afforestation	30,000/-
	Water Sprinkling	50,000/-
	Water Quality Test	25,000/-
	Air Quality Test	25,000/-
	Noise/Vibration Test	25,000/-
	CSR activities	50,000/-
	Sub Total	2,05,000/-
	Grand Total	**99,97,000/- ≃Rs. 1 Crore**

2.8 Technology&Process Description

2.8.1 Technology

Primary step of mining of minerals is the removal of the deposits from the ground. Once the minerals / ore are removed, additional preparation process is required to isolate the valuable minerals from their waste gangue minerals. There are two basic method of mining of minerals opencast and underground mining. The choice of method depends on the geologic, hydrological, geo-technical, geographic, economic, technological, environmental, safety, Socio - political and financial considerations.

The major purpose of mine development is to provide auxiliary and support facilities for physically opening a surface or underground, or mine and bringing it to full production is to be planned. The facilities will not contribute directly to the production operation. It is a period of intensive and diversified activity on the project site with environmental impacts, which are usually different in nature from operational impacts, which are crucial for successful environmental management. Schematic Diagram of Mining Process is given in **Figure 2-14.**

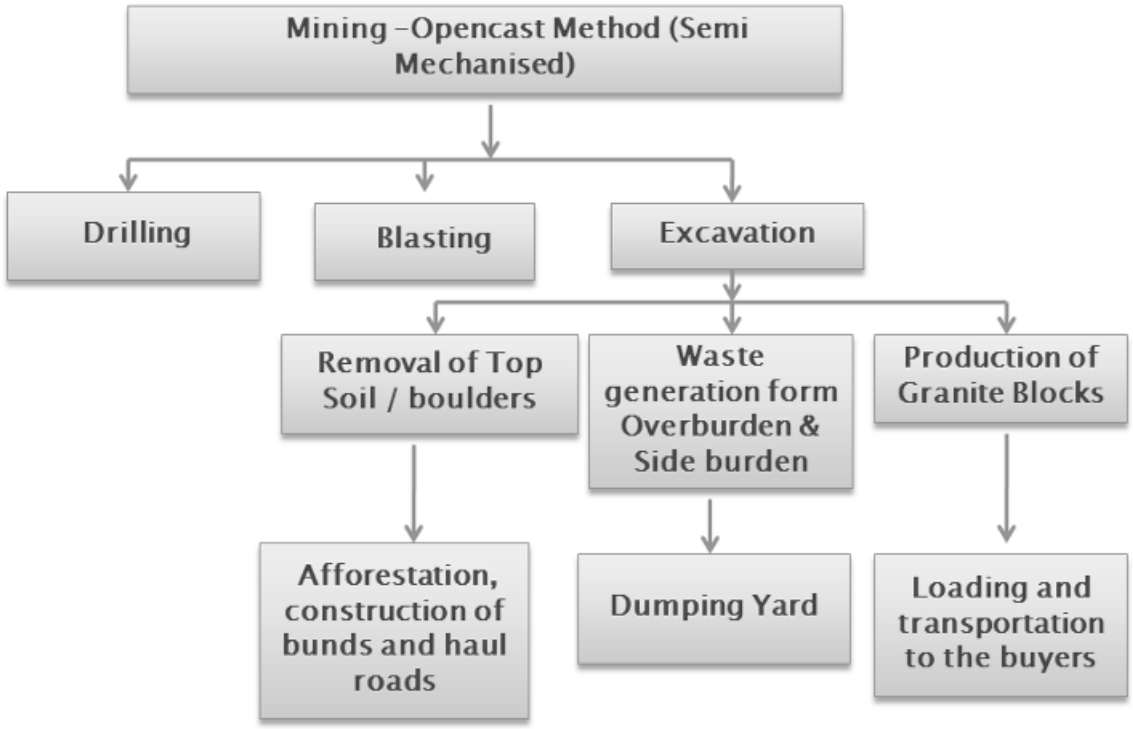

Figure 2-14 Schematic diagram of the mining process

2.8.2 Method of mining-Open Cast Working

In accordance with the Regulation 106 (2)(a) of the Metalliferous Mines Regulations 1961, in all open cast workings where the ore body forms hard rock, the working faces and sides should be adequately benched and sloped. A bench height not exceeding 6m and a bench width not less than the height has to be maintained. The slope angle of such benches and sides should not exceed 60° from the horizontal. However, observance of these statutory provisions into in granite dimensional stone mining is seldom possible due to the field difficulties and technical reasons as below:

- Recovery of the granite mineral is to be as undamaged rectangular dimensional blocks. In the attempt to the benches and sides with the above statutory parameters haphazard blasting may be involved.
- In which case the commercial granite body may get spoiled due generation of blasting cracks.In the exercise of forming the benches with 60° slope within the granite deposit, theportion confined within the 60° as we as its complimentary part in the extricated block will become as mineral waste while shaping into rectangular blocks.
- The granite industry needs blocks as huge as few cubic meters volume withmeasurements upto 3m x 2m x 2m.
- Production of such huge blocks with a moving bench of 6m height is not possible. Production of such huge blocks in turn increases the recovery and reduces the mineral waste during dressing.

- Blocks of smaller size of certain varieties of granite are not marketable now-a-days. Formation of too many benches with more height and the width equal to the heightmay lease to mineral lock up.

Hence in order to avoid granite waste 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 6m height and 3m width with vertical faces. Such a provision for relaxation of the Regulation has been provided within the regulation 106 (2) (a). Further, it is to be noteworthy that opencast granite 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 backfill the pit in as much as good quantities of reserves are underlying the pits. The stock yard for the granite blocks produced and the dressing yard where the manual dressing and shaping of the blocks are carried out are located near the working pit in order to minimize the lead from the pit to the dressing yard and stock yard. A mine office, store room, first-aid room and workers rest shelter have been provided.

2.8.3 Process Description

Blasting

The blasting parameters in the mining of Granite dimensional stones are entirely different from that of industrial minerals, since the basic purpose for the use of explosives in both the cases are entirely different. In the industrial minerals, maximum fragmentation and crushing of the ore is essential, whereas in the granite mining, the granite stones are to be extricated intact, without any damage on both the extricated part and the parent rock body. Wagon drilling and heavy blasting is seldom used in granite mining.

The portion to be extricated from the parent rock body is freed in all planes by adopting different methods as described in chapter 4.0. Only mild explosives such as gun powder, detonating cord, ordinary detonators etc will be used for the production of granite blocks. The blast holes of 32mm diameter are drilled upto the bottom of the horizontal plane all along the required planes without deviations sub grade drilling is avoided, since it may damage the underlying granite deposit.

Conventional 32 mm 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 upto a depth few cms above the required horizontal plane. Sub grade drilling is not necessary since the splitting will be affected upto a further distance of few cms from the drill hole on blasting. Sub grade drilling may affecttheunderlying granite deposit.

Explosives such as gelatin, delay detonators etc may also be used occasionally at places further away from the granite deposit for certain development works such as forming approach roads to the working faces below ground level for forming flat surfaces to be used as dumping yard etc. The explosives required for this mine is 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.

Now-a-days the splitting within the sheet rock is affected by diamond wire sawing, which largely reduces the use of explosives in granite mining. Many adverse effects of blasting are avoided and hence Diamond wire cutting will substantially increase the recovery. Hence it is proposed to deploy one wire saw machine in this quarry during its operation. Since the dimensional stones, which are needed without any cracks, high explosives are not used. The secondary splitting into required involves long hole drilling upto the bottom of the separated block along the required planes for which mostly rock breaking powder is used for splitting. It is chemically called as "Calcium Hydroxide Ca $(OH)_2$".

Soundless cracking Agent is a non explosive- demolition agent that has the ability to safely demolish the rocks and reinforced concrete, cement without producing noise, vibrations, debris launches or environmental pollution. To carry out demolition CRACMAX need to be mixed with water and poured in the drilled holes. Now a day only wire sawmachine is being utilized for primary cutting to liberate the required sizes of blocks from the parent rock. The secondary spitting is carried out by the way of splitting and overturning cushtion operational procedure.

2.8.4 Loading & Transportation

The mode of transport of the granite blocks produced and marketed is by road of various consumer destinations and granite processing units located at different parts of the country. The blocks approved for export market are shipped through Chennai / Tuticorin Harbours to various countries.

Exploration

A number of valuable data for economical mining of the granite stone in this area have already been known from the actual mining practice during the past 33 years in this field.

1. Occurrence of the grey granite stone in economically viable quality and quantity has been established by geological mapping and visual examination by mining geologist experienced in granite mining which have been proved by actual mining practice.

2. The depth persistence of the granite stone is proved beyond the workable limits of 29 m from the petro genetic character of the granite body as well as from the actual mining practice. Considering the hilly deposit with sheet rock formation of 29m depth persistence from the surface level has been taken as economically workable depth to include all the three categories of mineral reserves viz, proved, probable and possible reserves.
3. The recovery of the saleable granite stones has been established as 5% from the visual exploration and from the data available by actual mining practices during the past mining in this area. As the sale of granite dimensional stone is in terms of volumes (cubic meter) only and not in terms of tonnage as in the case of the mining of Industrial minerals, the geological reserves, mineable reserves and quantum of waste generation etc., are given in terms of cubic meter (volume) only.

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 foreman/ mines manager.

Mine drainage

The mine area is an elevated ground with gentle slope on both sides of the linear dyke. Hence there is natural drainage system facilitating easy and comfortable drainage of rain waters. However, as a precaution, catch drains has been formed all around the working pit and it has been led to the natural drainage, so that the rain water will not enter the working areas. The water table will be at a depth of 9.5m BGL, A diesel engine with 5 H.P capacity is kept at the mine site to meet any eventuality of bailing out the rain water to the natural drainage outside to carry out the mine working uninterrupted.

2.9 Requirements

2.9.1 Land Requirement and Land Use Planning

Quarry Land use pattern details are shown in **Table 2-7** and Land use pattern in provided in**Table 2-8.**

Table 2-8 Quarry Land details

District	Taluk	Village	S.F. No.	Area in Ha	Occupancy /ownership
Krishnagiri, Tamilnadu	Bargur	Sulamalai	283 (Part)	34.35.5	Government Poramboke land

Table 2-9 Land Use Pattern of the quarry area

S.No	Description	Present area (Ha)	Mining plan period (Ha)
1.	Area Under Quarrying	4.34.5	0.18.5
2.	Waste dump	2.62.5	3.83.0
3.	Infrastructure	0.02.0	--
4.	Roads	0.42.0	--
5.	Green Belt	1.64.5	0.10.0
6.	Un-utilized	25.30.0	21.18.5
	Total	**34.35.5**	**25.30.0**

2.9.2 Water Requirement

The total water requirement is 1.5 KLD. The total water requirement will be met from water tanker suppliers. Domestic wastewater will be treated in Septic Tank followed by soak pit. Septic Tank will be cleaned periodically. The water requirement break up is given in**Table 2-9.**

Table 2-10 Water requirement breakup

S. No	Description	Water Requirement (KLD)
1	Domestic purpose	0.5
2	Wire saw cutting purpose	0.3
3	Dust suppression	0.3
4	Green belt	0.4
	Total	**1.5**

2.9.3 Power Requirement

- DG Set with a capacity of 125 kVA will be used to meet the power requirement of 60 kVA.
- Diesel (HSD) will be used for quarrying machineries around 200 liters of HSD will be used per day.
- Diesel will be brought from nearby diesel pumps.

2.9.4 List of Equipments

The list of Equipment is given in **Table 2-10.**

Table 2-11 List of Machineries

S. No	Machinery	Capacity	Numbers
1	Excavator	300 LC	1
2	Compressor	400 cfm	2
3	Dumpers	25 Tonnes	2

4	Diamond wire saw	30 m^3/day	1
5	Jack Hammers (32mm dia.)	1.2 to 6m	6
6	Diesel Generator	125 kVA	1
7	Tractor Mounted Air Compressor	--	1

2.9.5 Man power Requirement

Manpower details are given in **Table 2-11.**

Table 2-12 Manpower Details

S.No	Description	No of persons
A	**Technical/Mining Personnel**	
1	Geologist/Agent (M.sc Qualified)	1
2	Mine Manager (Holder of Manager Certificate of Competency under MMR, 1961	1
3	Mining Mate cum Blaster	1
4	Machinery operator	6
5	Diesel Mechanic	1
B	**Workers**	
1	Skilled	1
2	Semi- Skilled	9
3	Un-skilled	10
	Total	**30**

2.10 Infrastructure facilities

Sanitation facility, office room and rest room facilities will be provided.

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

A schematic representation of the overall feasibility and environmental assessment process is shown in **Figure 2-15**.

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 & finalization 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.

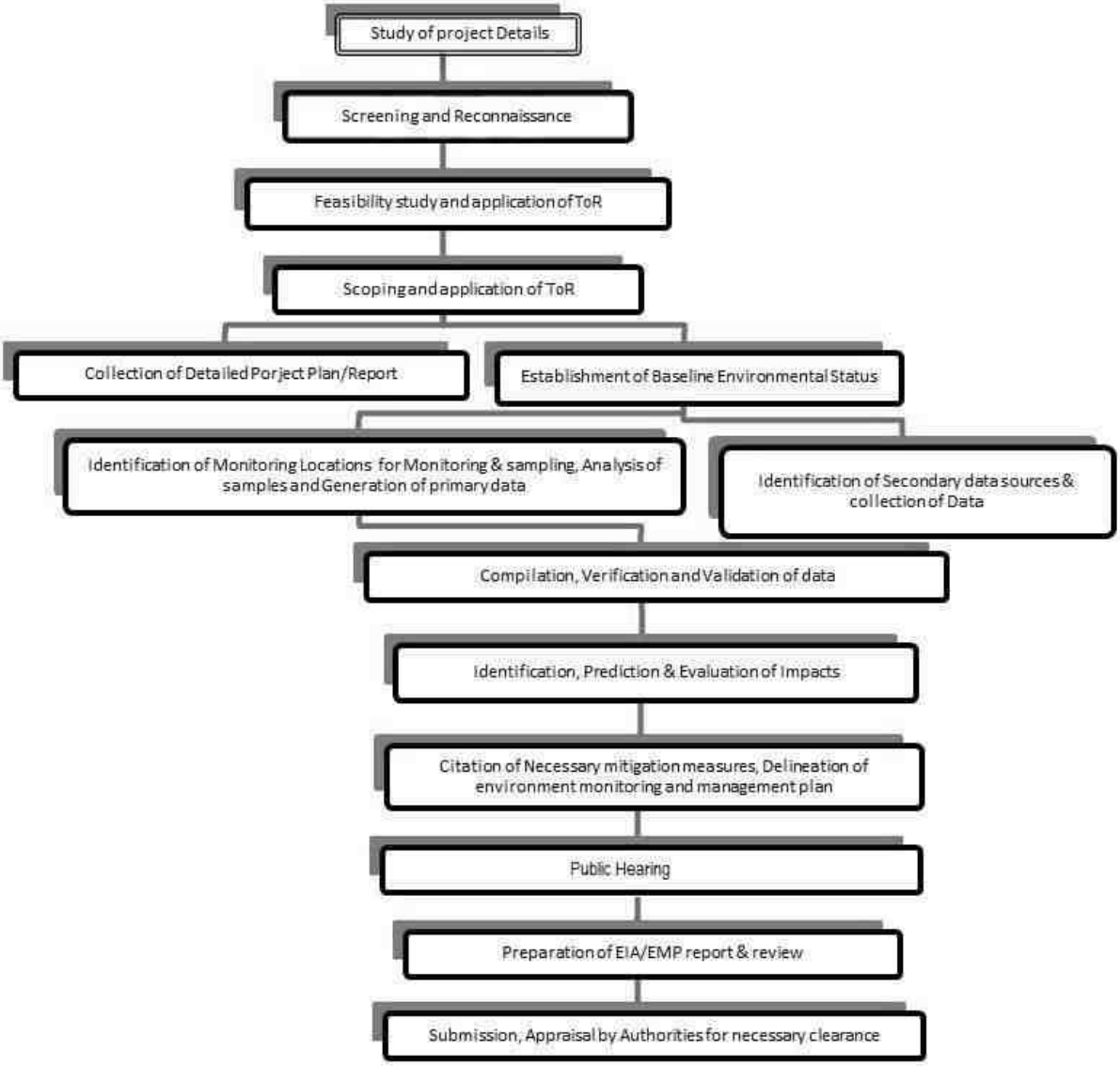

Figure 2-15 Feasibility & Environmental Assessment Process

2.12 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 generation, Noise generation, Solid waste generation etc.

2.12.1 Solid Waste Management

The municipal Solid waste generation and management details are given in**Table 2-12.**

Table 2-13 Municipal Solid Waste generation & Management

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

As per CPCHEEO guidelines: MSW per capita/day =0.45

2.12.2 Hazardous waste Management

The type of hazardous waste and the quantity generated are detailed in **Table 2-13.**

Table 2-14 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 TNPCB Authorized Agencies for Reprocessing/Recycling

2.13 Assessment of new and untested technology for the risk of technological failure

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

2.14 Mine Closure Plan

The site boundaries shall be safely fenced to prevent inherent entry of public and cattle and used as a temporary storage for water after mining activities are over. There is no proposal for back filling, reclamation and rehabilitation.

2.15 Progressive Mine Closure Plan

The quarry is not proposed to back fill the ultimate pit, in as much as good quantity of reserves is available below the workable depth of 29m and there is possibility of technology of up gradation in granite mining for greater depths in course of time for safe mining at economic cost beyond 29m depth. The pit boundaries shall be safely fenced and used for agricultural purpose when the pit is filled with underground see page or rain waters.

3 DESCRIPTION OF ENVIRONMENT

This chapter depicts the establishment of baseline for valued environmental components, as identified in and around the project area is located at survey no: 283 (Part), located at Sulamalai Village, Bargur Taluk, Krishnagiri District, Tamil Nadu State. The primary baseline data monitored covered three (3) months i.e., from **January 2024 – March 2024**, and secondary data was collected from Government and Semi-Government organizations. The primary baseline data has been generated by M/s. Hubert Enviro Care Systems (P) Ltd, Chennai, and a MoEF & CC approved Environmental Testing Laboratory for the following Terrestrial environmental components.

- **Meteorology:** Temperature, Relative Humidity, Rainfall, Wind Speed & Direction- **Refer Section - 3.5**
- **Ambient Air Quality:** Particulate matter <10 micron size (PM_{10}), Particulate matter <2.5 micron size ($PM_{2.5}$), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Carbon Monoxide (CO), Lead (Pb), Ozone (O_3), Benzene (C_6H_6), Benzo (a) pyrene ($C_{20}H_{12}$), Arsenic (As), Nickel (Ni), Ammonia (NH_3) and free Silica - **Refer Section - 3.6**
- **Ambient Noise Levels:** Day equivalent noise levels, Night equivalent noise levels - **Refer Section - 3.7**
- **Water Quality:** Groundwater Quality, Surface Water Quality - **Refer Section - 3.8**
- **Soil Quality - Refer Section - 3.9**
- **Ecology - Refer Section - 3.10**
- **Social Economic Status - Refer Section - 3.11**

3.1 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 Project Impact/Influence Area (PIA) is 10 km from the boundary of the project site which covers parts of in Sulamalai Village, Bargur Taluk, Krishnagiri District, and Tamil Nadu State.

3.2 Description of the Study Area

As described in Chapter 1, M/s. TAMIN proposes Sulamalai Grey Granite quarry lease over an extent of 34.35.5 Ha at S.F. Nos:283 (Part), located at Sulamalai Village, Bargur Taluk, Krishnagiri District, Tamil Nadu State. Patchur Railway Station is located approximately at a distance of 20.80 km towards ENE and Patchur to Mulanur Railway Line is located approximately at a distance of 16.14 km towards NE from the project boundary.NH-77

Krishnagiri to Tindivanam Highway is located towards S at a distance of ~0.43 km and SH-131 (Bargur-Tirupathur Road) is located towards NE at a distance of 6.59 km from the project boundary. An overall idea of the study area with reference to the physical conditions are presented for better understanding in the following sections before proceeding into the section on the prevailing environmental conditions of the study area.Topo Map of the study area is given in **Figure 3-1.**

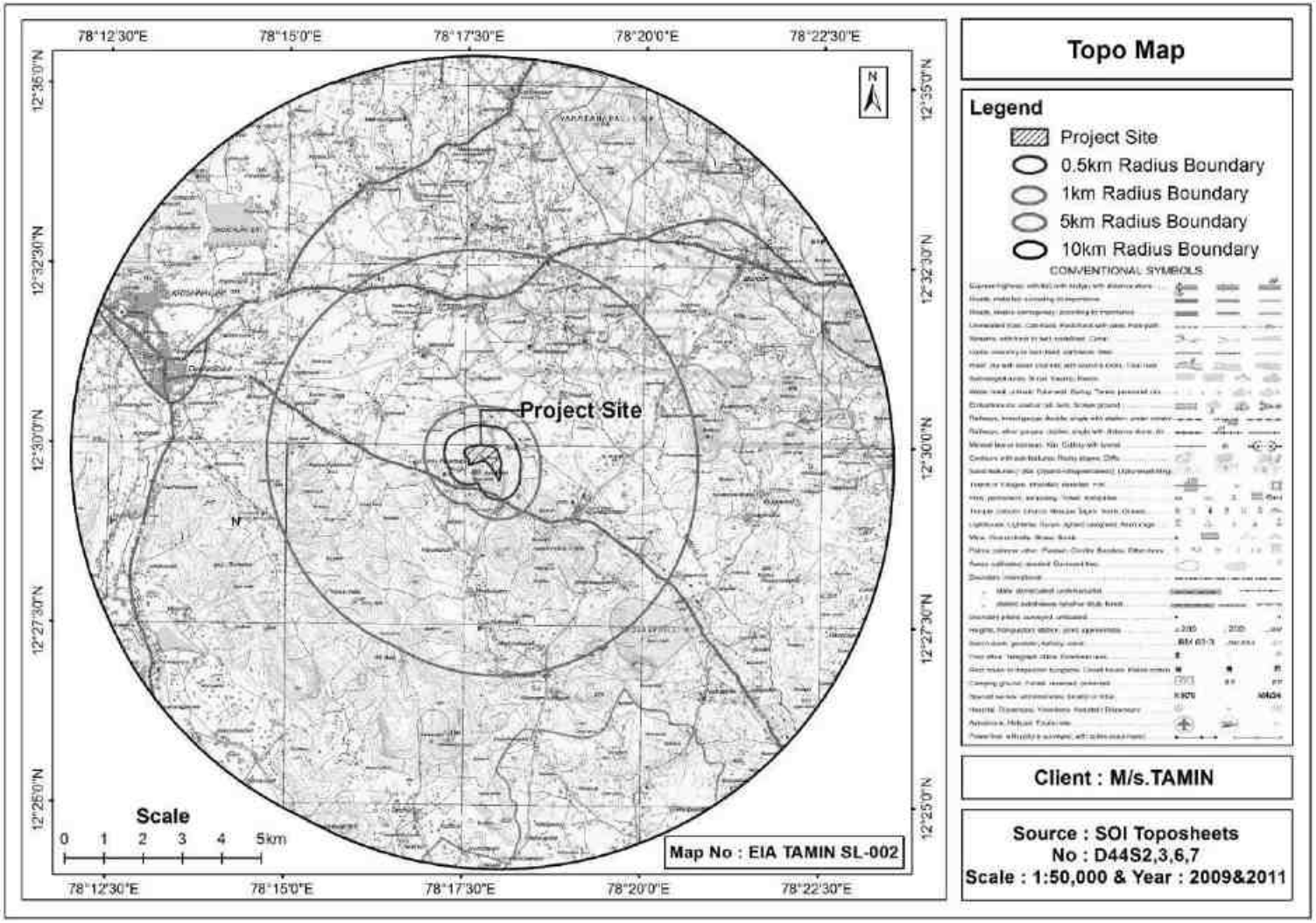

Figure 3-1 Topo Map of Study area

3.3 Environmentally/Ecologically Sensitive areas

This section details with the environmental sensitive areas present within the project site and surrounding environs. The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in **Table 3-1.**

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

<table>
<tr><th>S. No.</th><th>Areas</th><th>Distance & Direction from project boundary</th></tr>
<tr><td>1.</td><td>Monuments</td><td>
<table>
<tr><th>S. No</th><th>Places</th><th>Distance (≈km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Krishnagiri Hill Fort</td><td>8.93</td><td>WNW</td></tr>
</table>
</td></tr>
<tr><td>2.</td><td>Heritages</td><td>
<table>
<tr><th>S. No</th><th>Places</th><th>Distance (≈km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Jagadevi Fort (Ruins)</td><td>2.41</td><td>SE</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>Wetlands, Watercourses or other water bodies, coastal zone</td><td>
<table>
<tr><th>S. No</th><th>Places</th><th>Distance (≈km)</th><th>Direction</th></tr>
<tr><td>1</td><td>Odai</td><td>Adjacent to Site</td><td>N</td></tr>
<tr><td>2</td><td>Gettur Lake</td><td>0.49</td><td>E</td></tr>
<tr><td>3</td><td>Mettur Ar</td><td>2.35</td><td>E</td></tr>
<tr><td>4</td><td>Badatalav Eri</td><td>7.31</td><td>NW</td></tr>
<tr><td>5</td><td>Bargur Ar</td><td>7.90</td><td>ENE</td></tr>
<tr><td>6</td><td>Canal near Malaiyandahalli</td><td>7.91</td><td>SW</td></tr>
<tr><td>7</td><td>Timmapuram Lake</td><td>8.26</td><td>SW</td></tr>
<tr><td>8</td><td>Badatalav Supply Channel</td><td>9.20</td><td>NW</td></tr>
<tr><td>9</td><td>Ponnaiyar R</td><td>9.51</td><td>WSW</td></tr>
<tr><td>10</td><td>Baleguli Eri</td><td>9.82</td><td>S</td></tr>
<tr><td>11</td><td>Darai Cheruvu Vanka</td><td>10.56</td><td>NNE</td></tr>
<tr><td>12</td><td>Krishnagiri Dam/Krishnagiri Reservoir Project(KRP) Dam</td><td>11.20</td><td>W</td></tr>
<tr><td>13</td><td>Thirthamadugu Ar</td><td>13.45</td><td>NNE</td></tr>
</table>
</td></tr>
<tr><td>4.</td><td>Reserved Forests</td><td>
<table>
<tr><th>S.No</th><th>Places</th><th>Distance (≈km)</th><th>Direction</th></tr>
<tr><td>1</td><td>Togarappalli RF</td><td>4.40</td><td>SE</td></tr>
<tr><td>2</td><td>Varatanapalli RF</td><td>6.18</td><td>NNE</td></tr>
<tr><td>3</td><td>Bargur RF</td><td>9.20</td><td>ENE</td></tr>
<tr><td>4</td><td>Tattakkal RF</td><td>10.83</td><td>S</td></tr>
<tr><td>5</td><td>Neralakotta RF</td><td>11.27</td><td>NE</td></tr>
<tr><td>6</td><td>Nandi Banda RF</td><td>12.35</td><td>ENE</td></tr>
<tr><td>7</td><td>Maharajagadai Ext RF</td><td>12.36</td><td>N</td></tr>
<tr><td>8</td><td>Naralapalli RF</td><td>12.99</td><td>NNW</td></tr>
<tr><td>9</td><td>Maharajagadai RF</td><td>13.35</td><td>N</td></tr>
<tr><td>10</td><td>Kothur RF</td><td>14.98</td><td>NE</td></tr>
</table>
</td></tr>
<tr><td>5.</td><td>Routes or facilities</td><td>
<table>
<tr><th>S.No</th><th>Nearest Highway</th><th>Distance</th><th>Direction</th></tr>
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	used by the public for access to recreation or other tourist, pilgrim areas	

		(≈km)	
1.	SH-131(Bargur-Tirupathur Road)	6.59	NE
2.	NH-77(Krishnagiri - Tindivanam)	0.43	S

6.	State, National boundaries	➢ Nil

7.	Densely populated or built-up area (Nearest Town, City, District)	

S. No	Places	Distance (≈km)	Direction	Population
1.	Gettur	0.32	E	300
2.	Anjur	0.35	SSW	750
3.	Alagupudur Aanandhapattinam	0.37	N	150
4.	Chandrapalli	0.50	S	6,467
5.	Chinna Panamutlu	1.15	WSW	400
Nearest Town and City				
1.	Nearest Town - Krishnagiri	7	W	

8.	Nearest Railway station, Airport	

Nearest Railway Station, Airport			
No	**Places**	**Distance (≈km)**	**Direction**
1.	Nearest Railway Station - Patchur	20.80	ENE
2.	Hosur Airport	58.30	WNW

9.	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	

S. No	Places	Distance (≈km)	Direction
SCHOOLS			
1.	Jagadevi Government Higher Secondary School	0.88	SSE
2.	Jagadevi Government Primary School	1.99	ESE
3.	Periya Panamutlu Government High School	2.48	W
4.	Nakkalpatti Government High School	3.41	S
5.	Orappam Government Higher Secondary School	3.98	NNW
COLLEGES			
1.	K.E.T. Polytechnic College	1.71	W
2.	Government College of Engineering Bargur	5.63	NE
3.	Krishnagiri Government Arts & Science College	5.91	NW
4.	Krishnagiri Government Polytechnic College	6.12	NW
5.	Bargur Government Womens Arts And Science College	11.08	ENE
GOVERNMENT BUILDINGS			
1.	Gram Panchayat Jagadevi	2.09	ESE
2.	Bargur Taluk Office	8.39	ENE
3.	Krishnagiri Taluk Office	8.57	WNW
4.	Krishnagiri District S.P. Office	11.49	WNW

		5.	Krishnagiri Collector Office	11.70	WNW
		HOSPITALS			
		1.	Jagadevi Government Primary Health Centre	1.85	ESE
		2.	PSV Multispeciality Hospital	3.84	N
		3.	Orappam Government Primary Health Centre	3.86	N
		4.	Krishnagiri Urban Primary Health Centre	7.17	WNW
		5.	Bargur Government Hospital	7.99	NE
		RELIGIOUS PLACES			
		1.	Arulmigu Sri Sivasakthi Angalaparameshwari Amman Temple	0.42	N
		2.	Arulmigu Sri Govindaraj Swamy Temple	0.95	N
		3.	Hazrath Mohammed Sulaiman Shah Quadiri (Ra)	1.61	SE
		4.	Parshwa Padmavathi Jain Temple	4.27	NW
		5.	Saint Antony's Church	4.76	NNW
		6.	Srinivasa Perumal Temple	5.14	S
		7.	Kanavapatti Perumal Temple	5.15	WSW
		8.	Shri Ramaswamy Temple	6.77	S
		9.	Arulmigu Sri Katnampatti murugan Temple	6.69	NW
		10.	Sri Bhairava Nilayam	7.02	NNE
		11.	Arulmigu Sri Periya Mariamman Thirukovil	7.45	WNW
		12.	Avathanapatti Mariamman Temple	8.33	W
		13.	Sri Kattu Veera Anjaneya Temple	8.39	W
		14.	Our Lady of Fatima Shrine	8.71	WNW
		15.	MadinaMasjid	8.95	WNW
		16.	Sri LakshmiNarasimha Swamy Temple	9.03	N
		17.	Arulmigu Sri Kaveeshwarar Shri Sivan Temple	9.18	WNW
		18.	Arulmigu Sri Anjaneya Swamy Temple	10.24	WNW
		INDUSTRIES			
		1.	RAK India Granites Pvt Ltd	0.31	NNE
		2.	Basha Granites & Exports	0.36	N
		3.	Mod India Granites	0.37	NE
		4.	A.K Granites	0.42	SSE
		5.	Subamatsu Granites	0.48	SSW
		6.	Fivestar Granites	0.48	SSW
		7.	Shri Angali Granite	0.49	S
		8.	Marwa Granites	0.49	SSW
		9.	K P Granites	0.51	S
		10.	Vinram Granites LLP	0.61	NE

		11.	Nice Granites and Marbles	0.95	SSW	
		12.	Varalakshmi Granites	1.14	SE	
		13.	A Rainbow Granite	2.72	ESE	
		14.	Surya Granites	2.84	ESE	
		15.	M R Granite	3.03	ESE	
		16.	Jai Mahat Granites	3.46	W	
		17.	Roshan Fruits India Pvt Ltd	3.65	ESE	
		18.	Prime Granite	3.76	ESE	
		19.	Ganapathi Granites	3.80	E	
		20.	R.k.granite Industries	4.07	ESE	
		21.	Sriyans Rocks & Granites private limited	4.46	ESE	
		22.	Mayur Granites	5.31	ESE	
		23.	Universal Granite Industries	5.36	ESE	
		24.	Sri Mangala Rocks	7.56	N	
		25.	Selva Stone Export Limited	7.90	NE	
		26.	Sri Devaraja Pulp Processing Factory	9.50	WNW	
		27.	ABC Fruits	9.97	ENE	
		28.	Exotic Fruits Private Limited	11.69	E	
		29.	Sri Sakthi Pet Bottles	11.70	W	
		30.	No 1 Fly Ash Bricks and Solid Block Unit	13.17	NNW	
		31.	SMGK Agro Products	13.78	ESE	
		32.	Sre Devaraj Agro Foods	14.03	ESE	
		33.	GKS Milk Khoa Manufacturing Unit	14.16	SW	
		34.	Surabi Aseptic Food Products	14.35	SW	
		35.	Vasantam Agro Industries	14.40	ESE	

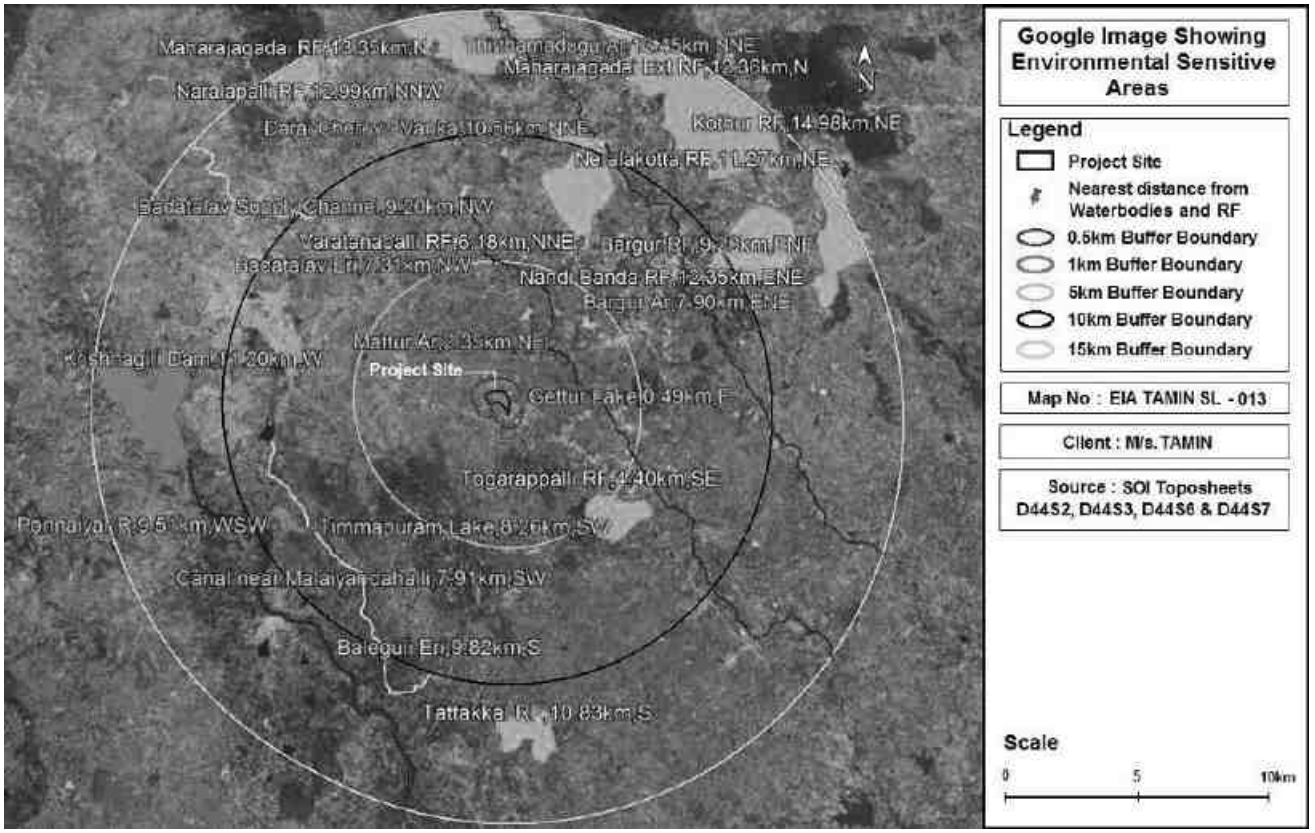


Figure 3-2 Environmental sensitive areas covering within 15 km from project boundary

3.4 Physical Conditions

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 in particular are also provided. The physical conditions are discussed as under:

- District profile
- Drainage, land use, geology, Physiography
- Natural resources
- Climatic conditions, seismic zone characteristics and natural hazard

3.4.1 PIA District Profile

The district lies between 11°12‟ and 12°49‟of Northern latitude and between 77°27‟ and 78°38‟ of Eastern longitude. This district is bounded by Andhra Pradesh in the north, Dharmapuri district in the south, Karnataka State in the west, Vellore and Tiruvannamalai district in the east. The total geographical area of the district is 5129 sq. kms. This district is placed at 9 ranks in comparison to other districts in terms of area in Tamil Nadu. It is located90 kms from Bangalore and 250 kms from Chennai.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.4.2 Climatic Conditions

Eastern part of the district experiences hot climate and Western part has a contrasting pleasant cold climate. The district is hot and dry in summer i.e., from March to June. From July to November is rainy season and between December to February winter prevails with very cold and misty. The maximum temperature of Krishnagiri district in 2010-11was 35.1°C (April) and minimum temperature was 18°C (January). In summer, from March to June, the wind is hot and uncomfortable. During the monsoon, from Julyto November, the wind is mild and pleasant. From December to February, the wind is very cold.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.4.3 Natural Resources of PIA District

3.4.4 Flora & Fauna

The Krishnagiri district is mountain terrain, the flora and fauna in the district are rich. The flora includes a variety of timber trees like Rose wood, Teak, Sandal, Bamboo, Charakkonnai, and hundreds of medicinal herbs, minor forest plants like Nelli, Kadukkai, Cheekai, Pungam etc. Pungam oil is extracted from the seeds of pungamtree, creating a non-polluting bio-fuel. The fruit trees like tamarind, mango and lime are widely spread over in this district. Krishnagiri district is the first place in the production of different types of Mangoes in Tamil Nadu. Almost20% of the mango varieties like Thothapuri and Alphonso‟ that are produced in this district, are processed into pulp. The Hosur roses are exported internationally. The Flora and fauna of PIA are discussed in **section 3.11.**

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.4.5 Forest Resources

The major types of forest seen here are tropical, deciduous, thorny shrubs and bamboo forests. Dense forest cover is at Denkanikottai region. The forests falling in Denkanikottai taluk have been declared as **'Elephant Reserve'** during 2003. The other region contains shrubs, hills and hillocks with bushes. In the past, the forests of Krishnagiri district were well known for its valuable sandal wood since the days of Tipu Sultan.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.4.6 Irrigation

Cauvery, Then Pennar and Kattar are the main rivers that flow through Krishnagiri district. Krishnagiri Reservoir Project, Shoolagiri-Chinnar Reservoir, Thangarai Reservoir, Pambar Reservoir, Kelevarapalli Reservoir Project and Baarur Tank are other sources of irrigation in this district. By all these water reservoirs 18,965 hectares of land is irrigated. The district has 4 Reservoir, 109 Canals of137 kms in length, 8599 tube wells, 1327 tanks, 57355wells for irrigation purpose and 5801 wells for domestic purpose. According to the Village Records, 48894hectares of land is irrigated. Of this irrigated land,5951.6 hectares of land is irrigated by canals, 288885.7hectares of land is irrigated by wells/tube wells and12560.5 hectares of land is irrigated by tanks.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.4.7 Agricultural Resources

Krishnagiri district has an excellent scope for agri-business. Regional Agricultural Research Centre of Tamil Nadu Agricultural University is functioning efficiently at Paiyur in Kaveripattinam union since 1973 AD. This centre is functioning in 18.5 hectares of land. It helps the peasants to develop and adopt the modern technique of cultivation. It has developed hybrid seeds by research which yields more with good quality. This district is the largest producer of mango and get first place in production of mango. With 40%share, the district is the top producer of 'ragi' in Tamil Nadu.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.4.8 Mineral Resources

Krishangiri district is famous for the Granite Industry with quarries and processing units spread around the district. "Paradise" is the most popular multicolored granite available in Krishnagiri district. Black granite is available in Hosur and Denkanikottai. Granite processing units, which make slabs of granite, finished and decorated beautifully is located mainly in Hosur and its surroundings. The multi-colored paradise slabs are being exported to America, England, Australia, and some other European countries in large quantities. A variety of quartz stones from Denkanikottai and whitemetal called limestone from Uthangarai are mined. The mineral map of Tamil Nadu is shown in the **Figure 3-3.**

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

Figure 3-3 Mineral Map of Tamil Nadu

3.4.9 Land use land cover for the study area

Total Project Study Area is **346.00** Sq.Km. Land Use /Land Cover pattern of the Study Area and Land Use /Land Cover map of the Study Area is given in **Figure 3-5**. The land use/ land cover pattern of the study area is given in **Table 3-4.**

Table 3-2 Land use/ Land Cover pattern of the Study Area

S. No	Description	Area (sq.km)	Area (Acres)	Area (Hectares)	Area (%)
1.	Crop land	143.91	35560.88	14391	41.59
2.	Plantation	74.77	18476.04	7477	21.61
3.	Scrub land	46.87	11581.81	4687	13.55
4.	Fallow	19.76	4882.79	1976	5.71
5.	Barren rocky	17.21	4252.68	1721	4.97
6.	Rural	14.69	3629.97	1469	4.25
7.	Urban	8.02	1981.78	802	2.32
8.	Tanks / Lakes / Ponds	7.75	1915.06	775	2.24
9.	Mining	7.30	1803.87	730	2.11
10.	Deciduous	3.83	946.41	383	1.11
11.	River / Stream / Canals	1.00	247.11	100	0.29
12.	Evergreen / Semi Evergreen	0.86	212.51	86	0.25
13.	Salt affected land	0.03	7.41	3	0.01
	Total	**346.00**	**85498.33**	**34600**	**100**

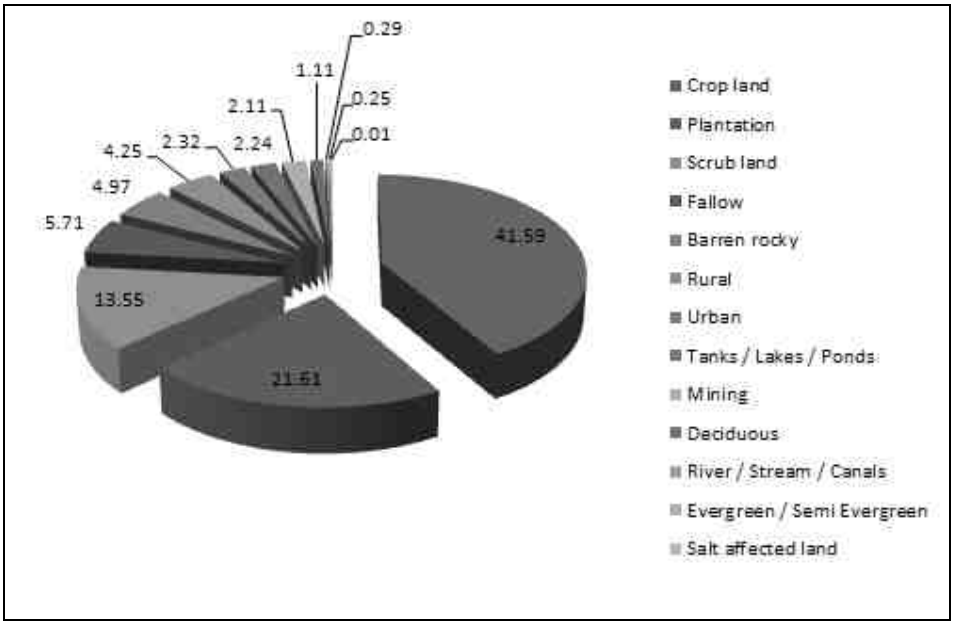


Figure 3-4 Land use/ Land Cover pattern of the Study Area

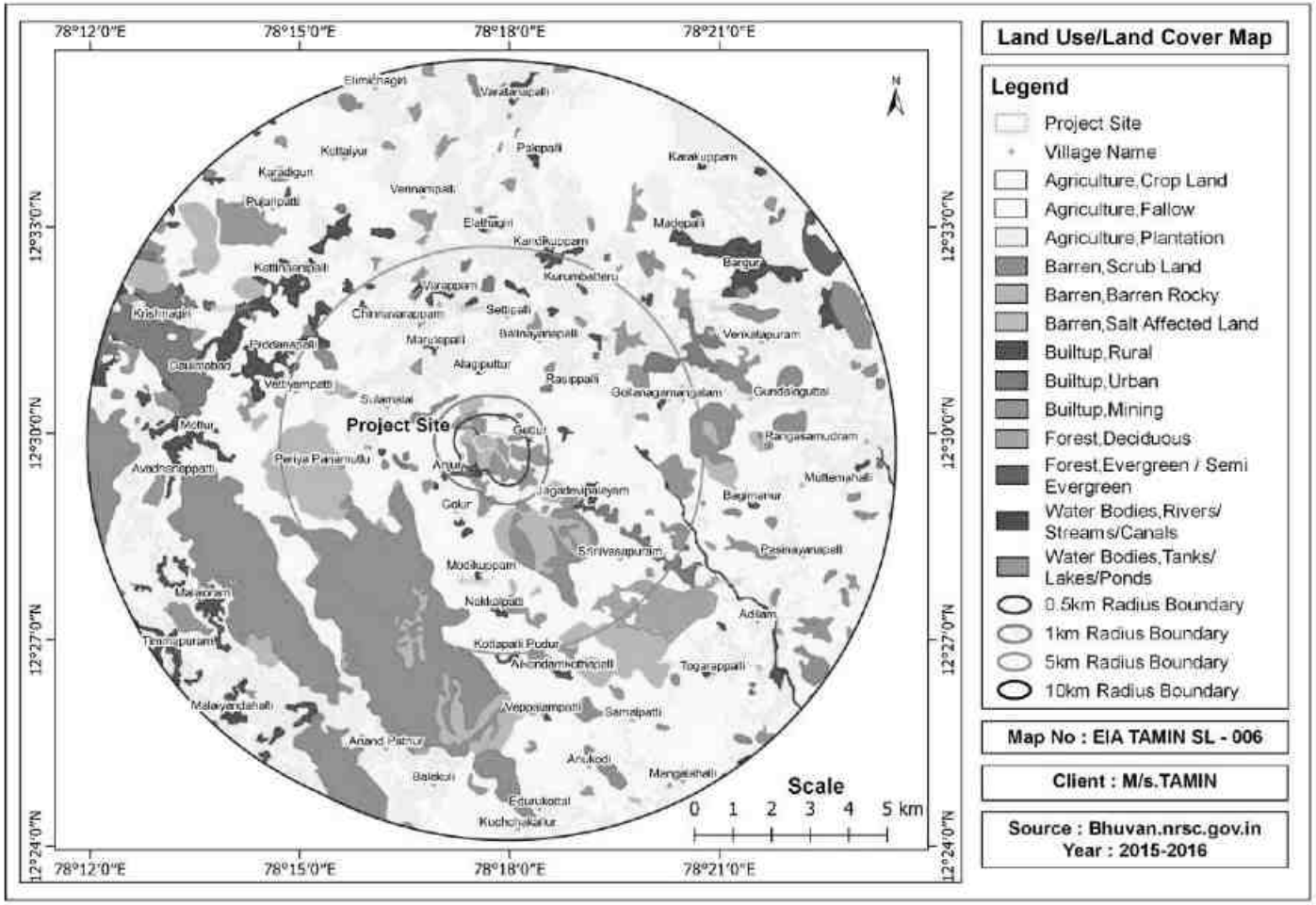


Figure 3-5 Land use/ land cover map of the Study Area

3.4.10 Topography

Krishnagiri district is bounded by Vellore and Thiruvannamalai districts in the East, Karnataka state in the west, State of Andhra Pradesh in the North Dharmapuri District in the south. Its area is 5143 Sq. Kms. This district is elevated from 300m to 1400m above the mean sea level. The Physical map of Tamilnadu is given as **Figure 3-6** and Topo map of study area is given as **Figure 3-1** and contour map of the study area is given as **Figure 3-7.**

Source:*https://krishnagiri.nic.in/about-district/district-at-aglance/#:~:text= Krishnagiri%20district%20is%20 bounded%20by,above%20the%20mean%20sea%20level.*

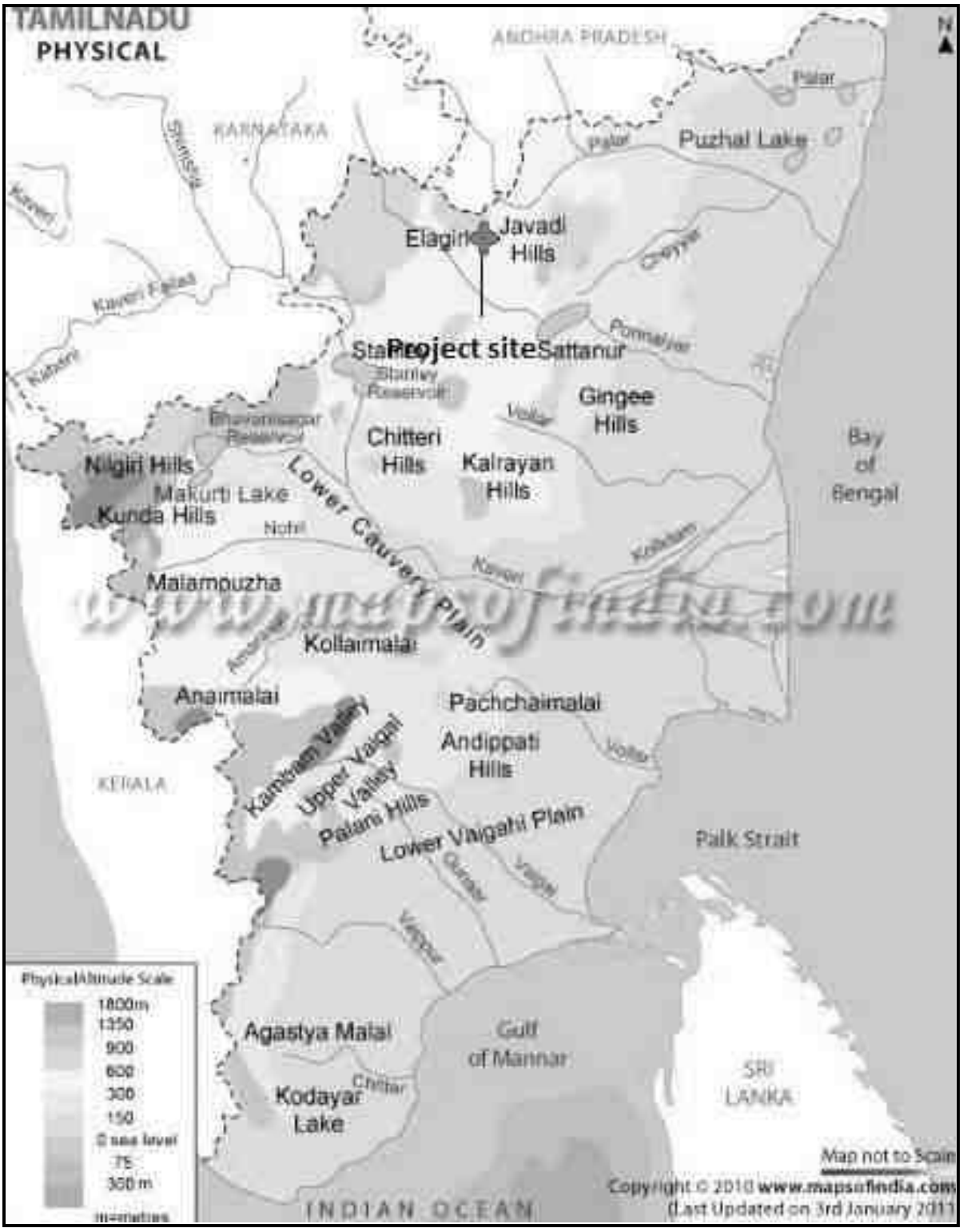


Figure 3-6 Physical map of Tamil Nadu State

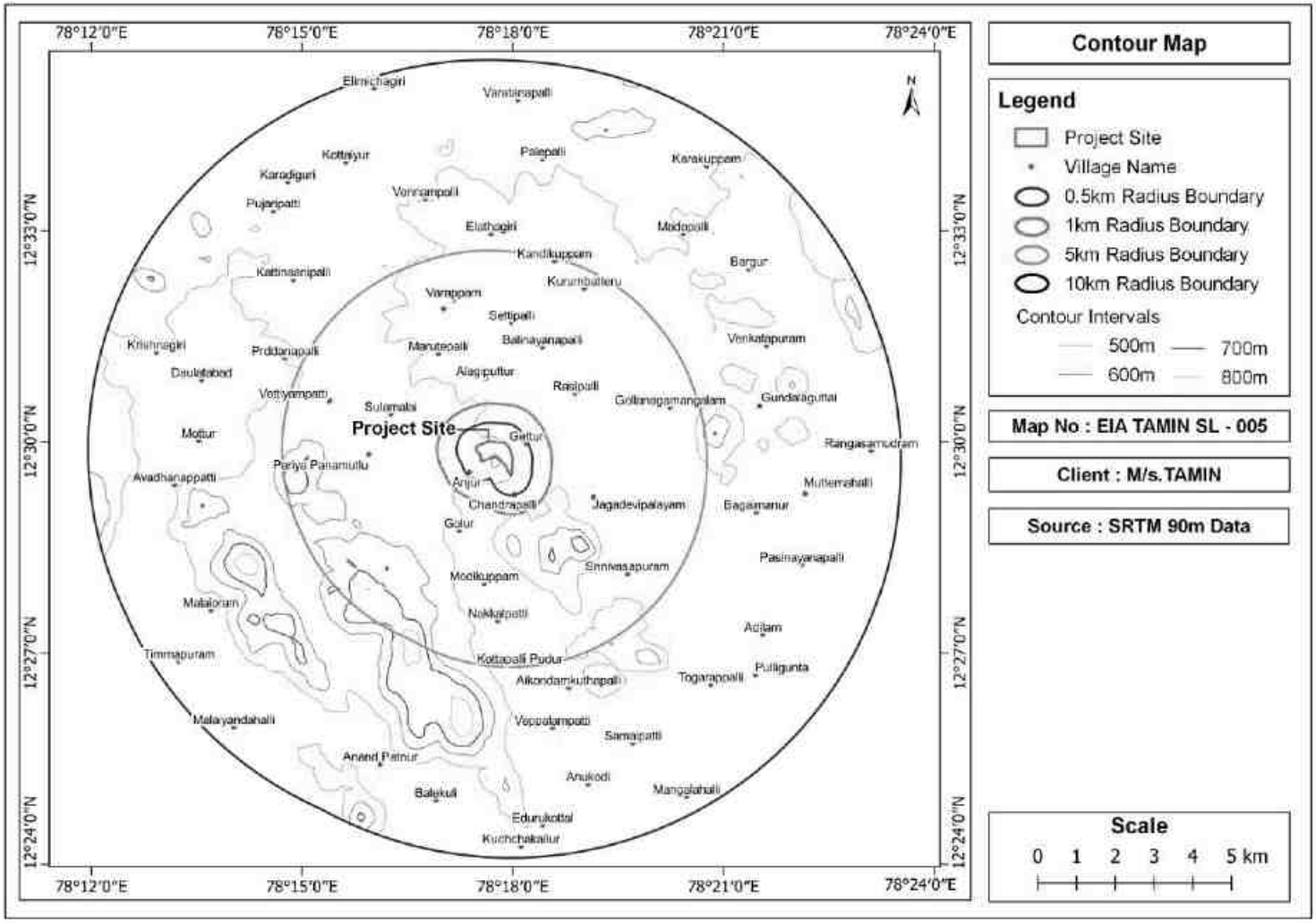


Figure 3-7 Contour map of Study Area

3.4.11 Geomorphology of the Study Area

The total Geographical area of the study area is **346.00 sq.km**. The Geomorphology of the study area is given in **Table 3-3.** Geomorphology pattern of the study area is given in **Figure 3-8.** Geomorphology map of study area is given in **Figure 3-9.**

Table 3-3 Geomorphology of the study area

S. No.	Geomorphology	Area in sq.km	Area in Acre	Area in Hectare	Total Area %
1.	Denudational Origin-Pediment-PediPlain Complex	273.90	67680.90	27390	79.16
2.	Structural Origin-Low Dissected Hills and Valleys	41.83	10336.40	4183	12.09
3.	Denudational Origin-Low Dissected Hills and Valleys	13.17	3253.95	1317	3.81
4.	Waterbodies	8.75	2162.17	875	2.53
5.	Denudational Origin-Moderately Dissected Hills and Valleys	7.14	1764.33	714	2.06
6.	Anthropogenic Origin-Anthropogenic Terrain	1.22	301.47	122	0.35
	Total	**346.00**	**85498.33**	**34600**	**100.00**

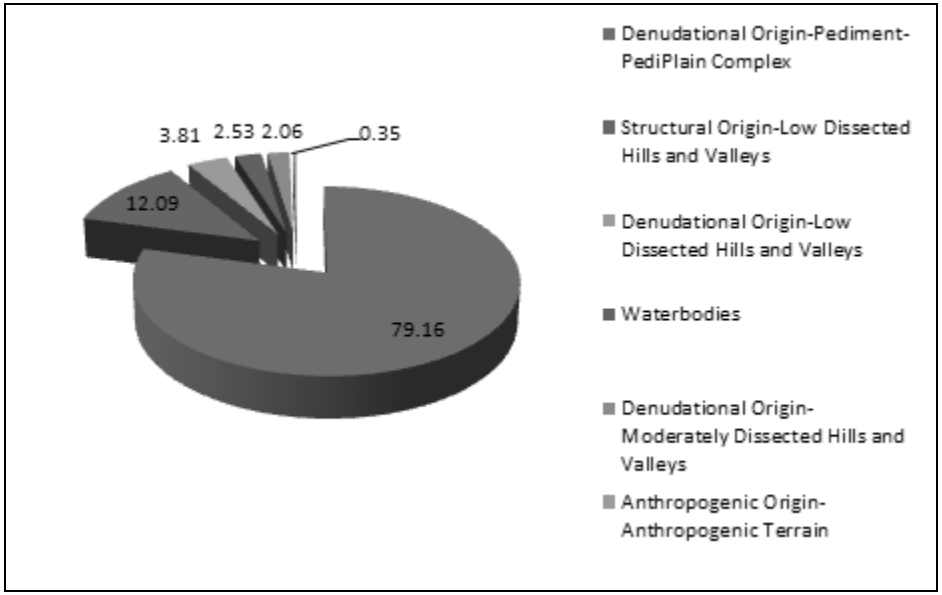


Figure 3-8 Geomorphology Pattern of the Study Area

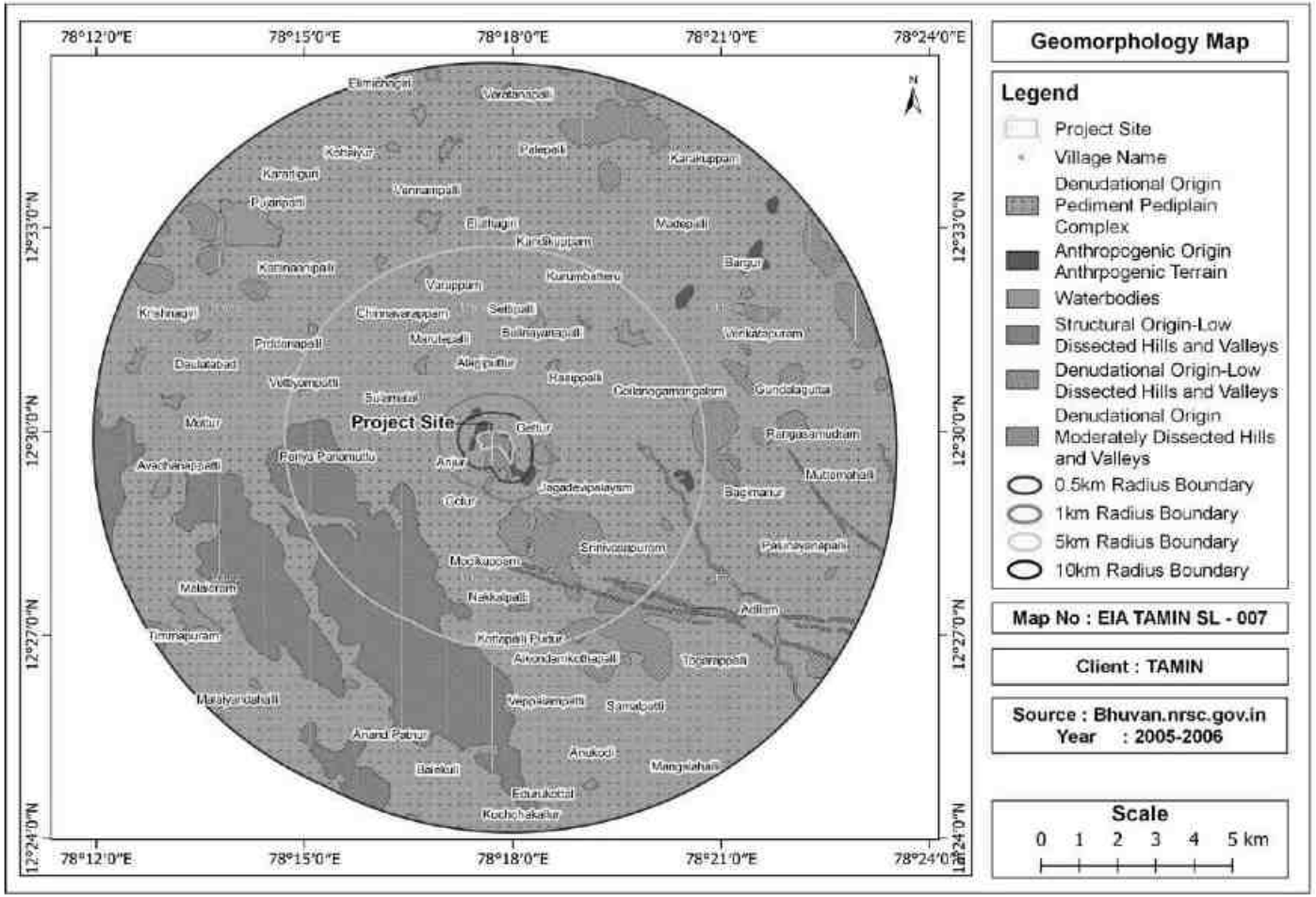


Figure 3-9 Geomorphology Map of Study Area

3.4.12 Hydrogeology of PIA District

Krishnagiri district is underlained by Archaean crystalline formations with recent alluvial deposits of limited areal extent and thickness along the courses of major rivers (Plate-II). The occurrence and movement of ground water are controlled by various factors such as physiography, climate, geology and structural features. Weathered and fractured crystalline rocks constitute the important aquifer systems in the district. Ground water generally occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fractured zones at deeper levels. The thickness of weathered zones in the district ranges from less than a meter to more than 15 m. The yield of large diameter dug wells in the district, tapping the weathered mantle of crystalline rocks ranges from 100 to 500 lpm. These wells normally sustain pumping for 2 to 6 hours per day, depending upon the local topography and characteristics of the weathered mantle

Source:https://cgwb.gov.in/District_Profile/TamilNadu/Krishnagiri.pdf

(**Ref**: Government of India, Ministry of Water Resources, Central Ground Water Board, "District Ground Water Brochure Krishnagiri District, Tamil Nadu")

3.4.13 Drainage Pattern in PIA District

Krishnagiri district forms parts of Cauvery and East Coast Minor Rivers basins. Cauvery River forms the southwestern boundary of the district. Dodda Halla is the most important tributary of Cauvery draining the rugged terrain in the northwestern part of the district. Ponnaiyar is the major river draining the district and is ephemeral in nature. It originates from Nandhi hills in Karnataka, enters Tamil Nadu west of Bagalur and flows almost in a southeasterly direction till it reaches Manjamedu from where it flows along the district boundary before entering the district, again near Hanuman Tirtham. After flowing for a short distance in an easterly direction, it again follows the district boundary before entering the neighboring Dharmapuri district. Pambar and Burgur Ar., are among the important tributaries of Ponnaiyar draining part of the district. The drainage map of the Study Area is given as **Figure 3-11.**

Source:https://cgwb.gov.in/District_Profile/TamilNadu/Krishnagiri.pdf

(**Ref**: Government of India, Ministry of Water Resources, Central Ground Water Board, "District Ground Water Brochure Krishnagiri District, Tamil Nadu")

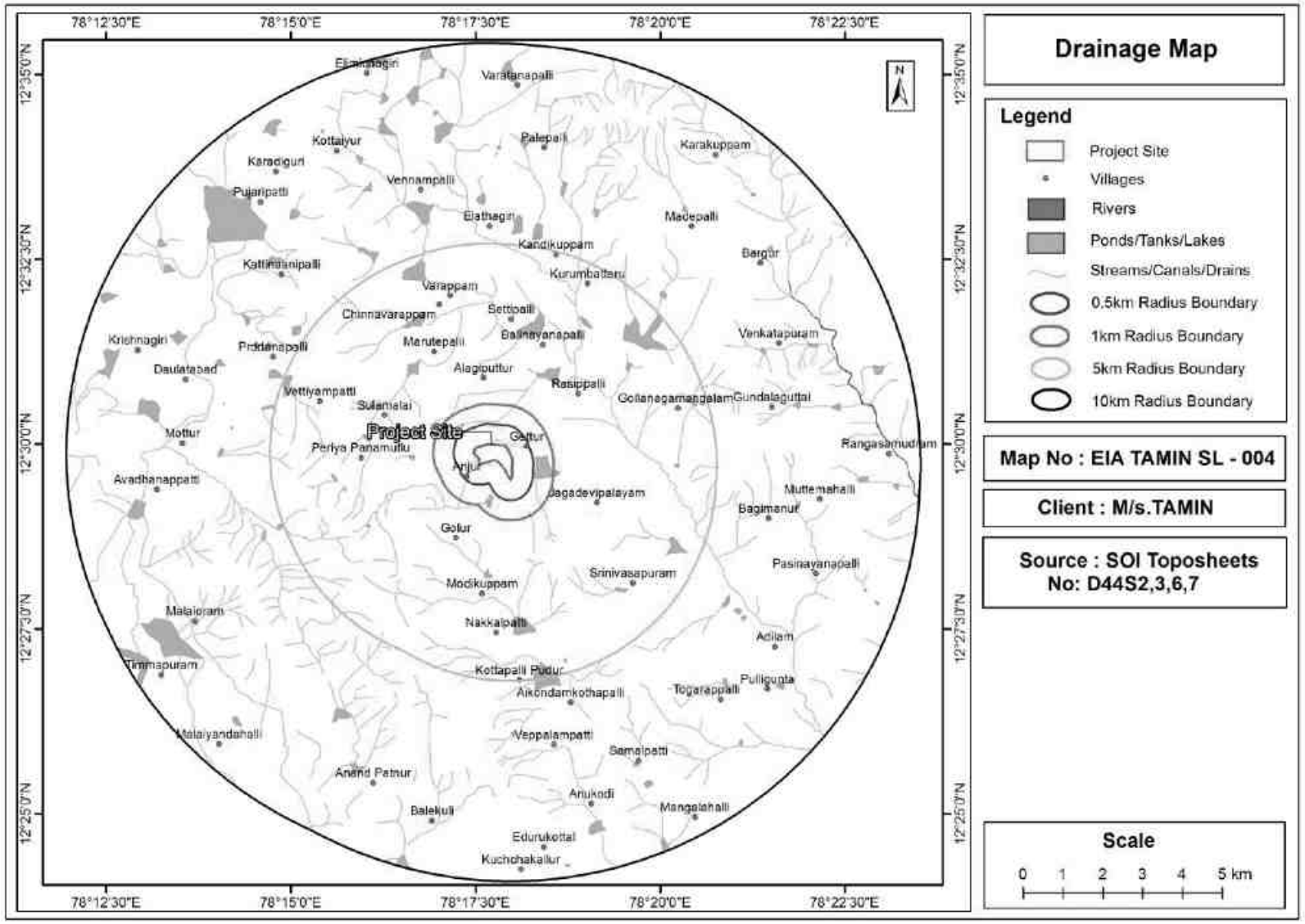


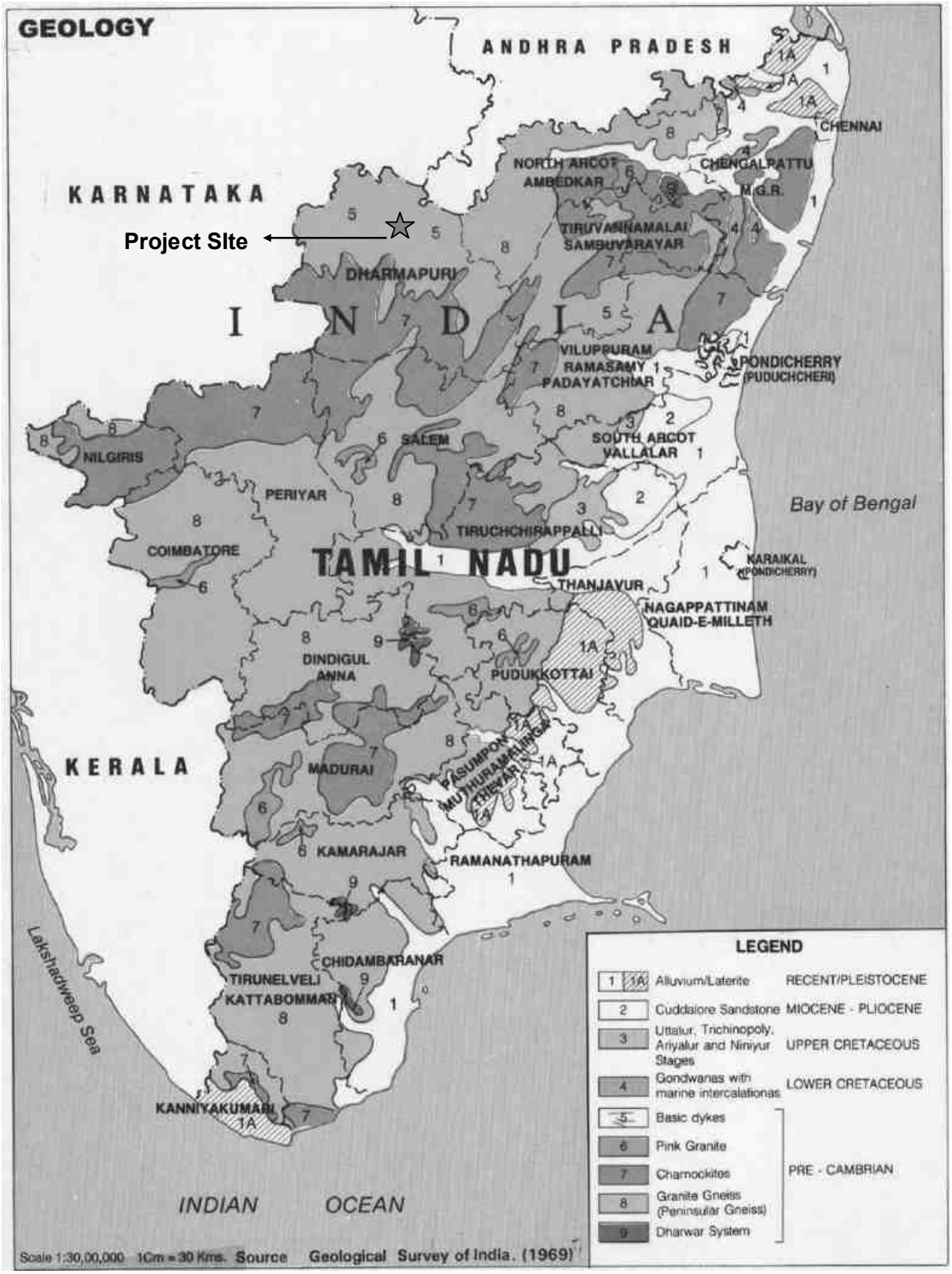
Figure 3-10 Drainage map of the study area

3.4.14 Geology

The geological formations of the district belong mainly to Archaeanage along with rock of Proterozoic age. The former is rerpresented by Khondalite Group of rocks, Charnockite Group of rocks, Migmatites Complex, Sathyamangalam Group of rocks, while the latter is represented by Alkaline rocks. The Khondalite Group includes garnet sillimanite gneiss and quartzite which occur as small patches. The migmatite complex includes argentiferous quartzo feldspathic gneiss and horn blends biotite gneiss, the former exposed on the western part of the district.

Source:[*https://krishnagiri.nic.in/document/krishnagiri-district-survey-report-minor-minerals-rough-stone/*](https://krishnagiri.nic.in/document/krishnagiri-district-survey-report-minor-minerals-rough-stone/)

(**Ref**: Department of Geology and Minning, Government of Tamil Nadu, Ministry of Mines, "District Survey Report, Krishnagiri District")

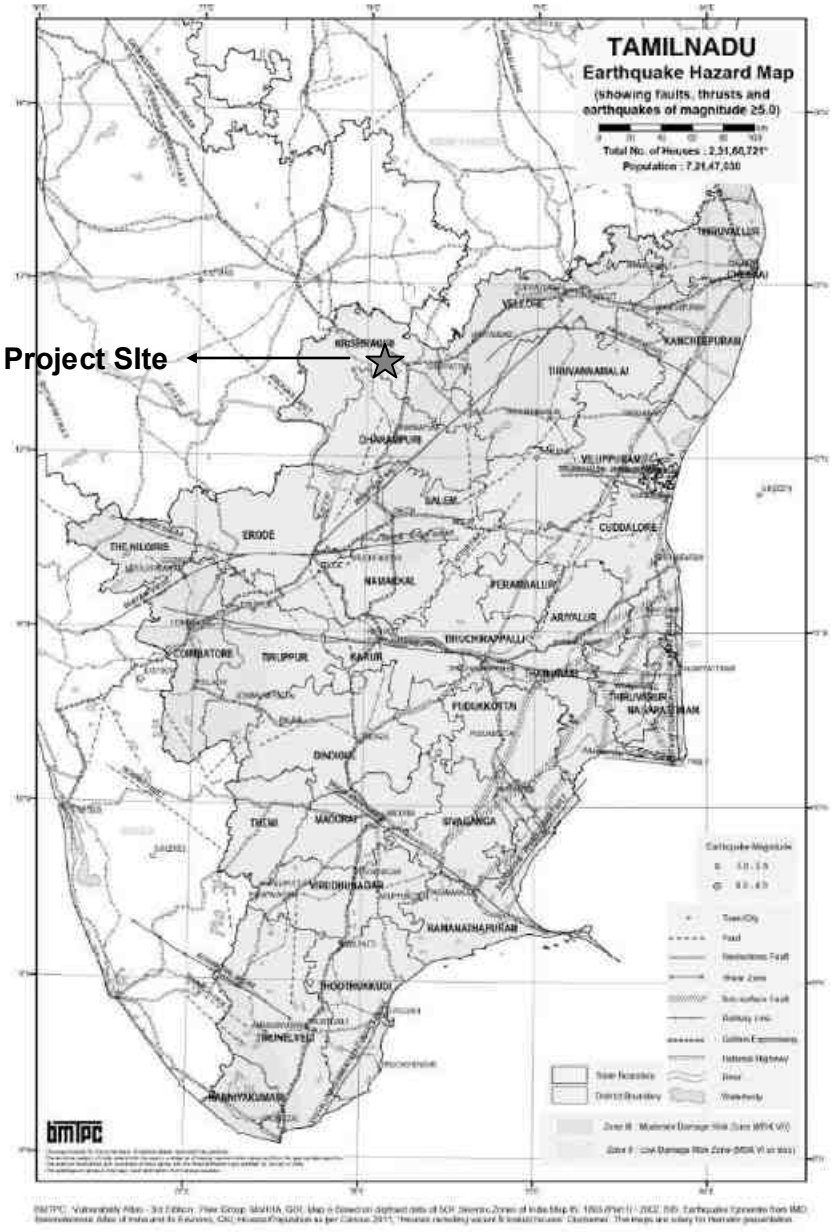


Source: Geological Survey of India

Figure 3-11 Geology Map of Tamilnadu

3.4.15 Seismicity

As per Earthquake hazard map of Tamil Nadu, The project location/study area falls in Zone II, which is categorized as a Low Damage Risk Zone. The seismicity map of India is shown in **Figure 3-13.**



(Source: Mapsof India)

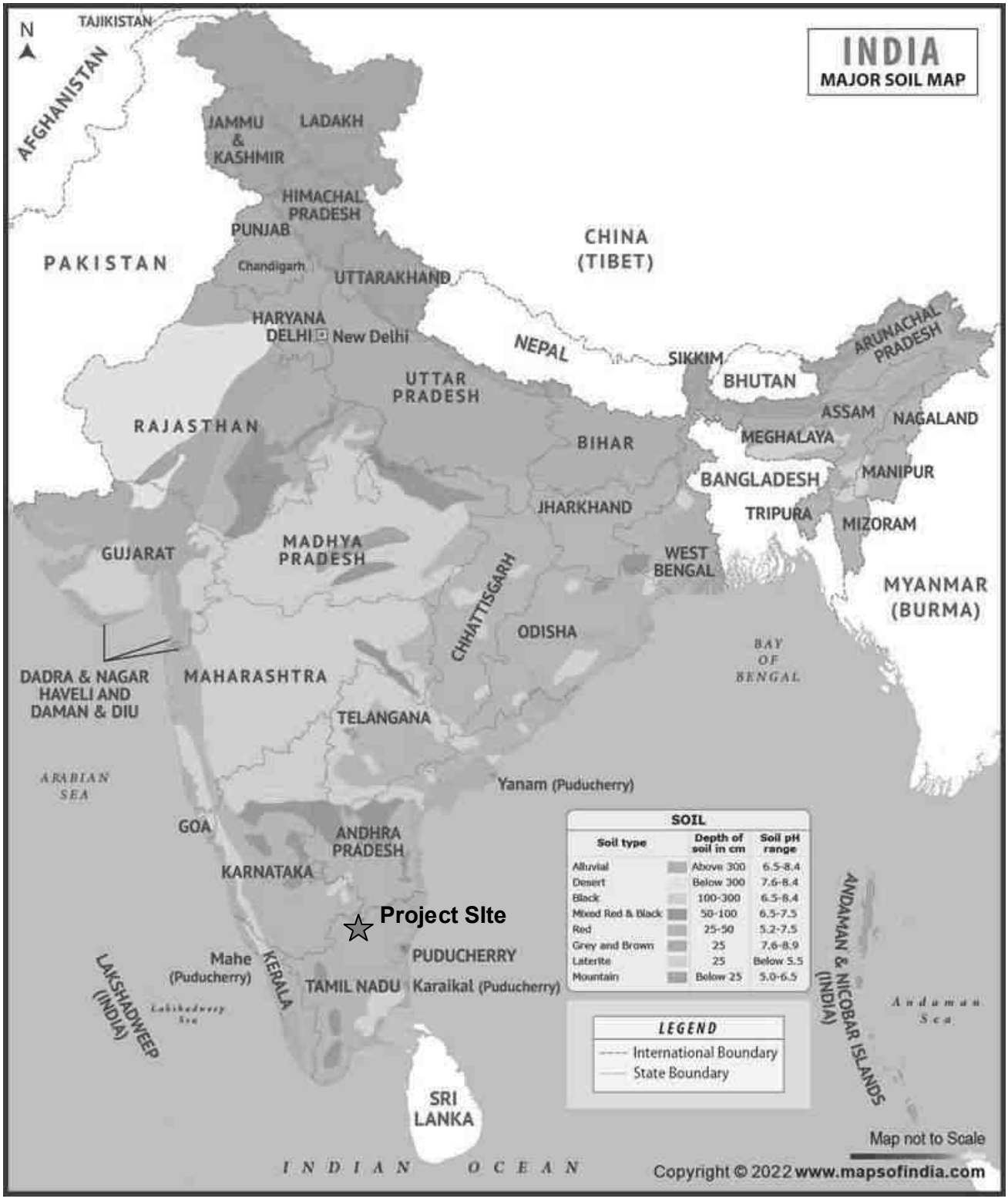
Figure 3-12 Seismicity Map of India

3.4.16 Soils in PIA District

The Different types of the soils such as black or mixed loamy red ferocious and gravel are found inthe district. The black of rigor loam is very fertile due to its moisture absorbing character. Red soil is seen in Hosur, Shoolagiri, Thally and Kelamangalam.In general, the soil in the district is quite loose and fresh with its colour from red to dark brown. The soil has low nitrogen and phosphate content with marked variation between different taluks. The following table explains type of soils found in the district.

***Source**:https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)



Source: Maps of India

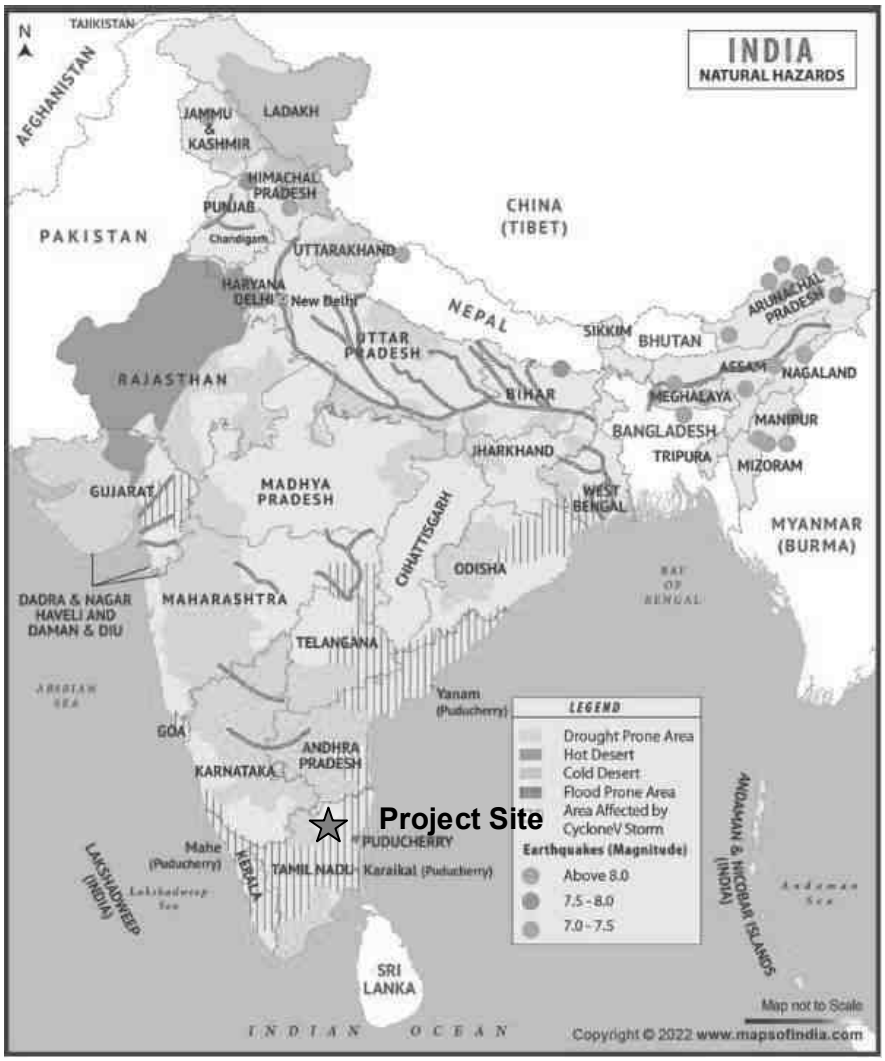
Figure 3-13 Soil map of India

3.4.17 Natural Hazards in PIA District

Tamil Nadu is multi hazard prone and faces the brunt of the Cyclonic storms during the Northeast Monsoon periods. In addition, Tamil Nadu also faces spells of heavy downpours and cloud bursts resulting in damages due to floods. The Natural Hazard Map of India is given in **Figure 3-15**.

Source: *https://ndma.gov.in/sites/default/files/PDF/Reports/Study-Report-Gaja-Cyclone-2018.pdf*

(Ref: Government of India, ministry of home affairs, National Disaster Management Authority)



Source:Maps of India

Figure 3-14 Natural hazard Map of India

3.5 Air Envronment

Baseline ambient air quality assessment gives the status in the vicinity of site and is an indispensable part of environmental impact assessment studies. Significant changes, in predominant winds and weather conditions are observed in winter, summer and post-monsoon seasons apart from the local topographic influences. The baseline status of air environment in the study area is assessed through a systematic air quality surveillance programme.

3.5.1 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. The 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 mining activities, Quarry machineries, DG set & vehicles etc.

3.5.2 Meteorological Data Collection

Available secondary data pertaining to the meteorological parameters was obtained from the IMD Climatological tables. In addition, baseline meteorological data (primary data) was generated during the Pre-monsoon Season **(January 2024 – March 2024)**. The methodology adopted for monitoring surface observations is as per the standard norms laid down by Bureau of Indian Standards (BIS) i.e. IS:8829 and Indian Meteorological Department (IMD).

3.5.3 General Meteorological Scenario based on IMD Data

The nearest India Meteorological Department (IMD) station located to project site is Dharmapuri. The Climatological data of Dharmapuri (12° 08" N and 78° 02" E), published by the IMD, based on daily observations at 08:30 and 17:30 hour IST for a 30-year period (1991-2020), 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 3-4.**

Table 3-4 Climatological Summary – Dharmapuri (1991-2020)

Month	Temp (°C)		Rainfall		Relative Humidity (%)		Vapour Pressure hPa		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)*	
	Daily	Daily	Total (mm)	No. of days	08:30	17:30	08:30	17:30		08:30	17:30

	Max.	Min.									
Jan	29.7	17.7	2.6	0.3	81	50	20.1	18.1	5.1	NE	E
Feb	32.7	18.9	2.3	0.2	75	41	20.9	17.9	5	NE	E
Mar	35.8	20.8	16.4	0.9	68	33	22.3	17.3	4.6	NE	E
Apr	36.8	23.8	52.9	2.8	68	38	25.5	20	4.3	SW	E
May	36.5	24.5	120.3	6.6	66	48	25.9	23.5	5.3	SW	SW
Jun	34.2	23.9	71.8	3.9	67	52	24.7	23.3	6.7	SW	SW
Jul	33.2	23.4	73.9	4.1	69	56	24.2	23.5	6.8	SW	SW
Aug	32.5	23.1	113.9	6.2	73	58	24.5	24	6.2	SW	W
Sep	32.3	22.6	143.5	7	76	61	25	24.9	4.7	SW	SW
Oct	30.7	21.9	193.2	9.7	82	71	25.6	25.6	3.7	NE	E
Nov	29	20.4	110.9	6.5	83	69	23.7	23.4	4.3	NE	E
Dec	27.9	18.3	40.3	2.7	82	62	20.8	20	4.8	NE	E
Max.	**36.8**	**24.5**	**193.2**	**9.7**	**83**	**71**	**25.9**	**25.6**	**6.8**	**Annual Predominant wind direction is North East**	
Min.	**27.9**	**17.7**	**2.3**	**0.2**	**66**	**33**	**20.1**	**17.3**	**3.7**		
Annual Avg/Total.	**32.7**	**21.6**	**942**	**50.8**	**74**	**53**	**23.6**	**21.8**	**5.1**		

As per the above IMD Climatological **Table 3.5,** the observations drawn are the following.

- Highest Daily maximum temperature is 36.8°C and the Lowest daily minimum temperature is17.7°C were recorded in the months of April and January respectively
- Maximum and minimum relative humidity of 83% and 33% were recorded in the months of November and March respectively.
- Maximum and minimum rainfall of 193.2 mm and 2.3 mm was recorded in the months of October Feburary respectively.
- Maximum and minimum Mean wind speed is 6.8 Km/hr and 3.7 Km/hr was recorded in the months of July and October respectively. Annual Wind predominant direction is **North East**.

3.5.4 Meteorological data during Study Period

The meteorological scenario in and around the project site is an essential requirement during study period for proper interpretation of baseline air quality status. Meteorological data was collected during the study period **January 2024 –March 2024**. and is presented in **Table 3-4**. The wind rose for the study period is given as **Figure 3-16.**

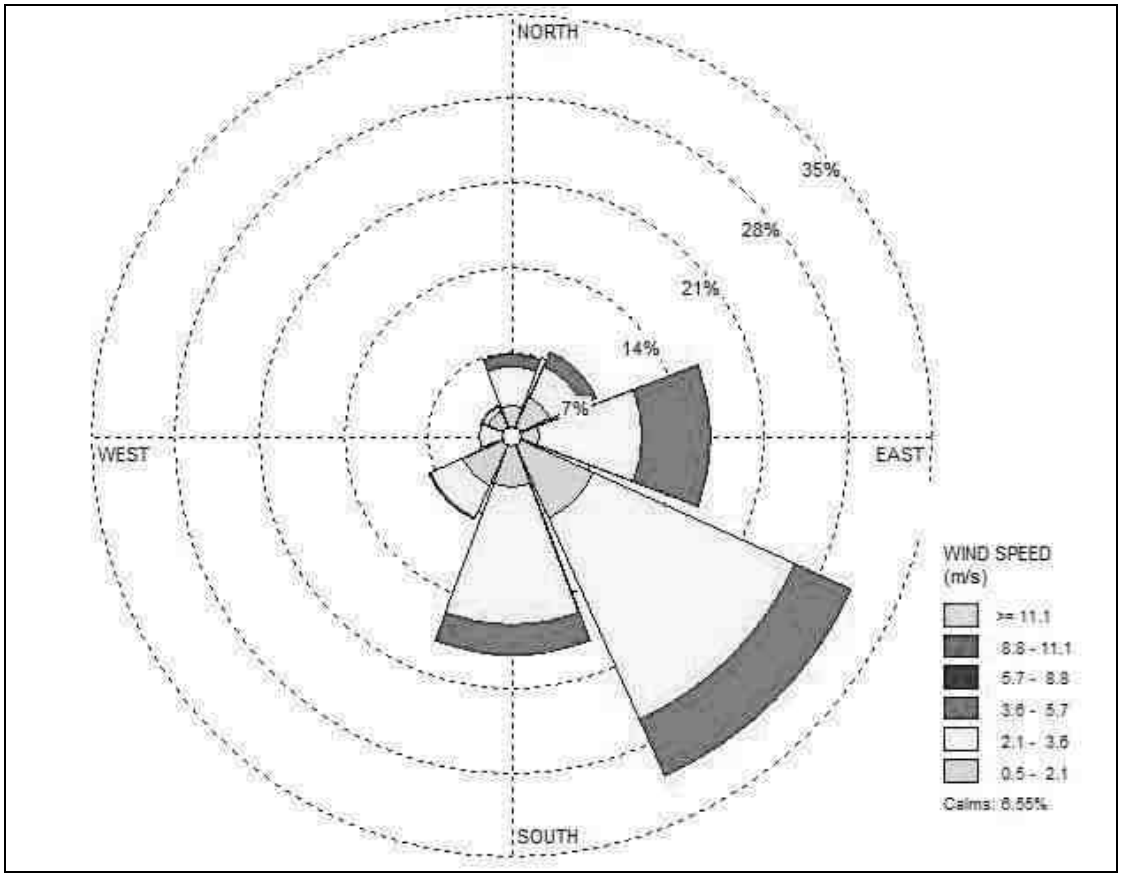


Figure 3-15 Wind rose diagram considered for Dispersion Modelling (January 2024 to March 2024)

Table 3-5 Meteorology Data for the Study Period (January 2024 to March 2024)

S.No	Parameter	Observation
1.	Temperature	Max Temperature: 37°C Min Temperature: 21°C Avg Temperature: 30.68°C
2.	Average Relative Humidity	44.95%
3.	Average Wind Speed	2.34 m/s
4.	Predominant Wind Direction	South East

3.5.5 Atmospheric Inversion

Atmospheric inversion level at the project site was monitored; the results observed at the site during the study period are as follows

- Average atmospheric temperature: 30.68°C
- Average Relative humidity:44.95%
- Average Wind speed:2.34m/s

The daily inversion level calculated based on the average temperature and average wind speed at the project site and the maximum inversion height is derived by the graph plotted based on the average temperature and average wind speed. The daily inversion level at the project site varies from 50 to 2966 m during 6 AM to 4 PM, the maximum recorded at 2966 m during March 2024. This is shown in the following **Figure 3-17.**

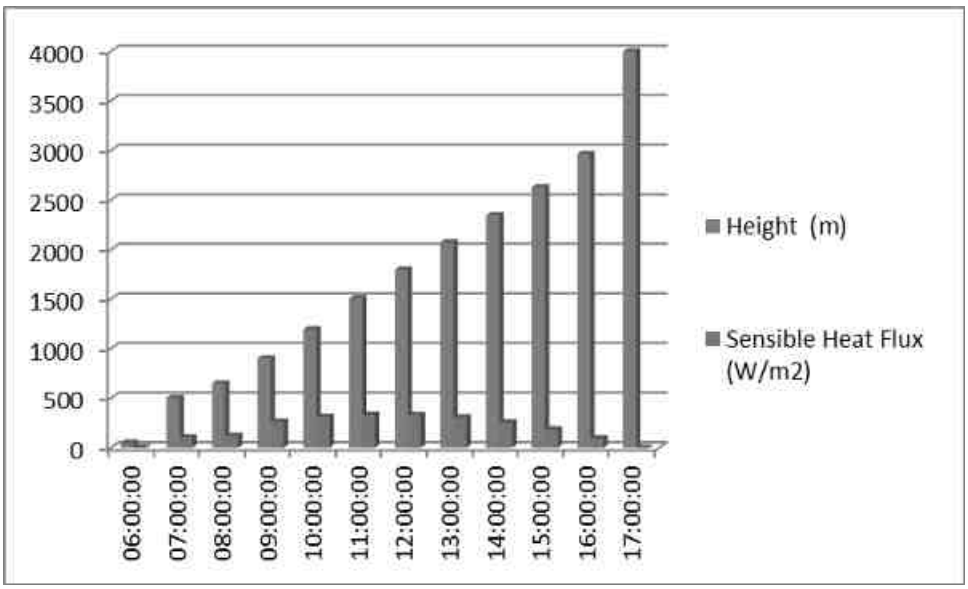


Figure 3-16 Atmospheric inversion level at the project site

3.6 Ambient Air Quality

The selection criteria for monitoring locations are based on the following:

- Topography/Terrain
- Meteorological conditions
- Residential and sensitive areas within the study area
- Representatives of regional background air quality/pollution levels and
- Representation of likely impacted areas

3.6.1 Ambient Air Quality Monitoring Stations

To evaluate the baseline air quality of the study area, Eight (08) monitoring locations have been identified as per annual wind predominance of Dharmapuri from IMD data (1991-2020). The wind predominance during study period (**January 2024 to March 2024**) is from **South East.** Map showing the AAQ monitoring locations is given in **Figure 3-18** and the details of the locations are given in **Table 3-6.**

Table 3-6 Details of Ambient Air Quality Monitoring Locations

Station Code	Location	Type of Wind	Distance (~km) from Project boundary	Azimuth Directions
AAQ1	Near Project site(Gettur)	-	0.46	ENE
AAQ2	Kandikuppam	c/w	4.89	NNE
AAQ3	Rasippalli	u/w	1.97	NE
AAQ4	Srinivasapuram	c/w	3.92	SE
AAQ5	Anjur	d/w	0.6	SW
AAQ6	Near Kanappatti	d/w	5.76	SW
AAQ7	Krishnagiri	c/w	8.23	WNW
AAQ8	Marutepalli	c/w	2.53	NNW

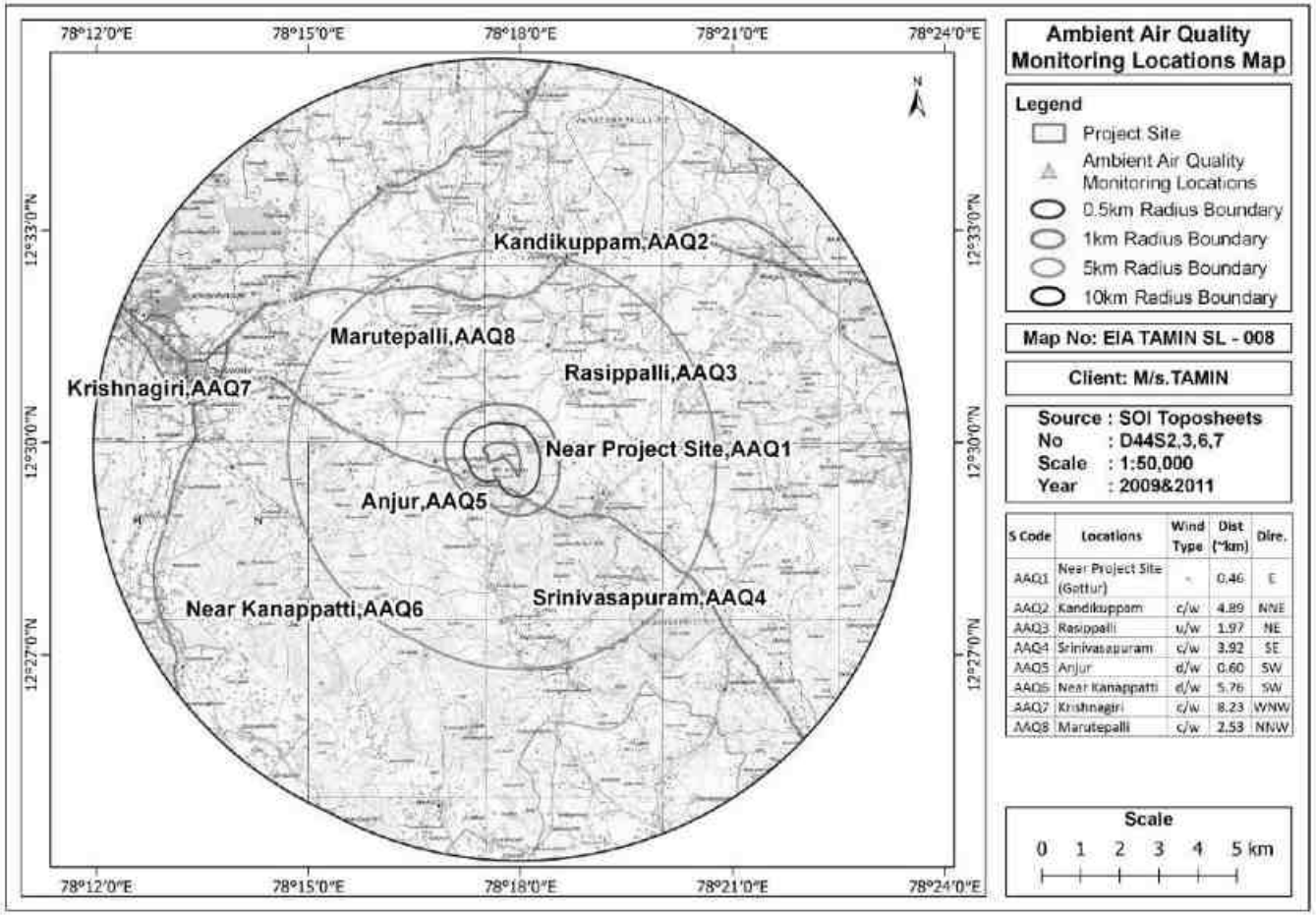


Figure 3-17 Map showing the Ambient Air Quality monitoring locations

3.6.2 Ambient Air Quality Monitoring Techniques and Frequency

Ambient air quality was monitored twice in a week for One (01) season (shall cover 12 weeks), i.e. during (**January 2024 –March 2024**). PM10, PM2.5, SO2, NOx, CO, Pb, O3, NH3, C6H6, C20H12, As, Ni, TVOC, Methane Hydrocarbon andNon-Methane Hydrocarbon were monitored. Sampling was carried out as per Central Pollution Control Board (CPCB) monitoring guidelines at each location. Analytical methods used for analysis of parameters are given in **Table 3-7.**

Table 3-7 Analytical Methods for Analysis of Ambient Air Quality Parameters (NAAQ)

S.No	Parameters	Analytical method	NAAQ standards: 2009		Sampling Time
1.	Sulphur Dioxide (SO_2), µg/m³	IS:5182(Part-2):2001 (Reaff:2006)	50 (Annual)	80(24 Hours)	24 Hours
2.	Nitrogen Dioxide (NO_2), µg/m³	IS: 5182 (Part - 6): 2006	40 (Annual)	80 (24 Hours)	24 Hours
3.	Particulate Matter ($PM_{2.5}$), µg/m³	IS: 5182 (Part - 23): 2006	40 (Annual)	60 (24 hours)	24 Hours
4.	Particulate Matter (PM_{10}), µg/m³	IS:5182 (Part– 23): 2006	60 (Annual)	100 (24 hours)	24 Hours
5.	CO mg/m³	IS:5182(Part–10):1999 (Reaff:2006)	2 (8 hours)	4 (1hour)	8 Hours
6.	Pbµg/m³	IS:5182(Part–22):2004 (Reaff:2006)	0.5(Annual)	1(24 hours)	24 Hours
7.	O_3, µg/m³	IS: 5182 (Part – 9): 1974	100(8hours)	180 (1hour)	8 Hours
8.	NH_3, µg/m³	APHA (air) 2nd edition (Indophenol-blue method)	100(Annual)	400(24 hours)	8 Hours
9.	Benzene, µg/m³	IS:5182(Part–11):1999 (RA:2009)	5 (Annual)	5 (Annual)	24 Hours
10.	Benzo (a) pyrene, ng/m³	IS:5182(Part–12):2004 (RA:2009)	1 (Annual)	1 (Annual)	24 Hours
11.	Arsenic, ng/ m³	APHA (air) 2nd edition	6 (Annual)	6 (Annual)	24 Hours
12.	Nickel ng/ m³	In house method (AAS method) based on CPCB guidelines volume 1	20(Annual)	20(Annual)	24 Hours

Results and Discussions

The variations of the pollutants Particulate matter <10 micron size (PM_{10}),Particulate matter <2.5 micron size ($PM_{2.5}$), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2),Carbon Monoxide (CO), Lead (Pb),Ozone (O_3),Benzene (C_6H_6), Benzo (a) pyrene ($C_{20}H_{12}$), Arsenic (As), Nickel (Ni),Ammonia (NH_3) are compared with National Ambient Air Quality Standards (NAAQS), MoEF&CC Notification, November 2009. Ambient Air Quality Monitoring Data (**January 2024 to**

March 2024) for the study area is given in **Table 3-8** and trends of measured ambient concentration in the study area were graphically represented in **Figure 3-19.**

Table 3-8 Summary of the average baseline concentrations of pollutants

Parameters	Conc.	NAAQ Standards	Locations							
			Near Project Site	Kandikuppam	Rasipalli	Srinivasapuram	Anjur	Near kanappatti	Krishnagiri	Marutepalli
			AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
PM10 Conc. (µg/m^3)	Min.	100 (24 Hours)	48.84	47.73	48.51	46.99	47.77	48.53	48.27	47.95
	Max		69.60	68.02	69.13	66.96	68.08	69.16	68.79	68.34
	Avg.		**58.57**	**57.24**	**58.17**	**56.35**	**57.29**	**58.20**	**57.89**	**57.51**
	98th 'tile		69.20	67.63	68.73	66.57	67.69	68.76	68.40	67.95
PM2.5 Conc. (µg/m3)	Min.	60 (24 Hours)	29.60	27.87	29.37	27.66	28.41	29.48	29.29	28.49
	Max		42.19	39.72	41.85	39.42	40.48	42.02	41.75	40.60
	Avg.		**35.50**	**33.43**	**35.22**	**33.18**	**34.07**	**35.36**	**35.13**	**34.17**
	98th 'tile		41.94	39.49	41.61	39.20	40.25	41.78	41.50	40.37
SO2 Conc. (µg/m3)	Min.	80 (24 Hours)	7.85	6.01	6.81	5.20	6.22	7.69	7.14	6.61
	Max		11.19	8.57	9.71	7.41	8.87	10.96	10.17	9.42
	Avg.		**9.42**	**7.21**	**8.18**	**6.24**	**7.46**	**9.23**	**8.57**	**7.94**
	98th 'tile		11.12	8.52	9.65	7.37	8.81	10.90	10.12	9.37
NO2 Conc.(µg/ m3)	Min.	80 (24 Hours)	16.15	11.06	14.73	10.59	12.01	15.46	14.04	12.73
	Max		23.01	15.77	20.99	15.09	17.11	22.04	20.02	18.14
	Avg.		**19.37**	**13.27**	**17.67**	**12.70**	**14.40**	**18.55**	**16.85**	**15.26**
	98th 'tile		22.88	15.68	20.87	15.00	17.01	21.91	19.90	18.03
Pb (µg/m3)	Avg.	1 (24 hour)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)	BLQ (LOQ 0.05)
CO (mg/m3)	Avg.	4 (1hour)	**0.82**	**0.22**	**0.52**	**0.12**	**0.28**	**0.62**	**0.45**	**0.37**
O3 (µg/m3)	Avg.	180 (1hour)	10.75	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)

Parameters	Conc.	NAAQ Standards	Locations							
			Near Project Site	Kandikuppam	Rasipalli	Srinivasapuram	Anjur	Near kanappatti	Krishnagiri	Marutepalli
			AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
NH3 (µg/m3)	**Avg.**	**400 (24 hours)**	7.14	6.90	7.84	7.16	6.57	7.34	6.21	6.49
Benzene (µg/m3)	**Avg.**	**5 (Annual)**	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
Benzo (a) pyrene, (ng/m3)	**Avg.**	**1 (Annual)**	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)	BLQ (LOQ 1)
Arsenic (ng/ m3)	**Avg.**	**6 (Annual)**	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)	BLQ (LOQ 2)
Nickel (ng/m3)	**Avg.**	**20 (Annual)**	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)	BLQ (LOQ 10)
Free Silica (µg/m3)	**Avg**	**-**	BLQ(LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)	BLQ (LOQ 0.04)

Note: *BLQ (Below the Limit of Quantifications), LOQ (Limit of Quantifications)*

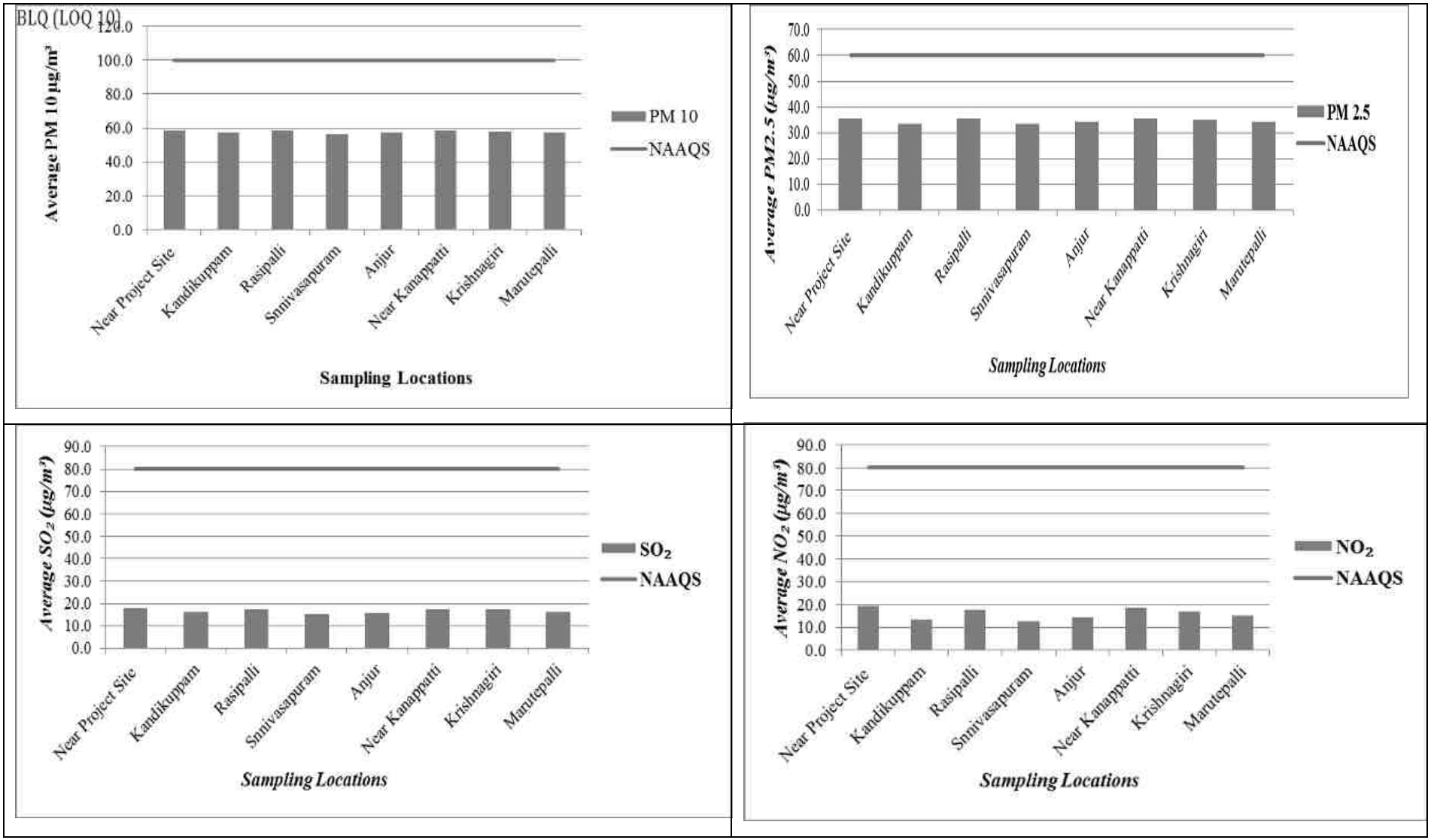


Figure 3-18 Trends of Measured Ambient Concentrations in the Study Area

Observations

The ambient air quality has been monitored at 8 locations for 12 parameters as per CPCB guidelines within the study area. The average baseline levels of PM_{10} is 56.35 to 58.57 µg/m^3, $PM_{2.5}$ is 33.18 to 35.50 µg/m^3, SO_2 is 6.24 to 9.42 µg/m^3, NO_2 is 12.70 to 19.37 µg/m^3 all the parameters are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period.

3.7 Noise Environment

The prevailing ambient noise level at a particular location is nothing but the resultant (total) of all kinds of noise sources existing at various distances around that location. The ambient noise level at a location varies continuously depending on the type of surrounding activities.

Ambient noise levels have been established by monitoring noise levels at Eight (08) locations in and around 10 km distance from project area during the study period using precision noise level meter. The noise monitoring locations in the study area were selected after giving due consideration to the various land use categories. The land use categories include commercial, residential, rural and sensitive areas. Noise levels were recorded on an hourly basis for one complete day at each location using pre- calibrated noise levels. Sampling images and map noise showing the noise monitoring locations are given in **Figure 3-20.**

3.7.1 Results and Discussions:

Based on the recorded hourly noise levels at each monitoring location, the day equivalent (Ld) and night equivalent (Ln) were calculated;

Ld: Average noise levels between 6:00 hours to 22.00 hours.

Ln: Average noise levels between 22:00 hours to 6.00 hours.

The comparison of day equivalent noise levels (Ld) and night equivalent noise levels (Ln) with the respective CPCB stipulated noise standards for various land use categories are shown in the **Table 3-9.**

Table 3-9 Day and Night Equivalent Noise Levels

Location Code	Location	Distance (~km) from Project boundary	Azimuth Direction	Noise level in dB(A) Leq		CPCB Standard		Environmental Setting
				Day	Night	Lday (Ld)	LNight (Ln)	
N1	Project site	Within the site		52.8	41.2	55	45	Residential
N2	Kandikuppam	4.89	NNE	51.4	40.1	55	45	Residential
N3	Rasipalli	1.97	NE	51.9	41.3	55	45	Residential
N4	Snnivasapuram	3.92	SE	50.6	42.2	55	45	Residential
N5	Anjur	0.6	SW	52.5	41.9	55	45	Residential
N6	Near Kanappatti	5.76	SW	52.7	41.8	55	45	Residential
N7	Krishnagiri	8.23	WNW	50.4	41.6	55	45	Residential
N8	Marutepalli	2.53	NNW	53.9	42.9	55	45	Residential

3.7.2 Observations

It is observed that the day equivalent and night equivalent noise levels at all locations are within prescribed CPCB standards.

- In residential area day time noise levels varied from 50.4 dB(A) to 53.9 dB(A) and night time noise levels varied from 40.1 dB(A) to 42.9 dB(A) across the sampling stations. The field observations during the study period indicates that the ambient noise levels are within the prescribed limit noise by CPCB (55 dB(A) Day time & 45 dB(A) Night time).

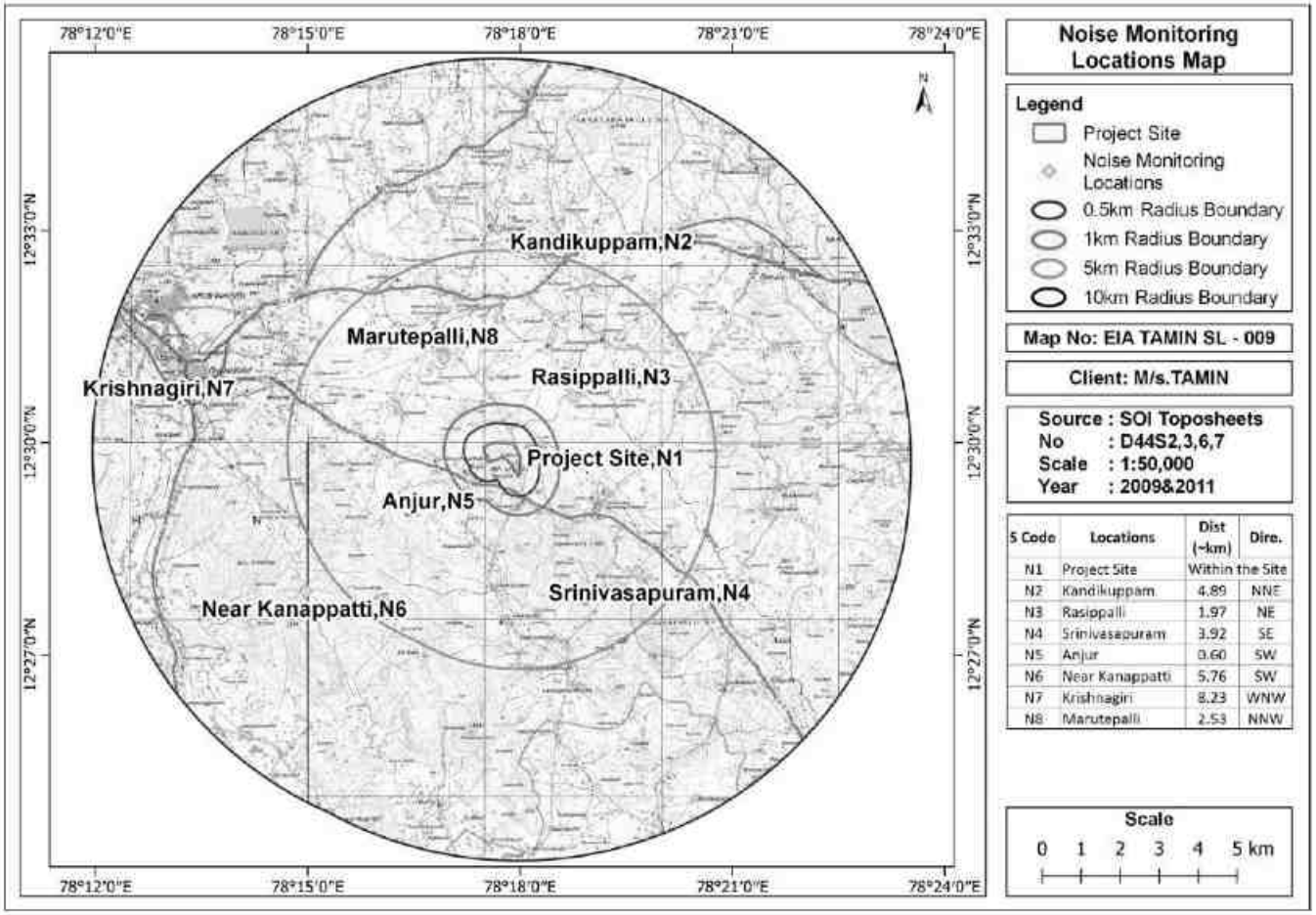


Figure 3-19 Map showing the noise monitoring location

3.8 Water Environment

3.8.1 Surface Water Resources

The main rivers that flow across the district are Cauvery and South Pennar. Cauveri enters the district from southwest in Denkanikottai taluk and exists in southwest direction. It forms waterfalls at Hokenakkal and joins at Mettur Dam. South Pennar originates in Nandidurg in Chikkaballapur district of Karnataka and flows through Hosur, Krishnagiri and Uthangari taluks.Vanniyaar and Markanda rivers join South Pennar. It flows towards south and then east for 400 kms through Karnataka and Tamil Nadu, draining into theBay of Bengal at Cuddalore. It has a catchment area of 3690 sq.kms, located in Karnataka, TamilNadu and Andhra Pradesh. Kelavarapalli dam is built across this river near Hosur. Krishnagiri dam and Sathanur Dam are also built across this river. Krishnagiri Reservoir Project, Shoolagiri Chinnar Reservoir, Thangarai Reservoir, Pambar Reservoir, Kelevarapalli Reservoir Project and Baarur Tank are the sources of irrigation for this district. By all these water reservoirs 18965 hectares of land is irrigated.

***Source**:https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.8.2 Surface Water Quality Assessment

Water quality monitoring and assessment can be used to determine ambient water quality, the extent and causes of a water quality problem, or to measure the effectiveness of best management practices being implemented in water system. Monitoring helps to determine the trends in the quality of the aquatic environment and the impact due to the release of contaminants, other anthropogenic activities, and/or by waste treatment operations (impact monitoring).To establish the baseline status of water environment, the representative sampling locations for surface water within a radial distance of 10Km 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 is given in**Table 3.10**.Water sampling and map of sampling location are given in **Table 3-11** and **Figure 3-21.**

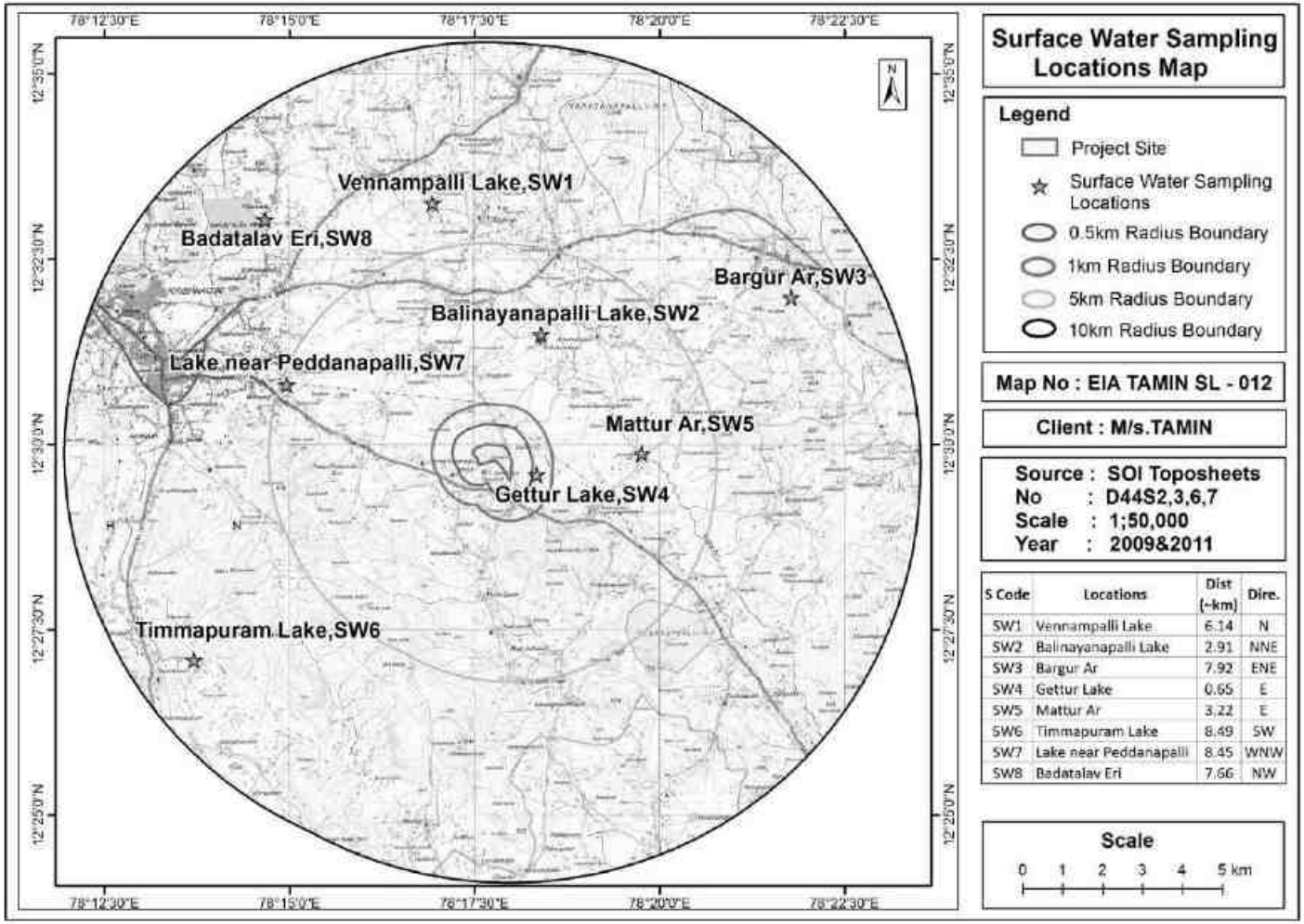
Table 3-10 Test methods used for the analysis of water quality parameters

S. No	Parameter Measured	Test Method
1.	Turbidity	IS 3025(Part - 10):1984
2.	pH	IS:3025 (Part - 11): 1983 (Reaff: 2006)

S. No	Parameter Measured	Test Method
3.	Electrical Conductivity	IS:3025 (Part - 14): 1983 (Reaff: 2006)
4.	Total Dissolve Solids	IS: 3025:1(Part - 16) 1984 (Reaff 2006)
5.	Total Suspended Solids	IS 3025 (Part - 17) 1984 (Reaff 1996)
6.	Total Alkalinity as CaCO3	IS:3025,1 (Part - 23) 1986 (Reaff 2009)
7.	Total Hardness as CaCo3	IS:3025 (Part - 21) 1983 (Reaff 2006)
8.	Sodium as Na	IS:3025,5(Part - 45) 1993 (Reaff 2006)
9.	Potassium as K	IS:3025,5(Part - 45) 1993 (Reaff 2006)
10.	Calcium as Ca	IS 3025 (Part - 40):1991
11.	Magnesium as Mg	IS 3025 (Part - 46) 1994
12.	Chloride as cl	IS 3025 (Part - 32):1988
13.	Sulphate as SO4	IS 3025(Part - 24):1986
14.	Nitrate as NO3	ASTM (Part - 31)1978
15.	Phosphate as PO4	IS 3025 (Pt 45) 1993 (R 2006)
16.	Fluorides as F	IS 3025 (Part - 60):2008
17.	Cyanide as Cd	IS 3025 (Part-27):1986
18.	Arsenic as As	IS 3025:(Part-37):1988(Reaff 2009)
19.	Cadmium as Cd	IS 3025 (Part - 41)1991
20.	Chromium, Total	IS:3025 (Part - 52) 2003 (Reaff 2009)
21.	Lead as Pb	IS:3025 (Part - 47) 1994 (Reaff 2009)
22.	Manganese as Mn	IS 3025:(Part - 59):2006
23.	Mercury as Hg	IS 3025 (Part48):1994 RA 1999
24.	Nickel as Ni	IS 3025:(Part-54):2003(Reaff 2009)
25.	Selenium as Se	IS 3025 Part (56)2003
26.	Zinc as Zn	IS:3025 (Part - 49) 1994 (Reaff 2009)
27.	Dissolved Oxygen (DO)	IS:3025 (Part - 38)1989 (Reaff 2009)
28.	BOD, 3 days @ 27°C as O_2	5210B APHA22nd Edn 2012
29.	Chemical Oxygen Demand as O_2	IS:3025 (Part-58)-2006

Table 3-11 Details of Surface water sampling locations

Location Code	Locations	Distance from Project Boundary(~km)	Direction from project boundary
SW1	Vennampalli	6.14	N
SW2	Balinayanapalli	2.91	NNE
SW3	Bargur	7.92	ENE
SW4	Gettur Lake	0.65	E
SW5	Mattur Ar	3.22	E
SW6	Timmapuram Lake	8.49	SW
SW7	Lake near Peddanapalli	8.45	WNW
SW8	Badatalav Eri	7.66	NW



S Code	Locations	Dist (~km)	Dire.
SW1	Vennampalli Lake	6.14	N
SW2	Balinayanapalli Lake	2.91	NNE
SW3	Bargur Ar	7.92	ENE
SW4	Gettur Lake	0.65	E
SW5	Mattur Ar	3.22	E
SW6	Timmapuram Lake	8.49	SW
SW7	Lake near Peddanapalli	8.45	WNW
SW8	Badatalav Eri	7.66	NW

Figure 3-20 Map showing the surface water monitoring locations

Table 3-12 Physicochemical Parameters of Surface water samples from study area

S. No	Parameter	Unit	Vennampalli	Balinayanapalli	Bargur	Gettur Lake	Mattur Ar	Timmapuram Lake	Lake near Peddanapalli	Badatalav Eri
			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
1.	pH (at 25°C)	--	7.27	7.51	7.60	7.38	7.21	7.48	7.55	7.81
2.	Electrical Conductivity	µS/cm	625	557	667	535	635	674	688	611
3.	Total Dissolved Solids	mg/l	331	295	354	283	337	357	365	324
4.	Total Suspended Solids	mg/l	17	34	42	29	32	14	36	31
5.	Total Alkalinity as $CaCO_3$	mg/l	140	127	179	125	144	175	179	145
6.	Total Hardness as $CaCO_3$	mg/l	193	177	209	190	175	211	186	179
7.	Sodium as Na	mg/l	39	32	42	22	44	40	54	39
8.	Potassium as K	mg/l	10	9	12	2	15	13	11	7
9.	Calcium as Ca	mg/l	36.2	34.1	35.8	36.9	30.4	32.7	31.5	33.7
10.	Magnesium as Mg	mg/l	25	22.4	29	23.7	24	31.4	26	23.1
11.	Chloride as Cl	mg/l	79.3	70.2	75.8	71.4	76.2	79.4	70.6	78.1
12.	Sulphate as SO_4	mg/l	24.1	17.3	15.8	18.6	26.3	19.7	27.6	20.9
13.	Nitrate as NO_3	mg/l	5.8	6.1	7.2	5.8	6.4	8.2	8.7	6.8
14.	Phosphate as PO_4	mg/l	0.32	0.15	0.38	0.42	0.29	0.45	0.43	0.49
15.	Fluorides as F	mg/l	0.24	0.21	0.26	0.23	0.29	0.31	0.33	0.3
16.	Cyanide	mg/l	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
17.	Arsenic	mg/l	BLQ (LOQ 0.005)	BLQ (LOQ 0.005)	BLQ (LOQ 0.005)	BLQ (LOQ 0.005)	BLQ (LOQ 0.005)	BLQ (LOQ 0.005)	BLQ (LOQ 0.005)	BLQ (LOQ 0.005)
18.	Cadmium as Cd	mg/l	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ	BLQ(LOQ

S. No	Parameter	Unit	Vennampalli	Balinayanapalli	Bargur	Gettur Lake	Mattur Ar	Timmapuram Lake	Lake near Peddanapalli	Badatalav Eri
			SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
			0.001)	0.001)	0.001)	0.001)	0.001)	0.001)	0.001)	0.001)
19.	**Chromium, Total**	**mg/l**	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
20.	**Lead as Pb**	**mg/l**	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)
21.	**Manganese as Mn**	**mg/l**	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)
22.	**Mercury**	**mg/l**	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)
23.	**Nickel as Ni**	**mg/l**	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
24.	**Selenium as Se**	**mg/l**	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)
25.	**Zinc**	**mg/l**	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
26.	**Dissolved Oxygen**	**mg/l**	5.7	5.4	5.6	5.9	5.8	5.8	5.5	5.7
27.	**Chemical Oxygen Demand as O_2**	**mg/l**	32	28	24	32	24	20	16	20
28.	**BOD, 3 days @ 27°C as O_2**	**mg/l**	4	3	3	4	3	2	2	3

Note: *BLQ (Below the Limit of Quantification), LOQ (Limit of Quantification),*

Results and Discussions

Water sampling results are compared with Surface water standards IS 2296:1992.

- pH in the collected surface water samples varies between 7.21 to 7.81 which is within the limit of IS 2296:1992.
- The Total Dissolved Solids (TDS) value of collected surface water sample ranges from 283 mg/l to 365 mg/l.
- The Total hardness value of the collected surface water sample ranges between 175 mg/l to 211 mg/l
- BOD value of surface water varies from 3 mg/l to 4 mg/l.
- COD value of surface water varies from 16 to 32 mg/l.

Surface water standards (IS 2296:1992) given in **Table 3-13.**

Table 3-13 Surface water Standards (IS 2296:1992)

S.No	Parameters	Unit	A	B	C	D	E
1	Turbidity	NTU	---	---	---	---	---
2	pH	--	8.5	8.5	8.5	8.5	8.5
3	Conductivity	µS/cm	---	---	---	1000	2250
4	Total Dissolved Solids	mg/l	500	---	1500	---	2100
5	Alkalinity as $CaCO_3$	mg/l	---	---	---	---	---
6	Total Hardness as $CaCo_3$	mg/l	300	---	---	---	---
7	Calcium as Ca	mg/l	80.10	---	---	---	---
8	Magnesium as Mg.	mg/l	24.28	---	---	---	---
9	Sodium Na	mg/l	---	---	---	---	---
10	Potassium	mg/l	---	---	---	---	---
11	Chloride as Cl	mg/l	250	---	600	---	600
12	Sulphate as SO4	mg/l	400	---	400	---	1000
13	Phosphate	mg/l	---	---	---	---	---
14	Nitrate as NO_3	mg/l	20	---	50	---	---
15	Fluorides as F	mg/l	1.5	1.5	1.5	---	---
16	Cyanide	mg/l	0.05	0.05	0.05	---	---
17	Arsenic	mg/l	0.05	0.2	0.2	---	---
18	Cadmium	mg/l	0.01	---	0.01	---	---
19	Chromium, Total	mg/l	0.05	0.05	0.05	---	---
20	Copper	mg/l	1.5	---	1.5	---	---
21	Iron	mg/l	0.3	---	50	---	---
22	Lead	mg/l	0.1	---	0.1	---	---
23	Zinc	mg/l	15	---	15	---	---
24	Manganese	mg/l	0.5	---	---	---	---

S.No	Parameters	Unit	A	B	C	D	E
25	Selenium	mg/l	0.01	---	0.05	---	---
26	Mercury	mg/l	0.001	---	---	---	---
27	Dissolved Oxygen	mg/l	6	5	4	4	---
28	COD	mg/l	---	---	---	---	---
29	BOD	mg/l	2	3	3	---	---

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 wild life propagation.

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

3.8.3 Groundwater resources

The stage of ground water development ranges from 34 to 159%. The minimum is in Thali block and the maximum is in Mattur block. The ground water development is more than 100% in 4 blocks viz., Burgur, Mathur, Uthangarai and Veppanapalli. The estimation of ground water resources for the district has shown that four blocks are over exploited and one block is semi-critical (Plate-V). The Depth of water level during Pre-Monsoon & Post Monsoon for Krishnagiri District, Tamil Nadu, is given in **Figure 3-22**.

Source:[*https://cgwb.gov.in/District_Profile/TamilNadu/Krishnagiri.pdf*](https://cgwb.gov.in/District_Profile/TamilNadu/Krishnagiri.pdf)

(**Ref**: Government of India, Ministry of Water Resources, Central Ground Water Board, "District Ground Water Brochure Krishnagiri District, Tamil Nadu")

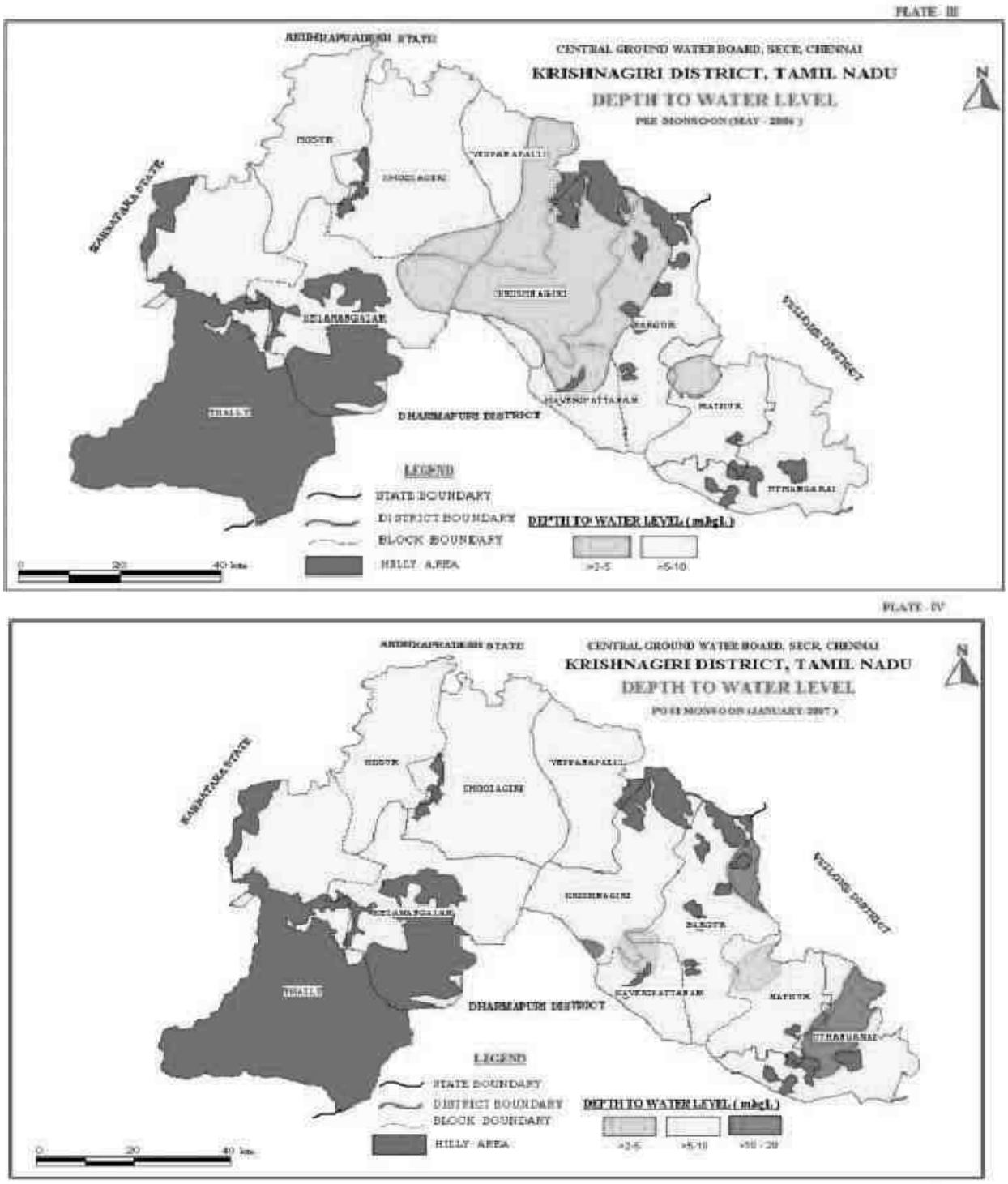


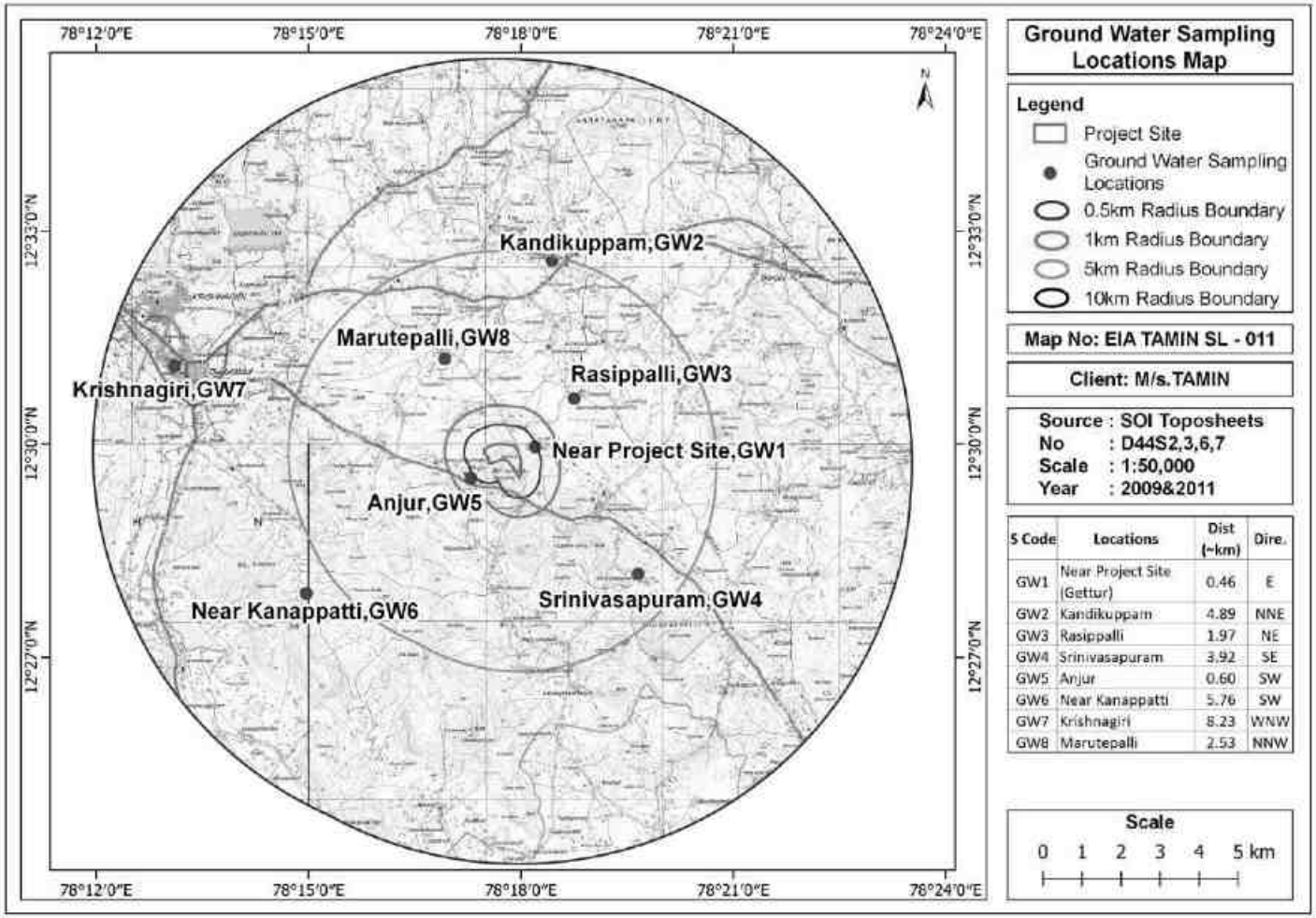
Figure 3-21 Depth to water level during Pre-Monsoon & Post Monsoon in Krishnagiri District

3.8.4 Groundwater Quality

Groundwater is the principal source for domestic and drinking purposes in almost all villages near the study area. The quality of the groundwater received is influenced by pollution of soil and air, industrial and domestic waste disposal, application of fertilizers and pesticides in agriculture, etc. Total Eight (08) ground water monitoring locations were identified for assessment in different villages around the project site based on the usage of sub surface water by the settlements/ villages in the study area. The groundwater results are compared with the acceptable and permissible limit of 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** and Map showing the groundwater monitoring locations is given in **Figure 3-23.**

Table 3-14 Details of Groundwater Quality Monitoring Locations

Station Code	Location	Distance (km) from Project boundary	Azimuth Directions
GW1	Near Project site(Gettur)	0.46	ENE
GW2	Kandikuppam	4.89	NNE
GW3	Rasipalli	1.97	NE
GW4	Srinivasapuram	3.92	SE
GW5	Anjur	0.6	SW
GW6	Near Kanappatti	5.76	SW
GW7	Krishnagiri	8.23	WNW
GW8	Marutepalli	2.53	NNW



S Code	Locations	Dist (~km)	Dire.
GW1	Near Project Site (Gettur)	0.46	E
GW2	Kandikuppam	4.89	NNE
GW3	Rasippalli	1.97	NE
GW4	Srinivasapuram	3.92	SE
GW5	Anjur	0.60	SW
GW6	Near Kanappatti	5.76	SW
GW7	Krishnagiri	8.23	WNW
GW8	Marutepalli	2.53	NNW

Figure 3-22 Map showing the groundwater monitoring locations

Table 3-15 Physico chemical analysis of Ground water samples from study area

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Near Project Site (Gettur)	Kandikuppam	Rasipalli	Srinivasapuram	Anjur	Near Kanappatti	Krishnagiri	Marutepalli
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1.	Colour	Hazen	5	15	BLQ (LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)
2.	Turbidity	NTU	1	5	BLQ (LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
3.	pH	--	6.5-8.5	NR	7.49	7.36	7.79	7.66	7.48	7.31	7.42	7.56
4.	Conductivity	µS/cm	-	-	656	684	680	620	554	485	698	534
5.	Total Dissolved Solids	mg/l	500	2000	474	497	445	341	307	278	387	291
6.	Total Suspended Solids	mg/l	-	-	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)	BLQ(LOQ 1)
7.	Alkalinity as $CaCO_3$	mg/l	200	600	214	215	177	210	150	139	220	104
8.	Total Hardness as $CaCO_3$	mg/l	200	600	257	250	243	211	218	166	256	151
9.	Sodium as Na	mg/l	-	-	25	27	22	28	13	18	25	27
10.	Potassium as K	mg/l	-	-	3	4	3	2	4	3	5	4
11.	Calcium as Ca	mg/l	75	200	84.8	72.2	69.5	74.5	47.98	45.67	72.41	27.84
12.	Magnesium as Mg	mg/l	30	100	10.9	16.8	16.9	5.95	23.8	12.64	18.34	19.72
13.	Chloride as Cl	mg/l	250	1000	44.9	48.2	37.2	27.9	52.01	15.37	18.34	52.14
14.	Sulphate SO_4	mg/l	200	400	14.5	19.8	42	16	12	37	49	31
15.	Nitrate as NO_3	mg/l	45	NR	17.45	25.4	26.8	24.2	28.17	18.64	29.8	27.5
16.	Phosphate as PO_4	mg/l	-	-	BLQ(LOQ 0.02)	BLQ(LOQ 0.02)	BLQ(LOQ 0.02)	BLQ(LOQ 0.02)	BLQ(LOQ 0.02)	BLQ(LOQ 0.02)	BLQ(LOQ 0.02)	BLQ(LOQ 0.02)
17.	Fluorides as F		1	1.5	0.86	0.91	0.82	0.51	0.31	0.36	0.67	0.82

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Near Project Site (Gettur)	Kandikuppam	Rasipalli	Srinivasapuram	Anjur	Near Kanappatti	Krishnagiri	Marutepalli
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
18.	Cyanide	mg/l	0.05	NR	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
19.	Arsenic as As	mg/l	0.01	0.05	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)
20.	Boron as B	mg/l	0.5	1.0	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)	BQL(LOQ 0.1)
21.	Cadmium as Cd	mg/l	0.003	NR	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)	BQL(LOQ 0.001)
22.	Chromium as Cr	mg/l	0.05	NR	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)	BQL(LOQ 0.01)
23.	Copper as Cu	mg/l	0.05	1.5	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
24.	Lead as Pb	mg/l	0.01	NR	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)
25.	Manganese as Mn	mg/l	0.1	0.3	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)	BLQ(LOQ 0.05)
26.	Mercury	mg/l	0.001	NR	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005)	BLQ(LOQ 0.0005

S. No	Parameters	Unit	Drinking water Standard (IS 10500: 2012) Acceptable Limit	Drinking water Standard (IS 10500: 2012) Permissible Limit	Near Project Site (Gettur)	Kandikuppam	Rasipalli	Srinivasapuram	Anjur	Near Kanappatti	Krishnagiri	Marutepalli
					GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
												)
27.	Nickel as Ni	mg/l	0.02	NR	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)	BLQ(LOQ 0.01)
28.	Selenium as Se	mg/l	0.01	NR	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)	BLQ(LOQ 0.005)

*(**Note:** BLQ – Below the Limit of Quantification; LOQ – Limit of Quantification; NR – No Relaxation)*

Results and Discussions

A summary of analytical results are presented below:

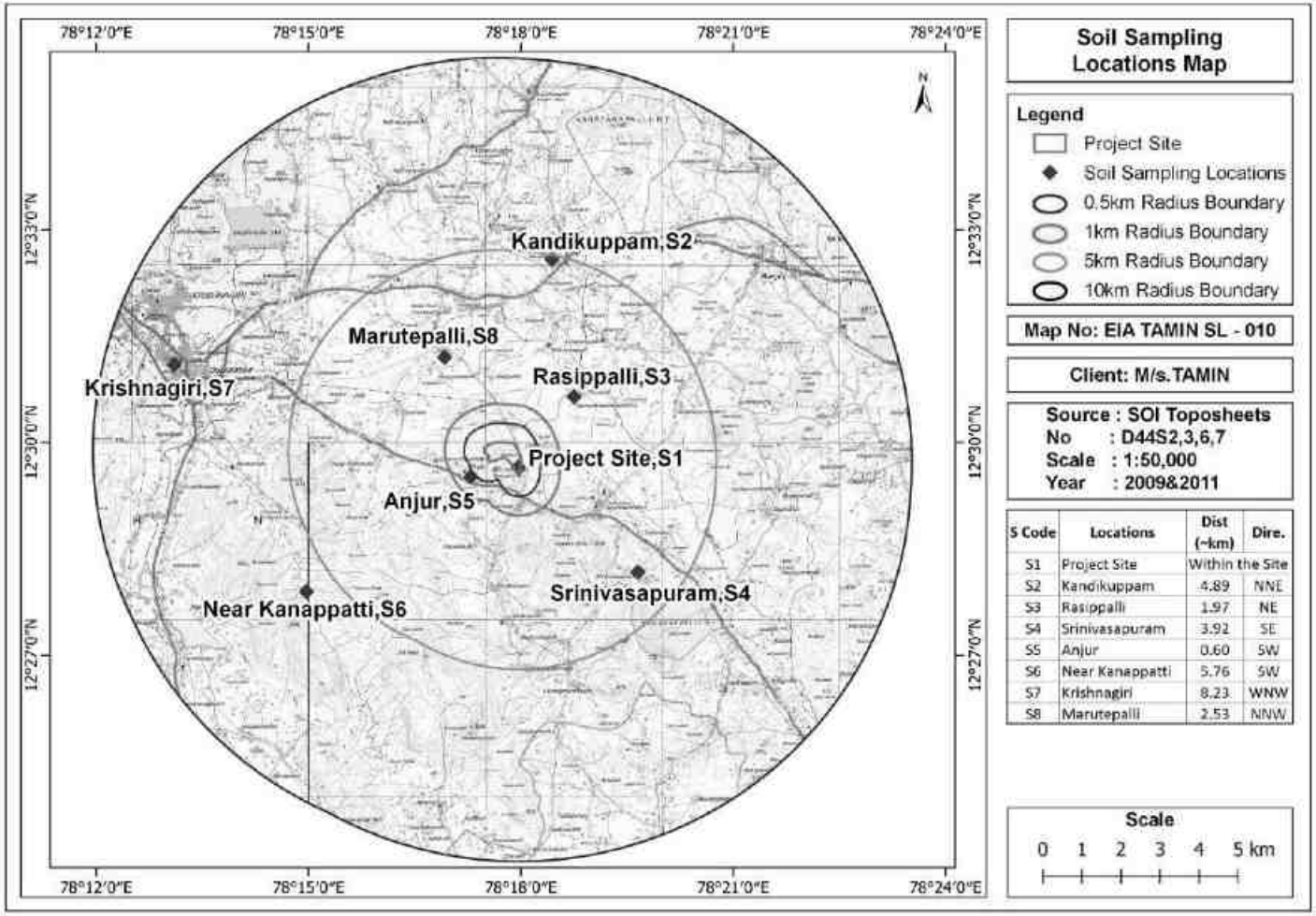
- The pH of the collected ground water sample ranges from 7.31 to 7.79.
- The concentrations of Chloride in the collected ground water sample ranges from 18.34 to 52.14 mg/l.
- Total Dissolved Solids (TDS) value of the collected ground water sample varies from 278 mg/l to 497 mg/l.
- Total hardness of the collected ground water sample ranges from 151 mg/l to 257 mg/l.
- The concentrations of Sulphate in the collected ground water sample ranges from 12 to 49 mg/l.

3.9 Soil Quality

Soil quality monitoring locations & results are given in **Table 3-16** & **Table 3-17.** Map showing the soil monitoring locations are given in **Figure 3-24.**

Table 3-16 Soil Quality Monitoring Locations

Location Code	Location	Distance (km) from Project boundary	Azimuth Directions
S1	Project Site	Within site	
S2	Kandikuppam	4.89	NNE
S3	Rasipalli	1.97	NE
S4	Srinivasapuram	3.92	SE
S5	Anjur	0.6	SW
S6	Near Kanappatti	5.76	SW
S7	Krishnagiri	8.23	WNW
S8	Marutepalli	2.53	NNW



S Code	Locations	Dist (~km)	Dire.
S1	Project Site	Within the Site	
S2	Kandikuppam	4.89	NNE
S3	Rasippalli	1.97	NE
S4	Srinivasapuram	3.92	SE
S5	Anjur	0.60	SW
S6	Near Kanappatti	5.76	SW
S7	Krishnagiri	8.23	WNW
S8	Marutepalli	2.53	NNW

Figure 3-23 Map showing the soil monitoring location

Table 3-17 Soil Quality Monitoring Results

S. No	Parameters	Units	Project Site	Kandikuppam	Rasipalli	Srinivasapuram	Anjur	Near Kanappatti	Krishnagiri	Marutepalli
			S1	S2	S3	S4	S5	S6	S7	S8
1.	Soil Texture	-	Clay loam	Sandy Clay Loam	Sandy Loam	Sandy Loam	Sandy loam	Clay loam	Sandy loam	Sandy loam
2.	Sand	%	31.45	57.20	62.25	53.20	55.15	28.35	60.15	60.65
3.	Silt	%	36.34	29.50	18.35	17.40	28.60	39.25	15.20	18.12
4.	Clay	%	32.21	13.30	19.40	29.40	16.25	32.40	24.65	21.23
5.	PH	-	7.69	6.78	7.23	8.12	7.43	6.82	7.23	8.31
6.	Electrical Conductivity	µs/cm	295	218	262	285	381	328	237	389
7.	Nitrogen	mg/kg	285.62	408.42	217.58	193.43	216.86	124.92	183.17	181.34
8.	Phosphorous	mg/kg	25.04	32.09	33.05	20.08	21.84	19.73	29.12	18.98
9.	Potassium	mg/kg	129	73.30	80.12	98.56	133.67	135.84	144.31	90.78
10.	Boron	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
11.	Cadmium	mg/kg	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)	BLQ(LOQ 0.1)
12.	Porosity	-	0.66	0.35	0.40	0.48	0.44	0.65	0.43	0.49
13.	Water holding capacity	(inches of water per foot of soil)	1.99	1.78	2.2	2.1	2.4	1.84	2.0	2.1

Note: *BLQ – Below the Limit of Quantification, LOQ – Limit of Quantification.*

3.9.1 Results and Discussions

Summary of analytical results

- The pH of the soil samples ranged from 6.78 to 8.31.
- Conductivity of the soil samples ranged from 218 to 389 µs/cm.
- Nitrogen content ranged from 124.92 mg/kg to 408.42 mg/kg.
- Phosphorous ranged from 18.98 mg/kg to33.05 mg/kg.
- Potassium content ranges from 73.30 mg/kg to 144.31 mg/kg.

3.10 Biological Environment

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 ecosystem play an important role in identifying sensitive issues for under taking appropriate action to mitigate the impact, if any. The biological study was under taken 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 condition with the help of available data, to predict changes in the biological environment as a result of present activities and to suggest measures for maintaining its health. A survey was conducted to study the flora & fauna in 10 km radius. Some of the information was gathered from the local habitants. All the collected data were classified to interpret the impact of pollution on the flora and fauna of that region. Survey of the wild plants as well as cultivated crop plants was made and all the available information was recorded.

During survey, following aspects were considered for ecological studies:

- ❖ Assessment of 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)

3.10.1 Methodology

Terrestrial investigations for flora and fauna records were collected by random field survey and a checklist was prepared. During field survey, discussions with the local people were carried-out to collect information related to local biodiversity in and around the area.

3.10.2 Floral Study

- ❖ Plants species were identified based on their specific diagnostics characters of family, genus and species using available floral, 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 Faunal Study

- 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 identify avifauna 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.

3.10.4 Floristic composition within the study area

For secondary information based on a total 112 species under 41 family found in the study area. The detailed list of plant species found in each quadrat provided in **Table 3-18.**

Table 3-18 Cumulative List of Floral Species

S.No	Botanical Name	Family	Common Name	Habit	IUCN
1.	*Abrusprecatorius*	Fabaceae	Kundumani	Shrub	NA
2.	*Abutilon indicum*	Malvaceae	Perun thuthi	Shrub	NA
3.	*Acacia nilotica*	Mimosaceae	Karuvelam	Tree	LC
4.	*Acacia planifrons*	Mimosaceae	Kodaivelam	Tree	NA
5.	*Acalypha indica*	Euphorbiaceae	Kuppaimeni	Herb	NA
6.	*Acanthospermumhispidum*	Compositae	--	Herb	NA
7.	*Achyranthes aspera*	Amaranthaceae	Nayurivi	Herb	NA
8.	*Aegle marmelos*	Rutaceae	Vilvam	Tree	NA
9.	*Aervalanata*	Amaranthaceae	Peelai, Sirupeelai	Shrub	NA
10.	*Aerva persica*	Amaranthaceae	Perumpeelai	Shrub	NA
11.	*Aeschynomene americana*	Fabaceae	--	Herb	NA
12.	*Aeschynomene aspera*	Fabaceae	Thakkai	Shrub	NA
13.	*Ageratum conyzoides*	Compositae	Poompillu	Herb	NA
14.	*Alloteropsiscimicina*	Poaceae	--	Grass	NA
15.	*Alternanthera sessilis*	Amaranthaceae	Ponnanganni	Herb	NA
16.	*Anisomeles indica*	Labiatae	--	Herb	NA
17.	*Annona squamosa*	Annonaceae	Seetha	Tree	NA
18.	*Arachis hypogaea*	Fabaceae	Verkadalai	Herb	NA
19.	*Argemone mexicana*	Papaveraceae	BramanThandu	Herb	NA
20.	*Aristida adscensionis*	Poaceae	--	Grass	NA
21.	*Aristida hystrix*	Poaceae	--	Grass	NA
22.	*Aristolochiabracteolata*	Aristolochiaceae	Aduthinnappalai	Herb	NA
23.	*Barleria acuminata*	Acanthaceae	--	Shrub	NA
24.	*Barlerialongiflora*	Acanthaceae	--	Shrub	NA
25.	*Barlerianoctiflora*	Acanthaceae	--	Shrub	NA
26.	*Boerhaviadiffusa*	Nyctaginaceae	Mookarattai	Herb	NA
27.	*Boerhaviaerecta*	Nyctaginaceae	Seemaimookaratta	Herb	NA

S.No	Botanical Name	Family	Common Name	Habit	IUCN
			i		
28.	*Carica papaya*	Caricaceae	Pappali	Tree	NA
29.	*Carissa carandas*	Apocynaceae	Kalaa, Perun kala	Shrub	NA
30.	*Cassia fistula*	Caesalpiniaceae	Kondrai	Tree	NA
31.	*Celosia argentea*	Amaranthaceae	Pannaikeerai	Herb	NA
32.	*Cissus quadrangularis*	Vitaceae	Pirandai	Shrub	NA
33.	*Citrullus colocynthis*	Cucurbitaceae	Peikkumatti	Herb	NA
34.	*Citrus aurantifolia*	Rutaceae	Elumichai	Tree	NA
35.	*Cleome viscosa*	Capparidaceae	Nai kadugu	Herb	NA
36.	*Coccinia grandis*	Cucurbitaceae	Kovai	Climber	NA
37.	*Croton bonplandianum*	Euphorbiaceae	Rail poondu	Herb	NA
38.	*Cucumis sativus*	Cucurbitaceae	Vellarikkaai	Climber	NA
39.	*Cyperus bulbosus*	Cyperaceae	—	Sedge	NA
40.	*Ecliptaprostrata*	Compositae	Karisaalai	Herb	NA
41.	*Eleocharis acutangula*	Cyperaceae		Sedge	NA
42.	*Eragrostistenella*	Poaceae		Grass	NA
43.	*Euphorbia antiquorum*	Euphorbiaceae	Sadura-kalli	Tree	NA
44.	*Euphorbia hirta*	Euphorbiaceae	Ammanpacharisi	Herb	NA
45.	*Euphorbia indica*	Euphorbiaceae	Ammanpacharisi	Herb	NA
46.	*Evolvulusalsinoides*	Convolvulaceae	Vishnukarandi	Herb	NA
47.	*Ficus benghalensis*	Moraceae	Aala maram	Tree	NA
48.	*Ficus religiosa*	Moraceae	Arasu	Tree	NA
49.	*Fimbristylis ovata*	Cyperaceae		Sedge	NA
50.	*Glinuslotoides*	Molluginaceae	Siruseruppadai	Herb	NA
51.	*Gynandropsisgynandra*	Capparidaceae	Nalvaelai, Vaelai	Herb	NA
52.	*Hedyotis aspera*	Rubiaceae		Herb	NA
53.	*Heliotropium indicum*	Boraginaceae	Thaelkodukku	Herb	NA
54.	*Hibiscus surattensis*	Malvaceae		Undershrub	NA
55.	*Hybanthusenneaspermus*	Violaceae	Orilaithamarai	Herb	NA
56.	*Hygrophilaschulli*	Acanthaceae	Neermulli	Herb	NA
57.	*Hyptissuaveolens*	Labiatae		Shrub	NA
58.	*Indigofera aspalathoides*	Fabaceae	Sivanaarvaembu	Herb	NA
59.	*Indigofera linnaei*	Fabaceae		Herb	NA
60.	*Indigofera tinctoria*	Fabaceae	Avuri, Neeli	Herb	NA
61.	*Ipomoea pes-caprae*	Convolvulaceae	Attukkal, Kudhirai Kulambu	Creeper	NA
62.	*Jasminum sambac*	Oleaceae	Malli, Peru malli, Pichigai	Climbing Shrub	NA
63.	*Jatropha curcas*	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
64.	*Jatropha gossypifolia*	Euphorbiaceae	Kaatu-amanakku	Shrub	NA
65.	*Justicia adhatoda*	Acanthaceae	Adathodai	Shrub	NA
66.	*Justicia simplex*	Acanthaceae		Herb	NA
67.	*Kylinga bulbosa*	Cyperaceae		Sedge	NA
68.	*Lagenaria siceraria*	Cucurbitaceae	Surakkaai	Climber	NA
69.	*Lantana camara*	Verbenaceae	Unnichedi	Shrub	NA
70.	*Leucaena leucocephala*	Mimosaceae	Soundil	Tree	NA
71.	*Leucas aspera*	Labiatae	Thumbai	Herb	NA
72.	*Ludwigia perennis*	Onagraceae		Herb	NA
73.	*Martynia annua*	Martyniaceae	ThaelKodukku	Herb	NA

S.No	Botanical Name	Family	Common Name	Habit	IUCN
74.	*Melia azedarach*	Meliaceae	Malaivaembu	Tree	NA
75.	*Merremia hederacea*	Convolvulaceae		Herb	NA
76.	*Nyctanthes arbor-tristis*	Nyctanthaceae	Parijaatham	Tree	NA
77.	*Ocimumamericanum*	Labiatae	Ganjaankorai	Herb	NA
78.	*Pavonia odorata*	Malvaceae	Peramutti	Herb	NA
79.	*Pedalium murex*	Pedaliaceae	Perunerunji	Herb	NA
80.	*Phyllanthus acidus*	Euphorbiaceae	Aranelli	Tree	NA
81.	*Phyllanthus amarus*	Euphorbiaceae	Kizha-nelli	Herb	NA
82.	*Phyllanthus emblica*	Euphorbiaceae	Nelli, Muzhunelli	Tree	NA
83.	*Phyllanthus reticulatus*	Euphorbiaceae	Inkipazham	Shrub	NA
84.	*Pithecellobium dulce*	Mimosaceae	Kodukkaaipuli	Tree	NA
85.	*Plumbago zeylanica*	Plumbaginaceae	Chitthiragam	Herb	NA
86.	*Polygala javana*	Polygalaceae		Shrub	NA
87.	*Pongamia pinnata*	Fabaceae	Punga maram	Tree	NA
88.	*Portulaca oleracea*	Portulacaceae	Kari keerai	Herb	NA
89.	*Prosopis juliflora*	Mimosaceae	Velikkaathaan	Tree	NA
90.	*Psidium guajava*	Myrtaceae	Koyya	Tree	NA
91.	*Punica granatum*	Punicaceae	Madhulai	Shrub	NA
92.	*Rhynchosiaviscosa*	Fabaceae		Climber	NA
93.	*Ricinus communis*	Euphorbiaceae	Amanakku	Shrub	NA
94.	*Riveahypocrateriformis*	Convolvulaceae	Boodhikeerai	Climber	NA
95.	*Ruellia tuberosa*	Acanthaceae		Herb	NA
96.	*Sansevieria roxburghiana*	Dracaenaceae	Marun, Mottamamji	Herb	NA
97.	*Senna auriculata*	Caesalpiniaceae	Avaram	Shrub	NA
98.	*Senna occidentalis*	Caesalpiniaceae	Peiyavarai	Tree	NA
99.	*Sesamum indicum*	Pedaliaceae	Ellu	Herb	NA
100.	*Sida acuta*	Malvaceae	Malaithangi	Herb	NA
101.	*Sida cordata*	Malvaceae	Pazhampaasi	Herb	NA
102.	*Sida cordifolia*	Malvaceae	Nilatutthi	Herb	NA
103.	*Solanum americanum*	Solanaceae	Manatakkali	Herb	NA
104.	*Solanum melongena*	Solanaceae	Kathiri	Herb	NA
105.	*Solanum torvum*	Solanaceae	Chundai	Shrub	NA
106.	*Solanum trilobatum*	Solanaceae	Thoodhuvalai	Climber	NA
107.	*Solanum virginianum*	Solanaceae	Kandankathiri	Herb	NA
108.	*Spermacocehispida*	Rubiaceae	Nathaichoori	Herb	NA
109.	*Spermacoceocymoides*	Rubiaceae		Herb	NA
110.	*Tamarindus indica*	Caesalpiniaceae	Puliyamaram	Tree	NA
111.	*Tectona grandis*	Verbenaceae	Thekku	Tree	NA
112.	*Tephrosia purpurea*	Fabaceae	Kozhinji	Undershrub	NA

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., Chithra, V.N. and Balakrishnan, P. (1989) Flora of Tamil Nadu India. Series 1: Analysis. Vol. III. Botanical Survey of India, Coimbatore.

3.10.5 Terrestrial Fauna

The core area is not a habitat for any Rare or endangered or threatened (RET) wildlife. Common rodents, reptiles andbirdswereseen.There was nothing unusual or special about the wild fauna of the core area. A list of fauna reported from secondary thestudy area is given in **Table 3-20**.

List of Fauna

Table 3-19 Cumulative List of Fauna Species

S.No.	Scientific Name	Common Name	WPA & IUCN Status
(a)Mammals			
1	*Funambulus pennantii*	Five striped Palm squirrel	IV/LC
2	*Urva edwardsii*	Indian grey mongoose	II/LC
3	*Rattus argentiventer*	Field Rat	V/LC
4	*Lepus nigricollis*	Indian hare	V/LC
5	*Sus scrofa*	Wild boar	V/LC
(b)Birds			
1	*Accipiter badius*	Shikra	LC/ Sch I
2	*Acridotheres tristis*	Common Myna	LC/ Sch IV
3	*Actitis hypoleucos*	Common Sandpiper	LC/ Sch IV
4	*Alcedo atthis*	Common kingfisher	LC/ Sch IV
5	*Amaurornis phoenicurus*	White breasted waterhen	LC/ Sch IV
6	*Anas acuta*	Northern Pintail	LC/ Sch IV
7	*Anastomus oscitans*	Asian Openbill	LC/ Sch IV
8	*Anhinga melanogaster*	Oriental Darter	LC/ Sch IV
9	*Anser indicus*	Bar-headed Goose	LC/ Sch IV
10	*Anthus rufulus*	Paddyfield pipit	LC/ Sch IV
11	*Apus affinis*	House Swift	LC/ Sch IV
12	*Ardea alba*	Great Egret	LC/ Sch IV
13	*Ardea cinerea*	Grey Heron	LC/ Sch IV
14	*Ardeola grayii*	Indian Pond Heron	LC/ Sch IV
15	*Argya malcolmi*	Large Grey Babbler	LC/ Sch IV
16	*Bubulcus ibis*	Cattle Egret	LC/ Sch IV
17	*Calidris minuta*	Little Stint	LC/ Sch IV
18	*Centropus sinensis*	Greater Coucal	LC/ Sch IV
19	*Ceryle rudis*	Pied kingfisher	LC/ Sch IV
20	*Charadrius mongolus*	Lesser Sand-Plover	LC/ Sch IV
21	*Chlidonias hybrida*	Whiskered Tern	LC/ Sch IV
22	*Ciconia episcopus*	Asian Woolly-necked Stork	NT/ Sch IV
23	*Cinnyris asiaticus*	Purple Sunbird	LC/ Sch IV
24	*Circus aeruginosus*	Eurasian Marsh-Harrier	LC/ Sch IV
25	*Columba livia*	Rock Pigeon	LC/ Sch IV
26	*Copsychus saularis*	Oriental Magpie Robin	LC/ Sch IV
27	*Coracias benghalensis*	Indian roller	LC/ Sch IV
28	*Corvus splendens*	House Crow	LC/ Sch IV
29	*Cyornis tickelliae*	Tickell's blue flycatcher	LC/ Sch IV

30	*Dendrocygna javanica*	Lesser Whistling-Duck	LC/ Sch IV
31	*Dicaeum erythrorhynchos*	Pale billed flowerpecker	LC/ Sch IV
32	*Dicrurus macrocercus*	Black Drongo	LC/ Sch IV
33	*Egretta garzetta*	Little Egret	LC/ Sch IV
34	*Egretta gularis*	Western Reef-Heron	LC/ Sch IV
35	*Elanus caeruleus*	Black-winged Kite	LC/ Sch IV
36	*Eudynamys scolopaceus*	Asian Koel	LC/ Sch IV
37	*Euodice malabarica*	Indian silverbill	LC/ Sch IV
38	*Fulica atra*	Eurasian Coot	LC/ Sch IV
39	*Gallinula chloropus*	Eurasian Moorhen	LC/ Sch IV
40	*Haliastur indus*	Brahminy Kite	LC/ Sch IV
41	*Halcyon smyrnensis*	White-throated kingfisher	LC/ Sch IV
42	*Himantopus himantopus*	Black-winged Stilt	LC/ Sch IV
43	*Lanius schach*	Long-tailed Shrike	LC/ Sch IV
44	*Limosa lapponica*	Bar-tailed Godwit	NT/ Sch IV
45	*Lonchura punctulata*	Scaly-breasted Munia	LC/ Sch IV
46	*Merops orientalis*	Green Bee-eater	LC/ Sch IV
47	*Microcarbo niger*	Little cormorant	LC/ Sch IV
48	*Milvus migrans*	Black Kite	LC/ Sch IV
49	*Motacilla maderaspatensis*	White browed Wagtail	LC/ Sch IV
50	*Mycteria leucocephala*	Painted Stork	NT/ Sch IV
51	*Numenius arquata*	Eurasian Curlew	NT/ Sch IV
52	*Nycticorax nycticorax*	Black-crowned Night-Heron	LC/ Sch IV
53	*Ocyceros birostris*	Indian Grey Hornbill	LC/ Sch IV
54	*Orthotomus sutorius*	Common tailorbird	LC/ Sch IV
55	*Ortygornis pondicerianus*	Grey francolin	LC/ Sch IV
56	*Passer domesticus*	House Sparrow	LC/ Sch IV
57	*Pelecanus philippensis*	Spot-billed Pelican	NT/ Sch IV
58	*Phalacrocorax carbo*	Great Cormorant	LC/ Sch IV
59	*Phalacrocorax fuscicollis*	Indian Cormorant	LC/ Sch IV
60	*Platalea leucorodia*	Eurasian Spoonbill	LC/ Sch IV
61	*Plegadis falcinellus*	Glossy Ibis	LC/ Sch IV
62	*Prinia inornata*	Plain prinia	LC/ Sch IV
63	*Prinia socialis*	Ashy Prinia	LC/ Sch IV
64	*Pseudibis papillosa*	Red-naped Ibis	LC/ Sch IV
65	*Psittacula krameri*	Rose-ringed Parakeet	LC/ Sch IV
66	*Pycnonotus cafer*	Red-vented Bulbul	LC/ Sch IV
67	*Saxicoloides fulicatus*	Indian Robin	LC/ Sch IV
68	*Spatula clypeata*	Northern Shoveler	LC/ Sch IV
69	*Sterna hirundo*	Common Tern	LC/ Sch IV
70	*Sternula albifrons*	Little Tern	LC/ Sch IV
71	*Streptopelia chinensis*	Spotted Dove	LC/ Sch IV
72	*Streptopelia decaocto*	Eurasian collared dove	LC/ Sch IV
73	*Streptopelia senegalensis*	Laughing Dove	LC/ Sch IV

74	*Sturnia pagodarum*	Brahminy Starling	LC/ Sch IV
75	*Tachybaptus ruficollis*	Little Grebe	LC/ Sch IV
76	*Thalasseus bengalensis*	Lesser Crested Tern	LC/ Sch IV
77	*Threskiornis melanocephalus*	Black-headed Ibis	NT/ Sch IV
78	*Tringa erythropus*	Spotted Redshank	LC/ Sch IV
79	*Tringa glareola*	Wood Sandpiper	LC/ Sch IV
80	*Tringa ochropus*	Green Sandpiper	LC/ Sch IV
81	*Tringa stagnatilis*	Marsh Sandpiper	LC/ Sch IV
82	*Tringa totanus*	Common Redshank	LC/ Sch IV
83	*Vanellus indicus*	Red-wattled Lapwing	LC/ Sch IV
(d)Reptiles			
1	*Calotes versicolor*	Oriental Garden lizard	LC/ Sch IV
2	*Varanus bengalensis*	Bengal Monitor Lizard	NT/Sch I
3	*Ptyas mucosa*	Indian Rat Snake	LC/Sch II
4	*Daboia russelii*	Russels Viper	LC/Sch II
5	*Psammophilus dorsalis*	Peninsular Rock Agama	LC/ Sch IV
6	*Xenochrophis piscator*	Checkered keelback	LC/Sch II
(e) Butterflies			
1	*Euthalia nais*	Baronet	NT/ Sch IV
2	*Tirumala limniace*	Blue tiger	LC/ Sch IV
3	*Belenois aurota*	Pioneer	LC/ Sch IV
4	*Euploea core*	Common crow	LC/ Sch IV
5	*Catopsilia pomona*	Common Emigrant	NT/ Sch IV
6	*Melanitis leda*	Common evening brown	LC/ Sch IV
7	*Eurema hecabe*	Common grass yellow	LC/ Sch IV
8	*Delias eucharis*	Common jezebel	NT/ Sch IV
9	*Phalanta phalantha*	Common leopard	LC/ Sch IV
10	*Papilio demoleus*	Common lime	NT/ Sch IV
11	*Papilio polytes*	Common mormon	NT/ Sch IV
12	*Atrophaneura hector*	Crimson rose	LC/ Sch I
13	*Hypolimnas misippus*	Danaid eggfly	LC/ Sch IV
14	*Hypolimnas bolina*	Great eggfly	NT/ Sch IV
15	*Junonia atlites*	Grey pansy	NT/ Sch IV
16	*Junonia lemonias*	Lemon pansy	NT/ Sch IV
17	*Catopsilia pyranthe*	Mottled Emigrant	NT/ Sch IV
18	*Pseudozizeeria maha*	Pale Grass Blue	NT/ Sch IV
19	*Junonia almana*	Peacock pansy	LC/ Sch IV
20	*Danaus chrysippus*	Plain tiger	LC/ Sch IV

LC- Least Concern, NT- Near Threatened, EN- Endangered, NE-Not Evaluated, DD -Data Deficient, VU-Vulnerable, IUCN- International Union for Conservation of Nature.

Source:

1. List of Birds: Ali, S. (2002). The Book of Indian Birds (13th Revised Edition). Oxford University Press, New Delhi, 326pp.

2. List of Butterflies: Kehimkar I. The Book of Indian Butterflies. Bombay Natural History Society, 2008, 497.
3. 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.
4. 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)

3.10.6 Conservation Plan for Schedule-I species

As per the secondary survey, following four species under Schedule I of Wildlife (Protection) Act, 1972 were found in the project site. The Conservation Plan would focus on conservation of habitats of Schedule-I species identified during the study.

The Conservation Plan would focus on conservation of habitats of Schedule-I species identified during the study. We identified 10 IUCN red list species viz.. one plant species, one reptile, one butterfly and two bird in the study area i.e. 10 km buffer area.

Flora

Tectona grandis L.f.- Endangered

Tectona grandis

This wood species is listed in the IUCN Red List of Threatened Species as endangered, but not listed in the CITES and also common in Botanical Survey of India.

Fauna

S.No	Common Name	Species Name	IUCN	WPA 1972
Birds				
1	Shikra	*Accipiter badius*	LC	Schedule I
2	Brahminy Kite	*Haliastur indus*	LC	Schedule I
Butterfly				
3	Crimson Rose	*Atrophaneura hector*	LC	Schedule I
Reptiles				
4	Bengal Monitor Lizard	*Varanus bengalensis*	LC	Schedule I

The budgetary provision has been made for implementation of wildlife conservation measures. TAMIN will allocate Rs.15,35,000 towards the conservation plan for implementing the following activities with the help of and in consultation with the Forest Department.

- **Bird species** - Shikra, Brahminy Kite
    - **Capacity Building:** Capacity building program on protection would be of high significance. Creation of awareness among local people as well as employees about the importance of protecting the habitat and foraging grounds.

- **Anti-Poaching Plan:** Poaching being one of the causes for depletion of wildlife in general and it being one of the main reasons for the poor faunal assemblage, it is necessary to increase protection for the RET species. The people living in the surrounding area should be rewarded for timely information about disturbing and/or poaching of the bird more specifically the threatened species.
- **Habitat Improvement:** Sufficient food, water resources, vegetation cover, and breeding sites must be available at the release location.
- **Development of Wetland Habitat:** The edges and the periphery of the water sources shall be planted with native tree species that can provide habitat for perching and nesting for the aquatic birds species.
- Provision of veterinary care and cages for injured or sick deformed birds with the help of and in consultation with the forest department.

- **Butterfly species**- Crimson Rose
  - Community inhibiting in study area should make well aware about the importance of the butterflies and bees which acts a very vital role in pollination which results in high and successful fruiting of crops. This can be achieved by awareness campaigns among village communities, focusing on local schools for protection of the species.
  - Community awareness-training sessions to be arranged for usage and manufacturing local indigenous pesticides and fertilizers by traditional methods which decreases usage of chemical pesticides and fertilizer.
- **Reptile Species**- Bengal Monitor Lizard
  - As the species are hunted for their meat, skins, and for use in medicine, awareness campaigns to be carried out among village communities, focusing on local schools for protection of the species.
  - Habitat improvement to be carried out near the forest area with the help of and in consultation with the forest department.

Good Practices:

- TAMIN will be bound by rules and regulation of Wildlife (Protection) Act, 1972 of India and any others rule and guidelines, stipulated by the State Government.
- State Forest Department will be consulted for development of greenbelt within the project site. Further unauthorized pesticides / toxic materials will not be used for plant species.

- TAMIN will not plant any alien and/or invasive species in the project site, which may spread in the forest areas.
- Employees will be made aware of presence of a few threatened and Schedule species in the area and legal consequences of hunting, poaching of animals and harvesting of forest produces.

The proponent has proposed a sum of Rs. 15,35,000/-for the "Schedule – I species" conservation plan under the following heads:

S.No	Work or Activity	Approximate Cost. Rs.				
		Year 1	Year 2	Year 3	Year 4	Year 5
1	Plantation-350 tree plants (@ 150/-per plant)	52,500/-	52,500/-	52,500/-	52,500/-	52,500/-
3	One awareness programme	20,000/-	20,000/-	20,000/-	20,000/-	20,000/-
3	Habitat improvement	6,00,000/-	5,00,000/-			
Total		**702500/-**	**572,500/-**	**72,500/-**	**72,500/-**	**72,500/-**

References:

- IUCN Red List of Threatened Species. Version (2013). International Union for Conservation of Nature.
- Petrie M, Krupa A, Burke T (1999). Peacocks lek with relatives even in the absence of social and environmental cues. Nature. 401 (6749):155–157.Bibcode, Natur.401.155P. doi:10.1038/43651.

3.11 Socio Economic profile of Project Influenced Area

Krishnagiri district was ranked 17th in terms of the highest population in the State. The urban population was 22.8% to the total population of the district. Krishnagiri district has recorded population density of 367 persons/sq km. The district sex ratio was 958, which is the 3rd lowest among the district in the State.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.11.1 Socio Economic Aspects

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status with secondary sources 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 characteristic helps in identification, prediction and evaluation of impacts on socio-economic and parameters of human interest due to proposed project developments. The parameters are:

- Demographic structure
- Infrastructure Facility
- Economic Status
- Health status
- Cultural attributes
- Awareness and opinion of people about the project and Industries in the area.

The following **Table 3-20** provides the certain important social indicators of Krishnagiri District.

Table 3-20 Social Indicators of Krishnagiri District

S.No	Social Indicators	Krishnagiri District
2.	Decadal growth rate %	20.4
3.	Urban population %	22.8
4.	Sex ratio	958
5.	0-6 age group %	12
6.	Population density (Persons per square Km)	367
7.	Scheduled caste population %	14.2
8.	Scheduled tribe population %	1.2
9.	Literacy rate %	71.5
10.	Work Participation rate %	46.7
11.	Main Workers %	84.5
12.	Marginal Workers %	15.5
13.	Cultivators %	26.89
14.	Agricultural labourers %	30
15.	Workers in household industries %	2.5
16.	Other workers %	40.61

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.11.2 Population and Household Size

The total population of the Krishnagiri district was 1879809 in 2011 census. Of this, the rural population was 1451446 and the urban population returned with 428363 persons. After

recasting, the population in2001 census was 1561118; rural and urban population returned as 1299726 and 261392 respectively.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

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 asper 2011 census was 958. This was recorded as 944in 2001 census. The child sex ratio in the district during 2011 census was 926 and this was 905 in2001 census.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.11.4 Scheduled Castes and Scheduled Tribes

The Scheduled Castes (SCs) population in the Krishnagiri district was 13.9 percent in 2001 census which has now increased to 14.2 per cent in 2011census. The rural-urban composition of SCs was 15.0percent and 11.6 per cent respectively in 2011census. The rural-urban SCs population share was14.5 per cent and 10.5 per cent in 2001 census respectively. The Scheduled Tribes population in the district was 1.1 percent in 2001 census and returned with a marginal increase to 1.2 per cent in 2011 census. The rural-urban composition of STs in 2011 census was 1.4 per cent and 0.3 per cent respectively.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.11.5 Economic Activity & Livelihood Pattern

The total workers constituted 46.7 percent to the total population as against 48.2 percent in 2001 census. The main workers among the wokers constituted 84.5 per cent in 2011, who were 83.7 percent in 2001. The marginal workers (both categories) in 2011 were 15.5 per cent and

unclassified marginal workers were 16.3 per cent in 2001. The non-workers to the total population were 53.3 percent in 2011, who were 51.8 percent in 2001 census.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(**Ref**:Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

3.11.6 Social Economic Profile of the study area

The villages and towns covering 10 km radius from the boundary of the project site is taken for the study. **Table 3-21** shows the population profile within the study area.

Table 3-21 Population profile within the study area

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
Krishnagiri Taluk- Krishnagiri District								
0-5 km								
1.	Chinnathimminayanapalli	1115	4794	2390	2404	524	1716	5
2.	Kallukurikki	1334	6097	2967	3130	789	825	0
3.	Kundarapalli	1100	4702	2262	2440	533	460	0
4.	Junjupalli	1177	4826	2309	2517	576	589	0
5.	Bayanapalli (Part)	526	2258	1151	1107	271	697	1
6.	Kathinayanapalli	1408	6060	2975	3085	691	1118	0
7.	Kammaampalli	1399	5759	2831	2928	674	295	2
8.	Palepalle	1847	7631	3698	3933	687	1092	43
9.	Madepalli	1790	7341	3683	3658	713	1474	27
10.	Balinayanapalli	1132	4761	2470	2291	521	495	0
11.	Orappam	1549	6796	3378	3418	737	779	0
12.	Boganapalli	1979	8763	4478	4285	1204	1762	15
13.	Peddatalapalli	2234	9773	4925	4848	1397	776	11
14.	Gangaleri	766	3242	1617	1625	360	470	13
15.	Kondepalli	693	2729	1339	1390	315	64	0
16.	Bellarapalli	1140	4891	2479	2412	563	581	0
17.	Periamuthu	1969	8413	4230	4183	1013	1303	201
18.	Agasipalli	2811	12915	6548	6367	1743	2275	12
19.	Soolamalai	477	1966	1027	939	238	344	0
20.	Modikuppam	662	2525	1277	1248	236	213	23
21.	Chowttahalli	2252	8992	4628	4364	978	448	0
22.	Sundekuppam	2073	8661	4386	4275	958	77	0
23.	Gundalapatti	1478	5838	2896	2942	639	269	0
24.	Sokkadi	1242	4931	2564	2367	514	408	3
25.	Mittahalli	2263	9361	4747	4614	1064	135	1
26.	Krishnagiri	448053	1879809	960232	919577	217323	267386	22388

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
27.	Krishnagiri	342859	1451446	742444	709002	166231	217822	21041
28.	Krishnagiri	105194	428363	217788	210575	51092	49564	1347
29.	Krishnagiri	141113	597071	300821	296250	67555	72114	4427
30.	Krishnagiri	109964	464232	234646	229586	53052	56560	4040
31.	Krishnagiri	31149	132839	66175	66664	14503	15554	387
32.	Krishnagiri (M)	16386	71323	35395	35928	7748	7589	129
33.	Krishnagiri (M) WARD NO.-0001	411	1987	1052	935	265	0	0
34.	Krishnagiri (M) WARD NO.-0002	407	1757	874	883	197	4	1
35.	Krishnagiri (M) WARD NO.-0003	349	1751	871	880	201	981	0
36.	Krishnagiri (M) WARD NO.-0004	422	1934	960	974	211	201	0
37.	Krishnagiri (M) WARD NO.-0005	585	2702	1341	1361	363	749	0
38.	Krishnagiri (M) WARD NO.-0006	436	2053	1029	1024	271	0	0
39.	Krishnagiri (M) WARD NO.-0007	378	1772	852	920	197	138	1
40.	Krishnagiri (M) WARD NO.-0008	444	1893	922	971	201	13	0
41.	Krishnagiri (M) WARD NO.-0009	279	1386	694	692	153	179	0
42.	Krishnagiri (M) WARD NO.-0010	866	3656	1849	1807	368	62	7
43.	Krishnagiri (M) WARD NO.-0011	445	1969	993	976	201	111	0
44.	Krishnagiri (M) WARD NO.-0012	531	2326	1163	1163	258	77	0
45.	Krishnagiri (M) WARD NO.-0013	412	1771	861	910	207	293	0
46.	Krishnagiri (M) WARD NO.-0014	553	2313	1097	1216	243	18	0
47.	Krishnagiri (M) WARD NO.-0015	588	2551	1265	1286	300	99	8
48.	Krishnagiri (M) WARD NO.-0016	560	2607	1236	1371	342	901	3
49.	Krishnagiri (M) WARD NO.-0017	413	1771	863	908	196	48	6
50.	Krishnagiri (M) WARD NO.-0018	310	1322	655	667	117	3	0
51.	Krishnagiri (M) WARD NO.-0019	485	2061	1018	1043	224	33	0
52.	Krishnagiri (M) WARD NO.-0020	562	2402	1187	1215	271	122	9
53.	Krishnagiri (M) WARD NO.-0021	561	2451	1223	1228	246	1459	0
54.	Krishnagiri (M) WARD NO.-0022	718	3075	1545	1530	325	315	15
55.	Krishnagiri (M) WARD NO.-0023	320	1402	679	723	159	35	0
56.	Krishnagiri (M) WARD NO.-0024	348	1447	742	705	161	14	0

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
57.	Krishnagiri (M) WARD NO.-0025	609	2653	1303	1350	276	33	0
58.	Krishnagiri (M) WARD NO.-0026	243	1041	522	519	95	0	0
59.	Krishnagiri (M) WARD NO.-0027	594	2393	1212	1181	221	80	52
60.	Krishnagiri (M) WARD NO.-0028	383	1559	805	754	132	10	0
61.	Krishnagiri (M) WARD NO.-0029	678	2831	1393	1438	282	232	4
62.	Krishnagiri (M) WARD NO.-0030	460	1875	920	955	157	265	6
63.	Krishnagiri (M) WARD NO.-0031	883	3478	1781	1697	358	211	17
64.	Krishnagiri (M) WARD NO.-0032	740	3335	1578	1757	334	871	0
65.	Krishnagiri (M) WARD NO.-0033	413	1799	910	889	216	32	0
66.	Venkatapuram (CT)	1764	7430	3745	3685	1010	1598	3
67.	Venkatapuram (CT) WARD NO.-0001	1764	7430	3745	3685	1010	1598	3
68.	Kattiganapalli (CT)	5518	22714	11317	11397	2503	2679	46
69.	Kattiganapalli (CT) WARD NO.-0001	5518	22714	11317	11397	2503	2679	46
70.	Venkatapuram	46	205	104	101	27	4	43
Total		**1262130**	**5310924**	**2700379**	**2610545**	**610243**	**721401**	**54386**
5-10 km								
Krishnagiri Taluk- Krishnagiri District								
71.	Kuppachiparai	372	1534	805	729	151	59	2
72.	Gunthapalli	141	536	266	270	56	0	0
73.	Kothigutalapalli	1058	4402	2127	2275	451	1041	0
74.	Mallapadi	1840	7707	3902	3805	806	724	46
75.	Thandagoundarahalli	532	2339	1208	1131	274	495	20
76.	Marigampalli	608	2523	1308	1215	240	219	66
77.	Jagadevipalayam	1607	6747	3398	3349	787	1602	447
78.	Pasinayanapalli	631	2441	1224	1217	272	444	32
79.	Puligunta	2033	8365	4212	4153	894	1312	31
80.	Ikondamkothapalli.	977	3964	1982	1982	420	358	111
81.	Majethgollahalli	395	1592	776	816	169	32	0
82.	Modikuppam	662	2525	1277	1248	236	213	23

Sl. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
83.	Balekuli	1772	7025	3623	3402	693	194	0
84.	Bannihalli	1479	5955	3045	2910	714	300	1
85.	Talihalli	829	3418	1728	1690	365	116	4
86.	Panneswaramadam	663	2686	1352	1334	314	216	0
87.	Paiyur	1507	5842	2994	2848	671	686	65
88.	Jagadab	1314	5621	2935	2686	669	185	0
Total		**18420**	**75222**	**38162**	**37060**	**8182**	**8196**	**848**

(***Source:*** *Census 2011)*

A walk-through survey was conducted by visiting rural place within the 10 km radius. While doing so, many interactions with various people like farmers, women, labours, teachers, health workers, etc. were conducted.

3.11.7 Employment and Livelihood with in study area

Majority of population in the study area comes under other working categories. As agriculture cannot be a main sustenance for most of farmers, they have dual professions. Farming is mostly seasonal, they involve in other livelihood activities like business, non-agriculture labour, agriculture labour and other service sectors. Fragmentation of landholding leads to adopt to have additional occupation.Summaries of employment and livelihood within the study are given in**Table 3-22.**

Table 3-22 Summaries of Employment and Livelihood within the study area

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
0-5 km												
Krishnagiri Taluk- Krishnagiri District												
1)	Chinnathimminayanapalli	2726	2214	512	690	5	1256	421	29	14	239	72
2)	Kallukurikki	2409	2033	376	292	34	395	70	45	5	1301	267
3)	Kundarapalli	1869	1466	403	462	45	462	298	31	3	511	57
4)	Junjupalli	1954	1702	252	837	12	217	167	26	32	622	41
5)	Bayanapalli (Part)	861	600	261	145	67	19	59	11	3	425	132
6)	Kathinayanapalli	2508	2310	198	513	33	951	119	24	7	822	39
7)	Kammaampalli	2841	2083	758	603	96	781	444	13	6	686	212
8)	Palepalle	3597	2400	1197	487	133	776	737	50	74	1087	253
9)	Madepalli	3412	2470	942	457	78	530	438	42	31	1441	395
10)	Balinayanapalli	2013	699	1314	229	295	114	687	17	39	339	293
11)	Orappam	2719	2269	450	414	41	1027	267	25	6	803	136
12)	Boganapalli	3404	2967	437	278	39	460	50	106	14	2123	334
13)	Peddatalapalli	3988	3540	448	475	68	542	206	42	20	2481	154
14)	Gangaleri	1393	1170	223	318	19	354	116	4	0	494	88
15)	Kondepalli	1084	845	239	371	44	144	109	12	4	318	82

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
16)	Bellarapalli	2463	2097	366	624	38	800	230	23	6	650	92
17)	Periamuthu	3753	3031	722	849	89	656	356	76	22	1450	255
18)	Agasipalli	4959	4053	906	568	377	894	206	122	11	2469	312
19)	Soolamalai	965	869	96	175	2	293	0	3	0	398	94
20)	Modikuppam	1212	979	233	191	6	290	167	2	2	496	58
21)	Chowttahalli	5049	3569	1480	1905	130	836	987	43	80	785	283
22)	Sundekuppam	4715	4217	498	2024	386	1409	80	26	3	758	29
23)	Gundalapatti	2377	1540	837	714	201	337	473	19	8	470	155
24)	Sokkadi	2787	2305	482	743	21	1073	362	48	20	441	79
25)	Mittahalli	4035	3061	974	1218	92	891	342	63	23	889	517
26)	Krishnagiri	877779	742001	135778	218600	17438	197369	65959	15237	6681	310795	45700
27)	Krishnagiri	715139	593454	121685	213921	17019	191241	64025	11621	5644	176671	34997
28)	Krishnagiri	162640	148547	14093	4679	419	6128	1934	3616	1037	134124	10703
29)	Krishnagiri	268706	222851	45855	54817	5898	60941	22307	4934	2427	102159	15223
30)	Krishnagiri	221452	180110	41342	53812	5769	60059	21340	3898	1958	62341	12275
31)	Krishnagiri	47254	42741	4513	1005	129	882	967	1036	469	39818	2948
32)	Krishnagiri (M)	24559	23156	1403	187	10	99	42	640	207	22230	1144
33)	Krishnagiri (M) WARD NO.-0001	611	588	23	2	0	4	0	5	2	577	21
34)	Krishnagiri (M) WARD NO.-0002	613	594	19	1	0	2	0	9	0	582	19
35)	Krishnagiri (M) WARD NO.-0003	535	513	22	7	0	0	0	52	0	454	22
36)	Krishnagiri (M) WARD NO.-0004	689	653	36	2	0	2	1	53	4	596	31
37)	Krishnagiri (M) WARD NO.-0005	1043	796	247	9	0	10	15	51	53	726	179
38)	Krishnagiri (M) WARD NO.-0006	726	588	138	7	1	0	2	13	69	568	66
39)	Krishnagiri (M) WARD NO.-0007	532	522	10	17	0	2	0	15	1	488	9
40)	Krishnagiri (M) WARD NO.-0008	662	649	13	1	0	1	2	19	3	628	8
41)	Krishnagiri (M) WARD NO.-0009	482	473	9	2	1	2	0	29	2	440	6
42)	Krishnagiri (M) WARD NO.-0010	1401	1322	79	5	0	1	0	13	1	1303	78
43)	Krishnagiri (M) WARD NO.-0011	617	583	34	11	0	6	1	25	1	541	32

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
44)	Krishnagiri (M) WARD NO.-0012	813	771	42	10	0	6	4	39	11	716	27
45)	Krishnagiri (M) WARD NO.-0013	648	615	33	3	0	2	2	5	0	605	31
46)	Krishnagiri (M) WARD NO.-0014	845	829	16	10	1	9	0	46	4	764	11
47)	Krishnagiri (M) WARD NO.-0015	780	753	27	16	3	15	2	21	1	701	21
48)	Krishnagiri (M) WARD NO.-0016	1008	944	64	1	0	5	1	42	11	896	52
49)	Krishnagiri (M) WARD NO.-0017	561	552	9	0	1	6	1	10	0	536	7
50)	Krishnagiri (M) WARD NO.-0018	438	431	7	1	0	0	0	17	1	413	6
51)	Krishnagiri (M) WARD NO.-0019	729	677	52	7	0	1	1	11	1	658	50
52)	Krishnagiri (M) WARD NO.-0020	759	630	129	2	0	3	0	6	11	619	118
53)	Krishnagiri (M) WARD NO.-0021	800	697	103	4	1	3	1	26	11	664	90
54)	Krishnagiri (M) WARD NO.-0022	1043	1019	24	13	0	1	0	41	6	964	18
55)	Krishnagiri (M) WARD NO.-0023	515	509	6	3	0	0	0	3	0	503	6
56)	Krishnagiri (M) WARD NO.-0024	459	444	15	1	0	4	0	1	3	438	12
57)	Krishnagiri (M) WARD NO.-0025	894	881	13	7	1	3	1	14	1	857	10
58)	Krishnagiri (M) WARD NO.-0026	354	345	9	4	0	3	0	6	1	332	8
59)	Krishnagiri (M) WARD NO.-0027	820	808	12	18	0	1	0	7	0	782	12
60)	Krishnagiri (M) WARD NO.-0028	499	486	13	1	0	0	1	4	0	481	12
61)	Krishnagiri (M) WARD NO.-0029	1034	992	42	2	0	1	1	26	4	963	37
62)	Krishnagiri (M) WARD NO.-0030	642	608	34	1	0	1	5	1	2	605	27
63)	Krishnagiri (M) WARD NO.-0031	1235	1187	48	14	0	1	0	6	0	1166	48
64)	Krishnagiri (M) WARD NO.-0032	1146	1095	51	4	1	2	1	17	3	1072	46
65)	Krishnagiri (M) WARD NO.-0033	626	602	24	1	0	2	0	7	0	592	24
66)	Venkatapuram (CT)	2817	2069	748	88	4	113	27	18	13	1850	704
67)	Venkatapuram (CT) WARD NO.-0001	2817	2069	748	88	4	113	27	18	13	1850	704
68)	Kattiganapalli (CT)	7864	7230	634	173	19	140	117	122	72	6795	426
69)	Kattiganapalli (CT) WARD NO.-0001	7864	7230	634	173	19	140	117	122	72	6795	426
70)	Venkatapuram	113	5	108	2	0	0	104	0	0	3	4
Total		**2432656**	**2049108**	**383548**	**563314**	**49089**	**532831**	**184399**	**42804**	**19233**	**910159**	**130827**
5-10 km												

Sl. No	Name	Total Workers	Main Workers	Marginal Workers	Agriculture Workers				Household Industry Workers		Other Workers	
					Cultivators		Agri. Labourers					
					Main	Marginal	Main	Marginal	Main	Marginal	Main	Marginal
Krishnagiri Taluk- Krishnagiri District												
71)	Kuppachiparai	929	918	11	610	1	249	5	4	0	55	5
72)	Gunthapalli	217	215	2	125	0	50	0	0	0	40	2
73)	Kothigutalapalli	1956	1883	73	196	13	785	35	12	2	890	23
74)	Mallapadi	3208	3015	193	423	40	936	68	52	10	1604	75
75)	Thandagoundarahalli	1203	1173	30	436	4	606	13	11	1	120	12
76)	Marigampalli	1300	1198	102	503	9	407	28	67	6	221	59
77)	Jagadevipalayam	2720	2093	627	253	76	755	359	52	55	1033	137
78)	Pasinayanapalli	1183	614	569	81	65	324	490	3	2	206	12
79)	Puligunta	3664	2859	805	594	22	827	329	36	17	1402	437
80)	Ikondamkothapalli.	1985	1670	315	283	3	879	186	9	4	499	122
81)	Majethgollahalli	732	510	222	133	57	231	117	7	1	139	47
82)	Modikuppam	1212	979	233	191	6	290	167	2	2	496	58
83)	Balekuli	3624	3263	361	2368	134	513	181	1	4	381	42
84)	Talihalli	1690	1487	203	353	70	833	100	14	2	287	31
85)	Panneswaramadam	1373	1043	330	332	33	262	101	9	13	440	183
86)	Paiyur	2942	2339	603	970	50	625	363	12	1	732	189
87)	Jagadab	3033	2654	379	729	17	412	27	49	8	1464	327
Total		**36127**	**30291**	**5836**	**9466**	**707**	**9868**	**3149**	**362**	**138**	**10595**	**1842**

*(**Source:** Census 2011)*

3.11.8 Education & Literacy

The literacy rate is calculated for the population aged above 7 years. In 2011 census,0-6 year‟s population has been treated as illiterates. 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 Krishnagiri district returned 71.5 percent as literate population; males with 78.7 percent and females with 63.9 per cent. The total literacy of Krishnagiri district in 2001 was 62.3 percent;males at 72.3 per cent and females at 51.8 percent. The disparity of literacy level between males and females were high which explains that the women in the district still remain backward. **Table 3-23** Show the details of education infrastructures in Krishnagiri District.

Source:*https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH_2011_3330_PART_A_D_CHB_KRISHNAGIRI.pdf*

(Ref: Directorate of Census Operations-Tamil Nadu, "District Census Handbook-2011, Krishnagiri District", Series-34 Part XII-A)

` Table 3-23 Education Infrastructures in Krishnagiri district

Type of school	Total schools		Rural Schools	
	Government	Private	Government	Private
Primary	1135	145	1101	115
Primary + Upper Primary	306	17	287	11
P + UP+ Secondary + Higher Secondary	10	71	7	56
UP only	4	0	4	0
UP + Secondary + Higher Secondary	95	13	86	10
P + UP + Secondary	15	41	11	30
UP + Secondary	166	4	160	3

Source:*http://udise.in/Downloads/Publications/Documents/District_Report_Cards-2016-17-Vol-II.pdf*)

The following **Table 3-24** shows the literates population and the percentage within the study area

Table 3-24 Literates population and the percentage within the study area

Name	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
0-5 km						
Krishnagiri Taluk- Krishnagiri District						
Chinnathimminayanapalli	3067	1716	1351	1727	674	1053
Kallukurikki	3931	2083	1848	2166	884	1282
Kundarapalli	3133	1698	1435	1569	564	1005
Junjupalli	3170	1743	1427	1656	566	1090
Bayanapalli (Part)	1484	847	637	774	304	470
Kathinayanapalli	3971	2194	1777	2089	781	1308
Kammaampalli	3541	2019	1522	2218	812	1406
Palepalle	5448	2832	2616	2183	866	1317
Madepalli	5399	2906	2493	1942	777	1165
Balinayanapalli	3121	1767	1354	1640	703	937
Orappam	4338	2385	1953	2458	993	1465
Boganapalli	5518	3156	2362	3245	1322	1923
Peddatalapalli	5729	3190	2539	4044	1735	2309
Gangaleri	2011	1106	905	1231	511	720
Kondepalli	1819	1053	766	910	286	624
Bellarapalli	2938	1660	1278	1953	819	1134
Periamuthu	5208	2923	2285	3205	1307	1898
Agasipalli	8199	4578	3621	4716	1970	2746
Soolamalai	1174	704	470	792	323	469
Modikuppam	1625	951	674	900	326	574
Chowttahalli	5420	3128	2292	3572	1500	2072
Sundekuppam	4847	2798	2049	3814	1588	2226
Gundalapatti	3522	1987	1535	2316	909	1407
Sokkadi	2732	1629	1103	2199	935	1264
Mittahalli	5776	3327	2449	3585	1420	2165
Krishnagiri	1187958	667062	520896	691851	293170	398681
Krishnagiri	865259	494718	370541	586187	247726	338461

Krishnagiri	322699	172344	150355	105664	45444	60220
Krishnagiri	385758	214076	171682	211313	86745	124568
Krishnagiri	284468	160931	123537	179764	73715	106049
Krishnagiri	101290	53145	48145	31549	13030	18519
Krishnagiri (M)	54766	28523	26243	16557	6872	9685
Krishnagiri (M) WARD NO.-0001	1444	790	654	543	262	281
Krishnagiri (M) WARD NO.-0002	1328	690	638	429	184	245
Krishnagiri (M) WARD NO.-0003	1231	673	558	520	198	322
Krishnagiri (M) WARD NO.-0004	1492	795	697	442	165	277
Krishnagiri (M) WARD NO.-0005	1754	954	800	948	387	561
Krishnagiri (M) WARD NO.-0006	1325	717	608	728	312	416
Krishnagiri (M) WARD NO.-0007	1270	633	637	502	219	283
Krishnagiri (M) WARD NO.-0008	1261	636	625	632	286	346
Krishnagiri (M) WARD NO.-0009	999	509	490	387	185	202
Krishnagiri (M) WARD NO.-0010	3059	1587	1472	597	262	335
Krishnagiri (M) WARD NO.-0011	1533	832	701	436	161	275
Krishnagiri (M) WARD NO.-0012	1804	951	853	522	212	310
Krishnagiri (M) WARD NO.-0013	1166	625	541	605	236	369
Krishnagiri (M) WARD NO.-0014	1723	897	826	590	200	390
Krishnagiri (M) WARD NO.-0015	1990	1049	941	561	216	345
Krishnagiri (M) WARD NO.-0016	1744	881	863	863	355	508
Krishnagiri (M) WARD NO.-0017	1295	662	633	476	201	275
Krishnagiri (M) WARD NO.-0018	1081	564	517	241	91	150
Krishnagiri (M) WARD NO.-0019	1570	815	755	491	203	288
Krishnagiri (M) WARD NO.-0020	1932	984	948	470	203	267
Krishnagiri (M) WARD NO.-0021	1861	992	869	590	231	359
Krishnagiri (M) WARD NO.-0022	2305	1228	1077	770	317	453
Krishnagiri (M) WARD NO.-0023	1022	524	498	380	155	225
Krishnagiri (M) WARD NO.-0024	1175	623	552	272	119	153
Krishnagiri (M) WARD NO.-0025	2049	1080	969	604	223	381
Krishnagiri (M) WARD NO.-0026	862	452	410	179	70	109
Krishnagiri (M) WARD NO.-0027	2022	1061	961	371	151	220
Krishnagiri (M) WARD NO.-0028	1334	700	634	225	105	120
Krishnagiri (M) WARD NO.-0029	2450	1211	1239	381	182	199
Krishnagiri (M) WARD NO.-0030	1620	815	805	255	105	150
Krishnagiri (M) WARD NO.-0031	2984	1530	1454	494	251	243

Krishnagiri (M) WARD NO.-0032	2822	1376	1446	513	202	311
Krishnagiri (M) WARD NO.-0033	1259	687	572	540	223	317
Venkatapuram (CT)	4938	2698	2240	2492	1047	1445
Venkatapuram (CT) WARD NO.-0001	4938	2698	2240	2492	1047	1445
Kattiganapalli (CT)	17961	9326	8635	4753	1991	2762
Kattiganapalli (CT) WARD NO.-0001	17961	9326	8635	4753	1991	2762
Venkatapuram	104	62	42	101	42	59
Total	**3399987**	**1897812**	**1502175**	**1910937**	**802567**	**1108370**
5-10 km						
Krishnagiri Taluk- Krishnagiri District						
Kuppachiparai	963	580	383	571	225	346
Gunthapalli	316	185	131	220	81	139
Kothigutalapalli	2946	1583	1363	1456	544	912
Mallapadi	5084	2846	2238	2623	1056	1567
Thandagoundarahalli	1257	755	502	1082	453	629
Marigampalli	1637	959	678	886	349	537
Jagadevipalayam	4474	2464	2010	2273	934	1339
Pasinayanapalli	1394	743	651	1047	481	566
Puligunta	5342	2978	2364	3023	1234	1789
Ikondamkothapalli.	2484	1376	1108	1480	606	874
Majethgollahalli	1004	551	453	588	225	363
Modikuppam	1625	951	674	900	326	574
Balekuli	3916	2311	1605	3109	1312	1797
Bannihalli	3392	2000	1392	2563	1045	1518
Talihalli	2203	1293	910	1215	435	780
Panneswaramadam	1593	932	661	1093	420	673
Paiyur	3812	2185	1627	2030	809	1221
Jagadab	3151	1925	1226	2470	1010	1460
Total	**46593**	**26617**	**19976**	**28629**	**11545**	**17084**

*(**Source**: Census 2011)*

3.11.9 Health facility within the study area

The majority of people visit nearby Hospitals/health services provided by the Government. The area has got good public health facilities at easily reachable distances. There were no major health issues reported in our survey. Even for any minor ailments they contact medical facilities immediately as it is very accessible to them. The local transport facilities and the communication facilities are the main reasons to get immediate medical attention. The incidents of institutional delivery are high due to awareness, education, economic development, proximity to health delivery system. The Infant mortality rate and the maternal mortality rate have significantly reduced. The health facilities within the study area are given in **Table 3-25.**

Table 3-25 Health facility within the study area

S.No	Type	Numbers
1	Community health centre	1
2	Primary health centre	5
3	Primary health sub-centre	58
4	Maternity and Child Welfare Centre	7
5	TB hospital/Clinic	6
6	Hospital Allopathic	0
7	Hospital Alternative Medicine	0
8	Dispensary Health Centre	5
9	Veterinary hospital	14
10	Mobile health clinic	0
11	Family Welfare Centre	5
12	Non-Government Medical facilities Out Patient	0

*(**Source:** Census 2011)*

3.11.10 Summary

The Socioeconomic profile of the study area shows that the majority of people in the study area work in non-agricultural sector, however in rural area majority of the people in the rural area depends on agricultural sector. They have good educational infrastructures and the people in the study area are well connected to the educational infrastructures. The people in the study area are well connected to Government primary health centres and Primary health sub-centresshows the socio-economic indicators within the study area given in **Table 3-26**.

Table 3-26 Summaries of Socio-economic indicators within the study area

S.No	Particulars	Study area	Unit
0-5 km			
1	Number of villages in the Study Area	70	Nos.
2	Total Households	1262130	Nos.
3	Total Population	5310924	Nos.
4	Children Population (<6 Years Old)	610243	Nos.
5	SC Population	721401	Nos.
6	ST Population	54386	Nos.
7	Total Working Population	2432656	Nos.
8	Main Workers	2049108	Nos.
9	Marginal Workers	383548	Nos.
10	Cultivators	612403	Nos.
11	Agricultural labours	717230	Nos.
12	Household Industries	62037	Nos.
13	Other Workers	1040986	Nos.
14	Literates	3399987	Nos.
15	IllLiterates	1910937	Nos.
5-10 km			
1	Number of villages in the Study Area	18	Nos.
2	Total Households	18420	Nos.
3	Total Population	75222	Nos.
4	Children Population (<6 Years Old)	8182	Nos.
5	SC Population	8196	Nos.
6	ST Population	848	Nos.
7	Total Working Population	36127	Nos.
8	Main Workers	30291	Nos.
9	Marginal Workers	5836	Nos.
10	Cultivators	10173	Nos.
11	Agricultural labours	13017	Nos.
12	Household Industries	500	Nos.
13	Other Workers	12437	Nos.
14	Literates	46593	Nos.
15	IllLiterates	28629	Nos.

(Source: Census 2011)

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Details of Investigated Environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project

The impacts due to mining operation and its mitigation measures adopted are detailed in this chapter. The opencast mining operations involve development of benches, approach roads, haul roads, blasting, excavation and handling & transportation of materials operations cause environmental problems such as degradation of land, deteriorating air, water, soil, also affecting the biological and socio-economic environment of the study area. So adequate control measures will be implemented to prevent/mitigate the adverse environmental impacts caused due to mining operation. Various environmental impacts, which have been identified due to the mining operation of the proposed project, are discussed in the following sections. The environmental parameters most commonly affected by mining activities are:

- Air quality
- Noise levels and ground vibrations
- Water resources and quality
- Land environment
- Soil quality
- Flora and Fauna
- Socio-Economic conditions
- Occupational Health.

4.2 Impact of Land Environment

- Land degradation due to disposal of large volume of waste materials.
- Creation of infrastructural facilities like office, rest shelter, first-aid centre and other service facilities.
- Site clearance and removal of vegetation.

4.3 Impact of Air Environment

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

operation of diesel driven mining equipment. The sources of air emission are detailed below in**Table 4-1.**

Table 4-1 - Sources of air pollution at quarry

S. No	Source of emission	Pollutant
1.	Excavation of Granite	PM
2.	Operation of diesel driven equipment	Gaseous emission
3.	Transportation of product	PM

4.3.1 Meteorological Data

The site specific meteorological data for three months from January 2024 to March 2024 was obtained from secondary sources and processed in AERMET to plot wind rose diagram (Fig 4.3.1). Other data included for AERMET were daily wind speed, wind direction, temperature, relative humidity, air pressure, precipitation, and solar radiation recorded during the period. AERMET reformats meteorological data so that it can be used as input for AERMOD model.

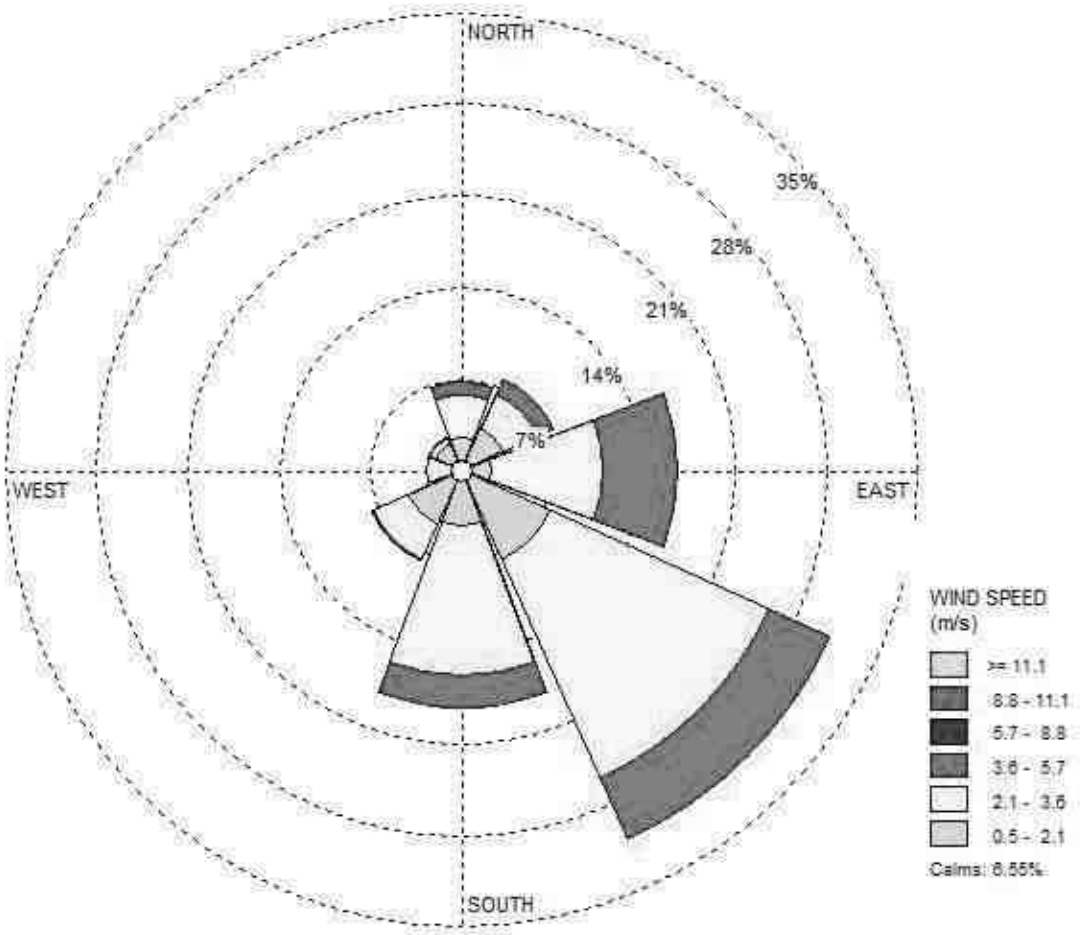


Figure 4-1 Wind rose diagram considered for Dispersion Modeling (January 2024 to March 2024)

AERMET Process

For the 3 phase AERMET processing of the meteorological data, specifications of the land use in the area are required to determine the terrain roughness for modeling. The land use was characterized for 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 modeling.

AERMOD Process

AERMOD Software Version 8.0.5 was used for air dispersion modeling and is applicable to a wide range of buoyant or neutrally buoyant emissions up to a range of 50 km. In addition to more straight forward 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 behavior 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 into the elevated stable layer, and then allows it to re-enter the boundary layer when and if appropriate. For sources in both the CBL and the SBL, AERMOD treats the enhancement of lateral dispersion resulting from plume meander. The emissions mainly generated from the mining activities are Blasting, Drilling, Scrapping, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling are estimated and used as inputs for the air dispersion modelling as shown in **Table 4-2** to **Table 4-6.**

Maximum incremental value for SO_2, NOx and PM are shown in **Figures 4-2** to **4-4** and Top 10 highest Ground Level Concentration (GLC) obtained from modeling are given in **Table 4-7 & 4-9** respectively.

Emission Calculations

Each mining activities is a source of emission and the estimation of emissions depends on parameters such as meteorological, topographic conditions and material characteristics. It is necessary to calculate the amount of emission for work or a source on site to the atmosphere. The following emission formulas are used to calculate the emission rate for the different emission source.

Source:

1. Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals by NPI, Nov 1999
2. Determination of the emission rate from various opencast mining operations, S. K. CHAULYA∗, M. K. CHAKRABORTY, et. Al. *Water, Air, and Soil Pollution 140: 21–55, 2002.*
3. Chaulya, S., 2006. Emission rate formulae for surface iron mining activities. *Environmental Modeling Assessment,* Issue 11, pp. 361-370.
4. *EPA. August, 2004. Section 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing. In: Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, Fifth Edition, AP-42. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.*

Table 4-2 Overview of the Source Parameters

S. NO	Description	Symbol	Quantity
1	Moisture Content (%)	m	1.64
2	Silt Content (%)	s	6
3	Production / Day (Tonn/Day)		13.75
4	Waste Dumping Area (Sq.Km)	a	0.0383
5	Open Pit Area (Sq.Km)	Aa	0.0018

Table 4-3 Emission from Mining Equipments

Source	Fuel used	Stack Details					Emissions (g/s)		
		No of Stack	Height (m) AGL	Dia (m)	Temp (°C)	Exit Velocity (m/s)	PM	SO_2	NO_X
125 KVA DG	Diesel	1	3	0.3	180	10	5.81E-03	5.38E-03	8.16E-02

Table 4-4 Vehicular Sources Emission details

Source	Emission (g/s)	
	PM	NO_X
4 Wheeler (1 no.)	6.94E-05	6.94E-04
Heavy Duty Vehicles (2	1.11E-04	1.94E-02

no.)			
Total	**1.81E-04**	**1.08E-04**	**2.01E-02**

Table 4-5 Emission Considered for Mining Activity

Activities	PM Emission rate
Wet Drilling (g/s)	2.89E-07
Haulage (g/s)	4.41E-05
Waste Dumping (g/s)	2.52E-06
Open Pit (g/s.m^2)	1.04E-08

Table 4-6 Emission input for modeling

Activities	PM	SO_2	NO_x
Line Source (Haul Road) (g/s)	4.41E-05	-	-
Area Source (Open Pit) (g/s.m^2)	1.04E-08	-	-
Area Source (Waste Dumping) (g/s)	2.52E-06	-	-
Point Source (DG) (g/s)	5.81E-03	5.38E-03	8.16E-02
Point Source (Drilling) (g/s)	2.89E-07	-	-
Line Source (Vehicle) (g/s)	1.81E-04	-	2.01E-02

Note:

a. Emission calculation is done for total production.

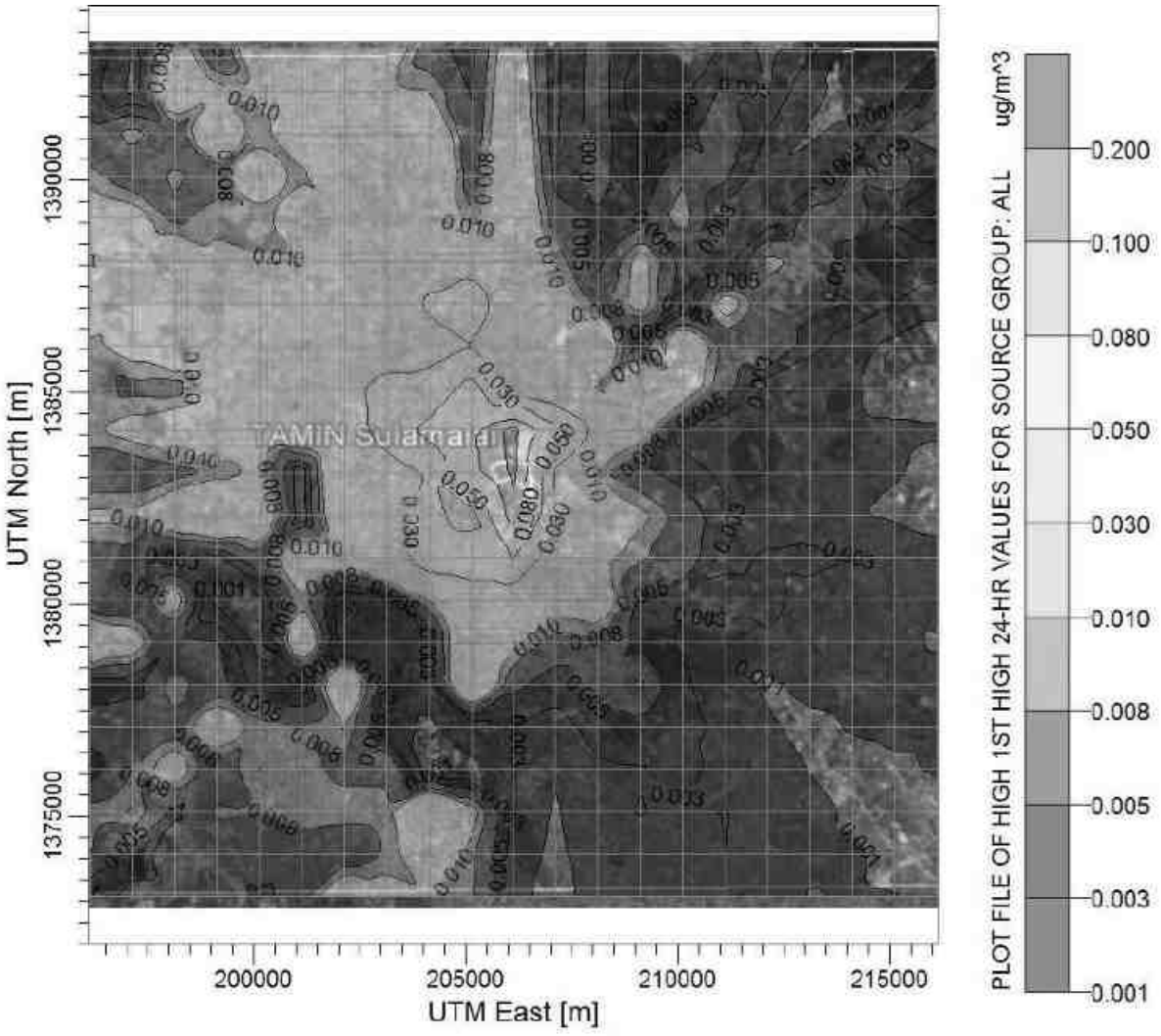


Figure 4-2 Predicted 24 hrs GLC's of PM within 10 km radius of the Study area

Table 4-7 Predicted Top 10 Highest Concentration of PM

S.NO	UTM coordinates (m)		Conc. (µg/m³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	206119	1384099	0.10792	1.00	N
2.	206119	1383099	0.10476	Project Site	Project Site
3.	206119	1382099	0.09448	1.00	S
4.	205119	1384099	0.07794	1.41	NW
5.	205119	1383099	0.07261	1.00	W
6.	205119	1385099	0.05772	2.23	NNW
7.	207119	1384099	0.05672	1.41	NE
8.	204119	1384099	0.05598	2.23	WNW
9.	206119	1381099	0.05079	2.00	S
10.	205119	1387099	0.04429	4.12	NNW

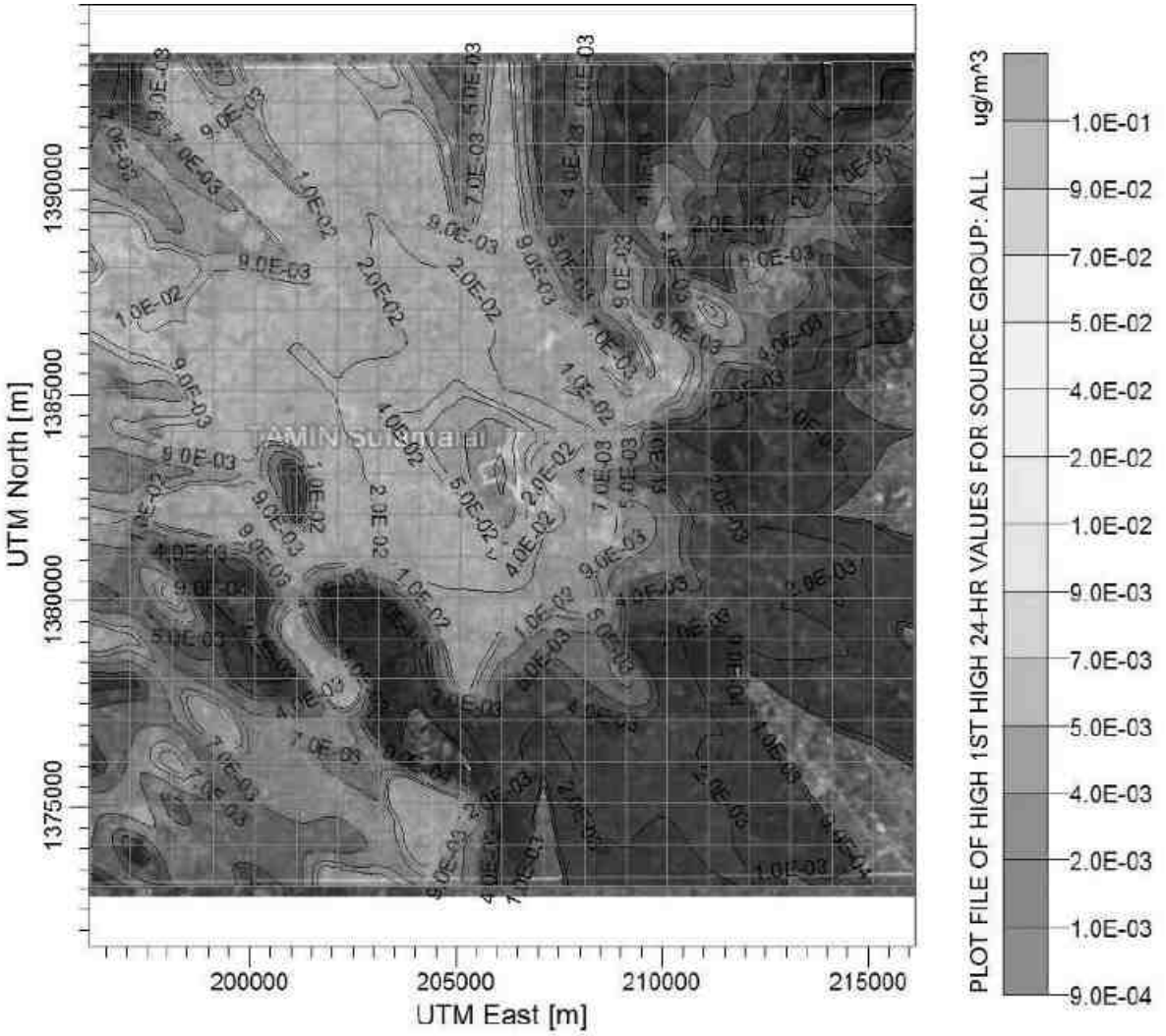


Figure 4-3 Predicted 24-Hrs' GLC's of SO_2 within 10 km Radius of the Study Area

Table 4-8 Predicted Top 10 Highest Concentration of SO_2

S.NO	UTM coordinates (m)		Conc. (µg/m³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	206119	1383099	0.09591	Project Site	Project Site
2.	206119	1382099	0.08694	1.00	S
3.	206119	1384099	0.08553	1.00	N
4.	205119	1384099	0.06754	1.41	NW
5.	205119	1383099	0.0635	1.00	W
6.	207119	1384099	0.04891	1.41	NE
7.	204119	1384099	0.04776	2.23	WNW
8.	205119	1385099	0.04574	2.23	NNW
9.	206119	1381099	0.04371	2.00	S
10.	205119	1387099	0.03791	4.12	NNW

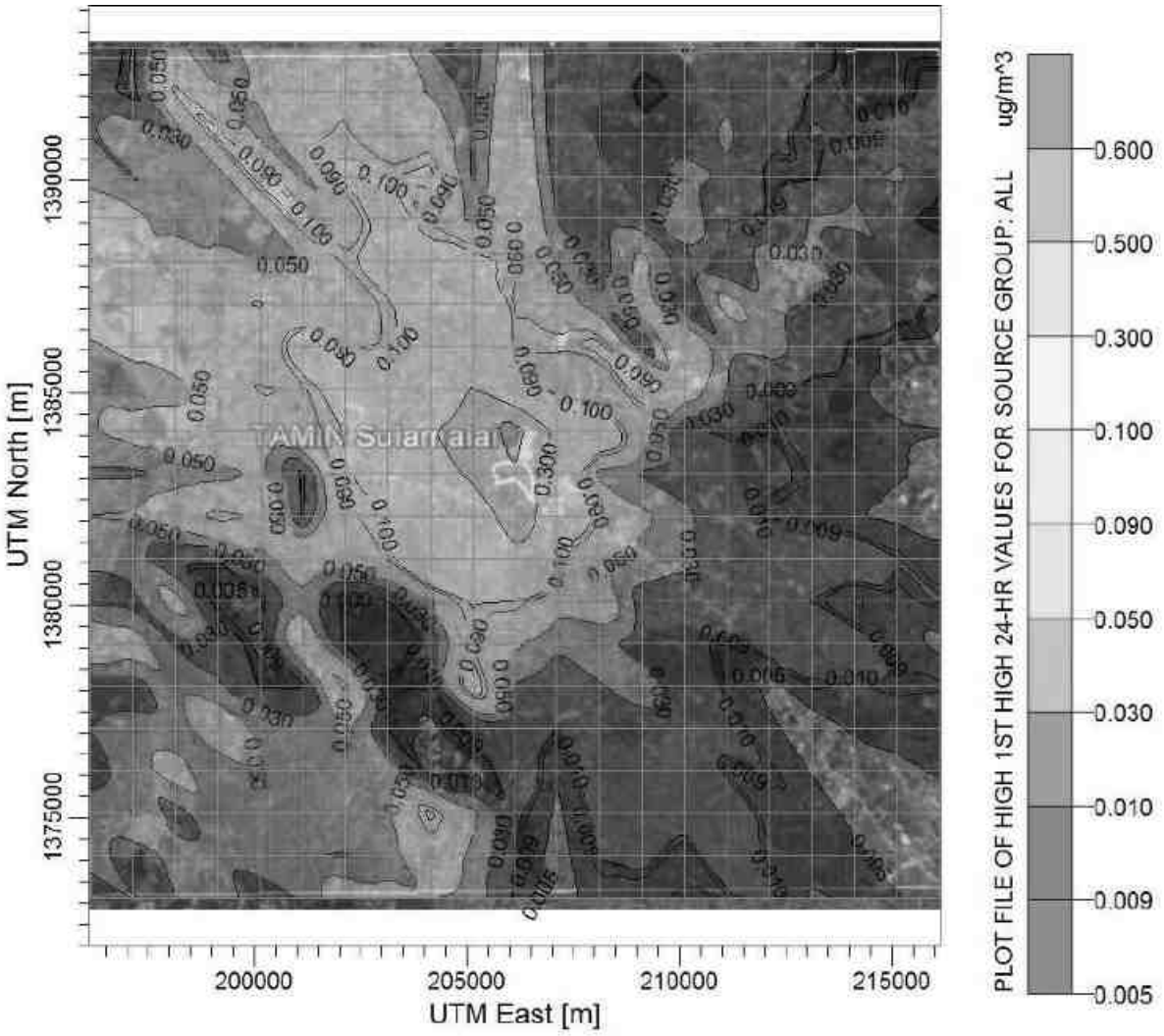


Figure 4-4 Predicted 24-Hrs' GLC's of NO_x within 10 km Radius of the Study Area

Table 4-9 Predicted Top 10 Highest Concentration of NO_x

S.NO	UTM coordinates (m)		Conc. (µg/m³)	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	206119	1384099	0.57123	1.00	N
2.	206119	1383099	0.4954	Project Site	Project Site
3.	206119	1382099	0.4447	1.00	S
4.	205119	1384099	0.38543	1.41	NW
5.	205119	1383099	0.35561	1.00	W
6.	205119	1385099	0.30504	2.23	NNW
7.	207119	1384099	0.28207	1.41	NE
8.	204119	1384099	0.28059	2.23	WNW
9.	206119	1381099	0.25295	2.00	S
10.	205119	1387099	0.22143	4.12	NNW

4.3.2 Conclusion:

The total increase in concentrations above baseline status to estimate the percentage increase is summarized in **Table 4-10.**

Table 4-10 Total Maximum GLCs from the Mining Emissions

Pollutant	Max. Base Line Conc. (µg/m³)	Estimated Incremental Conc. (µg/m³)	Total Conc. (µg/m³)	NAAQ standard
PM	69.60	0.10	69.70	100
SO_2	11.19	0.09	11.28	80
NO_X	23.01	0.57	23.58	80

4.4 Impact due to Carbon Emission

The proposed Quarry has the potential to generate various GHG emissions, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases, water vapour, and ozone. These emissions can arise from different phases of quarrying operations, such as excavation, transportation, energy consumption, and land-use changes. A detailed study has been conducted to analyse and mitigating these emissions for minimizing environmental impact and promoting sustainable quarrying practices.

Operating a granite quarry can have several impacts on increasing carbon emissions and contributing to temperature rise, primarily through direct and indirect mechanisms. The key impacts are identified as:

Table 4-11 Impact Due to Carbon Emission

S.No	Activity	Impacts /Consequences	Mitigation Measures
1	Operation of Heavy Machinery and Equipment – Direct Emissions	The continuous operation of such machinery results in the direct release of CO2 into the atmosphere, contributing to increased	Implementing energy- efficient technologies and practices, such as using low-emission equipment or transitioning to cleaner fuels, can help reduce direct emissions from machinery.
2	Energy-intensive processes, such as drilling, cutting, and	The combustion of fossil fuels releases CO_2 and other GHGs, contributing to indirect emissions associated with quarry	Transitioning to renewable energy sources, such as solar can reduce indirect emissions associated with energy consumption in quarry operations.

3	Land-Use Changes and Deforestation:	Deforestation results in the release of carbon stored in trees and soil into the atmosphere, thereby contributing to increased carbon emissions. Additionally, the loss of vegetative cover reduces the area's capacity to sequester carbon through	Implementing reforestation and afforestation programs in and around the quarry area can help offset carbon emissions and restore ecosystem functions.
4	Soil Disturbance, Excavation and Carbon Loss	Soil disturbance disrupts the natural carbon cycle by accelerating the decomposition of organic matter, releasing carbon dioxide into the atmosphere. Moreover, soil erosion reduces the soil's ability to retain carbon, further exacerbating	Implementing sustainable land management practices, such as minimizing soil disturbance and erosion control measures, can help preserve soil carbon and reduce carbon loss.
5	All Operations-Impacts on Microclimate and Temperature	Quarry operations can alter local microclimates and contribute to temperature rise in the surrounding areas. Removal of vegetation and exposure of bare rock surfaces can increase surface temperatures through the absorption and retention of solar radiation. Additionally, the	Implementing revegetation and reforestation programs within the quarry area can help mitigate temperature rise and restore ecosystem balance.

4.4.1 Mitigation measures to address these impacts may include development of Carbon Sinks.

Carbon sinks are natural or artificial systems that absorb and store carbon dioxide (CO_2) from the atmosphere, helping to mitigate climate change by reducing the concentration of greenhouse gases. There are several options for carbon sinks, each with varying degrees of effectiveness and feasibility. Some common carbon sink options include:

- Implementing vegetation and afforestation programs to restore vegetative cover and sequester carbon.
- Adopting sustainable land management practices to minimize soil disturbance and erosion, thereby preserving soil carbon.
- Incorporating carbon offset projects, such as reforestation initiatives or carbon capture and storage (CCS) technologies, to offset emissions generated by quarry operations.
- Install renewable energy sources such as solar, in lieu of operating DGs, for non-quarrying operations.
- Expand afforestation (planting trees on lands that historically lacked forests) and reforestation (restoring degraded forests) efforts to enhance carbon sequestration and biodiversity conservation.
- Healthy soils have the capacity to store significant amounts of carbon in the form of organic matter. Implementing sustainable land management practices such as no-till agriculture, cover cropping, and agroforestry can enhance soil carbon sequestration and improve soil health, wherever possible.

4.5 Impact on climate change, temperature rise, pollution

The proposed quarry will have various impacts on climate change, temperature rise, pollution, and carbon stocks, both above and below the soil. A detailed study has been conducted the results are given below.

Table 4-12 Climate Change and Temperature Rise

Sl.No	Activity	Impacts /Consequences	Mitigation Measures
1	Operation of Heavy Machinery and Equipment – Direct	Quarrying activities involving machinery, diesel vehicles, and energy consumption emit greenhouse gases (GHGs) such as carbon dioxide (CO_2) and methane (CH_4), contributing to	Adopt energy-efficient technologies and practices to reduce energy consumption and associated GHG emissions in quarry operations. Transition to

	Emissions	climate change. Carbon emissions.	renewable energy sources such as solar power to power quarry operations, minimizing reliance on fossil fuels. The other mitigation measures given in the previous point.
2	Deforestation	Clearing vegetation for quarry operations releases stored carbon into the atmosphere, leading to reduced carbon sequestration capacity and contributing to climate change.	Implement reforestation and afforestation programs to restore vegetation cover and sequester carbon, offsetting emissions from deforestation and land-use changes. Restore degraded areas within and around the quarry site to enhance carbon sequestration and biodiversity conservation.
3	Alteration of land cover and soil composition	Alteration of land cover and soil composition can disrupt local microclimates, affecting temperature, humidity, and precipitation patterns in the surrounding area.	Implement soil conservation measures such as erosion control, reclamation and soil stabilization to preserve soil carbon and maintain ecosystem integrity. Minimize soil disturbance during quarry operations to reduce carbon loss from soils and prevent erosion.

4.5.1 Major Environmental Pollution

Air Pollution: Quarrying activities generate dust, particulate matter, and diesel exhaust emissions, leading to air pollution and respiratory health issues for nearby communities.

Water Pollution: Runoff from the quarry site can carry sediment, chemicals, and heavy metals into nearby water bodies, polluting surface water and harming aquatic ecosystems.

Noise Pollution: Drilling, Cutting and heavy machinery operations produce noise pollution, disrupting wildlife habitats and affecting the well-being of local residents.

Soil Contamination

Soil Erosion: Soil disturbance and erosion associated with quarrying activities can lead to soil degradation, loss of topsoil, and reduced soil fertility, impacting agricultural productivity and ecosystem functioning.

Chemical Spills: Accidental spills or leaks of hazardous materials used in quarry operations can contaminate soil, posing risks to soil health, plant growth, and groundwater quality.

Impacts on Above and Below Soil Carbon Stock:

Above Soil Carbon Stock: Deforestation and soil disturbance reduce aboveground carbon stocks by releasing stored carbon from vegetation into the atmosphere.

Below Soil Carbon Stock: Soil erosion and disturbance associated with quarrying activities lead to the loss of soil organic carbon, compromising soil fertility and ecosystem health.

4.5.2 Mitigation Measures

- Implement reforestation and afforestation programs to restore vegetation cover and sequester carbon, offsetting emissions from deforestation and land-use changes.
- Adopt energy-efficient technologies and renewable energy sources like solar or wind power to reduce emissions from quarry operations and minimize environmental impact.
- Implement soil conservation measures such as erosion control, reclamation, and soil stabilization to preserve soil carbon and maintain ecosystem integrity.
- Install dust suppression systems, sedimentation ponds, and water treatment facilities to mitigate air and water pollution from quarrying activities.
- Implement habitat restoration and conservation measures to protect biodiversity and ecosystem services affected by quarry operations.
- Engage with local communities, stakeholders, and regulatory authorities to address concerns, promote transparency, and ensure sustainable quarrying practices.

By implementing these mitigation measures, it is possible to minimize the environmental impacts of the proposed quarry, reduce carbon emissions, preserve ecosystem health, and promote sustainable development in the region.

4.6 Impacts due to Transportation

The Granite dimensional blocks are transported to consumer directly as per buyer's requirement. The mine is in operation since 1998 and granite is being transported through existing road by trippers and approx. no. of trips required is 2 times per week. This minimum trip does not create impact on existing transportation. The vehicular movement for the proposed project is given in **Table 4-13.**

Table 4-13 Existing & proposed vehicular movement per day

Highway Connecting NH-77 (Krishnagiri-Tindivanam)

S. No	Type of Vehicle	Existing vehicles	Existing PCU	Proposed vehicles	Proposed PCU	Total vehicles after project implementation	PCU Factors IRC (SP 41)	Total PCU after project implementation
1.	2 wheeler	211	158	0	0	211	0.75	158
2.	3 wheelers	2	2	0	0	2	2	4
3.	4 wheelers/ cars	53	53	0	0	53	1	53
4.	truck/Lorry	25	55	8	30	33	3.7	122
5.	agricultural tractor	12	48	0	0	12	5	60
6.	light emission vehicle	19	27	0	0	19	2	38
Total		**322**	**343**	**8**	**30**	**330**	**-**	**435**

Table 4-14 Traffic Volume after Implementation of the Project

For the Road	Volume of Traffic	Volume (V)	Road Capacity (C)	V/C Ratio	LOS Category*	Traffic Classification
Existing	322	343	15000	0.02	"A"	Free Flow Traffic
After implementation	330	435	15000	0.02	"A"	Free Flow Traffic

*LOS (Level of Service) categories are A-Free Flow, B- Reasonably Free Flow, C-Stable Flow, D-Approaching unstable flow, E- Unstable flow, F- Forced or breakdown flow.

Due to proposed project, there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.

4.7 Impact of Water Environment

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

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

- Domestic sewage from the mine.
- Wastewater from Machineries.
- Wastewater from the miming area.
- Depletion of ground water.

4.8 Impact of Noise

4.8.1 Impact of Noise on Working Environment

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

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

4.8.2 Noise due to Drilling, Excavation and Transportation

The noise levels in the working environment will be maintained within the standards prescribed by Occupational Safety and Health Administration (OSHA). These standards were established with the emphasis on reducing the hearing loss. The permissible limits, as laid down by OSHA, are presented in**Table 4-15.**

Table 4-15 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)

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

4.8.3 Noise Due to Blasting

The blasting activity being minimum, the noise generated will be minimal.

4.8.4 Impact of Vibration

Blasting activities being minimum in granite quarry operations. The vibration during the moment of machinery will be minimal for a short span that will be well within the prescribed limits.

4.9 Impact of Biological Environment

- Togarappalli, Varatanapalli, Bargur, Tattakkal, Neralakotta, Nandi Banda, Maharajagadai, Naralapalli RF, Maharajagadai RF, Kothur Reserved Forests are located within the 15km radius of the project. There will not be any adverse impact due to mining operations in this lease since only small production is involved from this lease and there will not be any major polluting source from the mining operations. Besides, all necessary mitigation measures will be implemented.
- There is no perennial water body near the site.
- In the Quarry area or its proximate areas there is no wetland and the natural flow of water not available.
- There is no rare or endangered species
- There are no wild animals in the area. In the post mining stage, proper fencing will be carried in the mined out area to prevent fall of animals in the mine pits.
- No such significantly important medicinal value species within both the ML areas and its nearby region.

Table 4-16 Impacts on Biodiversity

S.No	Activity	Examples of aspects	Examples of biodiversity impact
1.	Extraction	Land clearing	Loss of habitat, introduction of plant diseases, Siltation of water courses
2.	Blasting, Digging and hauling	Dust, noise, vibration, water pollution	Disruption of water courses, impacts on aquatic ecosystems due to changes in hydrology and water quality
3.	Waste dumping	Clearing, water and soil pollution	Loss of habitat, soil and water contamination, sedimentation.
4.	Air emissions	Air pollution	Loss of habitat or species
5.	Waste disposal	Oil and water pollution	Encouragement of pests, disease transfer, contamination of groundwater and soil
6.	Building power lines	Land clearing	Loss or fragmentation of habitat
7.	Provision of Accommodation	Land clearing, soil and water pollution, waste generation	Loss of habitat, sewage disposal and disease impacts
8.	Access roads	Land clearing	Habitat loss or fragmentation, water logging upslope and drainage shadows down slope

9.	Population growth	Land clearing or increased hunting	Loss of habitat or species, stress on local and regional resources, pest introduction, clearing
10.	Water supply (potable or industrial)	Water abstraction or mine dewatering	Loss or changes in habitat or species composition

4.9.1 Flora and Fauna

Due to quarry operation, there will be impacts on flora and fauna.

- Site clearance and Loss of vegetation
- Fall in pits and occurrence of accidents
- Dust generation due to the proposed mining activity.

4.10 Impacts on Occupational Health due to project operations

Anticipated occupational illness sequel to mining activities involved in the project. Occupational health problems due to dust & noise and occupational illness by quarry activities as follows;

- Dust related pneumonia
- Tuberculosis
- Rheumatic arthritis
- Segmental vibration

4.11 Impacts on Social Environment

Since the entire lease area of the project has no habitations or hutments in the core zone area, no rehabilitation or resettlement problems are involved. By adopting various mitigation measures as explained earlier, the environmental scenario in respect of ambient air quality, water quality, Noise levels, water aspects, biological aspects etc. during the operation of the project will be maintained within the statutorily prescribed levels. As such, impact due to the projects will be positive on socio-economic aspects. It will be ensured that the buffer zone of the quarry will be properly preserved environmentally in all respects within sustainable limits through necessary monitoring. The project will be operated with care for minimizing environmental impacts with proper EMP measures for pollution control.

4.12 Mitigation measures

4.12.1 Soil Environment Mitigation Measures

- Good housekeeping and best practices of waste handling shall be adopted to eliminate/minimize the risks of soil contamination.
- The wastes generated will be stored in temporary storage facility and transferred to nearby municipal disposal bins.

- Waste oil generated from quarry machineries and the same is disposed through TNPCB Authorized dealers.

4.12.2 Air Environment Mitigation Measures

- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Usage of wire saw machine to reduce blasting and drilling.
- By using controlled blasting, the impacts of air will be mitigated.
- Delay blasting under unfavourable wind and atmospheric conditions

The production of blast fumes containing noxious gases will be reduced by the following methods:

- Use of adequate booster/primer
- Proper stemming of the blast hole.
- Drills fitted with dust collection system to be deployed or using wet drilling method.
- Development of greenbelt.

Table 4-17 Fugitive Dust Control Measures

S. No	Activities	Best practices
1	Drilling	➢ Drills should be provided with dust extractors (dry or wet system)
2	Blasting	➢ Water spray before blasting ➢ Water spray on blasted material prior to transportation ➢ Use of controlled blasting technique
3	Transportation	➢ Covering of the trucks/dumpers to avoid spillage

4.12.3 Mitigation Measures for transportation activity

Proper mitigation measures are practiced during mining activities to control air pollution load due to transportation activity are as follows:

- Water sprinkling on haul and access roads at regular intervals.
- Provision of greenbelt development along the haul roads and boundaries of the lease area.
- Utmost care will be taken to prevent spillage of granites and country rocks from the trucks.

4.12.4 Water Environment Mitigation Measures

4.12.5 Surface Water Pollution Control Measures

- Construction of garland drains of suitable size around the quarry area to prevent surface run-off rain water entering to the pit.
- During monsoon season, the rain water is being collected by natural slope of area to

water fed tank of the mine and it will be utilized for dust suppression and greenbelt development.

- Construction of check dams/ gully plugs at strategic places to arrest silt wash off from broken up area.
- The mine water will be regularly tested for presence of any undesirable elements and appropriate measures will be taken in case any element is found exceeding the limits prescribed by CPCB.

4.12.6 Ground Water Pollution Control Measures

- The domestic sewage will be disposed to septic tanks.
- Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.

Rain Water Harvesting

- Garland drains will be constructed around the quarry area to prevent surface water run off rain water entering to the pit.
- Construction of check dams/ gully plugs at strategic places to arrest silt wash off from broken up area.
- The storm water or mine water will be used for dust suppression, greenbelt development, etc.
- Construct barriers at suitable intervals along the path of the drains.
- Provide necessary overflow arrangement to maintain the natural drainage system.

4.12.7 Noise Environment Mitigation Measures

The following mitigation measures will be taken to control noise pollution:

- Controlled blasting with proper spacing, burden and stemming will be maintained, to reduce noise emission.
- Wherever the noise levels exceed 85 dB A, workers will be provided with earmuffs, ear plugs etc.
- All vehicles and machinery will be properly lubricated and maintained regularly.
- Speed of the vehicles entering and leaving the quarrying lease will be limited to 25 kmph.
- Unnecessary use of horns by the vehicle drivers shall be avoided.
- Minimum quantity of detonating fuse will be consumed by using alternatively excel non- electrical initiation system.
- The prime movers/diesel engines will be properly maintained.

- Provision of sound insulated chambers for the workers deployed on machines (HEMM).
- Proper designing of plant & machinery by providing inbuilt mechanism like silencers, mufflers and enclosures for noise generating parts and shock absorbing pads at the foundation of vibrating equipment.
- A thick green belt will be provided in phased manner around the periphery of the mine and on both sides of haul roads to attenuate noise.
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators of HEMM and persons working near HEMM and reducing the exposure time of workers to the higher noise levels.

Mitigate Measures for blasting activity

- MSDD Millisecond Delayed Detonator and Muffle Blasting technologies are going to be used for this proposed project to avoid noise pollution and also Rock Breaking Powder ($Ca(OH)_2$) is going to be used for rock splitting to avoid blasting. Hence the adverse impact of blasting will be reduced.
- Safe blasting zones are kept around the periphery of the quarry.

Mitigate Measures for Vibration

- Using controlled blasting techniques.
- Use vibration control techniques.
- Follow the blasting regulations and standards.
- Implement best management practices.
- Communicate and cooperate with stake holders.
- Evaluate and improve your blasting performance.

4.12.8 Biological Environment Mitigation Measures

To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating due to mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

- Renovation of ponds
- Construction of check dams and water holes

The objectives of the green belt cover will cover the following

- Noise absorption
- Reuse of waste water
- 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
  - Timber trees having long gestation period.
  - 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 10 feet and above.

4.12.9 Green Belt Development

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.

An area of 0.10.0 Ha land was alloted for greenbelt development during 5 years of mining plan, proposed to plant 200 No's of trees for 5 year and Rs.2,50,000/- will spend for proposed greenbelt development and maintenance.

Table 4-18 Proposed Green Belt development plan

Year	No of trees proposed to be planted	Area to be covered in m^2	Name of the species to be plant	Survival rate expected in %	No of trees expected to be grown
5 years	200	1000	Neem, Vilvam, Aathi, Panai	80	160

Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action. The plantation will be developed around 7.5m safety zone of the quarry. The soil dumps, are planted to prevent erosion and for stabilization of the soil.

4.12.10 Mitigate Measures for Occupational Health

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.

- Plantation.
- Avoid blasting during unfavorable wind & atmospheric conditions.
- Use of personal protective equipment. Compliance with DGMS circulars.
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.
- All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled.
- On-site first aid facilities will be provided and employees will be extended to the local community in emergencies.

Table 4-19 Mitigation for occupational health and safety

S. No	Activity	Mitigation measures
1.	Excavation	➢ Planned excavation, avoid haphazard mining
2.	Drilling and blasting	➢ In addition, the operators and other workers should be provided with masks, helmets, gloves and earplugs.
3.	Safety zone	➢ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width. ➢ Restricted entry, use of sirens and cordoning of the lasting area are some of the good practices to avoid accidents.
4.	Overburden stabilization	➢ Accidents are known to happen due to overburden collapse. ➢ Therefore, slope stabilization and dump stability are critical issues for safety and environment.
5.	Worker's health surveillance	➢ Health survey program for workers and local community. ➢ Regular training and awareness of employees to be conducted to meet health and safety objectives.

4.12.11 Mitigate Measures for Safety Aspects

- Water sprinkling on haul roads and dumping yards, etc.
- Green belt creation wherever possible to arrest dust and reduce noise propagation.
- All staff and workers will be provided with PPE to guard against excess noise levels.
- Provision of safety Helmets, goggles, safety boots, ear muffs, gas masks, etc.
- To provide appropriate instruction, training, retraining, vocational training, etc.
- Organization of safety contests and safety campaigns regularly to update knowledge of safe operational procedures, etc.
- Observation and compliance of all precautions, control measures and stipulations on above lines will ensure that in this project, health and safety problems will be minimal.

4.13 Irreversible and Irretrievable commitments of environmental components

Irreversible and Irretrievable commitments of environmental components are not envisaged in the proposed project.

4.14 Assessment of Significance of Impacts

This chapter comprises the information regarding the identified beneficially or adversely environmental impacts due to possible aspects predicted because of location of the plant, expected / predicted accidents scenario, conceptualization of project, preconstruction & construction activities and due to operation of machineries/equipment. Environmental aspect-impact relationship will be identified and quantified with its scale of magnitude and scale of importance, accordingly significance of impact will be determined along with mitigation measures.

The impact assessment essentially consists of three steps:

1. Impact Identification
2. Impact Predictions
3. Impact Analysis for determination of significance of impacts

Here, impact assessment has been done based on matrix method in which each action and its potential in creating impact is expressed in terms of its magnitude and importance. For quantitative representation, both magnitude & importance are represented by values as described below:

4.15 Scale of Importance

Importance of an interaction is related to its significance, or an assessment of probable consequences of anticipated impact. It ranges from 1 to 10; with 10 representing a very important interaction and 1 of relatively low.

4.16 Scale of Magnitude

Impact score or magnitude ranges from 0-5 with positive and negative values, depending upon the impact rising out of the project activity.

Table 4-20 Severity Criteria for Magnitude of Impacts

S. No	Category	Description of category	Impact	
			Adverse	Beneficial
1	No impact	-	0	0
2	No appreciable impact	Short term reversible	-1	1
3	Significant impact	Long term reversible	-2	2
4	Major impact	Irreversible but of lesser extent	-3	3
5	High impact	Irreversible but of medium extent	-4	4
6	Permanent impact	Severe irreversible impact	-5	5

Score of each of the component is to be multiplied by "Importance factor" and total score is to be obtained by summation of products. Score ranges of impact evaluation based on matrix score is given below

Table 4-21 Score ranges for Beneficial and Adverse Impacts

S. No	Total score	Outcome
1	+ve / -ve	Beneficial impact / adverse impact
2	0-300	No appreciable Beneficial impact / adverse impact
3	300-600	Appreciable but reversible adverse impact-mitigation measures are needed
4	600-900	Significant adverse impacts: most of the impacts are reversible. Mitigation measures are crucial.
5	900-1200	Major adverse impacts; most of the impacts are reversible. Alternative site selection to be considered.
6	>1200	Permanent irreversible impact; alternatives to the project need to be explored

Table 4-22 Impact Matrix without EMP

S.No	Environmental components likely to be affected	Air quality			Noise & Vibration			Surface water			Ground water			Soil quality			Flora & fauna			Land use pattern			Socio economics			Impact score
		Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	(Sum of M * I)
1	Site clearance and removal of vegetation	-	-	0	-	-	0	-	-	0	-	-	0	-3	5	-15	-1	4	-4	-4	6	-24	-	-	0	-43
2	Drilling and blasting operation	-5	8	-40	-5	8	-40	-	-	0	-	-	0	-4	-6	24	-1	4	-4	-2	7	-14	-	-	0	-74
3	Dust generation due to mining activity	-5	8	-40	-	-	0	-3	5	-15	-	-	0	-	-	0	-2	4	-8	-	-	0	-5	6	-30	-93
4	Loading & Unloading of granite	-4	7	-28	-3	6	-18	-	-	0	-	-	0	-2	4	-8	-1	3	-3	-	-	0	-2	4	-8	-65
5	Fall in pit, Accidents, fall of side walls etc.	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-4	6	-24	-2	4	-8	-3	5	-15	-47
6	Change in Topography and slopes	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-3	6	-18	-	-	0	-18
7	Granite Resource Depletion	-	-	0	-	-	0	-	-	0	-	-	0	-3	8	-24	-	-	0	-2	8	-16	-	-	0	-40
8	Stacking and handling of Mineral Rejects and Overburden	-2	5	-10	-	-	0	-	-	0	-	-	0	-3	6	-18	-	-	0	-2	7	-14	-	-	0	-42

9	Noise generation due to vehicular movement	-	-	0	-3	5	-15	-	-	0	-	-	0	-	-	0	-1	4	-4	-	-	0	-2	4	-8	-27
10	Usage of DG sets	-2	5	-10	-2	5	-10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-20
11	Sewage Generation	-	-	0	-	-	0	-3	6	-18	-2	6	-12	-3	5	-15	-	-	0	-	-	0	-	-	0	-45
12	Consumption of water	-	-	0	-	-	0	-1	5	-5	-2	5	-10	-	-	0	-	-	0	-	-	0	-1	2	-2	-17
13	Employment opportunities	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3	6	18	18
14	Greenbelt development	2	7	14	2	7	14	-	-	0	-	-	0	2	4	8	2	5	10	2	4	8	-	-	0	46
Total impact score		-16	40	-114	-11	31	-69	-7	16	-38	-4	11	-22	-16	26	-48	-8	30	-37	-13	42	-86	-10	27	-45	-459

Interpretation:

Based on assumption of importance and magnitude, the final impact score without EMP is -459 which concludes that the proposed project has, **"Appreciable but reversible adverse impact-mitigation measures are needed".**

Table 4-23 Impact Matrix with EMP

S.No	Environmental components likely to be affected	Air quality			Noise & Vibration			Surface water			Ground water			Soil quality			Flora & fauna			Land use pattern			Socio economics			Impact score	Mitigation Measures
		Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	Magnitude	Importance	(M * I)	(Sum of M * I)	
1	Site clearance and removal of vegetation	-	-	0	-	-	0	-	-	0	-	-	0	-2	5	-10	-1	4	-4	-2	6	-12	-	-	0	-26	Development of green belt and plantation

2	Drilling and blasting operation	-3	8	-24	-3	8	-24	-	-	0	-	-	0	-2	-6	12	-1	4	-4	-2	7	-14	-	-	0	-54	1. Ensure to use PPEs and well-maintained vehicles 2. Regular Water Sprinkling 3. Safe blasting zones are kept around the periphery of the quarry
3	Dust generation due to mining activity	-2	8	-16	-	-	0	-1	5	-5	-	-	0	-	-	0	-1	4	-4	-	-	0	-1	3	-3	-23	Water Sprinkling to control dust emission
4	Loading & Unloading of granite	-3	7	-21	-2	6	-12	-	-	0	-	-	0	-	-	0	-1	3	-3	-	-	0	-2	4	-8	-44	1. Dust filter mask to be provided to all workers 2. Vehicles will be covered by Tarpaulin sheets 3. Speed limits of vehicles will be maintained
5	Fall in pit, Accidents, fall of side walls etc.	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-1	6	-6	-1	4	-4	-1	5	-5	-15	Proper fencing and PPE's will be provided.
6	Change in Topography and slopes	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-2	5	-10	-	-	0	-10	Mine closure plan will be implemented after completion of mining activity.
7	Granite Resource Depletion	-	-	0	-	-	0	-	-	0	-	-	0	-2	8	-16	-	-	0	-2	8	-16	-	-	0	-32	Deletion of granite has positive & negative impacts. Even though it plays a vital role in improvement of country's economic development.
8	Stacking and handling of Mineral Rejects and Overburden	-1	5	-5	-	-	0	-	-	0	-	-	0	-2	6	-12	-	-	0	-2	7	-14	-	-	0	-31	1. Garland drains will be provided to prevent the back flow of OB material into nearby water bodies. 2. Granite rejects will be dumped into southwest side of the quarry
9	Noise generation due to vehicular movement	-	-	0	-1	5	-5	-	-	0	-	-	0	-	-	0	-1	4	-4	-	-	0	-1	4	-4	-13	1. All vehicles and machinery will be properly lubricated and maintained regularly. 2. Speed of the vehicles entering and leaving the quarrying lease will be limited to 25 kmph.

10	Usage of DG sets	-2	5	-10	-1	5	-5	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-15	The DG set are provided with stacks of adequate height so as to disperse the emanating flue gases containing suspended particulate matters, oxides of sulphur and nitrogen without affecting the ground level concentrations.
11	Sewage Generation	-	-	0	-	-	0	-1	6	-6	-1	6	-6	-	-	0	-	-	0	-	-	0	-	-	0	-12	Sewage will be disposed in soak pit Garland drains are provided
12	Consumption of water	-	-	0	-	-	0	-1	5	-5	-1	5	-5	-	-	0	-	-	0	-	-	0	-1	1	-1	-11	Water requirement will be met by private tankers Rain water management will be provided
13	Employment opportunities	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3	6	18	18	Employment will be provided to local workers
14	Greenbelt development	2	7	14	2	7	14	-	-	0	-	-	0	-	-	0	2	5	10	-	-	0	-	-	0	38	1. The plantation will be developed around 7.5m safety zone of the quarry. 2. Plants are chosen to provide aesthetic, ecological and economical value.
Total impact score		-9	40	-62	-5	31	-32	-3	16	-16	-2	11	-11	-8	13	-26	-4	30	-15	-11	37	-70	-3	23	-3	**-235**	

Interpretation:

Based on the assumption of importance and magnitude, the final impact score with the implementation of mitigation measures is -235, which concludes that the proposed project has, "**No appreciable beneficial impact / adverse impact**".

5 ANALYSIS OF ALTERNATIVES

5.1 Introduction

The proposed quarry over an extent of 34.35.5 Ha of Govt poramboke land, located in survey number 283 (part), Sulamalai Village, Bargur Taluk, Krishnagiri District.

5.2 Description of each Alternative

Alternative site is not considered. Since the project is site specific because of the availability of mineral in this location. The geological reserves of grey granite is 4,38,325 m^3.

5.3 Selection of alternative

No alternative site selection was carried out for this project since the project is site specific because of the availability of mineral in this location. The geological reserves of grey granite is 4,38,325 m^3.

5.4 Site Connectivity

The Site connectivity details are given in **Table 5-1**.

Table 5-1 Site Connectivity Details

Nearest State Highway	SH- 131 (Bargur-Tirupathur Road)~6.59km, NE
Nearest National Highway	NH-77 (Krishnagiri-Tindivanam) ~0.43km, S
Nearest Railway Station	Patchur Railway Station ~ 20.80 km, ENE
Nearest Town	Krishnagiri ~7 km, W

5.5 Technology Alternatives

No new technologies have been considered for this quarry. The open cast, semi-mechanized method with bench 5m height and width not less than height has been proposed.

Table 5-2 Alternative Technology Analysed

S.No	Activity involved in mining Operation	Technology	Impact
1.	Cutting	Burner Cutting	Adverse level of Noise
		Wire saw Cutting	No adverse impact to environment
2.	Drilling	Manual Drilling using jack hammer	Dust emission and Noise
		Wet drilling	Negligible dust emission
		Tamrac – Machine Drilling	Negligible dust emission and Noise
		Wagon Drill	Dust emission and Noise
		LD Bore	Dust emission
		PRD Drilling	Negligible dust emission
3.	Blasting	Conventional Blasting	Noise & Vibration

		Muffle Blasting	Minimal Noise impact & vibration
		Rock Breaking Powder or Expansive Mortar for secondary breaking	Negligible impact on noise & vibration

6 ENVIRONMENTAL MONITORING PROGRAMME

6.1 Introduction

Environmental monitoring is an essential tool for sustainable development & ensuring effective implementation of environmental management plan & mitigation measures adopted. The monitoring schedules are planned for systematic study of various pollution levels with respect to air and water qualities, noise levels, etc. to ensure that they conform to the standards laid down by Environmental Protection Act and various Central and State Pollution Control Board Limits. The various methodologies and frequency of studies of all environmental quality parameters also conform to norms lay down by MOEF, CPCB and SPCB in this respect.

The Project proponent will be overseeing/reviewing following activities:

- To observe the implementation of environmental control measures.
- To ensure implementation of planned plantation programme with monitoring of survival rate, etc.
- To keep monitoring records properly for submission of periodical returns to statutory authorities and for checking by them.
- To evaluate periodically the performance of existing pollution control equipment and systems for taking prompt action in this respect to rectify the defects.
- Conducting safety audits and programmes to create safety awareness in workers/staff.
- Monitoring of dumps and benches for slope stability, monitoring of OB dumps, laying of check dams, garland drains around the dumps and excavated areas and their regular maintenance for de-silting.
- To study the effects of project activities on the environment.
- To interact and liaise with State and Central Government Departments.
- To take immediate preventive action in case of some unforeseen environmental pollution attributable to the project.
- Imparting training on safety and conduct safety drills to educate employees.
- To ensure that fire fighting equipment, etc, are kept in ready-to-use condition.

For each of the environmental attributes, the monitoring plan specifies the parameters to be monitored, location of monitoring sites, frequency and duration of monitoring and it also denotes the applicable standards, implementation and supervising responsibilities.

6.2 Technical Aspects of Post Project Environmental Monitoring Program

The Summarized forms of post monitoring details are presented in **Table 6-1.**

Table 6-1 Post Project Environmental Monitoring Program

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analyzed

1.	Meteorology	One	Hourly and Daily basis.	Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall.
2.	Ambient Air Quality	3 Stations (1 within site premises and 2 outside site premises)	Twice a week:24 hourly period	PM_{10}, $PM_{2.5}$, SO_2, and NO_2
3.	Noise	3 Stations (1 within site premises and 2 outside site premises)	Once every season	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4	Exhaust from DG set	Stack of DG set	Quarterly	PM_{10}, $PM_{2.5}$, SO_2 and NO_2
5	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU
6	Soil	3 locations (1 within site premises and 2 outside site premises)	Six months once	Physico chemical properties, Nutrients, Heavy metals
7	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants
8	Surface/ Ground water quality	3 samples within the 10km buffer from the Project Site	Six months once	As per IS 10500:2012 and IS2296:1992 Standard parameters

6.3 Measurement Methodologies

The monitoring schedules are planned for systematic study of various pollution levels with respect to air and water qualities, noise levels, etc. to ensure that they conform to the standards laid down by Environmental Protection Act and various Central and State Pollution Control Board Limits. The various methodologies and frequency of studies of all environmental quality parameters also conform to norms laid down by MOEF, CPCB and SPCB in this respect.

6.4 Emergency procedures on reporting & documentation

All the necessary reports and documents shall be prepared complying with the statutory rules & regulations. Proper and due care shall be taken to adhere to the laid down rules and regulation by the government. Regular and periodic record shall be kept in order to ensure easier, comparable and brisk review and projection of past, present and future performances. Also, the management shall ensure to prepare separate records for water, wastewater, solid waste, air, emission, regularly and periodically in order to provide better and smooth vigilance.

The management shall look into the fact that as soon as the preparation of reports gets over it shall be forwarded to the concerned authority with due care for the purpose of reviewing. Adhering to the rules and regulations the management shall ensure that the outcome of the

reports and the conclusions been drawn shall be prepared as per the laid down regulations and procedures. No breach of any convention shall be availed.

These reports/documents shall be regularly and periodically reviewed and any changes/discrepancies found in mitigation measures/ operation/ management/ technology shall be brought into notice instantaneously and all possible corrective actions shall be taken to match the discrepancies been witnessed.

7 ADDITIONAL STUDIES

7.1 Public Consultation

The project is categorized 'B' category as per EIA Notification 2006; As per MoEF & CC Office Memorandum, dated 3rdJune 2009; EIA Notification, 2006 exempted from undertaking public hearing in existing projects.

TAMIN commenced the mining operation without prior environmental clearance. Hence, the project falls under violation category, Public Hearing is Mandatory for violation projects. The proposal was appraised under violation category during 431st SEAC meeting held on 12.12.2023 and 688th SEIAA meeting held on 10.01.2024 and recommended for violation ToR. ToR issued vide Lr. No. SEIAA-TN/F.No.10547/2023/Violation/ToR-1649/2023 dated 10.01.2024 for the preparation of EIA/EMP report with ecological damage assessment, remediation plan, natural resource augmentation plan and community resource augmentation plan for Public Hearing (PH) to Krishnagiri PCB.

After PH, the minutes will be incorporated in the EIA report along with action plan or commitment by the proponent. Final EIA will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

7.2 Risk Identification & Management

7.2.1 Introduction

Mining and allied activities are associated with several potential hazards both to the employees and the public at large. A worker in a mine should be able to work under conditions that are adequately safe and healthy. At the same time the environmental conditions should be such as not to impair his working efficiency. The various safeguards to be taken to ensure the safety of the mine and that of employees are provided in the Mines Act, 1952.Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas
- Identification of representative failure cases
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion
- Assess the overall damage potential of the identified hazardous events and the
- impact zones from the accidental scenarios
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view
- Furnish specific recommendations on the minimization of the worst accident Possibilities
- Preparation of broad DMP, On-site and Off-site Emergency Plan, which includes Occupational Health and Safety Plan.

The complete mining will be carried out under the management control and direction of a qualified mine manager holding a first class manager's certificate of competency. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation:

- Accident due to explosives
- Accident due to heavy mining equipment; and
- In order to take care of above hazard/disasters, the following control measures will be adopted.
- All safety precautions and provisions of the Mine Act, 1952, the MMR 1961 and the Mines Rules, 1955 will be strictly followed during all mining operations
- Entry of unauthorized persons will be prohibited
- Fire fighting and first-aid provisions in the mines office complex and mining area;
- Provisions of all the safety appliances such as safety boot, helmets, goggles etc. will be made available to the employees and regular check for their use

- Training and refresher courses for all the employees working in hazardous premises; Under mines rules all employees of mines will have to undergo the training at a regular interval
- Working of mine, as per approved plans and regularly updating the mine plans;
- Cleaning of mine faces will be regularly done
- Handling of explosives, charging and blasting will be carried out by competent persons only.
- Provision of magazine at a safe place with fencing and necessary security arrangement
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- Suppression of dust on the haulage roads
- Adequate safety equipment will be provided at explosive magazine
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.
- For any type of above disaster, a rescue team will be formed by training the mining staff with specialized training.

7.2.2 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
- Overburden handling
- Heavy Machinery

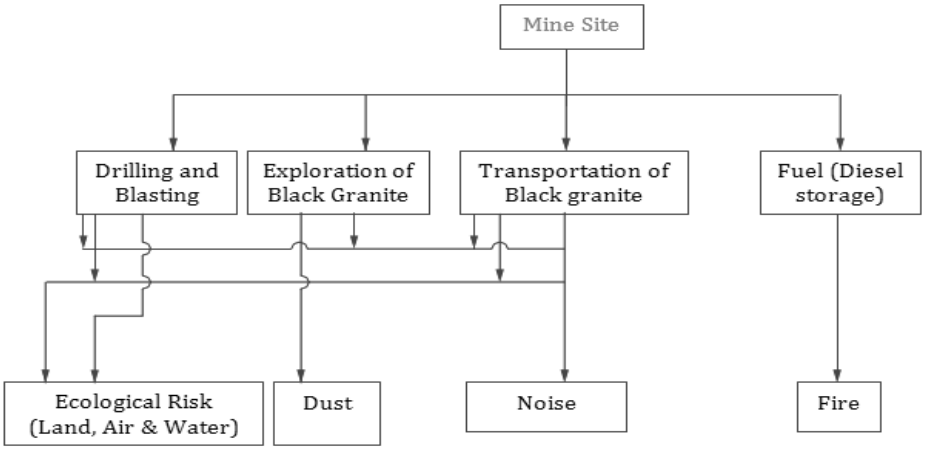


Figure 7-1 Identification of Hazards in Opencast Mine

Drilling

Drilling is an important activity in mining. This activity releases particulate matter into the air and noise in the vicinity of the operation. The particulate matter/dust can be arrested by employing dust extractor, wet or dry type. The usage of standard drill bits also reduces the dust formation. The noise is also arrested by the usage of dust extractors. The compressors which feed the compressor air to the drilling jack hammers can be covered in acoustic enclosures which reduce the dust and noise.

The hard strata will be excavated after drilling and blasting. Drilling will be done with jack hammers up to 1.2 to 1.5 m depth having a diameter of 30-32 mm.

Blasting

Most of the accidents from blasting occur due to the projectiles, as they may sometimes go even beyond the danger zone, mainly due to overcharging of the shot-holes as a result of certain special features of the local ground. Flying rocks are encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations.

- The damaging impacts on environment are evident noise, gas, flyrock and ground vibration.
- The last factor is most important for safety of constructions, buildings and various natural objects in the vicinity of mining area.
- The ground vibration parameters, crucial for safety of endangered objects have a significant correlation with charge weight and distance of blasting.
- This study tried to associate the main vibration parameter, particle velocity with blasting parameters and properties of vibration medium.

Precautionary Measures to Avoid Accidents Due to Blasting

- The provisions laid down in the MMR 1961 related to Blasting shall strictly be followed. However some of the main provisions are written here
- The blasting will be done under supervision of blaster/mine mate/mine foreman/mine manager
- Shots shall not be fired except during the hours of daylight.
- The holes charged onany particular day shall be fired on the same day.
- Adequate blasting shelters or other protection shall be provided at mines.
- The shot-firer shall give sufficient warning by effective signals over the entire area falling within a radius of danger zone.
- Multi-shot exploder shall be used. A shot-firer will fire maximum 120 Shots.

- During the approach and progress of electrical storm, adequate precautions shall be taken.

Overburden Handling

No overburden will be generated in the proposed project and side burden dump may cause landslides. High side burden dump created at the quarry edge may cause sliding of the side burden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property.

Heavy Machinery

Most of the accidents during transport of dumpers, trucks, proclaim, ripper dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

Precautionary Measures to Prevent Accidents due to Trucks and Dumpers

- All transportation within the main working shall be carried out directly under the supervision and control of the management.
- The vehicles must be maintained in good conditions and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management.
- Road signs shall be provided at each and every turning point especially for theguidance of the drivers.
- To avoid danger while reversing of vehicles especially at the embankment and tipping points, all areas for reversing of lorries should as far as possible be made man free.A statutory provision of the fences, constant education, training etc. will go a longway in reducing the incidents of such accidents.
- Generally, oversize rocks shall be dealt with in the pit by secondary blasting.
- A Load consisting of large rocks must not be over the edge.This is unsafe andmay damage equipment.
- The movement of the dumpers will be governed under the Code of Traffic rule, this is already formulated & implemented.

Storage of Explosives

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.

Safety Measures at the Mine site

- Adequate care has been taken in deciding the size of the bench for the working pit.
- The benches are properly sloped at an angle of 70 degree to avoid any spillage of benches.
- Adequate drainage system at the top of the pit and also on the benches shall be made to prevent erosion of the benches.

- The quarries will be protected by garland drains around the periphery for stormwater drainage.

7.3 Disaster Management Plan

The disaster management plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the disaster management plan, it should be widely circulated and personnel training through rehearsals/drills. The objective of the disaster management plan is to make use of the combined resources of the mining operation and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties
- Safeguard other people
- Minimize damage to property and the environment
- Initially contain and ultimately bring the incident under control
- Identify any dead
- Provide for the needs of relatives
- Provide authoritative information to the news media
- Secure the safe rehabilitation of affected area
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency
- In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

7.3.1 Emergency Organization (EO)

It is recommended to setup 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 fire fighting, rescue, rehabilitation, transport and provide essential and support services.

7.3.2 Emergency Communication (EC)

Whoever notices an emergency situation such as fire, growth of fire etc. would inform his immediate superior and Emergency Control Centre (ECC). The person on duty in the emergency control centre would appraise the site controller. Site Controller verifies the situation from the incident controller of that area or the Shift In-charge and takes a decision about an impending

on site emergency. This would be communicated to the entire incident controllers, emergency coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the site controller.

Emergency Coordinator - Medical, Mutual Aid, Rehabilitation, Transport and Communication

- Organizes medical treatment to the injured and if necessary will shift the injured to nearby hospitalsMobilizes extra medical help from outside, if necessary
- Keeps a list of qualified first aiders of the factory and seek their assistance
- Maintains first aid and medical emergency requirements
- Makes sure that all safety equipment are made available to the emergency team.
- Assists Site Controller with necessary data and to coordinate the emergency activities
- Assists Site Controller in updating emergency plan, organizing mock drills
- verification of inventory of emergency facilities and furnishing report to SiteController maintains liaison with Civil Administration
- Ensure availability of canteen facilities and maintenance of rehabilitation centre
- Liaison with Site Controller/Incident ControllerEnsure transportation facility
- Ensures availability of necessary cash for rescue/rehabilitation and emergency expenditure. Controls rehabilitation of affected areas on discontinuation of emergencymakes available diesel/petrol for transport vehicles engaged in emergency operation.
- He would assist Site Controller and Incident Controller
- Maintains essential services like Diesel Generator, Water, Fire Water, power supply for lighting. Gives necessary instructions regarding emergency electrical supply, isolation ofcertain sections etc. to shift in-charge and electricians
- Ensures availability of adequate quantities of protective equipment and other emergency materials, spares etc.

In order to handle disaster/emergency situations, an organization chart entrusting responsibility to various project personnel exists with their specific roles during emergency.
The possible composition of the management team shall be:

- Mines foreman
- Mine mate
- Senior most operator(communication)
- Operator(Medical Coordination)

7.3.3 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. Adequate number of external and internal telephone connections shall be installed.

1. Fire Protection System
2. Off Site Emergency Plan

Fire Protection System

The fire protection system for the project maintained will consist of Portable hand appliances of suitable types/capacities for extinguishing small fires in selected mine areas, storages areas such as that of Diesel, Explosives, etc.

Off-Site Emergency Plan

The offsite emergency plan defining the various steps to tackle any offsite emergencies, which may affect surrounding areas of the project, has to be prepared after due finalizing discussion in this respect with local Panchayat official, Revenue officials and District Collector. As per this off site plan, in case of any off site emergencies, actions have to be promptly initiated to deal with the situation in consultation with Collector and other revenue officials.

7.3.4 Water Quality Management

Average ground water table in the region indicates availability at a depth 9.5m from ground level. Most of the analytical results for ground and surface water showed parameter concentrations well within the permissible limits.Garland drains will be provided all along the periphery of the mining pit and along the toes of the side burden dumps. These drains will be aligned in such a way that all the surface drainage water will be carried away from the mining zone to settling tanks.The mining pit's catchment water will be coursed to the main sump and used for dust suppression and green belt development & plantation activities.

7.3.5 Mines Seepage Water

The experience of mining during past three years suggests a very little, almost negligible seepage of water in the mining pit. It will be collected in a well guarded pond / sump for settling of solids. The treated water is and will be used for dust suppression on working faces, haul roads and dump surfaces.

7.3.6 Air Quality Management

Ambient air quality was monitored twice in a week for One (01) season (shall cover 12 weeks), i.e. during Pre-Monsoon season (January 2024-March 2024). PM_{10}, $PM_{2.5}$, SO_2, NO_x, Pb,

NH_3, C_6H_6, $C_{20}H_{12}$, As, Ni, were monitored. Sampling was carried out as per Central Pollution Control Board (CPCB) monitoring guidelines at each location.

The following precautions have been considered or abatement of air pollution in the grey granite mine area:

- Water sprinkling shall be carried out at the active working faces, on all haul-roadsand the dump surfaces.
- Regular cleaning and removal of spillage grey granite from haul roads and weighbridge areas.
- Proper and regular maintenance of mining equipments.
- Development of comprehensive green belt around overburden dumps to reduce fugitive dust emissions in order to create clean and healthy environment.

7.3.7 Solid waste Management

As is stated earlier, mining is being carried out by opencast semi-mechanized method using conventional mining equipments i.e. hydraulic excavators / shovels and dumpers combination with ancillary mining equipment like compressor, wire cutting machine, generator etc.

The mine waste in the mine includes the over lain unrecoverable boulders / rock fragments and rubbles generated as granite rejects during the production works and the waste fragments generated during development works will be utilized for forming approach road and dumping yard purposes.Adequate space has been identified within the lease applied area for dumping such waste material on barren land covered with soil. The 7.5 m safety distance as well as the defective portion of the deposit may also be used for waste dumping purpose.

7.3.8 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.

7.3.9 Top Soil 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 area. The topsoil 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 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.

7.3.10 Disposal of Mining Machinery

Mining operations are planned to be operated using Company owned machinery. The company has its own Excavators, Mining Tippers, compressors; wire saw machine, jack hammers, and other mining equipment. These machines are complaint to the RTO conditions and CPCB conditions. Further, the company also operates a central workshop at Salem, to cater to major repairs/Rectifications of company Equipment.

These machineries are written off and disposed on completion of their normal life as per the set guidelines of the Government and TAMIN Board. The surplus machinery in working order, will be transferred to Company's other projects.

7.3.11 Other Infrastructure

Mine office, store room, first-aid room etc, will be provided on semi-permanent structures within the lease applied area.

7.3.12 Safety & Security

The water ponds developed in the reclaimed areas shall be properly fenced for safety. The water from these ponds is likely to be potable and shall used for human & cattle consumption and for agriculture purposes.

8 PROJECT BENEFITS

8.1 Technology in the Physical Infrastructure

Carrying out various developmental works in the nearby region based on the need of the locals.

8.2 Technology in the Social Infrastructure

- Improvement in Per Capita Income.
- The socio - economic conditions of the village will be enhanced due to the proposed project, hence the project should be allowed after considering all the parameters.
- It can thus be concluded that the project is environmentally compatible, financially viable and would be in the interest of construction industry thereby indirectly benefiting the masses.

8.3 Employment potential - Skilled, Semi-Skilled and Unskilled

- The quarry activity will provide job opportunities, which will help them to develop economically
- The quarrying activities provide employment to the 30 No's of local people.
- The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers.

S.No	Description	No of persons
A	**Technical/Mining Personnel**	
1	Geologist/Agent (M.sc Qualified)	1
2	Mine Manager (Holder of Manager Certificate of Competency under MMR, 1961	1
3	Mining Mate cum Blaster	1
4	Machinery operator	6
5	Diesel Mechanic	1
B	**Workers**	
1	Skilled	1
2	Semi- Skilled	9
3	Un-skilled	10
	Total	**30**

8.4 Other tangible benefits

Economic development of the nearby villages can be envisaged.

9 ENVIRONMENTAL COST & BENEFIT ANALYSIS

(Not recommended during scoping)

10 ENVIRONMENTAL MANAGEMENT PLAN

10.1 Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA Management Plan

The Environmental Management Plan for proposed quarry identifies the principles, procedures and methods that will be used to control and minimize the environmental impacts for the proposed project.

10.2 Environment 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 stretch beyond statutory obligations and we are committed to manage and continually improve the 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 as objective of no injuries and accidents at the work place and provide a safe work place for our employees, contractors and other 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 increase in employees' safety outside work hours.
- We protect the environment by control and prevention of pollution and promote green environment.
- We continuously evaluate and improve our conduct and carryout regular audit, 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.

- M/s. Tamil Nadu Minerals Ltd shall use its resources in order to live up to this policy and thereby promote our business.

Besides, the company 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, Metalliferrous 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 violation in this respect will be dealt with inflict of warnings first, followed subsequently by punitive punishments including fines and ultimately dismissal, if repeated continuously.
- Any infringement / violation 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 upwardly hierarchical communicative channels from the lowest level to superior levels in quick time bound duration.
- The Agent and the Mines Manager should exercise overall control over entire mining and connected operations and all infringements / violations on any count pertaining to unsafe operations, environmental degradation, etc., should be brought to the notice of the Board of Directors. Remedial measures for such violations and deviations should be taken by the Mines Manager to avoid any hazards or disasters in the mine and nearby areas. The persons responsible for such violations will be punished through appropriate disciplinarily penal actions.
- 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 violations 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 Figure 10-1.

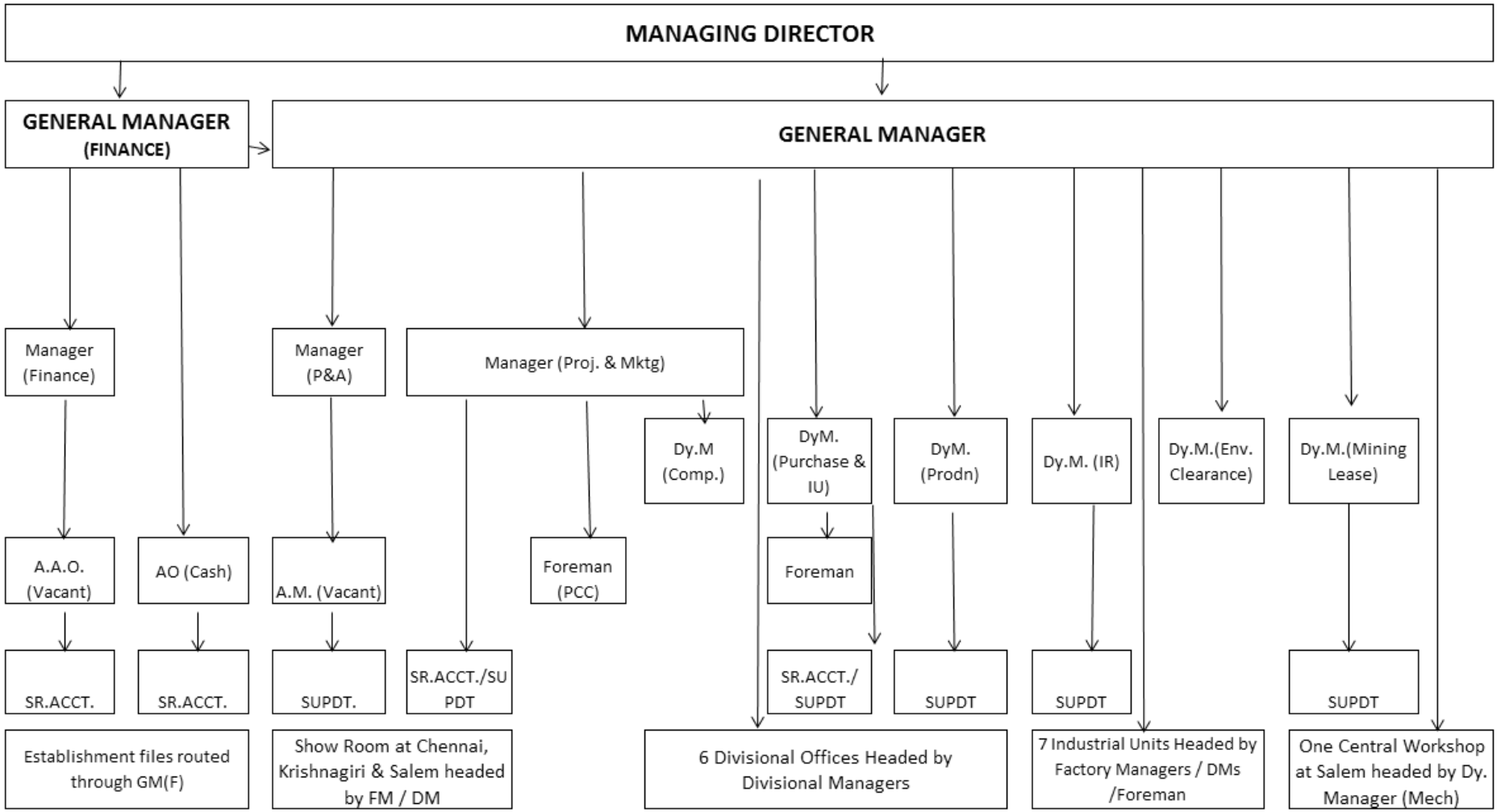


Figure 10-1 Hierarchical System of the TAMIN

10.3 Environmental Management Plan & its Control Measures

10.3.1 Air Quality Management

Quarrying operations are semi mechanized, but there is involvement of labours too. Dust would be generated during the course of over burden removing, drilling, mining, hauling, handling and transportation of the material. Dust is likely to be generated from emissions of diesel vehicles such as PM, SO_2, NO_x etc.

10.3.2 Measures for dust suppression

Water will be sprinkled for suppression of air borne dust on mine haulage roads and waste dumps on regular intervals by water tankers. Drilling of blast holes of 32mm - 36 mm dia will be always under wet condition to prevent flying of dust. In the unloading point of Tippers, water will be sprinkled and further the drillers are provided with respirators in accordance with mines regulations.

10.3.3 Emissions from Material Handling

PM emissions occur during the handling and transfer operations of material from one process to another within the facility. The environmental control measures, which are being taken and proposed to control the fugitive dust released during the quarry production are given below:

- The working faces will be regularly wetted before carrying out the drilling and excavation.
- Dust masks will be provided to the workers especially for the drillers and for the workers working in the loading operations.
- Periodic health checkup for the workers shall be done
- Plantation along approach roads and surrounding the Quarry Lease area.
- Water tankers with spraying arrangement will be used for regular water sprinkling on the haul roads to ensure effective dust suppression.

Haulage

- Haul road will be maintained regularly.
- Speed limits will be prescribed for transport vehicles.
- Water will be sprayed daily on the roads by using water tankers.
- Periodic maintenance of the trucks used for transport shall be done to reduce smoke emissions.
- Over loading of trucks is avoided.

10.3.4 Noise Pollution Control

In an operational mine major noise sources are operation of mine machineries, equipment & plying vehicles. Noise generation may be for an instant, intermittent or continuous period, with low to high decibels. General noise levels generated at mines are documented as below

Equipment	Noise Level (dB (A))
Rotary Drills	72-100
Compressor (85 m^3/min)	50-55
Excavator	75-90
Diesel Tipper	74-109
Diesel Generator	80-94

The management plan for controlling noise pollution is as given below.

- Reducing the drilling operations as far as possible.
- Provision of earmuffs to workers working in high noise prone areas.
- Proper gradient of haul roads to reduce cumulative noise levels.
- Development of green belt all along the boundary of the mining lease area which will act as effective noise barrier.
- Restriction of blast hole drilling to only day time hours and usage of sharp drilling bits and delivery of compressed air at optimal pressure during drilling.
- Noise emanating machine such as compressors, diesel generator are enclosed in acoustic enclosure so as to reduce the noise level.

10.3.5 Water Pollution Control Measures

10.3.6 Surface Water

There are no major streams and rivers, which can get affected by the mining. Hence there will be no major effect on the surface water environment. Surface water ditches or channels will be made to divert all surface drainage for agricultural purposes.

10.3.7 Mine Drainage Water

The ground water may not rise immediately in this type of mining. The rain water percolation and collection of water from the seepage shall be less than 300 lpm and it shall be pumped about periodically by a stand by diesel powered centrifugal pumps motivated with 5H.P Motor.

- Mine water will be used in wet drilling process, dust suppression & green belt development
- The runoff from the dumps will be channelized and care will be taken.

10.3.8 Land Environment

Landuse will be slightly changed due to open cast quarry. There will be no land subsidence as area is made up of hard rock. Aesthetic environment will not be affected, as the quarry is located 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.

- Top soil shall be used in afforestation work, as early as possible.
- A retaining wall and garland drain will be constructed all around to prevent the wash off.

10.3.9 Top soil management

Top soil will be removed in advance and stacked separately. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks. Top soil shall be used in afforestation work, as early as possible. A retaining wall and garland drain will be constructed all around to prevent the wash off.

10.3.10 Solid Waste Management

The solid waste that is likely to be generated during the quarry activity will be stacked along the lease barrier according to their quality and size. The sub Grade material and waste generated will be stored within the lease boundary over areas. All the care will be taken to minimize the waste generation at the source.

- Top Soil recovered will be used in the green belt areas around the lease area.
- Top soil Stored on the inner boundary of the mining lease area. To improve its quality, soil stabilizers shall be mixed and leguminous plantation will be done over these stacks.
- The solid waste that is likely to be generated during the quarry activity will be stacked along the lease barrier according to the mining plan.

10.3.11 Stabilization of Dumps

The dumps are mainly constituted of quarry waste. It will be afforested properly to stabilize the dumps and preserve soil character. Garland canal also will be dug around the 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.

10.3.12 Biological Environment

As in any typical Ligneous rocks deposit, there is no tree growth on the area, but grass shrub and bushes grow sparsely. No wildlife is found in quarry Lease area. In order to minimize the impacts and to improve up on the existing eco system afforestation plan will be envisaged.

10.3.13 Afforestation Plan

The main aim of the plantation of the mined out areas is to stabilize the area to protect it from rain, wind erosion, improve the aesthetics and support the re-creation of bio-diversity.

- Afforestation will be taken up along the lease area.
- In the Mining Plan 200 plants for five year is proposed to be planted for complying Afforestation program with the arrived survival rate of 80% in the lease area in the phased manner.
- Only Shrubs and bushes are seen in the quarry Lease area.

10.3.14 Occupational Health & Safety Measures

Grey granite does not contain any toxic elements. Further this being a semi-mechanized mine, production is by semi-mechanized means and waste material handling partly by mechanized way, there shall be marginal impact on air and noise qualities. Therefore, the possibilities of any health hazards are minimal.

- Awareness and planning are keys to prevention of occupational health hazards.
- Conducting air monitoring to measure worker exposures and to ensure that provided controls are adequate for protection of workers.
- Adequate respiratory protection will be provided to the workers.
- Periodic medical examinations for all workers.
- Provide workers with training that includes information about health effects, work practices, and use of protective equipment's.

10.3.15 Socio-Economic Benefits

Granite Quarry project is not going to have any negative impact on the social or cultural life of the villagers in the near vicinity. The quarry activity will provide job opportunities, which will help them to develop economically.

Granite quarry will be done with the vision of leaving a positive impact on socio-economics of people living in the nearby villages. A first-aid centre to meet the basic medical needs of employees will be provided.

10.3.16 Employment potential

Around 30 people directly and 20 people indirectly employed including material suppliers, outside workshops, unit supported industries. Local villagers residing in the nearby villages shall be employed as semi-skilled workers.

10.3.17 Care and Maintenance during Temporary Discontinuance

All the provisions as per the Mines Act 1952 and Rule17 of GC & DR 1999 shall be strictly adhered during temporary discontinuation.

10.3.18 Safety and Security

At the end of quarry operations, the total area excavated will be fenced properly with single opening for workers engaged in closure plan work.

10.4 Budget for Environmental Protection

It is necessary to include the environmental cost as a part of the budgetary cost component. Total of Rs 22,77,035/- allocated for environmental protection activities. Environmental Management cost is given in **Table 10-1.**

Table 10-1 Environmental Monitoring Cost

Parameters	Mitigation Measure	Capital cost (INR)	Recurring Cost
Air Environment	Compaction, gradation and drainage on both sides for Haulage Road	3,43,550	3,43,550
	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	8,00,000	50,000
	Air Quality will be regularly monitored as per norms within ML area & Ambient Area	40,000	40,000
	Muffle blasting – To control fly rocks during blasting	-	10,000
	Wet drilling procedure / latest eco-friendly drill machine with separate dust extractor unit	25,000	2,500
	No overloading of trucks/tippers/tractors	-	5,000
	Stone carrying trucks will be covered by tarpaulin	-	10,000
	Enforcing speed limits of 20 km/hr within ML area	0	1,000
	Regular monitoring of exhaust fumes as per RTO norms	0	5,000
	Regular sweeping and maintenance of approach roads for at least about 200 m	-	6,80,000

	from ML Area		
	Installing wheel wash system near gate of quarry	50,000	20,000
Noise Environment	Source of noise will be during operation of transportation vehicles, HEMM for this proper maintenance will be done at regular intervals.	0	6,80,000
	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	0	10,000
	Adequate silencers will be provided in all the diesel engines of vehicles.	10,000	0
	It will be ensured that all transportation vehicles carry a fitness certificate.	0	0
	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	0	10,000
	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	0	50,000
	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	0	50,000
	Provision for Portable blaster shed	50,000	5,000
	NONEL Blasting will be practiced to control Ground vibration and fly rocks	0	30
Water Environment	Water management	3,43,550	25,000
Waste Management	Waste management (Spent Oil, Grease etc.,)	50,000	5,000
	Bio toilets will be made available outside mine lease on the land of owner itself	60,000	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	3,000	1,000
	Workers will be provided with Personal Protective Equipment's	1,20,000	30,000
	Health check up for workers will be provisioned	0	30,000
	First aid facility will be provided	68,710	0
	Mine will have safety precaution signages, boards.	5,000	1,000

	Barbed Wire Fencing to quarry area will be provisioned.	0	10,000
	Construction of Green mesh along with wire fencing around the lease area	17,17,750	20,000
	No parking will be provided on the transport routes. Separate provision on the bottom of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	50,000	50,000
	Installation of CCTV cameras in the mines and mine entrance	30,000	5,000
	Implementation as per Mining Plan and ensure safe quarry working	0	7,80,000
Green Belt Development	Green belt development - 500 trees per one hectare	60,000	6,000
		45,000	6,000
Total		**38,71,560**	**29,41,080**

Table 10-2 Consolidated Cost of Environmental Management Plan

S.No	Description	Capital Cost	Recurring Cost
1.	Air Environment	12,58,550	11,67,050
2.	Noise Environment	60,000	8,05,030
3.	Water Environment	3,43,550	25,000
4.	Waste Management	1,10,000	5,000
5.	Implementation of EC, Mining Plan & DGMS Condition	19,94,460	9,27,000
6.	Greenbelt Development	1,05,000	12,000
Total		**38,71,560**	**29,41,080**

11 SUMMARY & CONCLUSION

11.1 Overall justification for the implementation of project

The proposed project is site specific because of the availability of mineral in this location. The geological reserves of grey granite is 4,38,325 m^3.

An Environmental Impact Assessment Study has been carried out and assessed for the proposed project, based on the ToR and baseline quality data collected for the study area. Identification and anticipation of the potential environmental impacts due to the proposed project with a delineation of appropriate impact mitigation measures in an Environmental Management plan is provided in the EIA report.

The marginal impacts that might be caused by the proposed activity will be mitigated by the pollution control and environmental management measures.

In a true and a larger sense, in view of the considerable benefits from the project with no major impacts, the proposed project is said to be more beneficial to the country.

The EMP implemented for the proposed project will include:

- Air Pollution control and management
- Noise Control and Management
- Solid and Hazardous Waste Management
- Water treatment and Management

In order to effectively implement the EMP, an environmental management system will be formulated.

11.2 Baseline Study

Ambient Air Quality

The ambient air quality has been monitored at 8 locations for 13 parameters as per CPCB guidelines within the study area. The average baseline levels of PM_{10} is 56.35 to 58.57 µg/m^3, $PM_{2.5}$ is 33.18 to 35.50 µg/m^3, SO_2 is 6.24 to 9.42 µg/m^3, NO_2 is 12.70 to 19.37 µg/m^3, all the parameters are well within the National Ambient Air Quality Standards.

Noise Environment

Ambient noise levels were monitored using precision noise level meter in and around the project site at 10 km radius at 8 locations during study period.

- In Residential area day time noise levels varied from 50.4 dB (A) to 53.9 dB (A) and night time noise levels varied from 40.1 dB(A) to 42.9 dB(A) across the sampling

stations. The field observations during the study period indicate that the ambient noise levels in Residential area are within the limit prescribed by CPCB for Residential area (55 dB (A) Day time & 45 dB(A) Night time).

Surface water quality

- pH in the collected surface water samples varies between 7.21 to 7.81 where all the samples are within the limit of IS 2296:1992.
- The Total Dissolved Solids (TDS) value of collected surface water sample ranges from 283 mg/l to 365 mg/l.
- The Total hardness value of the collected surface water sample ranges between 175mg/l to 211 mg/l.
- BOD value of the collected surface water sample ranges from 2 to 4 mg/l.
- COD value of collected surface water varies from 16 to 32 mg/l.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se are within the limits of IS 2296:1992.

Ground Water Quality

- The average pH ranges from 7.31 to 7.79.
- TDS value varied from varied from 278 mg/l – 497 mg/l.
- Total Hardness varied from 151 mg/l – 257 mg/l
- The chloride concentration ranged from 18.34 mg/l – 52.14 mg/l
- Sulphate range from 12 mg/l – 49 mg/l
- It is observed that all the collected ground water samples meets the drinking water standards (IS 10500:2012) and can be used for drinking.

Soil Environment

- The pH of the soil samples ranged from 6.78 to 8.31.
- Conductivity of the soil samples ranged from 218 to 389 µs/cm.
- Nitrogen content in the collected soil samples ranged from 124.92 mg/kg to 408.42 mg/kg.
- Phosphorous content ranged from 18.98 to 33.05 mg/kg.
- Potassium content ranges from 73.30 mg/kg to 144.31 mg/kg.

12 DISCLOSURE OF CONSULTANTS

In order to assess the potential environmental impacts dueto the proposed project at Survey. 283 (Part), Sulamalai Village, Bargur Taluk, Krishnagiri District, Tamil Nadu State to undertake EIA study.The nature of consultancy service rendered covers terrestrial environmental assessment.

12.1 Brief Profile of Hubert Enviro Care Systems (P) Limited (HECS)

Hubert Enviro Care Systems (P) Limited is a leading Environmental Management Company and service provider serving as a catalyst for environmental protection in the industrial & service sectors.

Enviro care Systems was started in 1997 as a proprietor company. In the year 2004, Enviro Care Systems became a Private Limited Company and registered as Hubert Enviro Care Systems (P) Limited.

Across two decades of operation we have developed into a matured corporate house to meet client's requirements to provide products and services of Global standards at the most competitive price within committed schedule of time.

We have full-fledged office and laboratory at Chennai, Mangalore, Trivandrum & Hyderabad.

12.2 Strengths of HECS

Number of Employees

Consultancy	42
Laboratory	100
Projects	29
]Operation & Maintenance	999
Total No of Employees	**1170**

12.3 QCI-NABET - EIA Accreditation

Consultancy	Hubert Enviro Care Systems Pvt. Ltd., Chennai
NABET Certificate No	NABET/ EIA/ 24-27/ RA 0335 Valid up to 31.03.2027
MoEF Reg. Lab	F.No. Q-15018/13/2016-CPW

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NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Hubert Enviro Care Systems, Chennai

A-21, III Phase, Thiru Vi Ka Industrial Estate– 600032

*The organization is accredited as **Category-A** under the QCI-NABET **Scheme for Accreditation of EIA Consultant Organization, Version 3** for preparing EIA/EMP reports in the following Sectors-*

S.No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals including opencast / underground mining	1	1 (a) (i)	A
2.	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3.	River Valley projects	3	1 (c)	A
4.	Thermal power plants	4	1 (d)	A
5.	Mineral beneficiation	7	2 (b)	A
6.	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
7.	Cement plants	9	3 (b)	A
8.	Petroleum refining industry	10	4 (a)	A
9.	Pesticides industry and pesticide specific intermediates (excluding formulations)	17	5 (b)	A
10.	Petro-chemical complexes	18	5 (c)	A
11.	Petrochemical based processing	20	5 (e)	A
12.	Synthetic organic chemicals industry	21	5 (f)	A
13.	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
14.	Bio-medical waste treatment facilities	32A	7(d a)	B
15.	Ports, harbours, break waters and dredging	33	7 (e)	A
16.	Highways,	34	7 (f)	B
17.	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
18.	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
19.	Building and construction projects	38	8 (a)	B
20.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated May 31, 2024, posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/24/3292 dated June 25, 2024. The accreditation needs to be renewed before the expiry date by Hubert Enviro Care Systems, Chennai following due process of assessment.

Issue Date
June 25, 2024

Valid up to
March 31, 2027

Mr. Ajay Kumar Jha
(Sr. Director, NABET)

Certificate No.
NABET/EIA/24-27/RA 0335

Prof (Dr) Varinder S Kanwar
(CEO- NABET)

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

Further details may be seen on the following URL: www.hecs.in.

13 DAMAGE ASSESSMENT REPORT

13.1 Enumerate the aspects of Violation

The proposed project 'Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha' has operated the quarry without prior Environment clearance from the period of 15.01.2016-10.01.2017 with the existing quarry depth of 12m and excavated quantity of 300396 m^3. So the proposed project comes under violation category as per MOEF & CC Notification S.O. 804 (E) dated 14th March 2017.

The Damage Assessment has been calculated for the Sulamalai Grey Granite Quarry over an extent of 34.35.5 Ha for the period of operation of the quarry operated from 15.01.2016-10.01.2017 as per MOEF&CC O.M F.No. 19-125/2019-IA.III Dated 5th March 2020. Based on the guidelines the Damage Assessment has been calculated on six following aspects.

1. Air Environment
2. Water Environment
3. Green Belt
4. Noise and Vibration ENvironment
5. Solid Waste Management
6. Land Environment

Also the economic benefits based on the turn over of the quarried quantity and the arrived Damage Cost. The penalty provision has been calculated based on the O.M F.No. 22-21/2020-IA.III Dated 07.07.2021.

13.2 Quantification of Damage cost

13.3 Air Environment

As per European Environment Agency Damage (in Indian currency @ Rs 80 per euro) per tonne emission estimates for PM_{10} in 2020 (2005 prices) for PM_{10}, $PM_{2.5}$, NO_2 and SO_2 are Rs. 17.02 lakhs, Rs. 26.21 lakhs, Rs. 4.79 lakhs and Rs. 8.25 lakhs respectively. These values are as per the assessment of EEA are updated upto 2020.

- For Indian conditions, damage cost / tonne can be reduced to 20% of the annual rate considered for UK/Europe since the cost of living / medical expenses are approximately 1/5th of the European cost on an average, accepting the fact that the density of population is much higher than European countries. In case of severely polluted areas/ cities, these damages cost can be considered @ 50% of the EEA Rates viz:

- Damage (@ 20% EEA Rate) cost Per Kg/day for PM10, PM2.5, NOx and SO2, at the 20% of EEA rates are as: PM10 – Rs. 340.00 per kg / day; PM2.5 – Rs 524.00 per kg / day; NOx – Rs. 96.00 per kg / day & SO2 – Rs. 165.00 per kg / day.

Table 13-1 Quantification of Damage cost

S.No	Parameters	For Emission Per Year (Rs. In lakhs)	Per day (Rs/Kg)	Per Kg/day (Rs.)
1.	PM_{10}	3.4	933.00/2.74	340
2.	$PM_{2.5}$	5.24	1436.00/2.74	524
3.	NO_X	0.96	263.00/2.74	96
4.	SO_2	1.96	452.00/2.74	165

13.3.1 Damage Assessment Calculation

No of working days per year during violation period from 15.01.2016-10.01.2017 is 300 days. The quantity of Grey Granite Excavated during the violation period is given in the below **Table 13-2.**

Table 13-2 Quantity Excavated

S.No	Type of Mineral	Excavated Quantity (m^3)	Depth (m)
1.	Grey Granite	300396	12

13.3.2 Input Parameters for Damage Assessment Calculation for Air Environment

Vehicle:

Tipper – 1

Excavator -2

Crawler crane - 1

4 Wheeler – 1

DG:

DG Capacity – 125 kW

Table 13-3 Emission Factor Source

S.No	Activity	Reference
1.	Wet Drilling for granite	EPA. August, 2004. Section 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing. In: Compilation of Air Pollutant Emission Factors,
2.	Loading	

3.	Unloading	Volume 1: Stationary Point and Area Sources, Fifth Edition, AP-42. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.
4.	Haulage	
5.	Vehicle	ARAI- Automotive Research Association of India
6.	DG	AP-42: Compilation of Air Emissions Factors

13.3.3 Mining Activity Emission

Table 13-4 Mining Activity Emission

Mining Activity	Emissions (TPA)			
	PM_{10}	$PM_{2.5}$	SO_2	NO_x
Line Source (Haul Road)	6.20E-02	3.72E-02	-	-
Area Source (Mining Pit)	2.67E-05	1.60E-05	-	-
Area Source (Waste Dump)	1.30E-03	7.78E-04	-	-
Point Source (DG)	1.50E-01	9.03E-02	1.40E-01	2.12E+00
Point Source (Drilling)	3.00E-02	1.80E-02	-	-
Line Source (Vehicle)	4.68E-03	2.81E-03	-	5.22E-01
Total (TPA)	**2.48E-01**	**1.49E-01**	**1.40E-01**	**2.64E+00**

13.3.4 Emission calculation References

- *The drilling emission is calculated with the equation of Chakraborty, et al. (2002),*
- *The emission factors for the haul roads the equation from the literature Chaulya, (2006).*
- *Haul Roads &Waste dump emission calculated based on the literature Chakraborty, et al., (2002).*
- *Open pitEmission calculation as per the open pit estimation is another tool than the area source in AERMOD. (Neshuku, 2012).*

Table 13-5 Quantification of Emissions due to quarry activities

S. No	Emission details	Emissions quantity for 1 year Ton/Year	Total Emissions quantity for 1 year (Ton/Day)
1	PM10	0.248	0.00083
2	PM2.5	0.149	0.00050
3	SO_2	0.140	0.00047
4	NOx	2.637	0.00879

Source for project activities: *Project proponent*

Table 13-6 Operation (from DG &Transportations Activities)

S. No	Pollutant	Total generation from production carried(Kg)	Cost of damage Rate (Rs/Kg)	Total damage Amount (Rs)

1	PM_{10}	0.83	340	282.2
2	$PM_{2.5}$	0.50	524	262
3	SO_2	0.47	165	77.55
4	NOx	8.79	96	843.84
Total				**1465.59**

13.4 Water Environment

Water is being sourced from nearby road tankers for mining operations purpose is about 1.5 m^3/day of water is required for the project.

13.4.1 Water pollution

There is no wastewater generation in the quarry. The sewage generated is being collected in Septic tank followed by soak pit. Assuming 100% of the sewage is collected in soak pit contaminating.

13.4.2 Environmental Compensation Ground Water (ECGW)

The guidelines have proposed following formula for calculation of Environmental Compensation Ground Water (EC_{GW}):

EC_{GW} = Water Consumption per Day x No. of Days x Environmental Compensation Rate for illegal extraction of ground water (EC_{GW}) Where water Consumption is in m^3/day and ECR_{GW} in Rs. /M^3

As per CGWB, safe, semi-critical, critical and over-exploited areas are categorized from the ground water resources point of view (CGWB, 2017). List of safe, semi-critical, critical and over- exploited areas are available on the website of CGWB.

Sector wise damage assessment with respect to Ground water utilization without NOC shall be calculated as per the formula suggested by the guidelines

13.4.3 Industry and Mining sector

Total Quantity assessed by GEC 2015 and neither fully or nor partially governed / managed by the industry / mining sectors, the damage cost will be as following

Table 13-7 Industry and Mining Sector Ground Water Consumption Damage Cost

Water consumption M^3 day				
Level Category	**<200**	**200 to <1000**	**1000 to <5000**	**>5000**
	Damage cost in Rs/M^3			
Safe	15	21	30	40
Semi-Critical /	30	45	60	75

Critical	45	60	85	115
Over Exploited	60	90	120	150

13.4.4 Environmental Compensation Surface Water (ECSW)

Total Quantity assessed by GEC 2015 and neither fully or nor partially governed / managed by the industry / mining sectors, the damage cost will be as following:

Table 13-8 Compensatory Cost of Surface Water

Water consumption M^3 day				
Level Category	**<200**	**200 to <1000**	**1000 to**	**>5000**
	Damage cost in Rs/M^3			
Safe	10	15	20	25
Semi-Critical / Critical	20	30	40	50
Over Exploited	40	60	80	100

Working

- Source of water: Private Tankers (Ground Water)
- Water Requirement per day: 1.5 KLD (1.5m^3)
- No of Days: 300 Days
- Level Category of Project Location: Safe(Source: CGWB)

Table 13-9 Water Consumption Calculation

Year	Water Consumption in KL (300 days)	Damage cost per KL	Cost (Rs)
15.01.2016-10.01.2017	450	60	27000
Total			**27000**

Note:1. *The water consumption is taken for total violation period of 1 year from* 15.01.2016-10.01.2017.

13.4.5 Sewage Generation Calculation

Input Parameters:

Sewage Generation: 0.4 KLD No of working days: 300 days

Table 13-10 Analysis of damage cost from Effluent & Sewage Generation

Year	Sewage Quantity in KL (300 days)	Damage cost per KL	Total
15.01.2016-10.01.2017	120	50	6,000

Note: There is no sewage discharged during violation period. Hence Damage Cost is not considered.

13.5 Green Belt

13.5.1 Building & Infra Sector

- 3 Times the requirement as per norms to be planted in the neighborhood @ Rs.1100/Per Tree
- **For every tree cut - 5 trees to be planted in the project/Boundary in other areas @ 1100/Per**
- **Tree** In NCR for every tree cut - 10 trees to be planted in the project/Neighborhood @ 1100/Per Tree.

13.5.2 Mining & Other Industries

- Above 3 points also applicable to mining & other Industries and apart from that below points to be considered
- Green belt is to be provided all along the ML boundary for a minimum width of 7.5M and also in the safety zone @ 7.5M width besides provision of GB along the water courses at 50M boundary on either side. Plantation on Minimum active dumps and other non- operational areas.
- EAC will assess the non or partial provision of theses and compensation will be estimated for the gap quantity @1500 nos/Ha. In Case of Industry as min of 33% of the plot area is to be covered under GB and plantation. The environmental damage will be assessed accordingly @ 1500 plants/Ha for the deficiency.

Working

Table 13-11 Tree Cutting Propobable Damage Cost

S.No	Probable Damage	Quantity	Cost of the damage	Total cost of damage Amount (Rs)

1.	Tree cutting (15.01.2016-10.01.2017)	Nil	1,100 Rs per tree	-

The quarry Lease area is fully rocky terrain. The quarry is in operation since, 1998. As per proponent information there is no removal of trees. No tree cut has been done. Hence no damage cost is considered

13.6 Noise and Vibration Environment

- Noise Monitoring and impact must be assessed by proper modeling Damage Assessment: Based on the impact exceeding the threshold values on neighborhood and core zone, the project will be assessed
- Provision of PPE's to employees: Provision of PPE: Rs. 1000 / head x No. of employees
- Provision of Noise barrier, while the habitations are in close proximity: Perimeter x height = Sq.Mtrs x Rs. 400 / sq. Mtrs as damage cost / relative remediation by either providing barriers / Green belt to be affected.In case of non-provision of either partial/ full GB as required, the damage will be assessed as following:

GB = Three tier at Rs.1100/ per tree in case of NCR, Metropolitan cities and for others @ Rs.500 per tree

Working

S.No	Probable Damage	Quantity	Cost of damage	Total Cost of damage Amount (Rs)
1.	Trees requirement for greenbelt development	As per CPCB 1500 trees/ha for greenbelt development. Approximately 150 trees required.(0.10.0Ha)	Rs 500 per tree	**75,000**

13.7 Solid Waste Management

13.7.1 Infra/ Industry Sector

As per SWM Rules 2016, non-compliance/partial compliance will be applicable for operating projects only. As per the industry average: cost of collection/ processing per house is Rs.12.00 per day for 4 persons and waste: 1.5-2.0 kg i.e Rs. 6.0 per kg per day for a colony of not less than 30000 to 100000 population. In construction stage for the workers, the overhead will

be minimum of 4times per kg since to deal with minimum numbers and also it has to be carted to a distant place of availability. Hence it is taken as Rs.25/-per Kg.

13.7.2 Working -Operation Phase

No of Manpower: 30

Table 13-12 Organic and inorganic Waste Generation

S.No	Type	Quantity(Kg/day)	Disposal Method
1	Organic	8.1	Municipal bin
2	In Organic	5.4	TNPCB authorized recyclers
Total		**13.5**	

Table 13-13 Dasmage Cost for the quantity of generated solid waste

Probable Damage	Quantity	Cost of the damage	Total cost of damage Amount (Rs)
Solid waste Generation	13.5 Kg/day	Rs.25/-per Kg	**1,01,250.00**
	Number of days worked – 300days		
	13.5x300 = 4050 kg		

There is no any additional Manpower incurred since we have not exceeded the approved production quantity (<33350Kg/A) in all days of violation period. Only the number of products has been exceeded against the EC approved products. So, there was no additional Municipal Solid Waste generation during the violation period (15.01.2016-10.01.2017).

In case of Hazardous Waste generation, the quantity generations are within the Hazardous Waste Authorized quantity and all the waste have been properly disposed to the recyclers/TSDF

13.8 Land Environment

Guidelines as per F.No.19-125/2019-IA.III for Land Environment-In Minning and other Industries

Damage to agriculture and community lands will be calculated at the beneficial cost/ Market values of the extent of the land/ water bodies so impacted for remediation

Topsoil Mismanagement will be assesses @ 50/- per cum of Qty not utilized.

Cost of rectification for proper slope, plantation on non-active dumps, others surface water control measures shall be assessed by the committee based on the area estimated and damage/ remediation cost to be computed for non/ partial provision of Garland drains, toe drains, toe walls, check dams, settling tanks and plantation

13.8.1 Working on Damage Cost

Table 13-14 Damage Cost on Top Soil Loss

Probable Damage	Quantity	Cost of the damage	Total cost of damage Amount (Rs)
Loss of Topsoil	-	50 Rs per m3	Nil since the site is covered with hard rock surface

13.9 Consolidation of all aspects of Damage cost

The arrived cost of value of Damagme from the quarrying period of 15.01.2016-10.01.2017 is given in below **Table 13-15.**

Table 13-15 Consolidated Value of Damage Cost of all environmental aspects

S. No	Type waste	Amount in Rupees
Construction		
1	Top Soil	-
2	Tree cutting	-
3	Air emission	-
4	Solid waste Generation	-
Total (A)		-
Operation		
1	Air Emissions	1,465.59
2	Water Environment	27,000
3	Solid Waste Management	1,01,250
4	Noise and Vibration -Tree requirement for Greenbelt	75,000
5	Sewage Management	6,000
Total (B)		**2,10,716**
Total (A) +(B)		**2,10,716**

13.10 Economic Benifits

Guidelines as per F.No.19-125/2019-IA.III Dated: 05.03.2020 for Economic Benefits - Mining – Minor Mineral Non Coal Mining Sector

A maximum of 3.0% of the net profit as computed will be added to the total damage cost and will be used for community resource augmentation

13.11 Total turnover of products manufacturing without EC during Violation period (15.01.2016-10.01.2017)

A maximum of 3.0% of the net profit as computed will be added to the total damage cost and will be used for community resource augmentation. The proponent did not sell any quarried granite blocks. Hence the turn over is zero.

13.12 Penalty Provisions

For Process Expansion

ii. Where operation /production with expanded capacity have commenced

1% of the project cost (attributable to the expansion activity) incurred upto the date of filling of application along with EIA/EMP report PLUS 0.25% of the total turnover (attributable to the expansion activity/capacity) involved during the period of violation

Table 13-16 Penalty provisions for violation cases

S. No	Description	Cost in Lakhs	Penalty in Lakhs
1	Project cost (1%)	99,97,000 (Project Cost)	99,970
2	Total turnover of products Manufacturing without EC during Violation period (2013-2018) (0.25%)	(Excavated minerals are not sold, Hence there is no turnover for the proponent)	-
Total		**99,97,000**	**99,970**

13.13 Remediation Plan, Natural Resource & Community Resource Augmentation Plan

S. No	Component Remediation	Remediation Proposed	Description	Location	Total Cost Management			
					Year I	Year II	Year III	Total cost
Remediation Plan								
1	Noise & Vibration	Avenue Plantation	Plantation of native plants at 90% survival rate with allocated cost budget including maintenance for 3 years.	Nearby villages	12,000	20,000	20,679	52,679

Total (Rupees) - A								
Natural Resource Augmentation Plan								
2	Water	Ground Water Manag ement	Conservation of lakes	Lakes present in and around the project area and in the study area	12,000	20,000	20,679	52,679
Total (Rupees) - B								
Community Resource Augmentation Plan								
3	Socio Econo mic	Medica l camps	Providing health camps & check-up	Nearby villages	10,000	12,000	13,000	35,000
4	Infrastr ucture Develo pment	-	Providing Library facilities	Nearby Govern ment schools	10,500	12,000	13,000	35,500
			Providing treated drinking water and public toilets	Nearby villages	11,619	11,619	11,620	34,858
Total (Rupees) - C								**1,05,358**
GRAND TOTAL (Rupees) – A+B+C								**2,10,716**

13.14Conclusion

The total damage cost = Rs. 2,10,716

The Penalty Cost = Rs 99,970

Table 13-17 Summary of Damage Assessment

S. No	Damage Assessment Cost in Lakhs (Rs)	Remediation Plan, Natural Resource & Community Resource Augmentation Plan Cost in Lakhs (Rs)	Penalty for violation cost in Lakhs (Rs)
1.	2,10,716	2,10,716	0.9