

# **ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**For**

## **BLACK GRANITE QUARRY**

**OVER AN EXTENT OF 14.53.0 Ha**

**At**

**Survey No: 155/2**

**Villages: Karandapalli**

**Taluk: Denkanikottai**

**District: Krishnagiri**

**State: Tamil Nadu**

**By**



**M/s. Tamil Nadu Minerals Limited**

**(Project termed under Schedule 1(a) Mining of Minerals 'B1' category as per EIA**

**Notification 2006 and its Amendments thereafter and O.M issued vide F. No. L-**

**11011/175/2018-IA-II (M), dated: 12.12.2018)**

**EIA Consultant**

**HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI**

**May 2023**

## 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 Black Granite Quarry, over an extent of 14.53.0 Ha at S.F.155/2 at Karandapalli village, Denkanikottai taluk, Krishnagiri District, Tamilnadu State.

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### **M/s Hubert Enviro Care System Private Limited**

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- 3) Mr. Vamsee Krishna Navooru (Head-Consultancy& EIA Coordinator)

**Declaration by the Project Proponent**

I, 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 **“Black Granite Quarry over the extent of 14.53.0Hectares at S.F.155/2 at Karandapalli village, Denkanikottai taluk, Krishnagiri District, 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 **“Black Granite Quarry over the extent of 14.53.0 Hectares at S.F. 155/2 at Karandapalli village, Denkanikottai taluk, Krishnagiri District, Tamilnadu State”**. I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.



Signature:

**Date: 31.05.2023**

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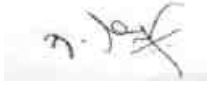
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**NABET Certificate No & Validity:** NABET/EIA/1922/RA 0172& valid upto13.10.2022

### Declaration of Experts contributing to the EIA



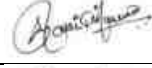

I, hereby, certify that I was involved in the EIA report for the project titled “**Black Granite Quarry over the extent of 14.53.0 Hectares at S.F.155/2 at Karandapalli Village, Denkanikottai Taluk, Krishnagiri District, and Tamil Nadu State**”. I was a part of the EIA team in the following capacity that developed the above EIA with the support of the following functional area experts.





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*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 Annexure**

<b>Annexure No</b>	<b>Name of the Annexure</b>
1	G.O (3D) No.58, Industries (MME.1) Department
2	Precise Area Communication Letter
3	Mining Plan Approval Letter
4	Approved Mining Plan
5	Sectional Plates
6	RQP Certificate
7	Terms of Reference

**LIST OF ABBREVIATIONS**

AAQ	Ambient Air Quality
AAQM	Ambient Air Quality Monitoring
AGL	Above Ground Level
AMSL	Above Mean Sea Level
BGL	Below Ground Level
CPCB	Central Pollution Control Board
CER	Corporate Environmental Responsibility
DMP	Disaster Management Plan
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Plan
GLC	Ground Level Concentration
GO	Government Order
HECS	Hubert Enviro Care Systems
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
O. B	Over Burden
S. B	Side Burden
kWh	Kilowatt Hour
MSDS	Material Safety Data Sheet
MMR	Metalliferous Mines Regulations
MoEF&CC	Ministry of Environment, Forest and Climate Change
NAAQ	National Ambient Air Quality
NABET	National Accreditation Board for Education and Training
QCI	Quality Council of India
R & D	Research & Development
RA	Risk Assessment
ROM	Run of Mine
STP	Sewage Treatment Plant
SOM	Scheme of Mining
SEIAA	State Environmental Impact Assessment Authority
SEAC	State Expert Appraisal Committee
TAMIN	Tamilnadu Minerals Limited
TWAD	Tamilnadu Water Supply and Drainage Board
TDS	Total Dissolved Solids
TNPCB	Tamil Nadu Pollution Control Board
TNSEAC	Tamil Nadu State Expert Appraisal Committee
TOR	Terms of Reference
TANGEDCO	Tamil Nadu Generation and Distribution Corporation
kVA	kilovolt-ampere

# 1 INTRODUCTION

## 1.1 Purpose of the report

The granite dimensional stone material by virtue of its pleasing colour and texture and its best ability to take polishing and appealing look in polished product has attracted the consumers TAMIN's Client to provide in the building construction and interior decoration industries. The domestic market capabilities have also been explored in recent periods. Bulk quantity of the blocks are produced and exported as raw blocks and some quantity is being processed at TAMIN's Granite polishing units and exported as value added finished products.

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 industries and factories are growing up.

Around 30 people directly employed including mining operations, outside workshops, unit supported industries. Local villages residing in the nearby villages shall be employed as semi-skilled workers.

## 1.2 Project background

M/s. Tamil Nadu Minerals Ltd, (An undertaking of Government of Tamil Nadu) was established in the year 1978, to carry out systematic mining and development of different minerals all over the state. Ever since its inception 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 magmatic origin), Raw silk (Yellow Feldspathic Leptynite) and a number of other coloured granite varieties apart from other industrial minerals viz., Quartz and Feldspar, Graphite, Limestone, Vermiculite etc.,.

Precise area communication letter has been issued to grant lease for 30 years for extent of 14.53.0 Ha at S.F.No.155/2 at Karandapalli Village, Denkanikottai Taluk, Krishnagiri District, and Tamil Nadu State. Tamil Nadu obtained lease vide G.O (3D) No.58, Industries (MME.1) Department, dated: 29.11.2011. Lease documents enclosed as **Annexure –I**. Accordingly, mining plan has been submitted and approved by the Director of Geology and Mining, Chennai vide Lr.No.2677/MM4/2020, dated: 09.07.2020. Precise area communication letter is enclosed as **Annexure-II**. Mining plan approval letter is enclosed as **Annexure-III**.

The area lies in the Eastern Longitude from 77°43'28.43"E to 77°43'46.40"E and Northern latitude from 12° 28'11.55"N to 12°28'27.29"N enclosed sectional plates as **Annexure-V**. The area does not fall under forest land of any category. It is a Government Poramboke land.

The Geological reserves of Black granite have been computed based on the Geological Plan & Sections up to the economically workable average depth of 30m from the surface level and the top surface of the granite body works out to 3,29,201 m<sup>3</sup>. By applying 10% recovery the effective Geological reserves 32,920 m<sup>3</sup>.

Mineable Reserves have been computed as 3,01,972 m<sup>3</sup> after deleting 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 30,197 m<sup>3</sup> by applying the recovery factor 10%. The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 30,197m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery. Open cast Semi mechanized method will be followed for proposed mining as per Mining plan. Sectional plates are enclosed as **Annexure-V**.

Total waste to be generated during the five years of Mining Plan period will be around 1,99,241 m<sup>3</sup>. These wastes are proposed to be dumped on the South eastern side of lease area. The total water requirement is 1.5KLD (Drinking & Domestic purpose-0.5 KLD, Wire Saw cutting -0.3 KLD, Dust suppression -0.3 KLD & Greenbelt-0.4KLD). The total water requirement will be met from private tankers. Power requirement 60 kVA will be met through 125 kVA DG Set. Diesel consumption will be 200lits/day. Man power requirement will be 30 Nos directly. Municipal Solid waste will be disposed into local municipal bins. Hazardous waste like waste oil will be disposed through TNPCB authorized dealers. Sewage will be disposed through septic tank followed by soak pit. Septic Tank will be cleaned periodically.

The project cost is Rs. 99.97 Lakhs. (Fixed Cost Rs. 2, 25,000/-, Operational Cost Rs. 95,67,000/- and EMP Cost Rs. 2,05,000/-).

### **1.3 Identification of Project & Project Proponent**

#### **1.3.1 Project**

The proposed Black Granite Mine is over an extent of 14.53.0Ha located at S.F.155/2, Karandapalli village, Denkanikottai taluk, Krishnagiri District, TamilNadu State. TAMIN is obtaining Environmental Clearance from SEIAA-Tamil Nadu. Since, the project falls under B1 Category, Schedule 1(a) Mining of Minerals as per MoEF&CC Notification and its amendment vide S. O. 3977(E) dated; 14<sup>th</sup> Aug 2018. The land use classification of the project site is government poramboke land. TAMIN obtained precise area communication letter vide Government letter No. 957/MM4/2022, dated: 01.03.2022. Precise area communication letter is enclosed as **Annexure-II**.

The Mining Plan has been prepared for quarrying Black Granite (Dolerite) over an extent of 14.53.0Ha in S.F. 155/2 of Karandapalli village, Denkanikottai taluk, Krishnagiri District, TamilNadu State. Tamil Nadu obtained lease for 30 years. Mining plan approval letter is enclosed as **Annexure-III**.

The area applied for quarry lease is exhibits hillock with height of about ( $\approx 277$ m AMSL), The lease area generally manifests undulating topography with low lying plain agricultural lands. Geologically, the lease applied area is a Dolerite dyke intruded into the Gneissic formation. The area lies in the Eastern Longitude from  $77^{\circ}43'28.43''$ E to  $77^{\circ}43'46.40''$ E and Northern latitude from  $12^{\circ}28'11.55''$ N to  $12^{\circ}28'27.29''$ N enclosed sectional plates as **Annexure-V**. The area is marked in the survey of India Topo sheet No. 57 H/10, 11, 14&15.

### 1.3.2 Project Proponent

Tamil Nadu Minerals Limited (TAMIN) (An Undertaking of Government of Tamil Nadu) has been established in the year 1978. 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 had started the Captive Graphite Mine in the year 1986.

TAMIN is only organization recognized by Bureau of Indian Standard for manufacture and supply of I.S. Sand all over the country. TAMIN has also been marketing granite cubes with sides measuring 6cm to 12cm. 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 Leptynite) and a number of other color granite varieties apart from other industrial minerals viz. quartz and feldspar, graphite, lime stone, silica sand, vermiculite, etc.

TAMIN has also set up industrial units for polishing processing the granite stones one each at Manali (Chennai), Madhepalli at Krishnagiri District and Melur at Madurai District. A Beneficiation plant for the beneficiation of graphite ore has been established close to Sivaganga Graphite mine. An exfoliation plant for the processing of vermiculite mineral at Sevathur village Tirupathur district has also been established.

### 1.4 Letter of Intent (LoI) & Mining Plan approval details

- i. TAMIN obtained precise area communication letter vide Rc.No. 957/MME4/2022, dated: 01.03.2022. Precise area communication letter is enclosed as **Annexure-II**.
- ii. The Mining Plan has been prepared for quarrying Black Granite (Dolerite) over an extent of 14.53.0 Ha. in S.F.155/2 of Karandapalli village, Denkanikottai taluk, Krishnagiri District, Tamil Nadu State, for 30 years. Mining plan was approved by the Director of Geology and Mining, Chennai vide Letter No.2677/MM4/2020, dated: 09.07.2020 and letter is enclosed as **Annexure-III**.



## 1.5 Land Acquisition Status

The entire mine lease area of 14.53.0Ha is Government land which is leased by TAMIN. TAMIN obtained precise area communication letter vide Rc.No.957/MM4/2022, dated: 01.03.2022. Precise area communication letter is enclosed as **Annexure-II**.

**Table 1-1 Land Use Description**

District and State	Taluk	Village	S.F. No	Area in (Ha)	Land Classification
Krishnagiri District, Tamil Nadu	Denkanikottai	Karandapalli	S.F.No.155/2	14.53.0	Government Land

## 1.6 Purpose and Status of the Report

The Karandapalli Black Granite Quarry is over an extent of 14.53.0 Ha. The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per EIA Notification dated 14<sup>th</sup> September 2006 and its subsequent amendments. The EC application was submitted to TN SEIAA vide File No.6708/2022. The proposal was appraised during 191<sup>st</sup> SEAC meeting held on 30.12.2020, 329<sup>th</sup> SEAC meeting held on 16.11.2022 and 574<sup>th</sup> SEIAA meeting held on 29.11.2022 and ToR was issued vide Lr No. SEIAA-TN/F.No.6708/ToR-1302/2022, dated: 29.11.2022 for the preparation of EIA/EMP report. The draft EIA/EMP report will be submitted for Public Hearing (PH). After completion of Public Hearing, the minutes issued will be incorporated in the EIA report along with proponent action plan. Final EIA report will be submitted to TN-SEAC for further appraisal of the project and obtaining Environmental Clearance.

## 1.7 Brief Description of the Project

### 1.7.1 Nature of the Project

The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per EIA Notification and its amendment. Hence, the project will appraise for Environmental Clearance from State Expert Appraisal Committee, Tamil Nadu. The EC application was submitted to TN SEIAA vide File No.6708/2022 & Proposal No. SIA/TN/MIN/82230/2022 dated 12.08.2020.

The TAMIN has obtained precise area communication letter vide Rc.No.957/MM4/2022, dated: 01.03.2022. Precise area communication letter is enclosed as **Annexure-II**. The mining plan has been submitted and approved by the Director of Geology and Mining, Chennai vide Letter No.2677/MM4/2020, dated: 09.07.2020. Mining approval letter is enclosed as **Annexure-III**.

The proposal was appraised during 191<sup>st</sup> SEAC meeting held on 30.12.2020, 329<sup>th</sup> SEAC meeting held on 16.11.2022 and 574<sup>th</sup> SEIAA meeting held on 29.11.2022 and ToR was issued vide Lr No. SEIAA-TN/F.No.6708/ToR-1302/2022, dated: 29.11.2022.

### 1.7.2 Size of the Project

The Proposed Black Granite Quarry over an extent of 14.53.0 Ha is located at SF.No.155/2, Karandapalli village, Denkanikottai Taluk, Krishnagiri District, Tamil Nadu State.

Black Granite Quarry area is over an extent of 14.53.0 Ha with the Geological reserves of Black granite have been computed based on the Geological Plan & Sections up to the economically workable average depth of 30m from the surface level and the top surface of the granite body works out to 3,29,201 m<sup>3</sup>. By applying 10% recovery the effective Geological reserves works out to 32,920 m<sup>3</sup>.

Mineable Reserves have been computed as 3,01,972 m<sup>3</sup> after deleting 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 30,197 m<sup>3</sup> by applying the recovery factor 10%. The average annual production per year would be 2,052m<sup>3</sup> of ROM of saleable and 30,197m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery. Open cast Semi mechanized method will be followed for proposed mining as per mining plan. Sectional plates are enclosed as **Annexure-V**.

Total waste (GraniteWaste+SideBurden) to be generated during the five years of Mining Plan period will be around 1,99,241m<sup>3</sup>. These wastes are proposed to be dumped on the South eastern side of lease area. The method of mining is Open cast semi mechanized.

**Table 1-2 UltimatePit Dimensional Details**

S. No	Description	Average Ultimate Pit Dimensional(m)		
		Length	Width	Depth
1	Top	516	71.70	30
2	Bottom	468	24.20	

**Table 1-3 Geological Reserves**

Section	Average Measurements (m)			ROM (m3)	Effective Reserves@ 10%(m3)	Granite waste @90% (m3)
	Length	Width	Depth			
PQ-AB	516	25.17	3	38,963		
PQ-CD	504	25.17	6	76,114		
QR-EF	492	25.17	6	74,302		

RS-GH	480	25.17	6	72,490		
ST-JK&LM	468	25.17	6	67,869		
<b>Total</b>				<b>3,29,738</b>		
<b>Depletion of reserves(2012-2017)</b>				<b>(-)25,115</b>		
<b>Depletion of reserves during the revised modified scheme of Mining-1 period (2017-2022)upto 31.07.2021</b>				<b>(-)2,651</b>		
<b>Updated Geological Reserves on 31.07.2021</b>				<b>3,01,972</b>	<b>32,920 @10%</b>	<b>2,96,281 @90%</b>

### 1.7.3 Location of the project

Karandapalli Black Granite Quarry area is over an extent of 14.53.0 Ha, the lease area is located at S.F.No.155/2 of Karandapalli village, Denkanikottai taluk, Krishnagiri District, and Tamil Nadu State. The boundary co-ordinates of the mine lease area are tabulated in Table 1-4.

**Table 1-4 Boundary Coordinates of the project**

S. No	Bourndary mark point	Latitude (N)	Longitude(E)
1	TM1	12 °28' 22.77"	77 °43' 45.76"
2	TM2	12 °28' 19.94"	77 °43' 45.33"
3	TM3	12 °28' 19.91"	77 °43' 45.07"
4	TM4	12 °28' 16.98"	77 °43' 45.44"
5	TM5	12 °28' 16.17"	77 °43' 45.03"
6	TM6	12 °28' 14.94"	77 °43' 44.46"
7	TM7	12 °28' 11.55"	77 °43' 41.94"
8	TM8	12 °28' 13.18"	77 °43' 38.22"
9	TM9	12 °28' 13.83"	77 °43' 35.71"
10	TM10	12 °28' 16.68"	77 °43' 36.37"
11	TM11	12 °28' 17.79"	77 °43' 35.98"
12	TM12	12 °28' 17.20"	77 °43' 29.69"
13	TM13	12 °28' 17.76"	77 °43' 29.23"
14	TM14	12 °28' 17.67"	77 °43' 28.43"
15	TM15	12 °28' 21.01"	77 °43' 29.89"
16	TM16	12 °28' 27.29"	77 °43' 32.60"
17	TM17	12 °28' 26.98"	77 °43' 34.52"
18	TM18	12 °28' 26.47"	77 °43' 36.80"
19	TM19	12 °28' 25.91"	77 °43' 40.07"
20	TM20	12 °28' 23.86"	77 °43' 40.64"
21	TM21	12 °28' 23.70"	77 °43' 43.22"
22	TM22	12 °28' 23.88"	77 °43' 45.38"
23	TM23	12 °28' 24.59"	77 °43' 45.62"
24	TM24	12 °28' 24.12"	77 °43' 46.40"

### 1.7.4 Connectivity of the Project

The project is situated at a distance of ~0.31km to Muluvanapalli Village towards East direction and ~2.03km East of Karandapalli Village, one approach road is running from SH 17B(Hosur-Denkanikottai) ~8.24 km towards (NNE) side of the lease area. The project site has well

established connection facilities. The nearest railway station is Periya Naga thunai Railway station located at  $\approx$  21.80Km towards ENE direction. NH-948A (Dobbaspet-Thalli-Attibele) situated at distance of  $\approx$  13.97 Km (NNW).

### **1.8 Need for the project and its importance to the country and or region**

The granite dimensional stone material by virtue of its pleasing colour and texture and its best ability to take polishing and appealing look in polished product has attracted the consumers in the building construction and interior decoration industries. The domestic market capabilities have also been explored in recent periods. Bulk quantity of the blocks is produced and exported as raw blocks and some quantity is being processed at TAMIN's Granite polishing units and exported as value added finished products.

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 industries and factories are growing up.

Around 30 people directly employed including mining operations, outside workshops, unit supported industries. Local villagers residing in the nearby villages shall be employed as semi-skilled workers.

#### **1.8.1 Demand –Supply Gap**

As of now there is good demand for this granite blocks in foreign as well as local market. The quarried granite blocks are either exported as raw blocks or processed at TAMIN's factories as value added products such as slabs, tiles, fancy items, monuments, sawn slabs or local sales as raw block etc.

#### **1.8.2 Imports Vs Indigenous**

There is no import of this granite material at present in India as we are having huge resources of this granite material particularly in South India.

#### **1.8.3 Export possibility**

The quarried granite blocks are either exported as raw blocks or processed at TAMIN's factories as value added products such as slabs, tiles, fancy items, monuments, sawn slabs etc. Apart from TAMIN so many private enterprises are exporting the granite material as raw blocks, polished slab and monuments etc.

#### **1.8.4 Domestic/export markets**

As of now there is good demand for this granite blocks in foreign as well as local market. The granite blocks are either exported as raw blocks or processed at TAMIN's as factories as value added products such as slabs, tiles, fancy items, monuments, sawn slabs etc. Apart from TAMIN so many private enterprises are exporting the granite material as raw blocks, polished slab and monuments etc.

## 1.9 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 as obtained Terms of Reference from SEIAA-TN 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/2224/SA0190, valid up to 27.07.2024.

## 1.10 EIA Cost

EIA study was undertaken by HECS for an amount of Rs.1, 72,000/- Lakhs. The base line monitoring was done by M/s. HECS lab, Chennai, an NABL and MoEF& CC Accredited Laboratory.

## 1.11 Scope of the Study

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

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

This EIA report presents the existing baseline scenario and the assessment and evaluation of the environmental impacts that may arise during mining. This report also highlights the Environmental Monitoring Program during the operation phase of the project and the post mined management program. The generic structure of the EIA document will be as per the EIA Notification of the MoEF&CC dated 14<sup>th</sup> 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 quarry 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.

**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.

### **1.11.1 Objectives of the Study**

- To ensure environmental considerations are explicitly addressed and incorporated into the development decision-making process.
- To anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of the above project proposal.
- To protect the productivity and capacity of natural systems and the ecological processes which maintain their respective functions
- To promote development that is sustainable and optimizes resource use as well as management opportunities.
- To fully recognize the scope and requirements of the ToR and comply with the same.
- The major objective of this study is to prepare a detailed Environmental Impact Assessment study within the study area i.e 10 km radius from the project.

### **1.11.2 Methodology adopted for the Study**

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

### **1.11.3 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.

#### 1.11.4 Legal Complicability

The establishment and functioning of mining industry will be governed by Tamin Client to provide the following environmental acts/regulations besides the local zoning and landuse 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: 2000as amended
- The Environment (Protection) Act, 1986 (EPA)as amended
- The Wildlife (Protection) Act, 1972
- The Forest (Conservation) Act, 1980
- 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) as amended
- Contract Labor Regulation and Abolition Act 1970as amended
- The Motor Vehicles Act – 1989as amended
- PESO – Explosives and handling of Hazardous Material: 1934

#### 1.11.5 Terms of Reference Compliance

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

##### 1.11.5.1 Standard Terms of Reference

S. No	Terms of Reference	Compliance															
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the	<p>It is an expansion quarry. Government has issued Precise area communication letter to grant of lease for 30 years vide Rc.No.957/MM4/2022, dated: 01.03.2022.</p> <p>Precise area communication letter is enclosed as <b>Annexure-2</b>.</p> <p>Granite Quarry Reserves</p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Description</th> <th>Granite (m<sup>3</sup>)</th> <th>Recovery 10% (m<sup>3</sup>)</th> <th>Granite waste 90% (m<sup>3</sup>)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Geological Resource</td> <td>3,29,201</td> <td>32,920</td> <td>2,96,281</td> </tr> <tr> <td>2</td> <td>Mineable Reserves</td> <td>3,01,972</td> <td>30,197</td> <td>2,71,775</td> </tr> </tbody> </table> <p><b>Yearwise Production details</b></p>	S. No	Description	Granite (m <sup>3</sup> )	Recovery 10% (m <sup>3</sup> )	Granite waste 90% (m <sup>3</sup> )	1	Geological Resource	3,29,201	32,920	2,96,281	2	Mineable Reserves	3,01,972	30,197	2,71,775
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2	Mineable Reserves	3,01,972	30,197	2,71,775													



EIA Notification 1994 came into force, w.r.t the highest production achieved prior to 1994.	<b>S. No</b>	<b>Year</b>	<b>ROM (m<sup>3</sup>)</b>	<b>Recovery @10% (m<sup>3</sup>)</b>	<b>Granite Waste @ 90 % (m<sup>3</sup>)</b>	<b>Side Burden (m<sup>3</sup>)</b>																																			
	1	1 <sup>st</sup> Year	20,085	2009	18076	-																																			
	2	2 <sup>nd</sup> Year	19,954	1995	18999	1040																																			
	3	3 <sup>rd</sup> Year	19,997	2000	17997	1599																																			
	4	4 <sup>th</sup> Year	20,075	2007	18068	1959																																			
	5	5 <sup>th</sup> Year	20,128	2013	18115	1096																																			
	<b>Total</b>		<b>1,00,239</b>	<b>10,024</b>	<b>90,215</b>	<b>5,694</b>																																			
The production details are provided in <b>Chapter 2 Section 2.7.</b>																																									
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	It is a Government Poromboke Land Tamil Nadu Minerals limited has leased for 30 years. Precise area communication letter from Industries (MME.1) Department, Chennai vide Rc.No.957/MM4/2022, dated: 01.03.2022 is enclosed as <b>Annexure-2.</b>																																							
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	<p>Mining Plan Approval by Director, Department of Geology and Mining vide Lr.No.2677/MM4/2020, dated: 09.07.2020 attached as <b>Annexure-III.</b></p> <p>Mine Lease Area: 14.53.00 Ha</p> <p><b>Yearwise Production details</b></p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Year</th> <th>ROM (m<sup>3</sup>)</th> <th>Recovery @10% (m<sup>3</sup>)</th> <th>Granite Waste @ 90 % (m<sup>3</sup>)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1<sup>st</sup>Year</td> <td>20,493</td> <td>2,049</td> <td>22,894</td> </tr> <tr> <td>2</td> <td>2<sup>nd</sup>Year</td> <td>20,516</td> <td>2,052</td> <td>33,851</td> </tr> <tr> <td>3</td> <td>3<sup>rd</sup>Year</td> <td>20,517</td> <td>2,051</td> <td>47,138</td> </tr> <tr> <td>4</td> <td>4<sup>th</sup>Year</td> <td>20,507</td> <td>2,051</td> <td>47,188</td> </tr> <tr> <td>5</td> <td>5<sup>th</sup>Year</td> <td>20,517</td> <td>2,052</td> <td>48,170</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td><b>1,02,550</b></td> <td><b>10,255</b></td> <td><b>1,99,241</b></td> </tr> </tbody> </table> <p><b>Production Details:</b> Mineable Reserves have been worked out as 30,197 m<sup>3</sup> by applying the recovery factor 10%. The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 10,255m<sup>3</sup> of ROM during the first five year of mining plan period at the rate of 10% recovery.</p> <p>Waste Generation and its management: 1,99,241 m<sup>3</sup>. These wastes will be proposed to dump on the South Eastern side of the lease area.</p> <p>The space available in the lease area for waste dump has been identified</p>					S. No	Year	ROM (m <sup>3</sup> )	Recovery @10% (m <sup>3</sup> )	Granite Waste @ 90 % (m <sup>3</sup> )	1	1 <sup>st</sup> Year	20,493	2,049	22,894	2	2 <sup>nd</sup> Year	20,516	2,052	33,851	3	3 <sup>rd</sup> Year	20,517	2,051	47,138	4	4 <sup>th</sup> Year	20,507	2,051	47,188	5	5 <sup>th</sup> Year	20,517	2,052	48,170	<b>Total</b>		<b>1,02,550</b>	<b>10,255</b>	<b>1,99,241</b>
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4	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 should be provided. Such a Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	<table border="1"> <thead> <tr> <th>S.No</th> <th>Bourndary mark point</th> <th>Latitude (N)</th> <th>Longitude(E)</th> </tr> </thead> <tbody> <tr><td>1</td><td>TM1</td><td>12 °28' 22.77"</td><td>77 °43' 45.76"</td></tr> <tr><td>2</td><td>TM2</td><td>12 °28' 19.94"</td><td>77 °43' 45.33"</td></tr> <tr><td>3</td><td>TM3</td><td>12 °28' 19.91"</td><td>77 °43' 45.07"</td></tr> <tr><td>4</td><td>TM4</td><td>12 °28' 16.98"</td><td>77 °43' 45.44"</td></tr> <tr><td>5</td><td>TM5</td><td>12 °28' 16.17"</td><td>77 °43' 45.03"</td></tr> <tr><td>6</td><td>TM6</td><td>12 °28' 14.94"</td><td>77 °43' 44.46"</td></tr> <tr><td>7</td><td>TM7</td><td>12 °28' 11.55"</td><td>77 °43' 41.94"</td></tr> <tr><td>8</td><td>TM8</td><td>12 °28' 13.18"</td><td>77 °43' 38.22"</td></tr> <tr><td>9</td><td>TM9</td><td>12 °28' 13.83"</td><td>77 °43' 35.71"</td></tr> <tr><td>10</td><td>TM10</td><td>12 °28' 16.68"</td><td>77 °43' 36.37"</td></tr> <tr><td>11</td><td>TM11</td><td>12 °28' 17.79"</td><td>77 °43' 35.98"</td></tr> <tr><td>12</td><td>TM12</td><td>12 °28' 17.20"</td><td>77 °43' 29.69"</td></tr> <tr><td>13</td><td>TM13</td><td>12 °28' 17.76"</td><td>77 °43' 29.23"</td></tr> <tr><td>14</td><td>TM14</td><td>12 °28' 17.67"</td><td>77 °43' 28.43"</td></tr> <tr><td>15</td><td>TM15</td><td>12 °28' 21.01"</td><td>77 °43' 29.89"</td></tr> <tr><td>16</td><td>TM16</td><td>12 °28' 27.29"</td><td>77 °43' 32.60"</td></tr> <tr><td>17</td><td>TM17</td><td>12 °28' 26.98"</td><td>77 °43' 34.52"</td></tr> <tr><td>18</td><td>TM18</td><td>12 °28' 26.47"</td><td>77 °43' 36.80"</td></tr> <tr><td>19</td><td>TM19</td><td>12 °28' 25.91"</td><td>77 °43' 40.07"</td></tr> <tr><td>20</td><td>TM20</td><td>12 °28' 23.86"</td><td>77 °43' 40.64"</td></tr> <tr><td>21</td><td>TM21</td><td>12 °28' 23.70"</td><td>77 °43' 43.22"</td></tr> <tr><td>22</td><td>TM22</td><td>12 °28' 23.88"</td><td>77 °43' 45.38"</td></tr> <tr><td>23</td><td>TM23</td><td>12 °28' 24.59"</td><td>77 °43' 45.62"</td></tr> <tr><td>24</td><td>TM24</td><td>12 °28' 24.12"</td><td>77 °43' 46.40"</td></tr> </tbody> </table> <p>Topo sheet: 57H/10,11,14&amp;15.</p> <p>All corners co-ordinates of the mine lease area are given in <b>Chapter 1</b> and <b>Section 1.7.3, Table 1-4</b>, Topo map in <b>Figure 2-9</b>.</p> <p><b>Geology:</b> The major part of the district is covered by metamorphosed crystalline rocks of the Charnockite Group and the Migmatite Complex of Archaean age. South of Palar River, the area where the Charnockite Group of rocks are spread over comprises charnockite, pyroxene granulite, magnetite quartzites and younger basic dykes intruding into them. <b>Source:</b><a href="https://cdn.s3waas.gov.in/s31651cf0d2f737d7adeab84d339dbabd3/uploads/2019/04/2019040961.pdf">https://cdn.s3waas.gov.in/s31651cf0d2f737d7adeab84d339dbabd3/uploads/2019/04/2019040961.pdf</a>.</p> <p>Geomorphology of the study area consists of Denudational origin - pediment – pedi plain Complex- 73.30%, Structural Origin- Moderately Dissected Hills and Valleys – 24.71% and Water bodies- 0.84%, Structural Origin-Low Dissected Hills and Valleys-0.51%, Anthropogenic Origin-Anthropogenic Terrain-0.40%, Denudational Origin-Low Dissected Hills and Valleys-0.25%. The total Geographical</p>	S.No	Bourndary mark point	Latitude (N)	Longitude(E)	1	TM1	12 °28' 22.77"	77 °43' 45.76"	2	TM2	12 °28' 19.94"	77 °43' 45.33"	3	TM3	12 °28' 19.91"	77 °43' 45.07"	4	TM4	12 °28' 16.98"	77 °43' 45.44"	5	TM5	12 °28' 16.17"	77 °43' 45.03"	6	TM6	12 °28' 14.94"	77 °43' 44.46"	7	TM7	12 °28' 11.55"	77 °43' 41.94"	8	TM8	12 °28' 13.18"	77 °43' 38.22"	9	TM9	12 °28' 13.83"	77 °43' 35.71"	10	TM10	12 °28' 16.68"	77 °43' 36.37"	11	TM11	12 °28' 17.79"	77 °43' 35.98"	12	TM12	12 °28' 17.20"	77 °43' 29.69"	13	TM13	12 °28' 17.76"	77 °43' 29.23"	14	TM14	12 °28' 17.67"	77 °43' 28.43"	15	TM15	12 °28' 21.01"	77 °43' 29.89"	16	TM16	12 °28' 27.29"	77 °43' 32.60"	17	TM17	12 °28' 26.98"	77 °43' 34.52"	18	TM18	12 °28' 26.47"	77 °43' 36.80"	19	TM19	12 °28' 25.91"	77 °43' 40.07"	20	TM20	12 °28' 23.86"	77 °43' 40.64"	21	TM21	12 °28' 23.70"	77 °43' 43.22"	22	TM22	12 °28' 23.88"	77 °43' 45.38"	23	TM23	12 °28' 24.59"	77 °43' 45.62"	24	TM24	12 °28' 24.12"	77 °43' 46.40"
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5	<p>Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.</p>	<p>It is a expansion quarry and It is a government poramboke land. Topo map prepared in 1:50000 scale and given as <b>Figure 2-9</b>.</p> <p>Geomorphology Map of Study Area if given in <b>Figure 3-13</b> Geomorphology pattern of the study area is shown in <b>Chapter 3, Section 3.5.5, Figure 3-12</b>.</p> <p>Hydrogeology of district is given in <b>Chapter 3, Section 3.5.6 Figure 3-14</b>.</p> <p>Drainage map is shown in <b>Chapter 3, Section 3.5.7, Figure 3-15</b>.</p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Places</th> <th>Distance (≈km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr><td>1.</td><td>Adda Vanka</td><td>0.19</td><td>W</td></tr> <tr><td>2.</td><td>Pond near Bilimudra</td><td>0.55</td><td>SSW</td></tr> <tr><td>3.</td><td>Nir Pallam</td><td>0.77</td><td>ENE</td></tr> <tr><td>4.</td><td>Javanaikaneri Kodi</td><td>2.29</td><td>W</td></tr> <tr><td>5.</td><td>Andevanpalli Lake</td><td>2.56</td><td>ESE</td></tr> <tr><td>6.</td><td>Gundumadu Halla / Agina Halla</td><td>3.06</td><td>SW</td></tr> <tr><td>7.</td><td>Gulubidamaduvu Halla</td><td>3.37</td><td>SW</td></tr> <tr><td>8.</td><td>Lake near Tekur</td><td>3.43</td><td>WNW</td></tr> <tr><td>9.</td><td>Ajjimaduvu Halla / Dodda Halla</td><td>6.71</td><td>WNW</td></tr> <tr><td>10.</td><td>Akkatangikova Halla / Battalamaduvu Halla</td><td>6.71</td><td>SSW</td></tr> <tr><td>11.</td><td>Metra Pallam / Periya Pallam</td><td>7.08</td><td>ESE</td></tr> <tr><td>12.</td><td>Mirre Vanka / Kittilimarattu Pallam / Dodda Halla</td><td>7.21</td><td>SSE</td></tr> <tr><td>13.</td><td>Denkanikota Lake</td><td>8.01</td><td>NE</td></tr> <tr><td>14.</td><td>Tatta Halla</td><td>8.37</td><td>SSW</td></tr> <tr><td>15.</td><td>Onnamma Cheruvu</td><td>8.53</td><td>NNW</td></tr> <tr><td>16.</td><td>Devotimaduvu Halla</td><td>8.89</td><td>WSW</td></tr> <tr><td>17.</td><td>Javugu Halla</td><td>9.21</td><td>WSW</td></tr> <tr><td>18.</td><td>Ichimaduvu Halla / Madeshvara halla</td><td>9.27</td><td>WSW</td></tr> <tr><td>19.</td><td>Kalli Halla</td><td>9.73</td><td>SSW</td></tr> <tr><td>20.</td><td>Mettukal Halla</td><td>10.31</td><td>SSW</td></tr> <tr><td>21.</td><td>Sidanakotta Halla</td><td>10.91</td><td>WNW</td></tr> <tr><td>22.</td><td>Chinnar R</td><td>11.28</td><td>N</td></tr> <tr><td>23.</td><td>Gelikal Pallam</td><td>11.32</td><td>SSE</td></tr> <tr><td>24.</td><td>Sanatkumara Nadi</td><td>12.19</td><td>N</td></tr> <tr><td>25.</td><td>Metimaduvu Pallam / Kattari Pallam</td><td>12.86</td><td>SSE</td></tr> <tr><td>26.</td><td>Bavi Halla</td><td>13.21</td><td>SW</td></tr> <tr><td>27.</td><td>Kolimara Pallam</td><td>13.27</td><td>SSW</td></tr> <tr><td>28.</td><td>Tali Kere</td><td>14.01</td><td>NNW</td></tr> <tr><td>29.</td><td>Tirumurugai Halla</td><td>14.03</td><td>SW</td></tr> </tbody> </table> <p><b>Geology:</b></p>	S.No	Places	Distance (≈km)	Direction	1.	Adda Vanka	0.19	W	2.	Pond near Bilimudra	0.55	SSW	3.	Nir Pallam	0.77	ENE	4.	Javanaikaneri Kodi	2.29	W	5.	Andevanpalli Lake	2.56	ESE	6.	Gundumadu Halla / Agina Halla	3.06	SW	7.	Gulubidamaduvu Halla	3.37	SW	8.	Lake near Tekur	3.43	WNW	9.	Ajjimaduvu Halla / Dodda Halla	6.71	WNW	10.	Akkatangikova Halla / Battalamaduvu Halla	6.71	SSW	11.	Metra Pallam / Periya Pallam	7.08	ESE	12.	Mirre Vanka / Kittilimarattu Pallam / Dodda Halla	7.21	SSE	13.	Denkanikota Lake	8.01	NE	14.	Tatta Halla	8.37	SSW	15.	Onnamma Cheruvu	8.53	NNW	16.	Devotimaduvu Halla	8.89	WSW	17.	Javugu Halla	9.21	WSW	18.	Ichimaduvu Halla / Madeshvara halla	9.27	WSW	19.	Kalli Halla	9.73	SSW	20.	Mettukal Halla	10.31	SSW	21.	Sidanakotta Halla	10.91	WNW	22.	Chinnar R	11.28	N	23.	Gelikal Pallam	11.32	SSE	24.	Sanatkumara Nadi	12.19	N	25.	Metimaduvu Pallam / Kattari Pallam	12.86	SSE	26.	Bavi Halla	13.21	SW	27.	Kolimara Pallam	13.27	SSW	28.	Tali Kere	14.01	NNW	29.	Tirumurugai Halla	14.03	SW
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		<p>The major part of the district is covered by metamorphosed crystalline rocks of the Charnockite Group and the Migmatite Complex of Archaean age. South of Palar River, the area where the Charnockite Group of rocks are spread over comprises charnockite, pyroxene granulite, magnetite quartzites and younger basic dykes intruding into them.</p> <p><b>Source:</b><a href="https://cdn.s3waas.gov.in/s31651cf0d2f737d7adeab84d339dbabd3/uploads/2019/04/2019040961.pdf">https://cdn.s3waas.gov.in/s31651cf0d2f737d7adeab84d339dbabd3/uploads/2019/04/2019040961.pdf</a>.</p>																																			
6	<p>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.</p>	<p>It is a expansion quarry. Government has issued precise area communication letter for 30 years vide Rc.No. Rc.No.957/MM4/2022, dated: 01.03.2022. Precise area communication letter is enclosed as <b>Annexure-2</b>.</p> <p>Director of Geology and Mining has approved the Mining Plan to carryout the mining activities. Mining Plan is enclosed as <b>Annexure-V</b>.</p> <p>The Geological reserves of Black granite have been computed based on the Geological Plan &amp; Sections up to the economically workable average depth of 30m from the surface level and the top surface of the granite body works out to 3,29,201 m<sup>3</sup>. By applying 10% recovery the effective Geological reserves works out 32,920 m<sup>3</sup>.</p> <p>Mineable Reserves have been computed as 3,01,972 m<sup>3</sup> after deleting 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 30,197 m<sup>3</sup> by applying the recovery factor 10%. The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 10,255m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery.</p> <p>The peak annual production per year would be 2,052 m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery.</p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Year</th> <th>ROM (m<sup>3</sup>)</th> <th>Recovery @ 10% (m<sup>3</sup>)</th> <th>Granite Waste @ 90% (m<sup>3</sup>)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1<sup>st</sup>Year</td> <td>20,493</td> <td>2,049</td> <td>22,894</td> </tr> <tr> <td>2</td> <td>2<sup>nd</sup>Year</td> <td>20,516</td> <td>2,052</td> <td>33,851</td> </tr> <tr> <td>3</td> <td>3<sup>rd</sup>Year</td> <td>20,517</td> <td>2,051</td> <td>47,138</td> </tr> <tr> <td>4</td> <td>4<sup>th</sup>Year</td> <td>20,507</td> <td>2,051</td> <td>47,188</td> </tr> <tr> <td>5</td> <td>5<sup>th</sup>Year</td> <td>20,517</td> <td>2,052</td> <td>48,170</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td><b>1,02,550</b></td> <td><b>10,255</b></td> <td><b>1,99,241</b></td> </tr> </tbody> </table> <p>The production details are provided in <b>Chapter 2 Section 2.7</b>.</p>	S. No	Year	ROM (m <sup>3</sup> )	Recovery @ 10% (m <sup>3</sup> )	Granite Waste @ 90% (m <sup>3</sup> )	1	1 <sup>st</sup> Year	20,493	2,049	22,894	2	2 <sup>nd</sup> Year	20,516	2,052	33,851	3	3 <sup>rd</sup> Year	20,517	2,051	47,138	4	4 <sup>th</sup> Year	20,507	2,051	47,188	5	5 <sup>th</sup> Year	20,517	2,052	48,170	<b>Total</b>		<b>1,02,550</b>	<b>10,255</b>	<b>1,99,241</b>
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<p>7</p>	<p>It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? I 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/vibration of the environmental or forest norms/conditions? The hierarchical systems or administrative order of the Company to deal with the environmental issues and for ensuring compliances with the EC conditions may also be given. The system of reporting of non-compliances /violations of environmental norms to the Board of Directors of the Company and /or stakeholders at large, may also be detailed in the EIA Report.</p>	<p>Environmental Policy of TAMIN is given in <b>Chapter 10 Section 10.15.</b></p> <ul style="list-style-type: none"> <li>➤ We develop safe working methods and practices, with as an 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.</li> <li>➤ 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 for supporting actions aimed at increase in employees' safety outside work hours.</li> <li>➤ We protect the environment by control and prevention of pollution and promote green environment.</li> <li>➤ We continuously evaluate and improve our conduct and carry out regular audit, analysis and studies to eliminate potential concerns and continuously improve upon our Safety, Health and Environmental standards.</li> <li>➤ We communicate our Safety, Health and Environmental Policy to all our employees' contractors and to the public for better understanding and practice.</li> <li>➤ 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.</li> <li>➤ M/s. Tamil Nadu Minerals Ltd shall use its resources in order to live up to this policy and thereby promote our business.</li> </ul>			
<p>8</p>	<p>Issues relating to Mine safety, including subsidence study in case of underground</p>	<p><b>Mine Safety and Mitigation Measures:</b></p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Activity</th> <th>Mitigation measures</th> </tr> </thead> </table>	S. No	Activity	Mitigation measures
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	mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should be provided.	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. Adequate 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.
		<p>No underground mining method is proposed. It is a Black Granite quarry an open cast Mining methodology will be followed. Workable depth of mining will be 30m AGL.</p> <p>Mining methodology is provided in <b>Chapter 2</b> and <b>Section 2.9</b> and <b>Section 2.10</b>.</p> <p>Safeguard measures are provided in <b>Chapter-4, Section 7.2.2.8</b>.</p> <ul style="list-style-type: none"> <li>➤ Adequate care has been taken in deciding the size of the bench for the working pit.</li> <li>➤ The benches are properly sloped at an angle of 60 degree to avoid any spillage of benches.</li> <li>➤ Adequate drainage system at the top of the pit and also on the benches shall be made to prevent erosion of the benches.</li> <li>➤ The quarries will be protected by garland drains around the periphery for storm water drainage.</li> </ul>		
9	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.	<p>The study area considered for the EIA study comprises of 10km zone of radial distance from the lease periphery.</p> <p>The data contained within the EIA including Production capacity, mineable capacity, Waste generation and other such details have been calculated for the lease period of five years as per the approved mining plan.</p> <p>The study area of 10km zone around the mines lease from lease periphery and furnished in <b>Chapter 3</b>.</p> <p>The production and waste generation details such as Mineable Reserves have been worked out as 30,197 m<sup>3</sup> by applying the recovery factor 10%.</p>		

		<p>The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 10,255m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery.</p> <p>The total waste (Granite waste + Side Burden+Over Burden) to be generated during the 5 years of Mining plan period will be around 1,99,241 m<sup>3</sup>. These wastes are proposed to be dumped on the South eastern side of lease area.</p> <p>Life time of the mine is 15 years.</p>																																																																									
10	<p>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.</p>	<p>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 are given below.</p> <p><b>Land use pattern of the Study Area:</b></p> <table border="1"> <thead> <tr> <th>Description</th> <th>Area (sq.km)</th> <th>Area (Acres)</th> <th>Area (Hectares)</th> <th>Area (%)</th> </tr> </thead> <tbody> <tr> <td>Crop land</td> <td>187.77</td> <td>46398.91</td> <td>18777</td> <td>56.57</td> </tr> <tr> <td>Deciduous</td> <td>68.92</td> <td>17030.48</td> <td>6892</td> <td>20.76</td> </tr> <tr> <td>Fallow</td> <td>22.81</td> <td>5636.47</td> <td>2281</td> <td>6.87</td> </tr> <tr> <td>Plantation</td> <td>21.71</td> <td>5364.65</td> <td>2171</td> <td>6.54</td> </tr> <tr> <td>Scrub land</td> <td>12.01</td> <td>2967.73</td> <td>1201</td> <td>3.62</td> </tr> <tr> <td>Mining</td> <td>6.66</td> <td>1645.72</td> <td>666</td> <td>2.01</td> </tr> <tr> <td>Reservoirs / Lakes / Ponds</td> <td>4.30</td> <td>1062.55</td> <td>430</td> <td>1.30</td> </tr> <tr> <td>Rural</td> <td>4.05</td> <td>1000.78</td> <td>405</td> <td>1.22</td> </tr> <tr> <td>Urban</td> <td>1.60</td> <td>395.37</td> <td>160</td> <td>0.48</td> </tr> <tr> <td>Barren rocky</td> <td>1.54</td> <td>380.54</td> <td>154</td> <td>0.46</td> </tr> <tr> <td>River / Stream / Canals</td> <td>0.55</td> <td>135.91</td> <td>55</td> <td>0.17</td> </tr> <tr> <td><b>Total</b></td> <td><b>331.92</b></td> <td><b>82019.09</b></td> <td><b>33193</b></td> <td><b>100.00</b></td> </tr> </tbody> </table> <p>Land use/land cover of Study Areas is given in <b>Chapter 3 and Section 3.5.4.1, Table 3-3, Figure 3-7 &amp; Figure 3-8.</b></p> <p>The impact on land pattern in the area has been and will be due to the following:</p> <ul style="list-style-type: none"> <li>• Land degradation due to disposal of large volume of waste materials.</li> <li>• Creation of infrastructural facilities like office, rest shelter, first-aid centre and other service facilities.</li> <li>• Exposure of topsoil to wind and water erosion.</li> </ul> <p>The details are provided in <b>Chapter 4 Section 4.1.2.</b></p> <p><b>Land use details of the quarry area:</b></p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Land Use</th> <th>Area to be required during the mining plan (Ha)</th> <th>Area at the end of the quarrying period (Ha)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Description	Area (sq.km)	Area (Acres)	Area (Hectares)	Area (%)	Crop land	187.77	46398.91	18777	56.57	Deciduous	68.92	17030.48	6892	20.76	Fallow	22.81	5636.47	2281	6.87	Plantation	21.71	5364.65	2171	6.54	Scrub land	12.01	2967.73	1201	3.62	Mining	6.66	1645.72	666	2.01	Reservoirs / Lakes / Ponds	4.30	1062.55	430	1.30	Rural	4.05	1000.78	405	1.22	Urban	1.60	395.37	160	0.48	Barren rocky	1.54	380.54	154	0.46	River / Stream / Canals	0.55	135.91	55	0.17	<b>Total</b>	<b>331.92</b>	<b>82019.09</b>	<b>33193</b>	<b>100.00</b>	S. No	Land Use	Area to be required during the mining plan (Ha)	Area at the end of the quarrying period (Ha)				
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<b>Total</b>	<b>331.92</b>	<b>82019.09</b>	<b>33193</b>	<b>100.00</b>																																																																							
S. No	Land Use	Area to be required during the mining plan (Ha)	Area at the end of the quarrying period (Ha)																																																																								

		1	Area under Quarry	1.32.5	3.60.5
		2	Waste Dump	1.88.0	5.70.0
		3	Infrastructure	0.01.0	0.01.0
		4	Village Road	0.01.0	0.01.0
		5	Mine Road	0.50.0	0.30.0
		6	Green Belt	0.17.0	0.36.5
		7	Un utilized Area	10.63.5	4.54.0
		<b>Total</b>		<b>14.53.0</b>	<b>14.53.0</b>
		A Land use detail of the quarry areas provided in <b>Chapter 2, Section 2.6, and Table 2.6</b>			
11	Details of the land for any Over Burden dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R & R issues, if any, should be given.	As it is a new project there is no external dump for over burden, side burdens. Over burden, Side burden and granite rejects will be dump within the lease area/boundary only. The total waste (Granite waste + Side Burden+Over Burden) to be generated during the 5 years of mining plan period will be around 1,99,241 m <sup>3</sup> . These wastes are proposed to be dumped on the South eastern side of lease area.			
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned	No Forest land involved in this project area. The proposed lease area is classified as Government poramboke land. TAMIN obtained Precise area communication from Rc.No.957/MM4/2022, dated: 01.03.2022. is enclosed as <b>Annexure-2</b> to obtain lease period of mining for 30 years.			



	<p>above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.</p>																																						
<p>13</p>	<p>State of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.</p>	<p>No forest clearance is required. As there is no forest land involved in the lease applied area.</p>																																					
<p>14</p>	<p>Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.</p>	<p>No scheduled tribes and other traditional forest dwellers are observed.</p>																																					
<p>15</p>	<p>The vegetation in the RF/ PF areas in the study area, with necessary details, should be given.</p>	<p>Environmental sensitive areas covering within 15 km from project boundary.</p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Description</th> <th>Distance (~km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Noganur RF</td> <td>2.09</td> <td>ENE</td> </tr> <tr> <td>2</td> <td>Panai West RF</td> <td>2.88</td> <td>SSW</td> </tr> <tr> <td>3</td> <td>Panai East RF</td> <td>2.90</td> <td>S</td> </tr> <tr> <td>4</td> <td>Javalagiri RF</td> <td>6.66</td> <td>WNW</td> </tr> <tr> <td>5</td> <td>Ulibanda RF</td> <td>8.83</td> <td>SW</td> </tr> <tr> <td>6</td> <td>Kolatti RF</td> <td>9.60</td> <td>SE</td> </tr> <tr> <td>7</td> <td>Denkanikota RF</td> <td>9.65</td> <td>ENE</td> </tr> <tr> <td>8</td> <td>Manjunatha State Forest</td> <td>9.90</td> <td>W</td> </tr> </tbody> </table>		S.No	Description	Distance (~km)	Direction	1	Noganur RF	2.09	ENE	2	Panai West RF	2.88	SSW	3	Panai East RF	2.90	S	4	Javalagiri RF	6.66	WNW	5	Ulibanda RF	8.83	SW	6	Kolatti RF	9.60	SE	7	Denkanikota RF	9.65	ENE	8	Manjunatha State Forest	9.90	W
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16	<p>A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.</p>	<p>There are no protected wildlife areas within the 15km radius of the project.</p> <p>Impact study was carried out as per ToR and detailed mitigation measures are furnished in <b>Chapter 4 Section 4.6.3.</b></p>																																																				
17	<p>Locations of National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well proposed), if any, within 10km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically</p>	<p>There are no National parks, Sanctuaries, Biosphere Reserves, Ramsar site Tiger/ Elephant Reserves within the 10km radius.</p> <p>These are the only reserve forests within 15 Km of the project site.</p> <p>The details of environmental sensitive areas covering within 15km from project boundary are given in <b>Chapter 3 and section 3.4, Table 3-1 &amp; Figure 3-3(a) &amp; Figure 3-4(b).</b></p> <table border="1"> <thead> <tr> <th>S.No</th> <th>Description</th> <th>Distance (~km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Noganur RF</td> <td>2.09</td> <td>ENE</td> </tr> <tr> <td>2</td> <td>Panai West RF</td> <td>2.88</td> <td>SSW</td> </tr> <tr> <td>3</td> <td>Panai East RF</td> <td>2.90</td> <td>S</td> </tr> <tr> <td>4</td> <td>Javalagiri RF</td> <td>6.66</td> <td>WNW</td> </tr> <tr> <td>5</td> <td>Ulibanda RF</td> <td>8.83</td> <td>SW</td> </tr> <tr> <td>6</td> <td>Kolatti RF</td> <td>9.60</td> <td>SE</td> </tr> <tr> <td>7</td> <td>Denkanikota RF</td> <td>9.65</td> <td>ENE</td> </tr> <tr> <td>8</td> <td>Manjunatha State Forest</td> <td>9.90</td> <td>W</td> </tr> <tr> <td>9</td> <td>Manchi RF</td> <td>12.81</td> <td>SSE</td> </tr> <tr> <td>10</td> <td>Aiyur Extension RF</td> <td>13.60</td> <td>E</td> </tr> <tr> <td>11</td> <td>Ubbarani RF</td> <td>14.20</td> <td>S</td> </tr> <tr> <td>12</td> <td>Anchetti RF</td> <td>14.50</td> <td>S</td> </tr> </tbody> </table>	S.No	Description	Distance (~km)	Direction	1	Noganur RF	2.09	ENE	2	Panai West RF	2.88	SSW	3	Panai East RF	2.90	S	4	Javalagiri RF	6.66	WNW	5	Ulibanda RF	8.83	SW	6	Kolatti RF	9.60	SE	7	Denkanikota RF	9.65	ENE	8	Manjunatha State Forest	9.90	W	9	Manchi RF	12.81	SSE	10	Aiyur Extension RF	13.60	E	11	Ubbarani RF	14.20	S	12	Anchetti RF	14.50	S
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	sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	<p style="text-align: center;"><b>List of Wildlife Sanctuaries</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">S. No</th> <th style="text-align: center;">Description</th> <th style="text-align: center;">Distance (~km)</th> <th style="text-align: center;">Direction</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Cauvery North Wildlife Sanctuary ESZ</td> <td style="text-align: center;">1.93</td> <td style="text-align: center;">SW</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Cauvery North Wildlife Sanctuary Core</td> <td style="text-align: center;">2.96</td> <td style="text-align: center;">SSW</td> </tr> <tr> <td style="text-align: center;">3</td> <td>Cauvery South Wildlife Sanctuary</td> <td style="text-align: center;">8.87</td> <td style="text-align: center;">SW</td> </tr> <tr> <td style="text-align: center;">4</td> <td>Bannerghatta National Park Core</td> <td style="text-align: center;">10.82</td> <td style="text-align: center;">W</td> </tr> <tr> <td style="text-align: center;">5</td> <td>Bannerghatta National Park ESZ</td> <td style="text-align: center;">12.28</td> <td style="text-align: center;">W</td> </tr> </tbody> </table>	S. No	Description	Distance (~km)	Direction	1	Cauvery North Wildlife Sanctuary ESZ	1.93	SW	2	Cauvery North Wildlife Sanctuary Core	2.96	SSW	3	Cauvery South Wildlife Sanctuary	8.87	SW	4	Bannerghatta National Park Core	10.82	W	5	Bannerghatta National Park ESZ	12.28	W
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18	<p>A detailed biological study of the study area [core zone and buffer zone (10km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary filed survey, clearly indicating the schedule of the fauna present. In case of any Schedule-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished.</p>	<p>Detailed study on Biological Environment of the study area is given in <b>Chapter 3, Section 3.11.</b></p> <p><b>Flora:</b></p> <p>The ecology and diversity survey were conducted in the core area and buffer area extend 10 km radius in the study area. It is observed that human settlements present in and surround the project site and within the study area of 10 km radius vegetation area is in agricultural, horticultural land and private plantation and some natural vegetation observed near the Kallar river and Ammur reserve forest. Total 263 species and 191 genres under 68 families were found in the study area.</p> <p>The details are provided in <b>Chapter 3, Section 3.11.3</b> The lists of floral species are provided in <b>Chapter 3, Section 3.11.3.1, Table 3.20.</b></p> <p><b>Fauna:</b></p> <p>Both direct (sighting) and indirect (evidences) observations methods were used to survey the faunal species around the study area.</p> <ul style="list-style-type: none"> <li>➤ Bird species</li> <li>➤ Mammals</li> <li>➤ Reptiles &amp; Amphibians</li> <li>➤ Butterfly Species</li> <li>➤ Aquatic Ecology</li> </ul> <p>List of Fauna in the Study Area are provided in <b>Chapter 3, Section 3.11.4, Table 3.20.</b></p>																								

	Necessary allocation of funds implementing the same should be made as part of the project cost.	
19	Proximity to Areas declared as “Critically Polluted” or the Project areas likely to come under the ‘Aravali Range’, (attracting court restriction 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.	Nil
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to	There is no Coastal Zone within 15km radius of the project site.

	obtain approval of the concerned Coastal Zone Management Authority)	
21	<p>R&amp;R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&amp;R Plan, the relevant State/National Rehabilitation &amp; Resettlement Policy should be kept in view. In respect of SCs/Sts and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to access their requirements and action programmes prepared submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R &amp; R and socio-</p>	<p>The lease area is classified as Government Poramboke land. Precise area communications from Industries (MME.1) Department, Chennai vide Rc.No.957/MM4/2022, dated: 01.03.2022. is obtained from Govt.of Tamil Nadu for 30 years.</p> <p>There will be no Rehabilitation and Resettlement involved.</p> <p>Precise area communication letter is enclosed as <b>Annexure-2</b>.</p>

	economic aspects should be discussed in the Report.																																																																																		
22	<p>One season (non-monsoon) [i.e. March–May (Summer Season); October-December (Post Monsoon Season); December-February (Winter Seasons)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented data-wise in the EIA and EMP report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500m of the mine lease in the pre-dominant downwind direction. The mineralogical</p>	<p>The primary baseline data monitored covered three (3) months i.e., from <b>mid January 2023 – mid April 2023</b>, and secondary data was collected from Government and Semi-Government organizations.</p> <p>The primary baseline data results and discussions are furnished in <b>Chapter 3</b>.</p> <p><b>Ambient Air Quality:</b></p> <p style="text-align: center;"><b>Monitoring Locations</b></p> <table border="1"> <thead> <tr> <th>Station Code</th> <th>Location</th> <th>Type of Wind</th> <th>Distance (~km) from Project boundary</th> <th>Azimuth Directions</th> </tr> </thead> <tbody> <tr> <td>A1</td> <td>Project Site</td> <td>-</td> <td>0.36</td> <td>E</td> </tr> <tr> <td>A2</td> <td>Tavarakkarai</td> <td>u/w</td> <td>4.90</td> <td>NE</td> </tr> <tr> <td>A3</td> <td>Karandapalli</td> <td>c/w</td> <td>2.23</td> <td>E</td> </tr> <tr> <td>A4</td> <td>Ramasandiram</td> <td>c/w</td> <td>4.92</td> <td>SE</td> </tr> <tr> <td>A5</td> <td>Mudugerai</td> <td>d/w</td> <td>4.58</td> <td>SW</td> </tr> <tr> <td>A6</td> <td>Bilimudra</td> <td>d/w</td> <td>0.80</td> <td>SW</td> </tr> <tr> <td>A7</td> <td>Kanchchuvadi</td> <td>c/w</td> <td>3.72</td> <td>W</td> </tr> <tr> <td>A8</td> <td>Palaiyankottai</td> <td>c/w</td> <td>3.97</td> <td>NNW</td> </tr> </tbody> </table> <p>The details of Ambient Air Quality Monitoring Locations, Results and Maps are provided in <b>Chapter 3, Section 3.7, Table 3.7- Table 3.9, Figure 3.22 &amp; Figure 3.23</b>.</p> <p>The average baseline levels of PM<sub>10</sub> (56.27-58.49 µg/m<sup>3</sup>).</p> <p><b>Noise:</b></p> <p style="text-align: center;"><b>Monitoring Locations</b></p> <table border="1"> <thead> <tr> <th>Station Code</th> <th>Location</th> <th>Distance (~km) from Project boundary</th> <th>Azimuth Directions</th> </tr> </thead> <tbody> <tr> <td>N1</td> <td>Near Project Site</td> <td>0.36</td> <td>E</td> </tr> <tr> <td>N2</td> <td>Tavarakkarai</td> <td>4.90</td> <td>NE</td> </tr> <tr> <td>N3</td> <td>Karandapalli</td> <td>2.23</td> <td>E</td> </tr> <tr> <td>N4</td> <td>Ramasandiram</td> <td>4.92</td> <td>SE</td> </tr> <tr> <td>N5</td> <td>Mudugerai</td> <td>4.58</td> <td>SW</td> </tr> <tr> <td>N6</td> <td>Bilimudra</td> <td>0.80</td> <td>SW</td> </tr> <tr> <td>N7</td> <td>Kanchchuvadi</td> <td>3.72</td> <td>W</td> </tr> <tr> <td>N8</td> <td>Palaiyankottai</td> <td>3.97</td> <td>NNW</td> </tr> </tbody> </table> <p>The details of Noise Monitoring Locations, Results and Maps are provided in <b>Chapter 3, Section 3.8, Table 3.10, Figure 3.24</b>.</p> <p><b>Water:</b></p> <p><b>i. Surface Water:</b></p>	Station Code	Location	Type of Wind	Distance (~km) from Project boundary	Azimuth Directions	A1	Project Site	-	0.36	E	A2	Tavarakkarai	u/w	4.90	NE	A3	Karandapalli	c/w	2.23	E	A4	Ramasandiram	c/w	4.92	SE	A5	Mudugerai	d/w	4.58	SW	A6	Bilimudra	d/w	0.80	SW	A7	Kanchchuvadi	c/w	3.72	W	A8	Palaiyankottai	c/w	3.97	NNW	Station Code	Location	Distance (~km) from Project boundary	Azimuth Directions	N1	Near Project Site	0.36	E	N2	Tavarakkarai	4.90	NE	N3	Karandapalli	2.23	E	N4	Ramasandiram	4.92	SE	N5	Mudugerai	4.58	SW	N6	Bilimudra	0.80	SW	N7	Kanchchuvadi	3.72	W	N8	Palaiyankottai	3.97	NNW
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<p>carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of Vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.</p>	<table border="1"> <thead> <tr> <th>Pollutant</th> <th>Max. Base Line Conc. (<math>\mu\text{g}/\text{m}^3</math>)</th> <th>Estimated Incremental Conc. (<math>\mu\text{g}/\text{m}^3</math>)</th> <th>Total Conc. (<math>\mu\text{g}/\text{m}^3</math>)</th> <th>NAAQ standard</th> <th>% contribution of concentration above Base line</th> </tr> </thead> <tbody> <tr> <td>PM<sub>10</sub></td> <td>69.6</td> <td>1.27</td> <td>70.87</td> <td>100</td> <td>1.82</td> </tr> <tr> <td>PM<sub>2.5</sub></td> <td>42.1</td> <td>0.76</td> <td>42.86</td> <td>60</td> <td>1.80</td> </tr> <tr> <td>SO<sub>2</sub></td> <td>21.29</td> <td>0.11</td> <td>21.40</td> <td>80</td> <td>0.51</td> </tr> <tr> <td>NO<sub>x</sub></td> <td>23.01</td> <td>0.28</td> <td>23.29</td> <td>80</td> <td>1.21</td> </tr> </tbody> </table>	Pollutant	Max. Base Line Conc. ( $\mu\text{g}/\text{m}^3$ )	Estimated Incremental Conc. ( $\mu\text{g}/\text{m}^3$ )	Total Conc. ( $\mu\text{g}/\text{m}^3$ )	NAAQ standard	% contribution of concentration above Base line	PM <sub>10</sub>	69.6	1.27	70.87	100	1.82	PM <sub>2.5</sub>	42.1	0.76	42.86	60	1.80	SO <sub>2</sub>	21.29	0.11	21.40	80	0.51	NO <sub>x</sub>	23.01	0.28	23.29	80	1.21
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<p>Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow. The details are provided in <b>Chapter 4, Section 4.2.5, Table 4.16 &amp; Table 4.17.</b></p>																															



24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	<p>The water requirement for the project is addressed in <b>Chapter 2 and Section 2.11.2. Table 2.12.</b></p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Description</th> <th>Water Requirement (KLD)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Drinking &amp; Domestic purpose</td> <td>1.5</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" style="text-align: right;"><b>Total</b></td> <td><b>1.5</b></td> </tr> </tbody> </table> <p>The total water requirement is sourced from Private tank suppliers. The details are shown in <b>Chapter 4, Section 4.3, Figure 4.49.</b></p>	S. No	Description	Water Requirement (KLD)	1	Drinking & Domestic purpose	1.5	2	Wire Saw Cutting	0.3	3	Dust suppression	0.3	4	Green Belt	0.4	<b>Total</b>		<b>1.5</b>
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25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	<p>No ground water withdrawal to meet the water requirement is proposed.</p> <p>The total water requirement will be sourced from Private tank suppliers.</p>																		
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.	<p><b>Water conservation measures:</b> Ground water occurrence in this area is 15m BGL due to scanty rainfall and subtropical climate. The quarry operation confined to well above the water table for the entire lease period; hence the quarry operation will not be affected by the ground water in any manner.</p> <p><b>Rainwater harvesting:</b> The rainwater will be diverted towards the middle of the mine to prevent water entering the mine working. The rainwater flows will also contain fines both from surface and waste dumps during seasonal flows. As such, it is proposed to have structures in such a way to act as settling pond and also for rainwater harvesting.</p> <ul style="list-style-type: none"> <li>➤ Construct barriers at suitable intervals along the path of the drains.</li> <li>➤ Divert the water to de-silting cum rainwater harvesting pond in the mine area.</li> </ul> <p>Provide necessary overflow arrangement to maintain the natural drainage system.</p> <p>Rainwater harvesting details are provided in <b>Chapter 4 Section 4.3.4.2</b></p>																		
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required,	<p>The Proposed depth the quarry is 30m AGL and the ground water is in 15m. So there will be no impact on the Ground water.</p> <p>There are no major surface water bodies in the surrounding the project area but the following measures will be taken to prevent the runoff water from polluting.</p> <p><b>Surface Water Pollution Control Measures:</b></p>																		

	<p>should be provided.</p>	<ul style="list-style-type: none"> <li>➤ Construction of garland drains of suitable size around mine area and dumps to prevent rain water descent into active mine areas.</li> <li>➤ 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.</li> <li>➤ 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.</li> <li>➤ 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.</li> <li>➤ 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.</li> <li>➤ The worked out slopes will be stabilized by planting appropriate shrub/grass species on the slopes.</li> <li>➤ 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.</li> </ul> <p><b>Ground Water Pollution Control Measures</b></p> <ul style="list-style-type: none"> <li>➤ The proposed mining project will not generate any effluent. The domestic sewage from the toilets will be routed to septic tanks.</li> <li>➤ Regular monitoring of water levels and quality in the existing open wells and bore well in the vicinity will be carried out.</li> </ul> <p>The details are provided in <b>Chapter 4, Section 4.3.4.2.</b></p>
28	<p>Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect</p>	<p>The mining activity proposed in depth of 30m from the top of the hill. (ABL as per mining plan)</p> <p>Ground water table is available at 15m BGL as per Mining plan.</p> <p>Mining activities will not intersect with ground water table as the proposed depth of mining will be above ground level (from the top of the hill). Workable depth will be 30m from the top of the hill of height.</p>

	groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should be obtained and copy furnished.	
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification/diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	<ul style="list-style-type: none"> <li>➤ A safety distance of 7.5m shall be maintained for the Patta lands.</li> <li>➤ A safety distance of 10m shall be maintained for the Govt Poromboke land S.F.No: 202,203/1,94/1,94/4,535/2,533/2.</li> <li>➤ Details are provided in area precise communication letter is provided as <b>Annexure-2</b>.</li> </ul>
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in ASML and bgl. A schematic diagram may also be provided for the same.	<p>Site Elevation: 277m</p> <p>Groundwater level is 15m depth in the summer. (As per mining plan)</p> <p>Proposed Depth of Mining is 30m AGL given in the Mining Plan enclosed as <b>Annexure-4</b>.</p>
31	A time bound Progressive Greenbelt Development Plan	About 0.06.50 Ha of area is proposed for Green Belt development. It is proposed to plant 20 No's of trees per year. Detailed Green Belt Development plan is given in <b>Chapter 2 section 2.16.8. Table 2.18</b> .

	<p>shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for greenbelt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.</p>	<p>Species of ecological value and good utility value to the local population with emphasis on local and native species are proposed as part of the afforestation.</p> <table border="1"> <thead> <tr> <th>Year</th> <th>No. of trees proposed to be planted</th> <th>Name of the species</th> <th>Area( M3)</th> <th>Survival rate expected</th> <th>No. of trees expected to be grown</th> </tr> </thead> <tbody> <tr> <td>1<sup>st</sup>Year</td> <td>20</td> <td>Neem/ Pungam</td> <td>130</td> <td>50%</td> <td>10</td> </tr> <tr> <td>2<sup>nd</sup>Year</td> <td>20</td> <td>Neem/ Pungam</td> <td>130</td> <td>50%</td> <td>10</td> </tr> <tr> <td>3<sup>rd</sup>Year</td> <td>20</td> <td>Neem/ Pungam</td> <td>130</td> <td>50%</td> <td>10</td> </tr> <tr> <td>4<sup>th</sup>Year</td> <td>20</td> <td>Neem/ Pungam</td> <td>130</td> <td>50%</td> <td>10</td> </tr> <tr> <td>5<sup>th</sup> Year</td> <td>20</td> <td>Neem/ Pungam</td> <td>130</td> <td>50%</td> <td>10</td> </tr> </tbody> </table>	Year	No. of trees proposed to be planted	Name of the species	Area( M3)	Survival rate expected	No. of trees expected to be grown	1 <sup>st</sup> Year	20	Neem/ Pungam	130	50%	10	2 <sup>nd</sup> Year	20	Neem/ Pungam	130	50%	10	3 <sup>rd</sup> Year	20	Neem/ Pungam	130	50%	10	4 <sup>th</sup> Year	20	Neem/ Pungam	130	50%	10	5 <sup>th</sup> Year	20	Neem/ Pungam	130	50%	10
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	<p>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.</p>	<p>*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.</p> <p>Due to propose project there will be slight increment in the vehicle movement but the level of service (LOS) anticipated will be Free Flow.</p> <p><b>Impact and Mitigation on local transport:</b></p> <p>The increment in the dust emissions will be mainly due to transportation activity. Therefore, emissions due to mineral handling during mining operation are not much and restricted to the lease area only. Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits are as follows:</p> <ul style="list-style-type: none"> <li>➤ Regular water sprinkling on haul and access roads.</li> <li>➤ Watering of haul roads and other roads at regular intervals</li> <li>➤ Provision of green belt by vegetation for trapping dust.</li> <li>➤ Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.</li> <li>➤ Utmost care will be taken to prevent spillage of sand and stone from the trucks.</li> </ul> <p>Impacts and mitigation measures on transportation is given in <b>Chapter 4. Section 4.2.5.1.</b></p>																																				
33	<p>Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.</p>	<p>Sanitation facilities are provided to mines workers. The details are provided in Mining plan and the same is enclosed as <b>Annexure-4 (Table 2.5)</b>.</p> <p>An area of 0.01.0 Ha, of land is allocated for infrastructure within the lease area.</p> <p><b>Land use details of the quarry area:</b></p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Land Use</th> <th>Area to be required during the mining plan (Ha)</th> <th>Area at the end of the quarrying period (Ha)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Area under Quarry</td> <td>1.32.5</td> <td>3.60.5</td> </tr> <tr> <td>2</td> <td>Waste Dump</td> <td>1.88.0</td> <td>5.70.0</td> </tr> <tr> <td>3</td> <td>Infrastructure</td> <td>0.01.0</td> <td>0.01.0</td> </tr> <tr> <td>4</td> <td>Village Road</td> <td>0.01.0</td> <td>0.01.0</td> </tr> <tr> <td>5</td> <td>Mines Road</td> <td>0.50.0</td> <td>0.30.0</td> </tr> <tr> <td>6</td> <td>Green Belt</td> <td>0.17.0</td> <td>0.36.5</td> </tr> <tr> <td>7</td> <td>Un utilized Area</td> <td>10.63.5</td> <td>4.54.0</td> </tr> <tr> <td colspan="2" style="text-align: center;"><b>Total</b></td> <td><b>14.53.0</b></td> <td><b>14.53.0</b></td> </tr> </tbody> </table> <p>Land use details of the quarry area are given in <b>Chapter-2, Section 2.6.</b></p>	S. No	Land Use	Area to be required during the mining plan (Ha)	Area at the end of the quarrying period (Ha)	1	Area under Quarry	1.32.5	3.60.5	2	Waste Dump	1.88.0	5.70.0	3	Infrastructure	0.01.0	0.01.0	4	Village Road	0.01.0	0.01.0	5	Mines Road	0.50.0	0.30.0	6	Green Belt	0.17.0	0.36.5	7	Un utilized Area	10.63.5	4.54.0	<b>Total</b>		<b>14.53.0</b>	<b>14.53.0</b>
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34	<p>Conceptual post mining land use and Reclamation and</p>	<p>There will be no reclamation and restoration.</p> <p>It is proposed not to fill back the ultimate pit, in as much as good</p>																																				

	<p>Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.</p>	<p>quantity of reserve is available below the workable depth.</p>									
<p>35</p>	<p>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.</p>	<p><b>Impacts on Occupational Health due to project operations:</b>                  Anticipated occupational illness sequel to mining activities involved in the project. Occupational health problems due to dust &amp; noise and Occupational illness by quarry activities as follows;</p> <ul style="list-style-type: none"> <li>➤ Dust related pneumonia</li> <li>➤ Tuberculosis</li> <li>➤ Rheumatic arthritis</li> <li>➤ Segmental vibration</li> </ul> <p><b>Mitigate Measures for Occupational Health</b></p> <ul style="list-style-type: none"> <li>➤ Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.</li> <li>➤ Plantation</li> <li>➤ Avoid blasting during unfavorable wind &amp; atmospheric conditions.</li> <li>➤ Use of personal protective equipment. Compliance with DGMS circulars.</li> <li>➤ Emergency response plan that includes installation of emergency response equipment to combat events such as fire.</li> <li>➤ All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled.</li> <li>➤ On-site first aid facilities will be provided and employees will be extended to the local community in emergencies.</li> </ul> <p><b>Mine Safety and Mitigation Measures:</b></p> <table border="1"> <thead> <tr> <th>S. No</th> <th>Activity</th> <th>Mitigation measures</th> </tr> </thead> <tbody> <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.</td> </tr> </tbody> </table>	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.
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		<p>3</p>	<p>Safety zone</p>	<ul style="list-style-type: none"> <li>➤ Provisions for a buffer zone between the local habitation and the mine lease in the form of a green belt of suitable width.</li> <li>➤ Restricted entry, use of sirens and cordoning of the lasting area are some of the good practices to avoid accidents.</li> </ul>
		<p>4</p>	<p>Overburden stabilization</p>	<ul style="list-style-type: none"> <li>➤ Accidents are known to happen due to overburden collapse.</li> <li>➤ Therefore, slope stabilization and dump stability are critical issues for safety and environment. All measures will be taken care for stabilization of Overburden.</li> </ul>
		<p>5</p>	<p>Worker's health surveillance</p>	<ul style="list-style-type: none"> <li>➤ Health survey programmes for workers and local community.</li> <li>➤ Regular training and awareness of employees to be conducted to meet health and safety objectives.</li> </ul>
		<p>Occupational Health impacts &amp; preventive measures detail given in <b>Chapter 4 Section 4.7.3</b>                  Granite stone 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.</p> <ul style="list-style-type: none"> <li>➤ Awareness and planning are keys to prevention of occupational health hazards.</li> <li>➤ Conducting air monitoring to measure worker exposures and to ensure that provided controls are adequate for protection of workers.</li> <li>➤ Adequate respiratory protection will be provided to the workers.</li> <li>➤ Periodic medical examinations for all workers.</li> <li>➤ Provide workers with training that includes information about health effects, work practices, and use of protective equipments.</li> </ul> <p>The EMP details are given separately as Chapter 10 along with EMP Cost details are provided in Section 10.14.</p>		
<p>36</p>	<p>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</p>	<p>Occupational Health impacts &amp; preventive measures details are given in <b>Chapter 4Section 4.7.1.</b>                  Granite stone 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.</p>		

	detailed along with budgetary allocations.	<ul style="list-style-type: none"> <li>➤ Awareness and planning are keys to prevention of occupational health hazards.</li> <li>➤ Conducting air monitoring to measure worker exposures and to ensure that provided controls are adequate for protection of workers.</li> <li>➤ Adequate respiratory protection will be provided to the workers.</li> <li>➤ Periodic medical examinations for all workers.</li> <li>➤ Provide workers with training that includes information about health effects, work practices, and use of protective equipments.</li> </ul> <p>The EMP details are given as a separately as <b>Chapter 10</b> along with EMP Cost details are provide in <b>Section 10.14</b>.</p> <table border="1"> <thead> <tr> <th colspan="3">EMP COST</th> </tr> <tr> <th>S.No</th> <th>Description</th> <th>Amount in Rs.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Afforestation</td> <td>30,000/-</td> </tr> <tr> <td>2</td> <td>Water Sprinkling</td> <td>50,000/-</td> </tr> <tr> <td>3</td> <td>Water Quality Test</td> <td>25,000/-</td> </tr> <tr> <td>4</td> <td>Air Quality Test</td> <td>25,000/-</td> </tr> <tr> <td>5</td> <td>Noise / Vibration Test</td> <td>25,000/-</td> </tr> <tr> <td>6</td> <td>CSR Activity</td> <td>50,000/-</td> </tr> <tr> <td></td> <td><b>Total EMP Cost</b></td> <td><b>2,05,000/-</b></td> </tr> </tbody> </table>	EMP COST			S.No	Description	Amount in Rs.	1	Afforestation	30,000/-	2	Water Sprinkling	50,000/-	3	Water Quality Test	25,000/-	4	Air Quality Test	25,000/-	5	Noise / Vibration Test	25,000/-	6	CSR Activity	50,000/-		<b>Total EMP Cost</b>	<b>2,05,000/-</b>
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37	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	<p>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 socio - Economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• The quarrying activities in this belt will benefit to the local people both directly 30 persons &amp; indirect persons are 20 Nos.</li> <li>• The direct beneficiaries will be those who got employed in the mines as skilled and unskilled workers.</li> </ul>																											
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39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	<p>Draft EIA is prepared as per obtained ToR and will be submitted for public hearing to TNPCB.</p> <p>After completing Public hearing and obtaining minutes the point wise proponent compliance will be enclosed.</p>																																	
40	Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the Project should be given.	No litigation pending against the project as per Project Proponent.																																	
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	<table border="1"> <thead> <tr> <th>S. No</th> <th>Description of the Cost</th> <th>Amount in Rs.</th> </tr> </thead> <tbody> <tr> <td colspan="3">A. Fixed Cost</td> </tr> <tr> <td>1</td> <td>Land Cost</td> <td>Nil. Because Govt. land</td> </tr> <tr> <td>2</td> <td>Labour shed</td> <td>50,000/-</td> </tr> <tr> <td>3</td> <td>Sanitary facilities</td> <td>50,000/-</td> </tr> <tr> <td>4</td> <td>Fencing Cost</td> <td>1,25,000/-</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td><b>2,25,000/-</b></td> </tr> <tr> <td colspan="3">B. Operational Cost</td> </tr> <tr> <td>1</td> <td>Jack Hammers</td> <td>1,98,000/-</td> </tr> <tr> <td>2</td> <td>Compressor</td> <td>19,82,000/-</td> </tr> <tr> <td>3</td> <td>Diamond wire saw</td> <td>4,87,000/-</td> </tr> </tbody> </table>	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/-	<b>Total</b>		<b>2,25,000/-</b>	B. Operational Cost			1	Jack Hammers	1,98,000/-	2	Compressor	19,82,000/-	3	Diamond wire saw	4,87,000/-
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		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/-
		<b>Total Operational Cost</b>		<b>95,67,000/-</b>
		<b>C. EMP Cost</b>		
		1	Afforestation	30,000/-
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		6	CSR activities	50,000/-
		<b>Total EMP Cost</b>		<b>2,05,000/-</b>
		<b>Total Cost of the Project (A+B+C)</b>		<b>99,97,000/- (Say 1 Crore)</b>
		The project Cost is <b>99,97,000/-</b> as addressed in <b>Chapter 2</b> and <b>Section 2.8</b>		
42	A Disaster Management Plan shall be prepared and include in the EIA/EMP Report.	<p><b>Disaster Management Plan:</b></p> <ul style="list-style-type: none"> <li>➤ Effect the rescue and medical treatment of casualties</li> <li>➤ Safeguard other people</li> <li>➤ Minimize damage to property and the environment</li> <li>➤ Initially contain and ultimately bring the incident under control</li> <li>➤ Identify any dead</li> <li>➤ Provide for the needs of relatives</li> <li>➤ Provide authoritative information to the news media</li> <li>➤ Secure the safe rehabilitation of affected area</li> <li>➤ Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency</li> <li>➤ In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.</li> </ul> <p>Detailed Disaster management plan are provided in <b>Chapter 7</b> and <b>Section 7.2.3.</b></p>		
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.	<ul style="list-style-type: none"> <li>➤ The quarrying activities in this belt will benefit to the local people both directly 30 persons&amp; indirect persons are 20 Nos.</li> <li>➤ The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers.</li> <li>➤ Improvement in Per Capita Income.</li> <li>➤ The socio - Economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters.</li> <li>➤ 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.</li> </ul>		

44	Besides the above, the below mentioned general points are also to be followed:	
a)	Executive Summary of the EIA/EMP report.	Executive Summary of EIA Report enclosed separately
b)	All documents to be properly referenced with index and continuous page numbering.	Noted and 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.	Noted and 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 <b>Chapter 12</b> .
e)	Where the documents provided are in a language other than English, an English translation should be provided.	The entire document is prepared in English.
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, which are available on the website of this Ministry, should be followed.	Noted
h)	Changes if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H process) will entail conducting the PH again with the revised documentation.	Noted
i)	As per the circular no J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report	Not Applicable, as it is a new project

	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.	
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 adjoin area.	All the Sectional Plates are enclosed as <b>Annexure-5</b>

**1.11.5.2 In addition to the above the following shall be furnished:**

**The executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following point:**

<b>S. No</b>	<b>ToR Point</b>	<b>Compliance</b>
1	Project name and location (village, District, State, Industrial Estate (if applicable))	Noted and is followed
2	Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous waste.	Noted and is followed
3	Measures for mitigation the impacts on the environment and mode of discharge or disposal	Noted and is followed
4	Capital cost of the project, estimated time of completion.	Noted and is followed
5	The proponent shall furnish the contour map of the water table detailing the number of wells located around the site and impacts on the wells due to mining activity	Noted and is followed
6	A detailed study of the lithology of the mining lease area shall be furnished	Noted and is followed
7	Detailed of village map” A” register and FMB sketch shall be furnished	Noted and is followed
8	Detailed mining closure plan for the proposed projects approved by the Geology of Mining department shall be shall be submitted along with EIA report	Noted and is followed
9	Obtain a letter/certificate from the Assisstant Director of Geology and Mining standing that	Noted and is followed

	there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report	
10	EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010	Noted and is followed
11	Details plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.	Noted and is followed
12	The EIA study report shall include the surrounding mining activity, if any.	Noted and is followed
13	Modelling study for Air, Water and Noise shall be carried out in this field and incremental increase in the above study shall be substantiated with mitigation measures	Noted and is followed
14	A study on the geological resources available shall be carried out and reported	Noted and is followed
15	A specific study on agriculture and livelihood shall be carried out and reported	Noted and is followed
16	Impact of soil erosion, soil physical chemical and biological property changes may be assumed	Noted and is followed
17	Site selected for the project-Nature of land Agricultural (single/double crop), barren, Govt./private land, status of is acquisition, nearby (in 2-3km) water body, population, with in 10km other industries, forest, eco-sensitive zones, accessibility, (note-incase if industrial estate this information may not be necessary)	Noted and is followed
18	Baseline environmental data-air quality, surface and ground water quality and soil characteristic, flora and fauna, socio economic conditions of the nearby population.	Noted and is followed
19	Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.	Noted and is followed
20	Likely impact of the project on Air, Water, Land, flora and fauna and nearby population.	Noted and is followed
21	Emergency preparedness plan in case of natural or in case of plant emergencies.	Noted and is followed
22	Issues raised during public hearing (if applicable) and response giving.	Noted and is followed
23	CER plan with proposed expenditure.	Noted and is followed
24	Occupational Health Measures.	Noted and is followed
25	Post project monitoring plan.	Noted and is followed
26	The project proponent shall carry out detailed	Noted and is followed

	hydro geological study through institutions/NABET Accredited agencies.	
27	A detailed report on the greenbelt development already undertaken is to be furnished and also submit the proposal for greenbelt activities	Noted and is followed
28	The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines	Noted and is followed
29	A specific study should include impact on flora and fauna, disturbance to migratory pattern of animals	Noted and is followed
30	Reserve funds should be earmarked for proper closure plan	Noted and is followed
31	A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and Forests (EC.2) Department dated 25.06.2018 regarding ban on time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.	Noted and is followed

**1.11.5.3 Besides the above the below mentioned general points should also be followed:**

S. No	ToR Point	Compliance
a.	A note containing compliance of the ToR with cross referencing of the relevant sections/pages of the EIA report should be provided.	Noted and is followed
b.	All documents may be properly referenced with index, page number and continuous page numbering.	Noted and is followed
c.	Where data are present in the report especially in table, the period in which the data were collected and the sources should be indicated.	Noted and is followed
d.	While preparing the EIA report, the instructions for the proponents and instruction for the consultant issued by the MoEF vide OM no. J-11013/41/2006-IA.II (I) dated 4 <sup>th</sup> August 2009 which are available on the website of the ministry should also be followed.	Noted and is followed
e.	The consultants involved in the preparation of EIA/EMP report after accreditation with quality council of India (QCI)/National	EIA Report is prepared by NABET accredited Consultant, The Consultancy Laboratory is certified by MoEF&CC and NABL

<p>Accreditation board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organizations/laboratories including the status of the approvals etc. in this regards circular no. F.No.J-11013/77/2004-IA-II(I) dated 2<sup>nd</sup> December, 2009, 18<sup>th</sup> March 2010 , 28<sup>th</sup> may 2010, 28<sup>th</sup> June 2010, 31<sup>st</sup> December 2010 and 30<sup>th</sup> September 2011 posted on the Ministry's website <a href="http://www/moef.nic.in/">http://www/moef.nic.in/</a> may be referred.</p>	<p>accredited. The disclosure of Consultant is given in <b>Chapter 12</b>.</p>
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## 2 PROJECT DESCRIPTION

### 2.1 Type of Project including interlinked and interdependent projects

The black 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 & 6 m width with vertical slopes. The area applied for quarry lease exhibits hilly terrain; the altitude of the area is above ( $\approx 277$ ) AMSL. Total estimated Geological reserves are 3,29,201 m<sup>3</sup>. Total Mineable Reserves is estimated as 3,01,972 m<sup>3</sup>. Maximum production will be 2,052 m<sup>3</sup> of ROM of Black Granite and 30,197 m<sup>3</sup> of recoverable production of granite per annum. Summary of quarry reserves are given in **Table 2-1**.

The extent of the Quarry lease area is 14.53.0 Ha. The Quarry is located at Karandapalli village, Denkanikottai taluk, Krishnagiri District, Tamilnadu State. Quarry lease area falls in the survey of India Toposheet no 57 H/10,11,14&15 and the area lies in the Eastern Longitude from 77°43'28.43"E to 77°43'46.48"E and Northern latitude from 12°28'11.55"N to 12°28'27.29"N.

**Table 2-1 Summary of Project Reserves**

S. No	Description	Quantity (m <sup>3</sup> )
<b>Geological Reserves:</b>		
1	Geological Reserves (ROM)	3,29,201
2	Geological Reserves (at 10% Recovery)	32,920
<b>Mineable Reserves:</b>		
1	Mineable Reserves (ROM)	3,01,972
2	Mineable Reserves (at 10 % Recovery)	30,197
3	The peak/maximum annual production per year would be	2,052

### 2.2 Need of the Project

The granite dimensional stone material by virtue of its pleasing color and texture and its best ability to take polishing and appealing look in polished product has attracted the consumers in the building construction and interior decoration industries. The domestic market capabilities have also been explored in recent periods. Bulk quantity of the blocks is produced and exported as raw blocks and some quantity is being processed at TAMIN's granite processing units and exported as value added finished products.

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 industries and factories are growing up.

This project will provide direct employment for about 30 persons. This material is well known in the international supermarket of Granite which will fetch a good foreign exchange to the nation.



### 2.3 Location of the project

The quarry is located at SF.No.155/2, Karandapalli village, Denkanikottai taluk, Krishnagiri District, Tamilnadu State. Quarry lease area falls in the survey of India Topo sheet 57H/10,11,14&15 and the area lies in the eastern Longitude from 77°43'28.43"E to 77°43'46.40"E and Northern latitude from 12°28'11.55"N to 12°28'27.29"N. The topography of the area is hilly. The elevation of the lease area is  $\approx 277$ m AMSL. The boundary coordinates of the site are shown in the **Table 2.2**.

**Table 2-2 The Boundary Coordinates of the Site**

S. No	Bourndary mark point	Latitude (N)	Longitude(E)
1	TM1	12 28' 22.77"	77 43' 45.76"
2	TM2	12 28' 19.94"	77 43' 45.33"
3	TM3	12 28' 19.91"	77 43' 45.07"
4	TM4	12 28' 16.98"	77 43' 45.44"
5	TM5	12 28' 16.17"	77 43' 45.03"
6	TM6	12 28' 14.94"	77 43' 44.46"
7	TM7	12 28' 11.55"	77 43' 41.94"
8	TM8	12 28' 13.18"	77 43' 38.22"
9	TM9	12 28' 13.83"	77 43' 35.71"
10	TM10	12 28' 16.68"	77 43' 36.37"
11	TM11	12 28' 17.79"	77 43' 35.98"
12	TM12	12 28' 17.20"	77 43' 29.69"
13	TM13	12 28' 17.76"	77 43' 29.23"
14	TM14	12 28' 17.67"	77 43' 28.43"
15	TM15	12 28' 21.01"	77 43' 29.89"
16	TM16	12 28' 27.29"	77 43' 32.60"
17	TM17	12 28' 26.98"	77 43' 34.52"
18	TM18	12 28' 26.47"	77 43' 36.80"
19	TM19	12 28' 25.91"	77 43' 40.07"
20	TM20	12 28' 23.86"	77 43' 40.64"
21	TM21	12 28' 23.70"	77 43' 43.22"
22	TM22	12 28' 23.88"	77 43' 45.38"
23	TM23	12 28' 24.59"	77 43' 45.62"
24	TM24	12 28' 24.12"	77 43' 46.40"

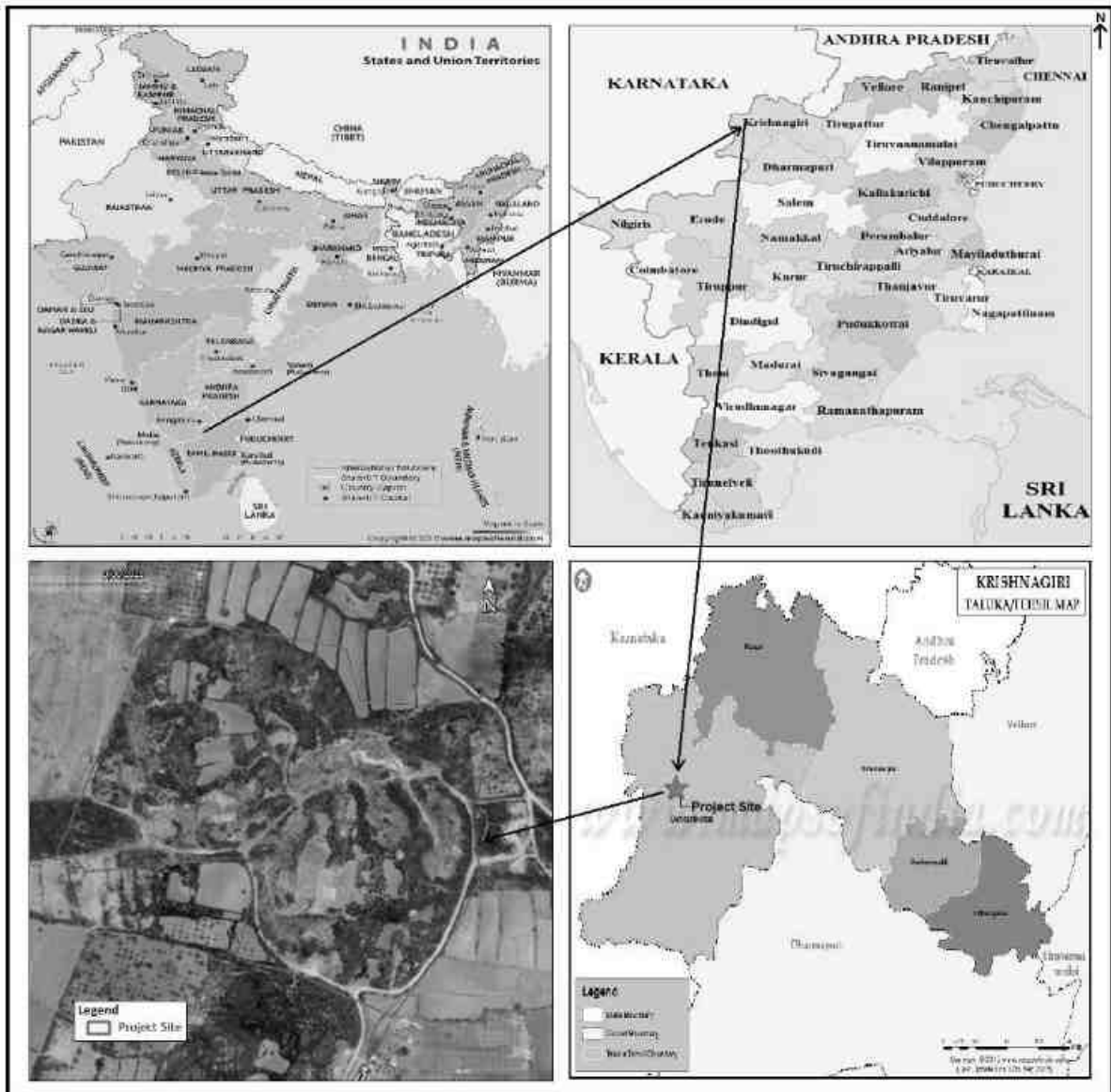


Figure 2-1 Project Location map



Figure 2-2 300m Google image of the lease area



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



Figure 2-4 Google Imagery of 1 km radius of the lease area

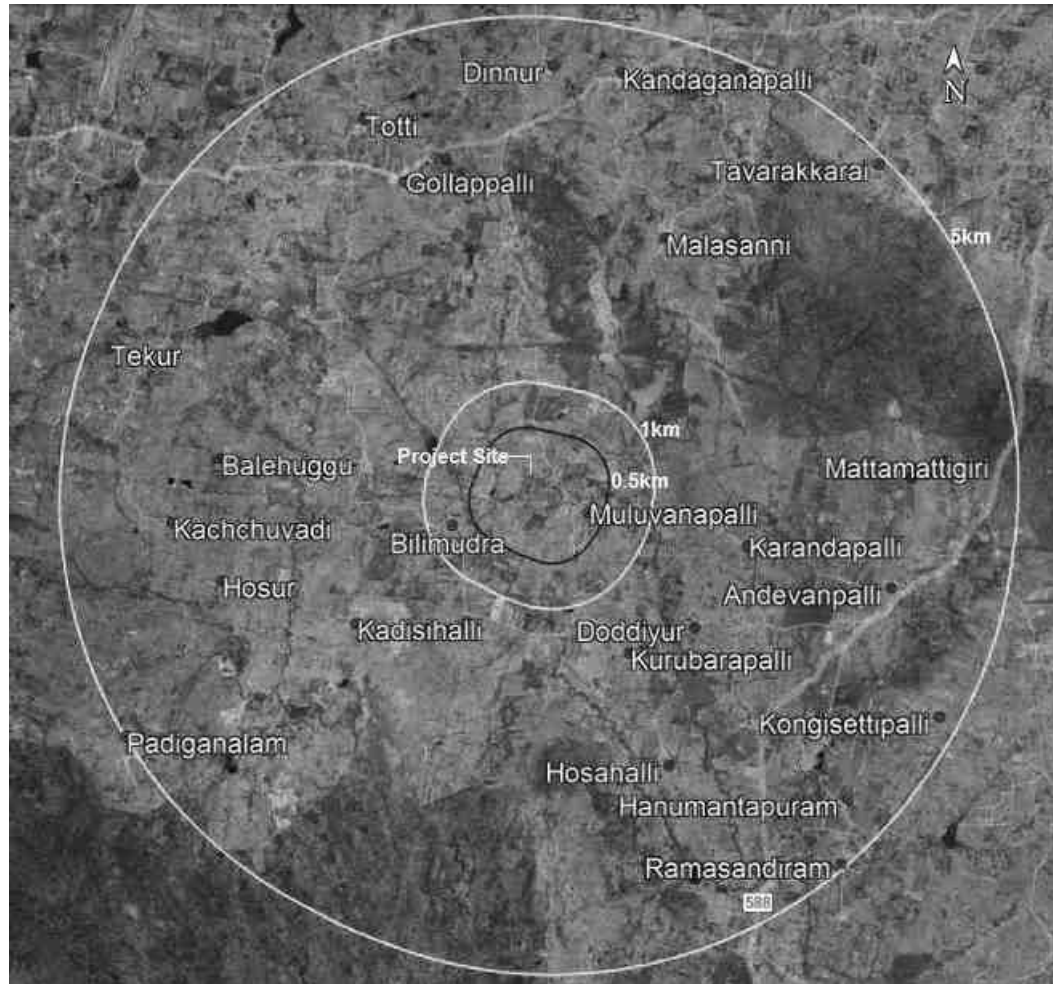


Figure 2-5 5 km Google Imagery of the project site

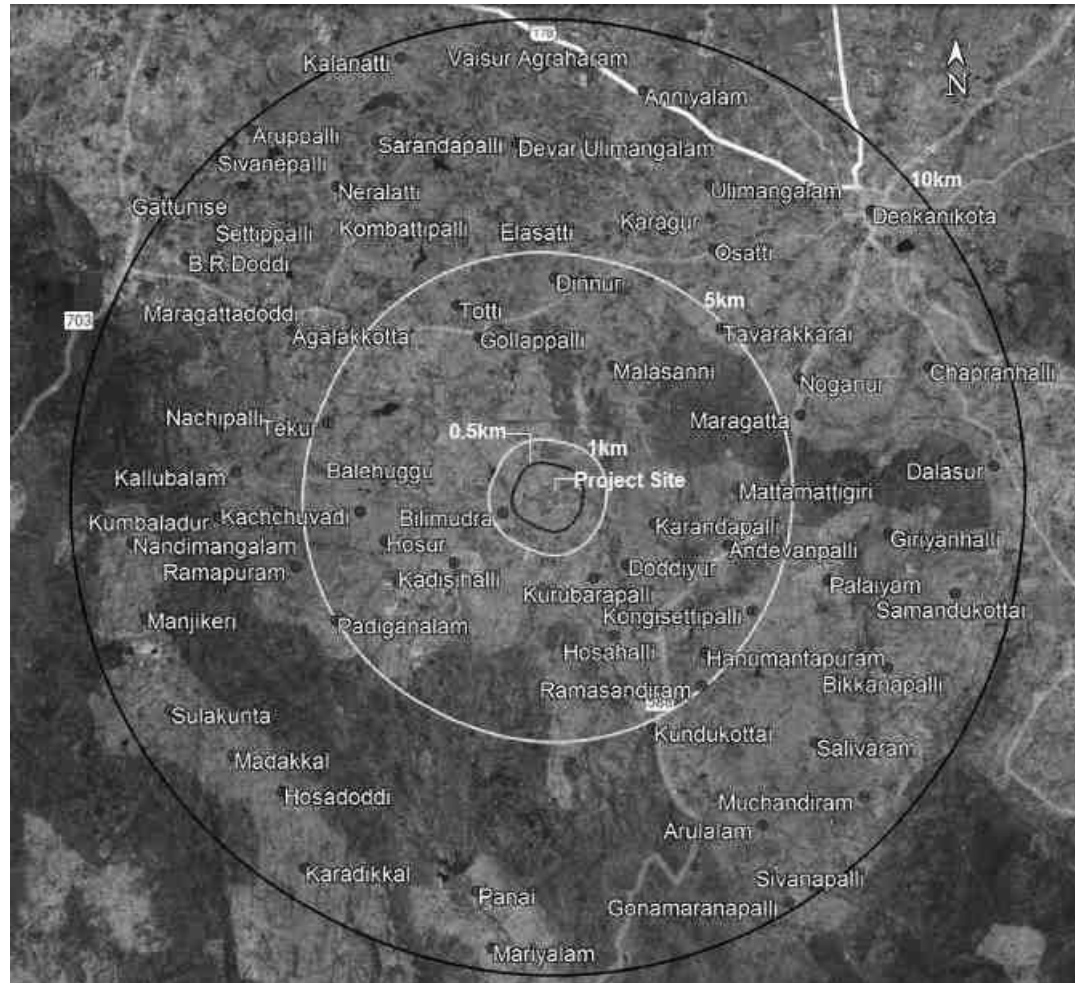


Figure 2-6 10 km Google Imagery of the project site

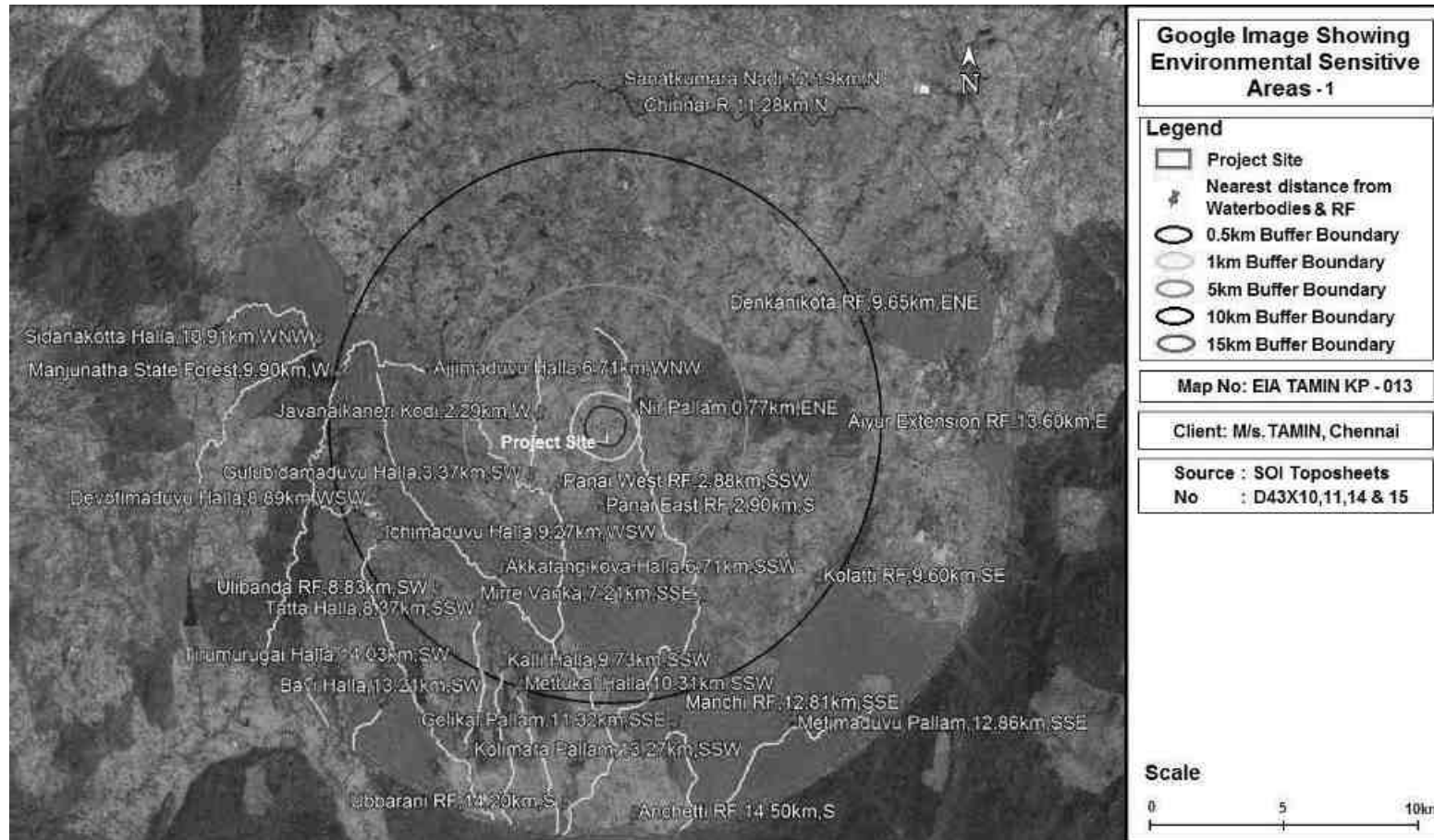


Figure 2-7 (a) Environmental Sensitive areas within 15 km radius of the lease area demarcated on Google Image



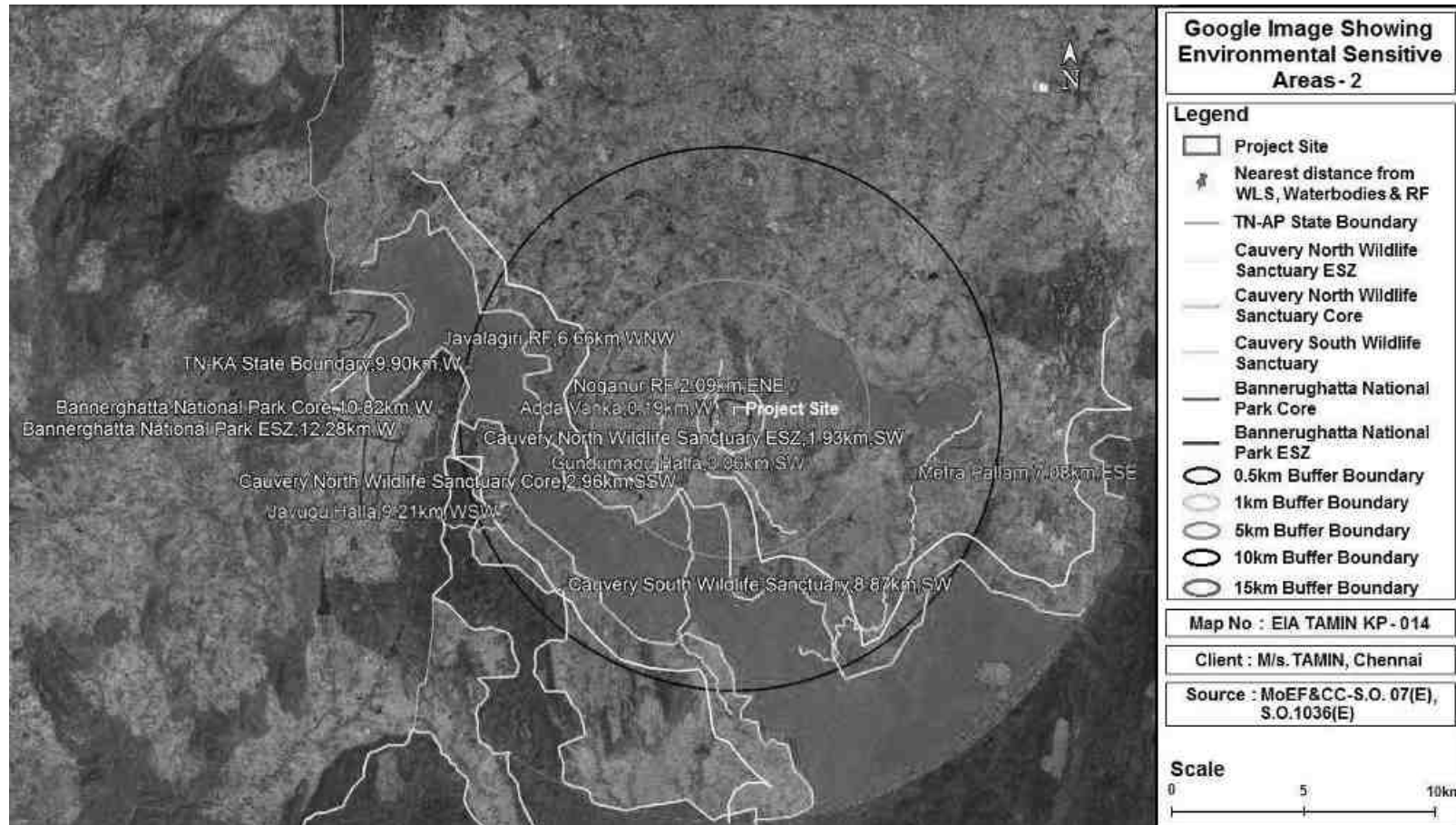


Figure 2-8 (b) Environmental Sensitive areas within 15 km radius of the lease area demarcated on Google Image

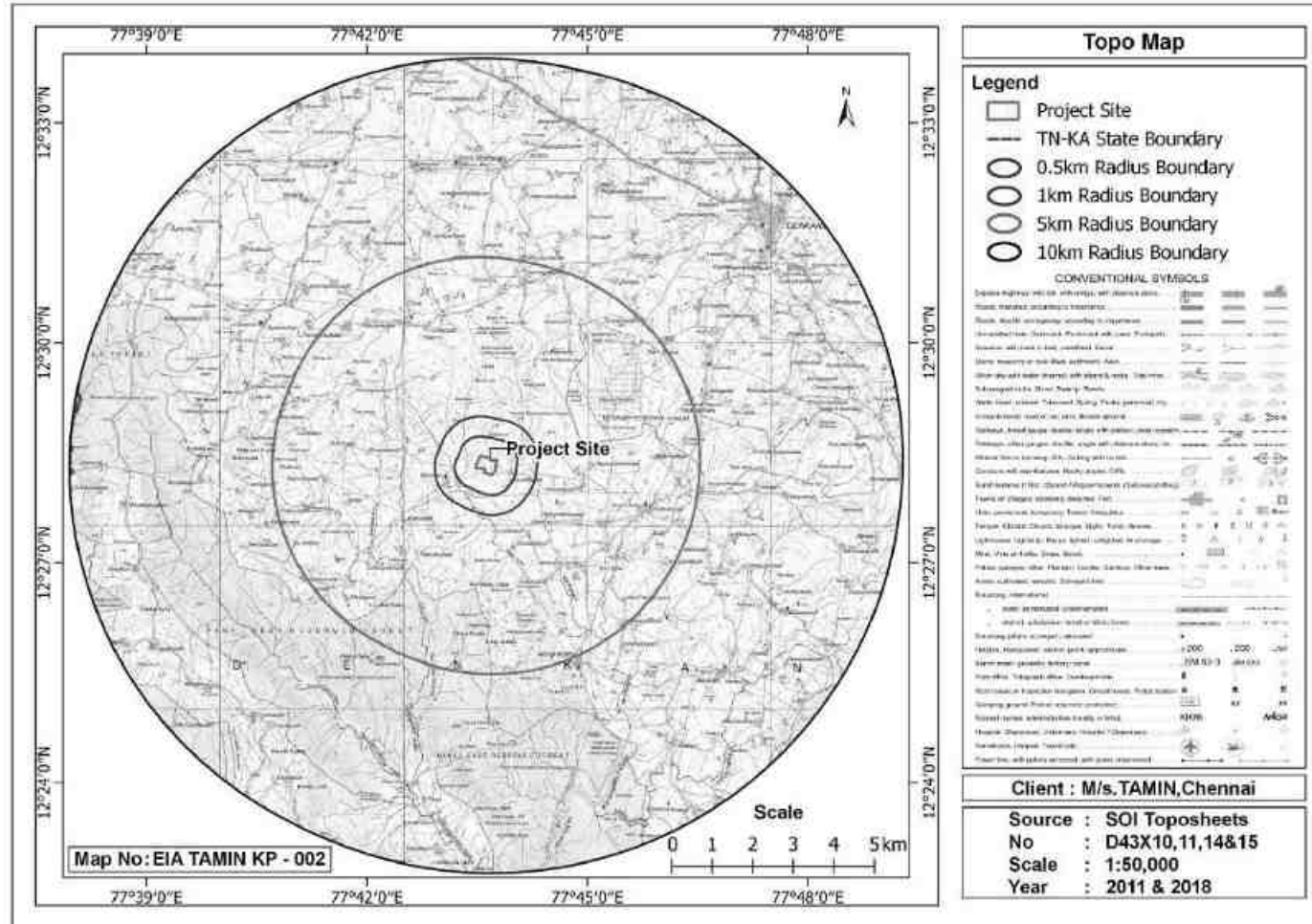


Figure 2-9 Topo map of the study area

**Table 2-3 Salient Features and Environmental sensitivity details within 15km radius of the project side**

S. No	Particulars	Details			
1	Latitude	77°43'28.43"E to 77°43'46.40"E			
2	Longitude	12°28'11.55"N to 12° 28'27.29"N			
3	The lease area height	277m			
4	Topo sheet no.	57 H/10,11,14 & 15			
5	Topography	Hilly terrain			
6	Land Type	Government Poramboke land			
7	Extent of lease area(hectares)	14.53.0			
8	Nearest National highway	NH948A (Dobbaspeth-Thalli-Attibele) ~ 13.97km, NNW			
9	Nearest State highway	SH 17B (Hosur-Denkanikottai) ~ 8.24km, NNE			
10	Nearest railway station	Periya Naga Thunai Railway station ~ 21.80km, ENE			
11	Nearest airport	Hosur Airport ~ 21.06km, N Kempegowda International Airport, Bangalore ~ 78.51km, N			
12	Nearest town / city	Denkanikottai~8.5km, NE			
13	Hills / valleys	Nil within 15 km radius from the project boundary			
14	Archaeologically important Places	Nil within 15 km radius from the project boundary			
15	National parks / Wildlife Sanctuaries	<b>S.No</b>	<b>Wildlife</b>	<b>Distance (≈km)</b>	<b>Direction</b>
		1.	Cauvery North Wildlife Sanctuary ESZ	1.93	SW
		2.	Cauvery North Wildlife Sanctuary Core	2.96	SSW
		3.	Cauvery South Wildlife Sanctuary	8.87	SW
		4.	Bannerghatta National Park Core	10.82	W
		5.	Bannerghatta National Park ESZ	12.28	W
16	Reserve Forest	<b>S.No</b>	<b>Places</b>	<b>Distance (≈km)</b>	<b>Direction</b>
		1.	Noganur RF	2.09	ENE
		2.	Panai West RF	2.88	SSW
		3.	Panai East RF	2.90	S
		4.	Javalagiri RF	6.66	WNW
		5.	Ulibanda RF	8.83	SW
		6.	Kolatti RF	9.60	SE
		7.	Denkanikota RF	9.65	ENE
		8.	Manjunatha State Forest	9.90	W
		9.	Manchi RF	12.81	SSE
		10.	Aiyur Extension RF	13.60	E
		11.	Ubbaran RF	14.20	S
		12.	Anchetti RF	14.50	S
17	Water Bodies	<b>S.No</b>	<b>Places</b>	<b>Distance (≈km)</b>	<b>Direction</b>
		1.	Adda Vanka	0.19	W
		2.	Pond near Bilimudra	0.55	SSW
		3.	Nir Pallam	0.77	ENE

S. No	Particulars	Details				
		S. No	Places	Distance (≈km)	Direction	Population
		4.	Javanaikaneri Kodi	2.29	W	
		5.	Andevanpalli Lake	2.56	ESE	
		6.	Gundumadu Halla / Agina Halla	3.06	SW	
		7.	Gulubidamaduvu Halla	3.37	SW	
		8.	Lake near Tekur	3.43	WNW	
		9.	Ajjimaduvu Halla / Dodda Halla	6.71	WNW	
		10.	Akkatangikova Halla / Battalamaduvu Halla	6.71	SSW	
		11.	Metra Pallam / Periya Pallam	7.08	ESE	
		12.	Mirre Vanka / Kittilimarattu Pallam / Dodda Halla	7.21	SSE	
		13.	Denkanikota Lake	8.01	NE	
		14.	Tatta Halla	8.37	SSW	
		15.	Onnamma Cheruvu	8.53	NNW	
		16.	Devotimaduvu Halla	8.89	WSW	
		17.	Javugu Halla	9.21	WSW	
		18.	Ichimaduvu Halla / Madeshvara halla	9.27	WSW	
		19.	Kalli Halla	9.73	SSW	
		20.	Mettukal Halla	10.31	SSW	
		21.	Sidanakotta Halla	10.91	WNW	
		22.	Chinnar R	11.28	N	
		23.	Gelikal Pallam	11.32	SSE	
		24.	Sanatkumara Nadi	12.19	N	
		25.	Metimaduvu Pallam / Kattari Pallam	12.86	SSE	
		26.	Bavi Halla	13.21	SW	
		27.	Kolimara Pallam	13.27	SSW	
		28.	Tali Kere	14.01	NNW	
		29.	Tirumurugai Halla	14.03	SW	
18	Nearest Villages					
		1.	Muluvanapalli	0.31	E	450
		2.	Bilimudra	0.68	W	600
		3.	Kurubarapalli	1.50	SSE	350
		4.	Karandapalli	1.76	E	3678
		5.	Doddiur	2.82	SE	250
19	Seismicity	Seismic zone-III (moderate risk)				
20	Defense Installations	Nil within 15 km radius				
21	State Boundary	TN – KA State Boundary ~ 9.90km, W				
22	Monuments	Nil within 15 km radius				

**Table 2-4 Project summary**

S.No	Particulars	Details
1.	Project Location	S.F.No.155/2, Karandapalli village, Denkanikottai taluk, Krishnagiri District, TamilNadu State.
2.	Land classification	Government Land
3.	Extent of lease area (Ha.)	14.53.0
4.	Precise area communication	Precise area communication letter was granted vide Industries (MME.1) Department, Rc. No. 957/MM4/2022, dated: 01.03.2022.
5.	Lease Period	30 years
6.	Estimated Geological Reserves (ROM) m <sup>3</sup>	3,29,201
7.	Estimated Mineable Reserves (ROM) m <sup>3</sup>	3,01,972
8.	Black Granite production per annum m <sup>3</sup>	2,052
9.	Depth of Mining	30m from the surface level and the top surface of the granite body
10.	Method of Mining	Open cast semi mechanized method
11.	Water Requirement (KLD)	1.5
12.	Source of Water	Road tankers
13.	Power requirement (kVA)	60
14.	Power Backup (DG set)Kva	1* 125
15.	Fuel requirements (Lts/Day)	200
16.	Direct Manpower (Nos)	30
17.	Municipal Solid Waste Generation (kg/day)	13.5
18.	Waste Oil generation (Lts/Year)	3.0
19.	Project Cost in Lakhs	99.97
20.	EMP Cost in Lakhs	2.05

#### 2.4 Nearest Human Settlement

The detail of nearest human settlement from the project site is provided below in **Table 2.5**.

**Table 2-5 Nearest Human Settlement**

S.No	Places	Distance (~km)	Direction	Population
1.	Muluvanapalli	0.31	E	450
2.	Bilimudra	0.68	W	600
3.	Kurubarapalli	1.50	SSE	350
4.	Karandapalli	1.76	E	3678
5.	Doddiur	2.82	SE	250

#### 2.5 Details of alternate sites considered

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

No R&R, no Sensitive area etc., making the site suitable for the mining of Black Granite. The site

meets the requirement of all critical factors that are important for success of mining in the state and could be a pre-eminent location. Thus, there are no alternative sites examined.

## 2.6 Size or Magnitude of operation

The black granite quarrying operations is carryout by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 6m &6m.

The Geological reserves of Black granite have been computed based on the Geological Plan &Sections up to the economically workable average depth of 30m from the surface level and the top surface of the granite body works out to 3,29,201 m<sup>3</sup>. By applying 10% recovery the effective geological reserveswork out 32,920 m<sup>3</sup>.

Mineable Reserves have been computed as 3,01,972 m<sup>3</sup> after deleting 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 30,197 m<sup>3</sup> by applying the recovery factor 10%. The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 30,197m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery.

Total waste(Granite waste + Side Burden to be generated during the five years of Mining Plan period will be around 1,99,241m<sup>3</sup>. These wastes are proposed to be dumped on the South eastern side of lease area. The Land Use break up summarized as **Table 2.6**.

**Table 2-6 Land use details of the quarry area**

S. No	Land Use	Area to be required during the mining plan(Ha)	Area at the end of the quarrying period (Ha)
1	Area under Quarry	1.32.5	3.60.5
2	Waste Dump	1.88.0	5.70.0
3	Infrastructure	0.01.0	0.01.0
4	Village Road	0.01.0	0.01.0
5	Mines Road	0.50.0	0.30.0
6	Green Belt	0.17.0	0.36.5
7	Un utilized Area	10.63.5	4.54.0
<b>Total</b>		<b>14.53.0</b>	<b>14.53.0</b>

## 2.7 Granite Reserves

The Geological reserves of Black granite have been computed based on the Geological Plan &Sections up to the economically workable average depth of 30m from the surface level and the top surface of the granite body works out to 3,29,201 m<sup>3</sup>. By applying 10% recovery the effective Geological reserves works out 32,920 m<sup>3</sup>.

Mineable Reserves have been computed as 3,01,972 m<sup>3</sup> after deleting 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 30,197 m<sup>3</sup> by applying the recovery factor 10%. The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 10,255m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery. Sectional plates are enclosed as **Annexure-V**.

The generation of total waste estimated about 1,99,241m<sup>3</sup>(Granite Rejects 92,295m<sup>3</sup> and side Burden 83,312&Over Burden 23,634 m<sup>3</sup>) and the dumps will be maintained not exceeding 5m height and the angle of slope of dumps will be at 45° from horizontal. The area for disposal of waste rock has been identified by extending the existing waste dump on south eastern side of the lease area. The unsold blocks are kept within the boundary on the country rock area.

The total waste (Granite waste + Side Burden+Over Burden) to be generated during the 5 years of Mining plan period will be around 1,99,241 m<sup>3</sup>. These wastes are proposed to be dumped on the South eastern side of lease area. Granite Quarry Reserves is given in **Table 2-7**. The yearwise production details are given in the **Table 2.8**. Surface Plan of the Quarry is given in **Figure 2.8** Geological plan and cross section of the quarry is shown in **Figure 2.9**. Conceptual Plan of the quarry area is shown as **Figure 2.14**. Land use and afforestation of the quarry is shown as **Figure 2.11**. Year wise production plan is shown as **Figure 2.12**.

**Table 2-7 Granite Quarry Reserves**

S. No	Description	Granite (m <sup>3</sup> )	Recovery 10% (m <sup>3</sup> )	Granite waste 90% (m <sup>3</sup> )
1	Geological Resource	3,29,201	32,920	2,96,281
2	Mineable Reserves	3,01,972	30,197	2,71,775

**Table 2-8 Yearwise Production details**

S. No	Year	ROM (m <sup>3</sup> )	Recovery@ 10% (m <sup>3</sup> )	Total Waste Generation(m <sup>3</sup> )			
				Over Burden	Side Burden (m <sup>3</sup> )	Granite Rejects	Total
1	1 <sup>st</sup> Year	20,493	2,049	2,960	1,490	18,444	22,894
2	2 <sup>nd</sup> Year	20,516	2,052	5,129	10,258	18,464	33,851
3	3 <sup>rd</sup> Year	20,517	2,051	5,712	22,960	18,466	47,138
4	4 <sup>th</sup> Year	20,507	2,051	3,726	25,006	18,456	47,188
5	5 <sup>th</sup> Year	20,517	2,052	6,107	23,598	18,465	48,170
<b>Total</b>		<b>1,02,550</b>	<b>10,255</b>	<b>23,634</b>	<b>83,3121</b>	<b>92,295</b>	<b>1,99,241</b>

**Estimated Life of the Quarry:**

- Proposed ROM: 1,02,550 m<sup>3</sup>
- Recoverable Reserved @10%: 10,255 m<sup>3</sup>
- Average Production per Year@10%: 30,197/15 Years= 2,052 m<sup>3</sup>
- Estimated Life of the Quarry: 30,197/2,052 m<sup>3</sup>=15 years



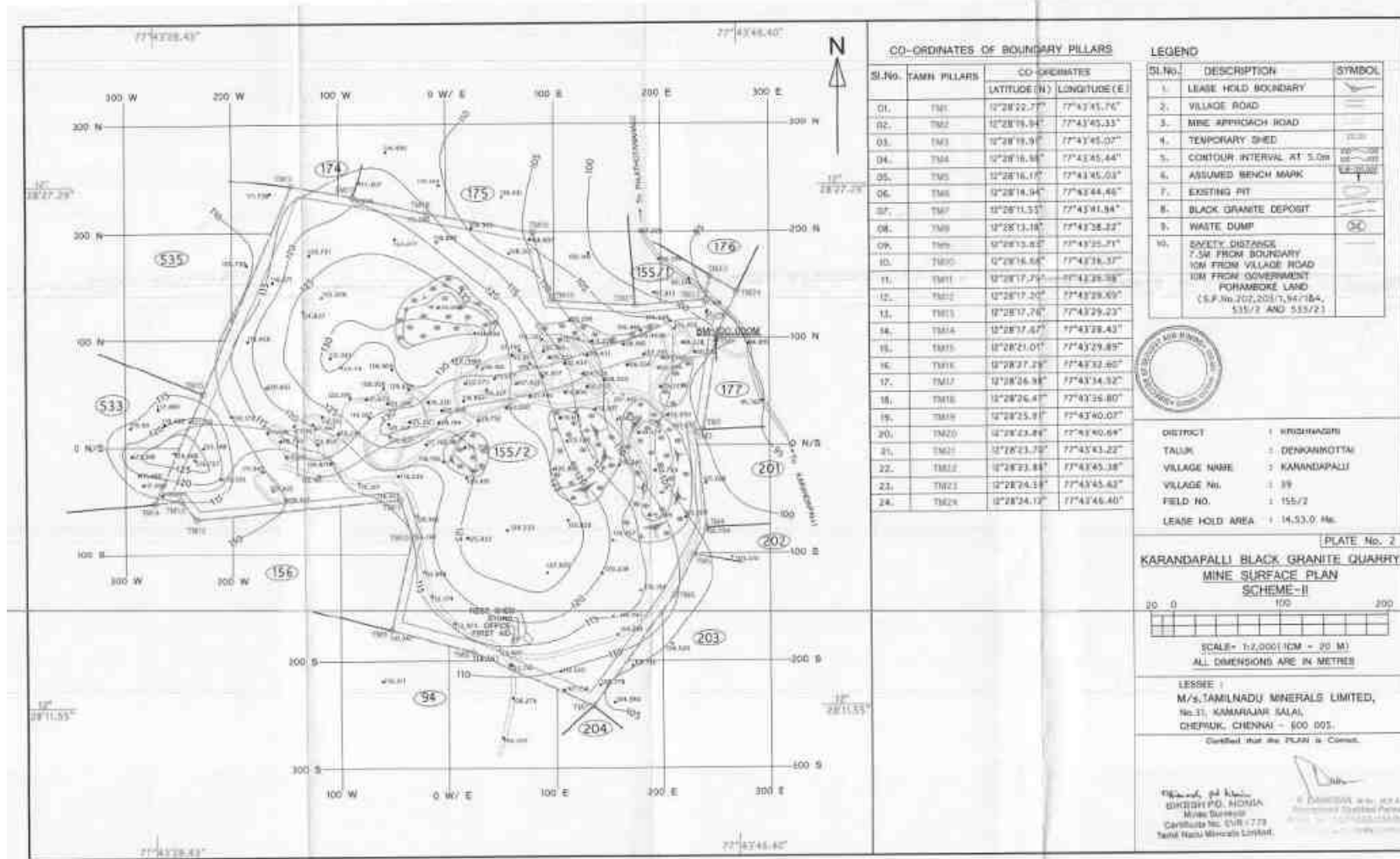


Figure 2-8 Surface Plan of the Quarry

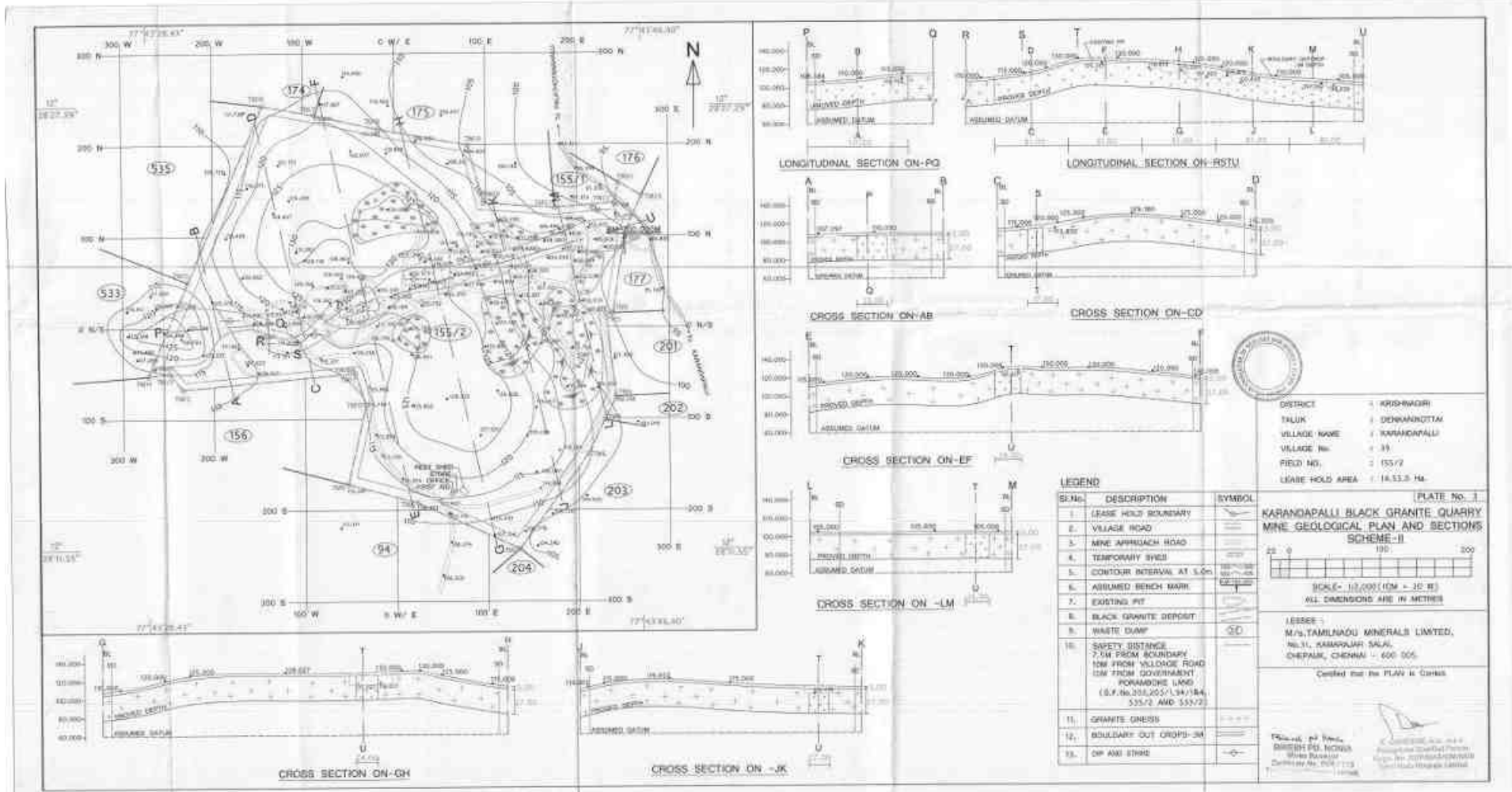


Figure 2-9 Geological plan & section of the quarry

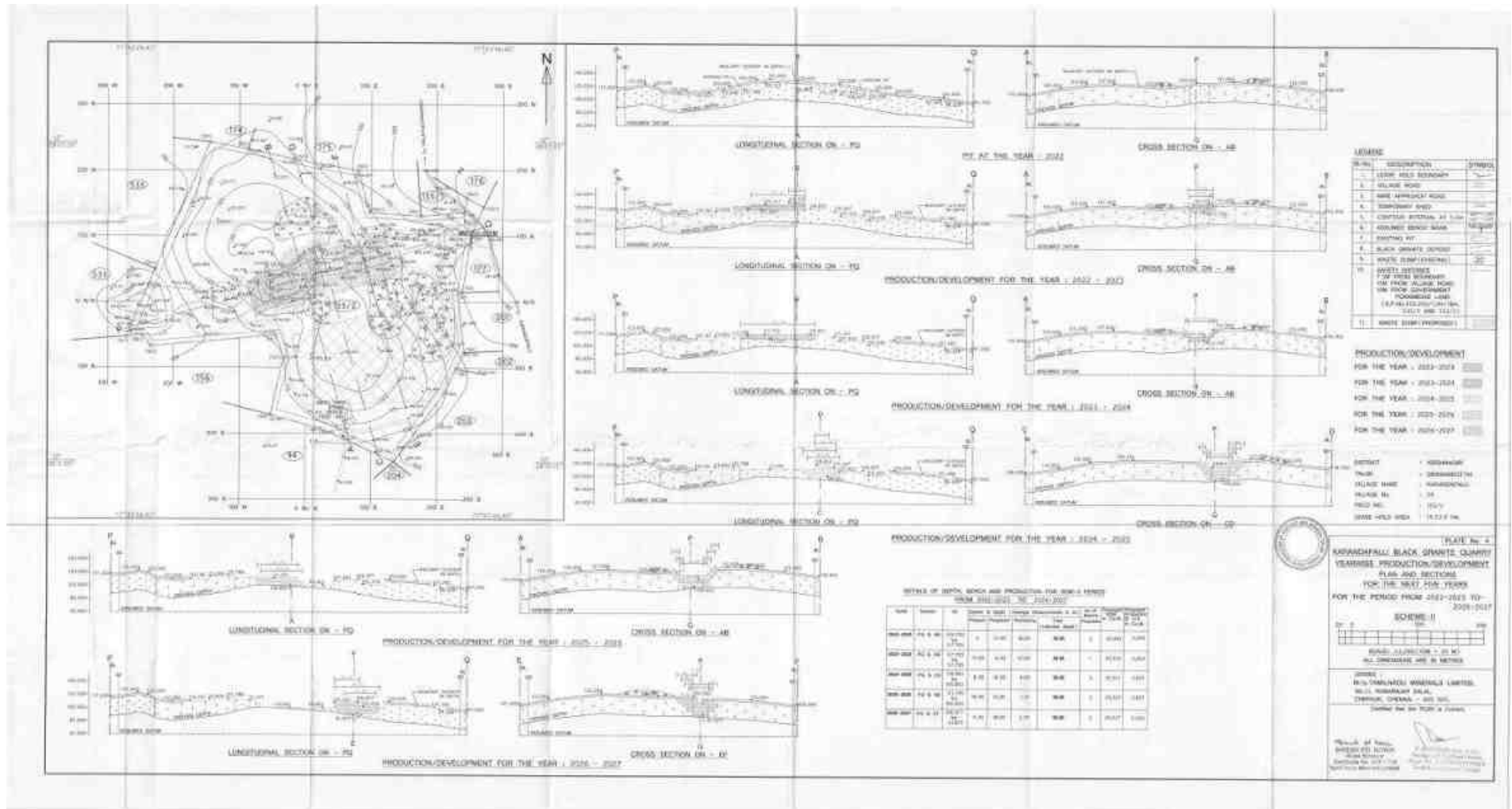


Figure 2-10 Yearwise Production/Development Plan for 5 years

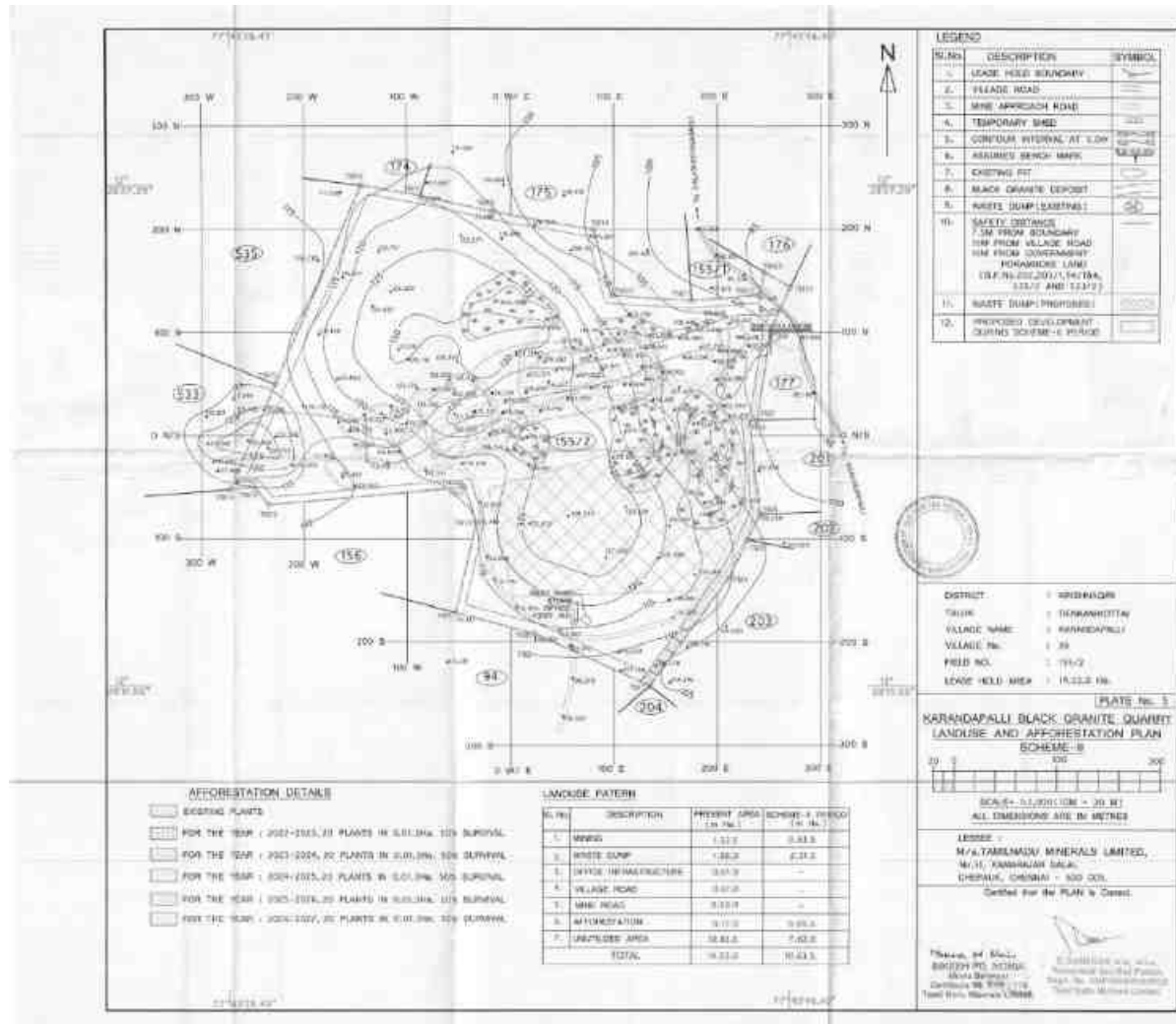


Figure 2-11 Land Use and Afforestation Plan

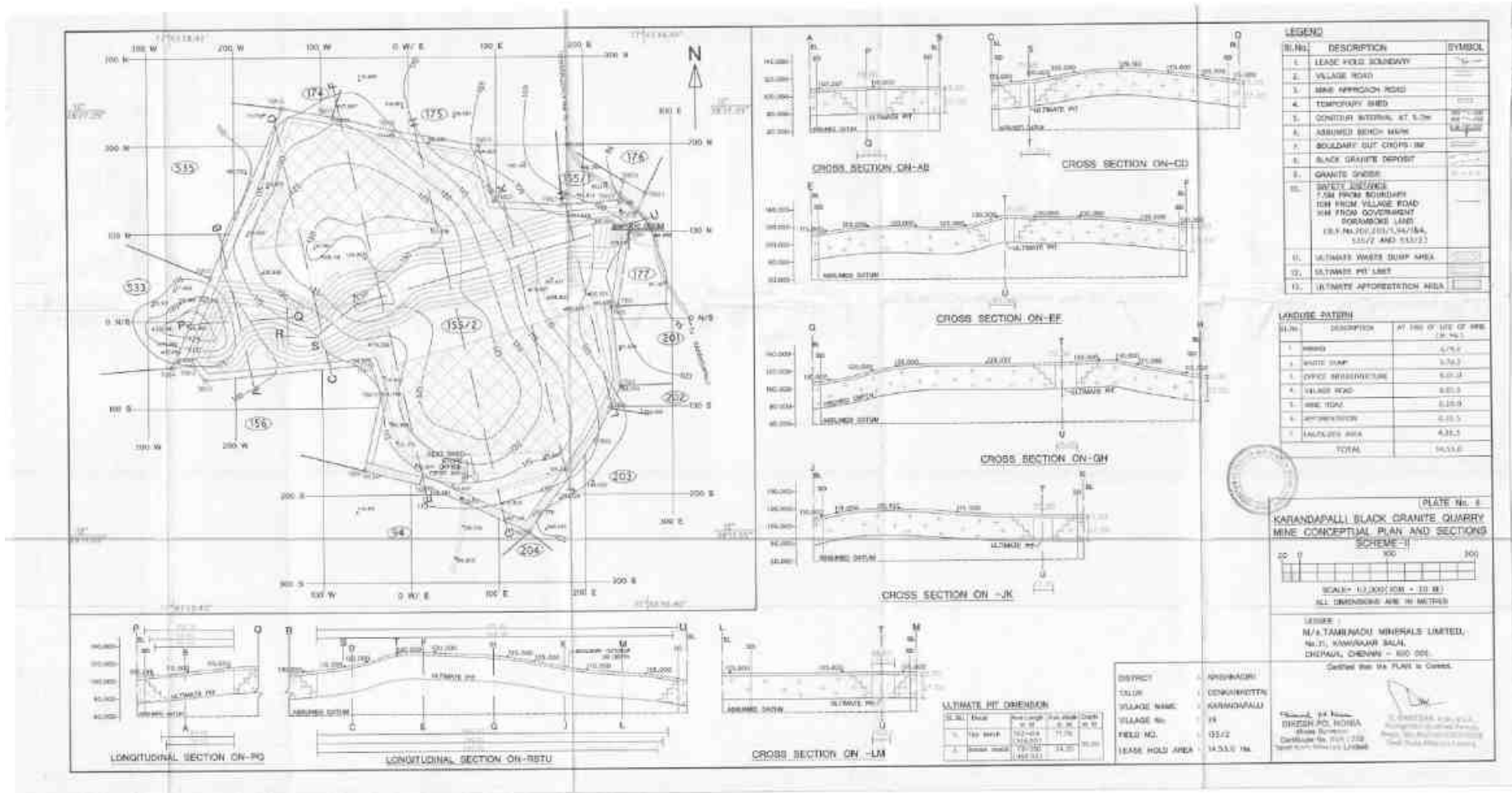


Figure 2-12 Conceptual Plan

### 2.7.1 Proposed schedule for approval and implementation

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

Particulars	Time Schedule
Preparation of PFR, FORM – I and obtaining ToR	29.11.2022
Submission of DRAFT EIA/EMP	May 2023
Conducting Public Hearing and submitting final EIA/EMP and PoD	June 2023
Presentation before SEAC and Obtaining EC	July 2023

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

### 2.8 Project Cost

The project cost is summarized in Table 2.9.

**Table 2-9 Project cost**

S. No	Description of the Cost	Amount in Rs.
<b>A. Fixed Cost</b>		
1	Land Cost	Nil. Because Govt. land
2	Labour shed	50,000/-
3	Sanitary facilities	50,000/-
4	Fencing Cost	1,25,000/-
<b>Total</b>		<b>2,25,000/-</b>
<b>B. Operational Cost</b>		
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/-
<b>Total Operational Cost</b>		<b>95,67,000/-</b>
<b>C. EMP Cost</b>		
1	Afforestation	30,000/-
2	Water Sprinkling	50,000/-
3	Water Quality test	25,000/-
4	Air Quality test	25,000/-
5	Noise/Vibration test	25,000/-
6	CSR activities	50,000/-
<b>Total EMP Cost</b>		<b>2,05,000/-</b>
<b>Total Cost of the Project (A+B+C)</b>		<b>99,97,000/- (Say 1 Crore)</b>

## 2.9 Technology & Process Description

### 2.9.1 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. Schematic Diagram of Mining Process is given in **Figure 2.13**.



**Figure 2-13 Schematic Diagram of Mining Process**

### 2.9.2 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 to generation of blasting cracks. In the exercise of forming the benches with 60° slope within the granite deposit, the portion confined within the 60° as well 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 with measurements up to 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 height may lead 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 are provided within the lease hold area.

## **2.10 Process Description**

### **2.10.1 Mining**

The production of Black Granite dimensional stone in this mine involves the following methods typical for granite mining in contrast to any other major mineral mining.

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.

- a. Separation of two vertical ends along the width side by diamond wire cutting.
- b. Separation of the horizontal(bottom) and the vertical(lengthside) planes by serial blasting simultaneously along the above two plans by using 32mm dia blast holes charged with mild explosives like gunpowder or detonatincord.
- c. Diamond wire cutting along the horizontal as well as two sides parallel to strike and dip direction and the vertical face will be a free face is liberated by conventional serial blasting.

All the above process continued together aiming at the liberation of huge volume of the granite body from the parent sheet rock is called 'primarycutting'.

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 to the dressing yard by using hydraulic excavators.



Now-a-days the secondary splitting is carried out by way of splitting and overturning cushion operational procedure. The procedure is by utilizing the compressed air available at the quarry at 7 to 8 bar pressure, initially (widening) splitting up to 15 to 18cms. Next by using super imposed cushion widening up to 80cms and overturning of the blocks.

Removing the defective portions and dressing into the dimensional blocks are done manually using feather and wedges and chiseling respectively by the laborers who are skilled in this work.

The defect free rectangular shaped dimensional stones as acceptable to consumers are produced by the method described as above which is constantly supervised by experienced mining geologist.

The waste material generated during mining activity include the rock fragments of different angularity formed during the works, during the removal of naturally defective and uneconomical portions of the deposits and the working waste formed during dressing of the extricated blocks. Such waste materials are proposed to be dumped along the northern side of the lease boundary / barren area where the commercial granite occurrences are not seen / the area covered with poor quality granite deposit identified to be uneconomical due to sheared and contacted nature or the presence of closely space natural joints, etc.

### **2.10.2 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.

The portion to be extricated from the parent rock body is free in all planes by adopting different methods. Only mild explosives such as detonating cord, ordinary detonators etc will be used for the production of granite blocks. The blast holes of 32mm diameter are drilled up to the bottom of the horizontal plane all along the required planes without deviations.

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 up to a depth of few cms above the required horizontal plane. Sub grade drilling is not necessary, since the splitting will be affected up to a further distance of few cms from the drill hole on blasting. Sub grade drilling may affect the underlying 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.

Blasting is carried out at appointed hours only with prior precaution to the local public. 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 the recovery will be substantially increased by diamond wire cutting. Hence it is proposed to deploy one wire saw machine in this mine.

Now-a-days expansion mortar [ $\text{Ca}(\text{OH}_2)$ ] is used for splitting granite blocks from parent rocks and wire saw cutting is also used for that. Thus, kind of technique will minimize the blasting activities in granite mining.

### **2.10.3 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.

### **2.10.4 Exploration**

A number of valuable data for economical mining of the granite stone in this area have been known.

1. Occurrence of the Black granite stone is economically viable quality and quantity has been established by geological mapping and visual examination by mining geologist experiences 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 depth of 30m from the surface level and the top surface of the granite body works.
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.

### **2.10.5 Storage of Explosives**

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

### 2.10.6 Mine Drainage

The lease applied area is hillock 30m height with slope towards northern and southern sides. Through the area receives scanty rainfall, the ground water level is at 15m depth. The Production faces are operated at shallow depths. During the rainy seasons the surface run of water and the ground water are collected at one point called as sump and dewatered nearby agricultural field with the help of 10HP oil engines.

### 2.10.7 Disposal of Waste

The Mine waste in the mine includes the over burden, side burden, rock fragments and rubbles generated as mineral rejects during production works and the country rock fragments generated during development works as approach road formation, formation of dumping yard sites etc., During the first five years of Mining Plan period, such waste material are proposed to be dumped along the Southern part of the lease area where it comprises of country rock terrain.

### 2.10.8 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 concurrent lying without bringing the topsoil to the soil stack near the OB dump.

### 2.10.9 Stabilization of Dump

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

## 2.11 Requirements

### 2.11.1 Land Requirement and Land Use Planning

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

**Table 2-10 Quarry Land details**

District and State	Taluk	Village	S.F. No	Area (Ha)	Land Classification
Krishnagiri, TamilNadu	Denkanikottai	Karandapalli	155/2	14.53.0	Government land

**Table 2-11 Land Use Pattern of the lease area**

S. No	Land Use	Area to be required during the mining plan(Ha)	Area at the end of the quarrying period (Ha)
1	Area under Quarry	1.32.5	3.60.5
2	Waste Dump	1.88.0	5.70.0
3	Infrastructure	0.01.0	0.01.0
4	Village Road	0.01.0	0.01.0
5	Mine Roads	0.50.0	0.30.0
5	Green Belt	0.17.0	0.36.5
6	Un utilized Area	10.63.5	4.54.0
<b>Total</b>		<b>14.53.0</b>	<b>14.53.0</b>

### 2.11.2 Water Requirement

The total water requirement is 1.5 KLD. The total water requirement will be met through private tankers. The granite quarry will not produce toxic effluent in the form of solid, liquid or gas. No wastewater will be generated by quarry operation except domestic sewage. Domestic sewage will be disposed to septic tank followed by soak pit. Septic tank will be cleaned periodically.

**Table 2-12 Water requirement breakup**

S. No	Description	Water Requirement(KLD)
1	Drinking & Domestic purpose	0.5
2	Wire Saw Cutting	0.3
3	Dust suppression	0.3
4	Green Belt	0.4
<b>Total</b>		<b>1.5</b>

### 2.11.3 Power & Fuel Requirement

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

**Table 2-13 Power Requirements**

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

### 2.11.4 List of Equipments

1 No. of Excavator having 600LC capacity Tata Hitachi will be used for excavation and 2 nos of 25 tones capacity Ashok Leyland Dumpers will be used during loading. The list of Equipments is given in **Table 2-14**.

**Table 2-14 Lists of Machineries**

S. No	Machinery type	Numbers	Capacity	Motive power
1	Jack Hammar (32mm dia.)	6	1.2 to 6m	Compressed air
2	Compressor	2	400 psi	Diesel Drive
3	Tractor Mounted air Compressor	1	-	Diesel Drive
4	Diamond wire saw	1	30m <sup>3</sup> /day	Diesel Generator
5	Diesel Generator	1	125 kVA	Diesel
6	Excavator	1	300Lc	Diesel
7	Dumper	2	25Tonnes	Diesel

### 2.11.5 Man power Requirement

Manpower details are given in **Table 2-15**.

**Table 2-15 Manpower Details**

S. No	Details	Numbers
<b>A</b>	<b>Technical/Mining Personnel</b>	
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>B</b>	<b>Workers</b>	
1	Skilled	1
2	Semi- Skilled	9
3	Un-skilled	10
<b>Total</b>		<b>30</b>
<b>Indirect Manpower</b>		<b>20</b>

### 2.11.6 Solid Waste Management

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

**Table 2-16 Municipal Solid Waste generation & Management**

S.No	Type	Quantity Kg/day	Disposal Method
1	Organic	8.1	Municipal bin including food waste
2	Inorganic	5.4	TNPCB authorized recyclers
<b>Total</b>		<b>13.5</b>	

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

### 2.11.7 Hazardous waste Management

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

**Table 2-17 Hazardous Waste Management**

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

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

### **2.13 Resource optimization/recycling and reuse envisaged in the project**

No optimization/recycling and reuse envisaged in the black granite quarry.

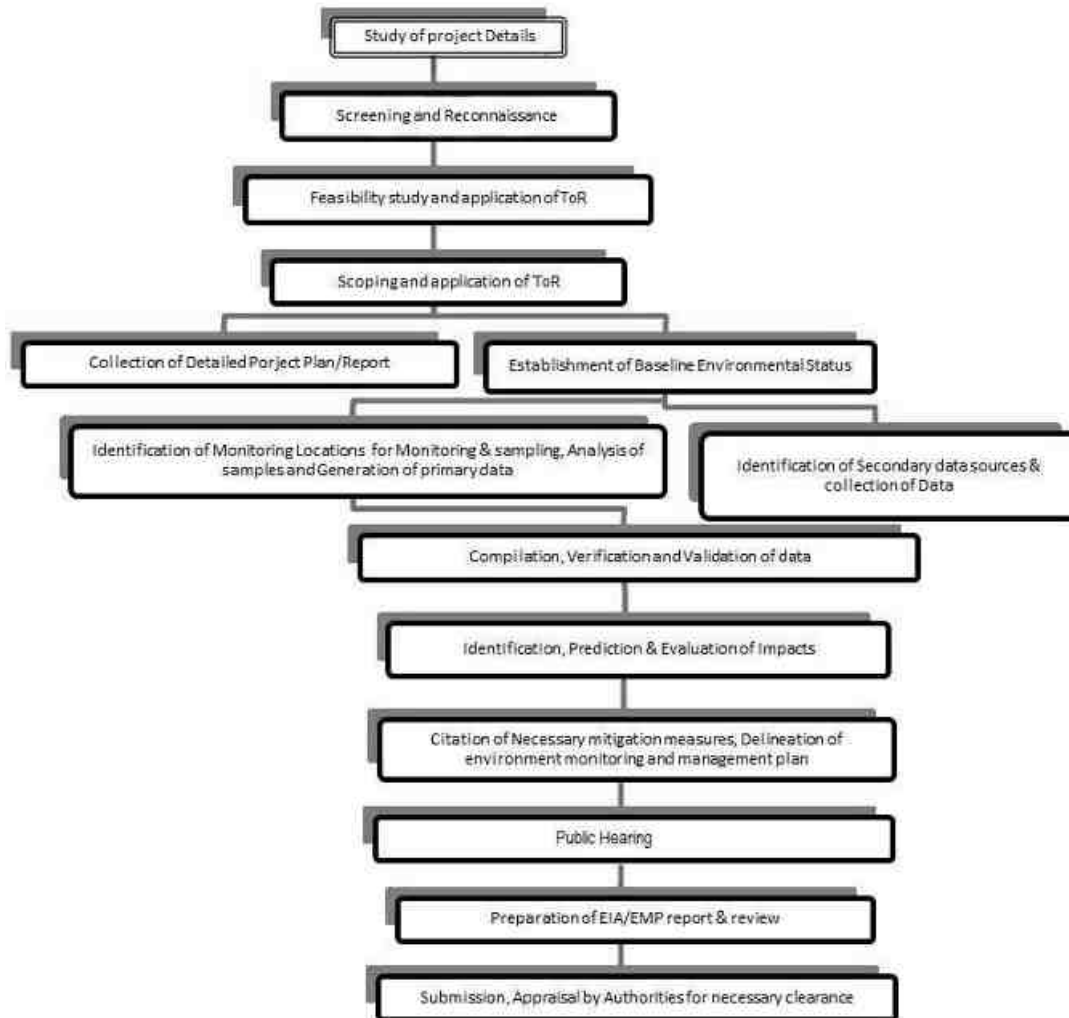
### **2.14 Availability of water its source, Energy/power requirement and source**

This quarry project does not require huge water and No electricity requirement is proposed for the project. The operations will be carried out in day time only.

### **2.15 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 2-14**. The EIA process is composed of the following stages:

- Study of project information
- Screening & Scoping
- Environmental Pre-Feasibility study & application for approval of TOR
- Collection of detailed project management plan/report
- Baseline data collection
- Impact identification, Prediction & Evaluation
- Mitigation measures & delineation of EMP
- Risk Assessment and Safety & Disaster Management plan
- Review & 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 2-14 Feasibility & Environmental Assessment Process**

## 2.16 Description of mitigation measures incorporated into the project to meet the environmental standards

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

## 2.17 Land Environment

The land use of the existing area is already for mining purpose. Hence there will be no change in land use pattern.

### i. Discharges on Land-Impact

#### Domestic:

Domestic sewage will be disposed in to septic tank followed by soak pit.

## Mitigation Measures

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

### ii. Impacts- Soil Contamination

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

### Soil – 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.

## 2.17.1 Air Environment

Mining operations contribute towards air pollution in two ways: addition of gaseous pollutants to the atmosphere and the dust particles. The gaseous pollutants include NO<sub>x</sub>, SO<sub>2</sub> and Hydrocarbons. The sources of pollutants from the mining activity include:

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

## 2.17.2 Sources of Air Pollution

### 2.17.2.1 Point Source/Single Source

These are stationary sources, which emit air pollutants into the atmosphere from a certain fixed point. In the proposed quarry, the following sources or activities from the point sources, which emit Suspended Particulate Matter (SPM), SO<sub>2</sub>& NO<sub>x</sub>.



### **2.17.2.2 Drilling**

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

### **2.17.2.3 Loading**

In the proposed project, the loading of side burden and granite rejects is proposed by Hydraulic excavators. This activity is likely to contribute air pollution in the form of SPM (dust) during discharge of material from bucket and gaseous pollutants like SO<sub>2</sub>, NO<sub>x</sub> and Hydrocarbons due to combustion of fuel (diesel) in the loading machinery.

### **2.17.2.4 Unloading**

The generated rejects and granite at mine face will be transported by dumpers and unloaded at the designated locations. During unloading operation of both the material, air pollution in the form of SPM (dust) is envisaged due to discharge of material from the dumper and gaseous pollutants like SO<sub>2</sub>, NO<sub>x</sub> and Hydrocarbons due to consumption of fuel (diesel) by dumper while unloading the material.

### **2.17.2.5 Linesources**

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

### **2.17.2.6 Transportation**

The generated rejects and granite from site will be transported by haul road. Transportation also includes movement of service vehicles also in the mine lease area. The traffic on the haul roads is likely to contribute towards increase in dust and gaseous pollutants concentration in the area. However, this is more of a localized phenomenon within the mining areas that have limited human exposure.

### **2.17.2.7 Area sources/multiple sources**

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

### 2.17.2.8 Instantaneous Sources

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

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

#### Mitigation Measures

- The increment in the fugitive emissions will be mainly due to transportation activity. Therefore emissions due to mineral handling during mining operation are not much and restricted to the lease area only.
- Proper mitigation measures are practiced during mining activities to control air pollution load below the prescribed limits are as follows:
  - Watering of haul roads and other roads at regular intervals
  - Spraying of water on permanent transport roads at required frequencies.
  - Provision of dust filter / mask to workers working at highly dust prone and affected areas.
  - Provision of green belt by vegetation for trapping dust.
  - Greenbelt development along the haul roads, dumps and along the boundaries of the lease area.
  - Utmost care will be taken to prevent spillage of sand and stone from the trucks.
  - Covered tarpaulin for transport of materials.

### 2.17.3 Noise & Vibration environment

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

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

### 2.17.3.1 Noise Levels

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

### 2.17.3.2 Vibration

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

By adopting controlled blasting, the problems will be greatly minimized and the impacts will also be minimized by choosing proper detonating system, optimizing total charge and charge/delay.

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

### Impact

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

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

### Mitigation Measures

- The major noise generating equipments like Compressors, DG sets, Exacavator, &Tippers etc, will be enclosed in an acoustic enclosure designed for an insertion loss of 25 dB (A) and silencers to other equipment etc.
- Drilling will be carried out with the help of sharp drill bits which will help in reducing noise.
- Secondary blasting will be totally avoided.
- Controlled blasting with proper spacing, burden, stemming and optimum charge/delay will be maintained.

- The blasting will be carried out during favorable atmospheric condition and less human activity timings i.e. during lunch interval.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- Greenbelt and plantation will be developed around the mining activity area and long haul roads. The plantation minimizes propagation of noise.
- Periodical monitoring of noise will be done.
- The occupational noise exposure to the workers in the form of eight hourly times weighted average will be maintained well within the prescribed Occupational Safety and Health Administration (OSHA) standard limits.
- Adequate PPE will be provided to the staff exposing to noise risks.
- Acoustic silencers will be provided in equipment wherever necessary.
- Use of personal protective equipments/devices such as ear-muffs, ear plugs etc. will be strictly enforced for the workers engaged in high noise areas.
- Periodic maintenance of the equipment to be used in the developmental works will be carried out. Worn out parts will be replaced and rotating parts will be lubricated to minimize noise emissions.
- Implementation of greenbelt for noise attenuation will be undertaken.
- Ambient noise levels will be monitored at regular intervals during operational phase of the project.
- Low vibration generating machines/equipment will be selected to meet international standards and foundations will be so designed to minimize vibrations and secured properly.
- Vibration generating sources and their platforms should be maintained properly to minimize vibrations and related impacts.
- Vibration dampers will be provided around the source of generation.
- Transportation Management Plan will be prepared and the transportation of materials will be planned in line with the same.

#### **2.17.4 Water Environment**

##### **2.17.4.1 Impact on Existing Water Resources**

The total water requirement for quarry is 1.5 KLD. The total water requirement is met from private tankers; Domestic sewage will be disposed into Septic tank & no toxic/other effluent generation. Hence the impact due to the project is very minimal.

### **2.17.4.2 Impacts on Surface Water Bodies**

The surface water and groundwater are the life line of the villages. All the ponds in the area are working as recharge sites for the under lying groundwater and hence the surface water and ground water systems are acting like a single unit and therefore cannot be seen in Isolation.

Any contamination in surface drainage due to operation of project could collapse the system and will have serious impacts to the water resources especially the availability of potable water in the PIA area. The impacts will be high in the core area especially the 10 km radius area. Therefore, apparenttothatthere will is negligible impact of mining on the surface water regime.

### **2.17.4.3 Impact on Ground Water**

There will not be any ground water withdrawal, as the total water requirement will be met by private water tankers. As, the mine lease area is a Hilly area, elevated at 277m AMSL height from the ground level. Hence, there will not be any groundwater level intersect as the planned depth of mining is 30m.

#### **Mitigation Measures**

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

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

### **2.17.5 Biological Environment**

#### **2.17.6 Impact on migratory paths for wildlife and forest blocks**

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

#### **Mitigation Measures**

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

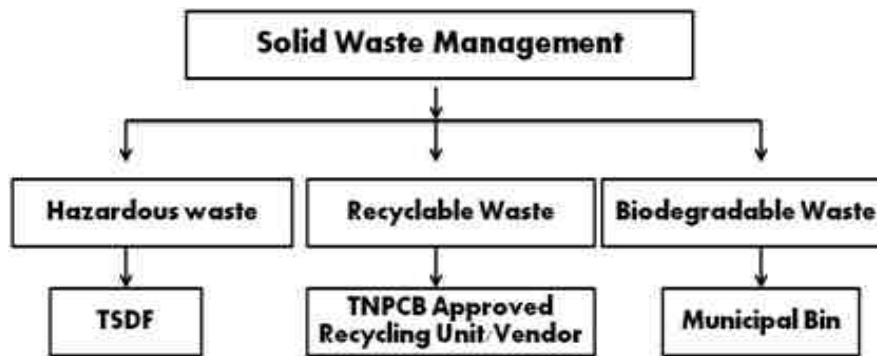
## 2.17.7 Solid Waste Management

### 2.17.7.1 Impact due to Solid Waste Generation

During quarry operations, Municipal solid waste and waste oil are likely to be generated which can be broadly categorized as Hazardous Waste and Non-hazardous Waste. Further, the generated solid waste generation may include Biodegradable, Recyclable and Inert compounds. The details of solid waste generation and its management proposed are discussed in **Chapter 2, Section 2.11.6 & 2.11.7**. If the solid waste generated is not properly managed and disposed in unauthorized manner, it will impact on soil quality, groundwater and air quality.

### 2.17.7.2 Solid Waste Management

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



**Figure 2-15 Waste Management Concepts**

### 2.17.8 Afforestation

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 as well as to prevent air pollution & noise pollution. Afforestation will be taken up along the lease area.

During Mining plan period 20 plants per year is proposed to be planted for complying Afforestation program with the arrived survival rate of 50% within the safety distance along the 650m<sup>2</sup> portion of the lease area in a phase manner. Native species will be planted in phased manner as given in table below **Table 2-18**.

**Table 2-18 Afforestation Plan details**

Year	No. of trees proposed to be planted	Name of the species	Area(M3)	Survival rate expected	No. of trees expected to be grown
1 <sup>st</sup> Year	20	Neem/Pungam	130	50%	10

2 <sup>nd</sup> Year	20	Neem/Pungam	130	50%	10
3 <sup>rd</sup> Year	20	Neem/Pungam	130	50%	10
4 <sup>th</sup> Year	20	Neem/Pungam	130	50%	10
5 <sup>th</sup> Year	20	Neem/Pungam	130	50%	10

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

The project is a expansion granite quarry. 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 TAMIN is being processed to take care of any technological failures.

### 3 DESCRIPTION OF ENVIRONMENT

#### 3.1 Preamble

This chapter depicts the establishment of baseline for valued environmental components, as identified in and around the proposed project of **Black granite quarry** over an extent of 14.53.0 Ha in S.F. No. 155/2 Karandapalli Village, Denkanikottai Taluk, Krishnagiri District, Tamil Nadu by M/s. Tamil Nadu Minerals Limited. The primary baseline data monitoring covered one season (three (3) months) i.e., from **Mid of January 2023 – Mid of April 2023**, and the secondary data was collected from government and semi-government organization's published data. The primary baseline data has been generated by M/s. Hubert Enviro Care Systems (P) Ltd, Chennai, a MoEF&CC approved and National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited environmental testing laboratory for the following terrestrial environmental components.

- **Meteorology:**

Temperature, Relative Humidity, Rainfall, Wind Speed & Direction- **Refer Section - 3.6**

- **Ambient Air Quality:**

Particulate matter <10 micron size (PM<sub>10</sub>), Particulate matter <2.5 micron size (PM<sub>2.5</sub>), Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Carbon Monoxide (CO), Lead (Pb), Ozone (O<sub>3</sub>), Benzene (C<sub>6</sub>H<sub>6</sub>), Benzo (a) pyrene (C<sub>20</sub>H<sub>12</sub>), Arsenic (As), Nickel (Ni), Ammonia (NH<sub>3</sub>)-**Refer Section - 3.7.**

- **Ambient Noise Levels:**

Day equivalent noise levels, Night equivalent noise levels – **Refer Section - 3.8.**

- **Inland Water Quality:**

Groundwater Quality, Surface Water Quality – **Refer Section - 3.9.**

- **Soil Quality – Refer Section - 3.10.**

- **Ecology – Refer Section - 3.11.**

- **Social Economic Status – Refer Section - 3.12.**

#### 3.2 Study Area

A 10 km radial distance from the proposed project site boundary has been identified as the General study area for assessing the baseline environmental status. The core study area is the project area and its immediate surroundings to the tune of 1.0 km radius from the boundary. Further the Project Impact/Influence Area (PIA) is 10 km from the boundary of the project site which covers parts of Ranipet District, Tamil Nadu State.



### 3.3 Description of the Study Area

The project site is located  $\approx 0.82$  km away from the state highway SH-61 in West North West direction and NH40 is 17.63 km in South West direction from the site. 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. The map showing the satellite image of the study area is given in **Figure 3-1** and Topo Map of the study area is given in **Figure 3-2**.

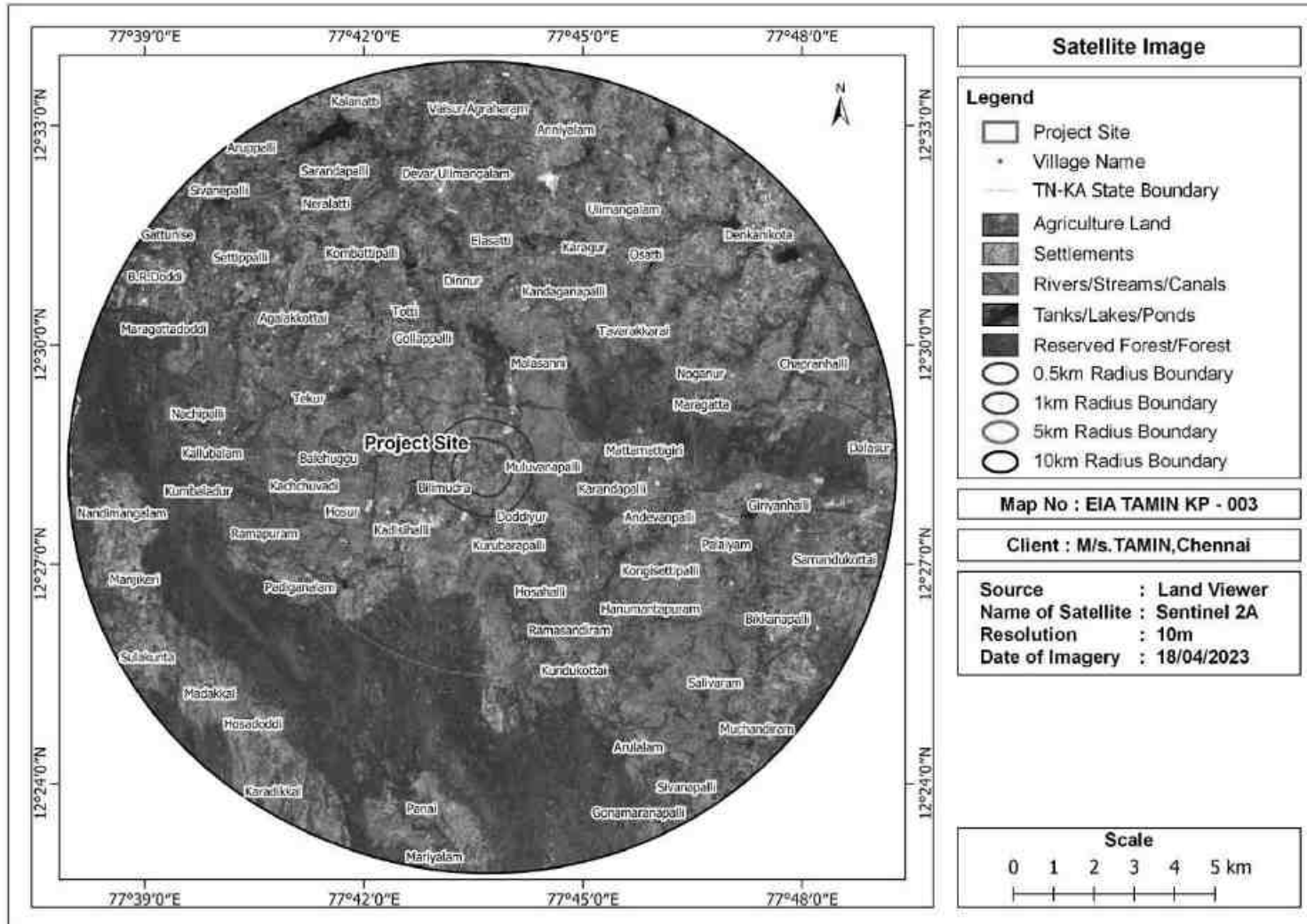


Figure 3-1 Map showing the Satellite Image of the study area of Project

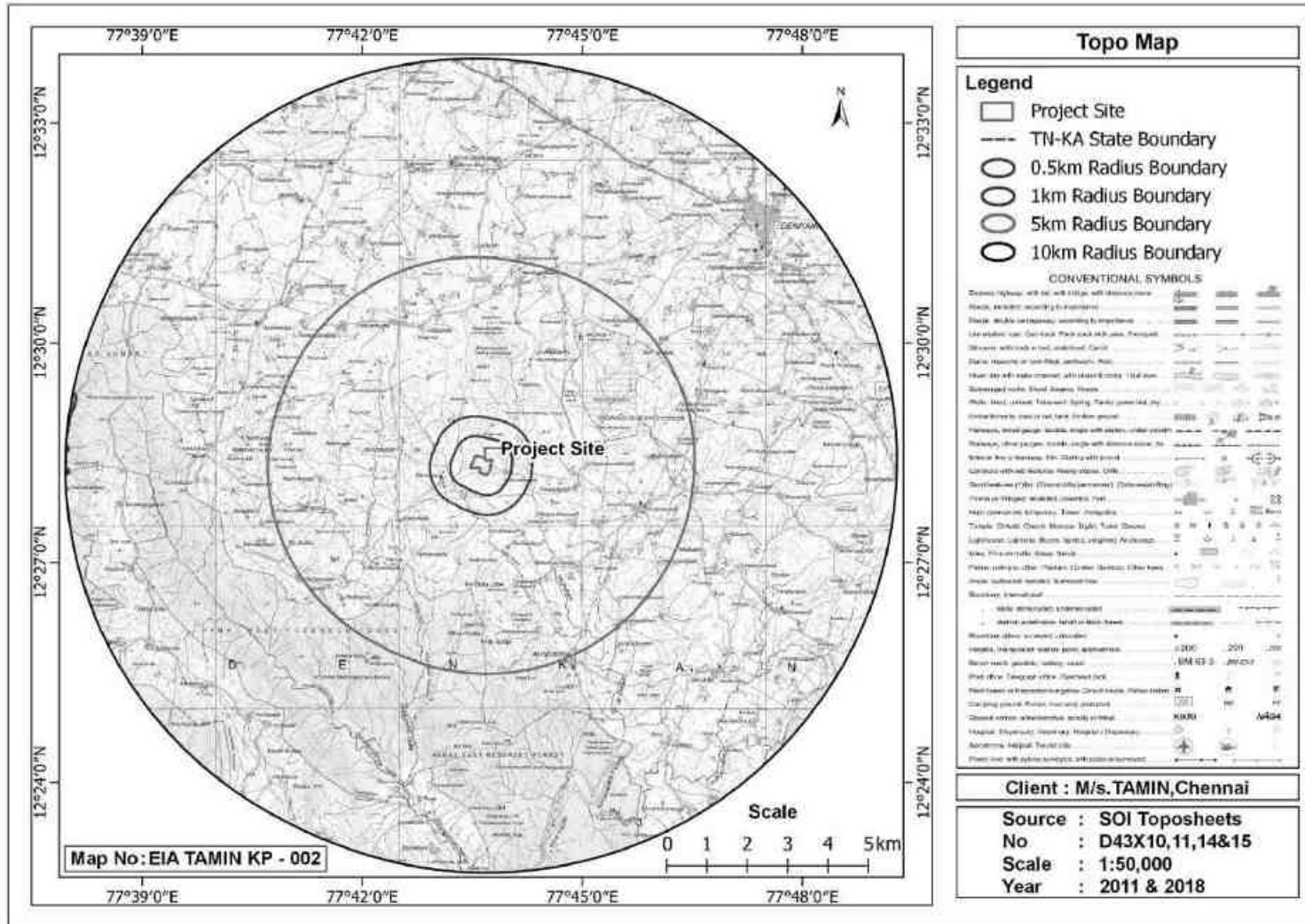


Figure 3-2 Topo Map of Study area

### 3.4 Environmentally/Ecologically Sensitive areas

This section details with the environmentally sensitive areas present within the project site and surrounding environs. It included national parks, state forest, essential habitats etc. The environmental sensitive areas covering an aerial distance of 15 km from the project boundary is given in **Table 3-1** and **Figure 3-3(a) & Figure 3-4(b)**.

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

S.No	Areas	Distance & Direction from project boundary			
		S.No	Water bodies	Distance (~km)	Direction
1	Monuments	Nil			
2	Waterbodies & Reserve Forest	1.	Pond near Bilimudra	0.55	SSW
		2.	Andevanpalli Lake	2.69	E
		3.	Lake near Tekur	3.44	WNW
		4.	Denkanikota Lake	8.01	NE
		5.	Onnamma Cheruvu	8.53	NNW
		6.	Adda Vanka	0.19	W
		7.	Nir Pallam	0.77	ENE
		8.	Javanaikaneri Kodi	2.29	W
		9.	Gundumadu Halla	3.06	SW
		10.	Gulubidamaduvu Halla	3.37	SW
		11.	Aijimaduvu Halla	6.71	WNW
		12.	Akkatangikova Halla	6.71	SSW
		13.	Metra Pallam	7.08	ESE
		14.	Mirre Vanka	7.21	SSE
		15.	Tatta Halla	8.37	SSW
		16.	Devotimaduvu Halla	8.89	WSW
		17.	Javugu Halla	9.21	WSW
		18.	Ichimaduvu Halla	9.27	WSW
		19.	Kalli Halla	9.73	SSW
		20.	Mettukal Halla	10.31	SSW
		21.	Sidanakotta Halla	10.91	WNW
		22.	Chinnar R	11.28	N
		23.	Gelikal Pallam	11.32	SSE

		24.	Sanatkumara Nadi	12.19	N				
		25.	Metimaduvu Pallam	12.86	SSE				
		26.	Bavi Halla	13.21	SW				
		27.	Kolimara Pallam	13.27	SSW				
		28.	TaliKere	14.01	NNW				
		29.	Tirumurugai Halla	14.03	SW				
		<b>Reserved Forest</b>							
		1.	Noganur RF	2.09	ENE				
		2.	Panai West RF	2.88	SSW				
		3.	Panai East RF	2.90	S				
		4.	Javalagiri RF	6.66	WNW				
		5.	Ulibanda RF	8.83	SW				
		6.	Kolatti RF	9.60	SE				
		7.	Denkanikota RF	9.65	ENE				
		8.	Manjunatha state Forest	9.90	W				
		9.	Manchi RF	12.81	SSE				
		10.	Aiyur Extension RF	13.60	E				
		11.	Ubbaran RF	14.20	S				
		12.	Anchetti RF	14.50	S				
		3	Manmade	<b>S. No</b>	<b>Places</b>			<b>Distance (~km)</b>	<b>Direction</b>
<b>Schools</b>				<b>Government Building</b>					
1	Karandapalli Govt School			2.19	E	1	Denkanikottai Fire and Rescue Station	7.61	NE
2	Andevanapalli Govt High School			3.40	ESE	2	Denkanikottai Taluk Office	8.45	NE
3	Balathotanapalli Govt High School			4.07	NNW	3	Denkanikottai District Educational Office	8.97	NE
4	Denkanikottai Govt Boys High School			7.85	NE	4	Anchetty Taluk Office	12.32	S
5	T.Soolagunta Govt High School			9.07	WSW	5	Anchetty Police Station	13.16	S
6	Kakkadasam Govt Hr Sec School			9.56	N	<b>Religious Places</b>			
7	Jowlagiri Govt High School			10.46	NW	1	Maramma Temple	0.35	E

		8	Erudukottai Govt Hr Sec School	11.10	E	2	Shivalayam	0.87	SE
		9	Anchetty Govt High School	12.89	S	3	Shri Gudde Mallikarjuna Swami Temple	3.10	SE
		10	Thalli Govt Girls High School	14.41	NNW	4	St. Peter's Church	7.07	E
		<b>College</b>				5	ISKCON Temple	8.24	NE
		1	Sun Catering College	8.97	NE	6	Yaarab Baba Dargah	8.62	NE
		2	Horticulture Research And Training Center	14.57	NW	<b>Industries</b>			
		<b>Hospitals</b>				1	Primeur Farmsted (p) Limited	6.49	E
						2	Natural Remedies Pvt ltd	8.54	N
		1	Balathotanapalli Govt PHC	3.95	NNW	3	SKA Dairy Foods India (p)Ltd unit III	9.63	N
		2	Denkanikottai Goverment Hospital	8.52	NE	4	Indian design export Pvt limited	10.15	NE
		3	Kakkadasam Govt PHC	9.89	N	5	Manam fruit Product private ltd	12.42	NNE
		4	Anchetty Upgraded Govt PHC	12.10	S	6	Sri Krisha Agro service	13.02	N
		5	Namrelli Govt PHC	13.59	ESE				
4	State, National boundaries	TN-KA state boundary ~ 9.90km,W							
5	Nearest Highway/Railway/Town and city	<b>S. No</b>	<b>Description</b>	<b>Distance (~km)</b>	<b>Direction</b>				
		1	MDR-588(Denkanikottai-Anchety-Natrampalayam)	3.17	SE				
		2	NH-948A(Dobbaspet-Thalli-Attibele)	13.97	NNW				
		3	SH17B-(Hosur-Denkanikottai )	8.24	NNE				
		4	Nearest Railway Station - Periya Naga Thunai	21.80	ENE				
		5	Nearest Town – Denkanikottai(Pop~ 24,252 )	8.5	NE				
		6	Nearest City - Hosur (Pop~ 1,16,821)	26.0	NNE				
6	Nearest port/ Airport	<ul style="list-style-type: none"> <li>➤ Kempegowda International airport Bangalore at a distance of ~ 238.05km towards ESE</li> <li>➤ Hosur Airport (Domestic) at a distance of ~ 21.06km towards N</li> </ul>							
7	Near by villages and Population	<b>S. No</b>	<b>Villages</b>	<b>Distance (~km)</b>	<b>Direction</b>	<b>Population</b>			
		1	Muluvanapalli	0.31	E	450			
		2	Bilimudra	0.68	W	600			
		3	Kurubarapalli	1.50	SSE	350			
		4	Karandapalli	1.76	E	3678			

		5	Doddiyur	1.82	SE	250	
7	Defence installations	Nil					

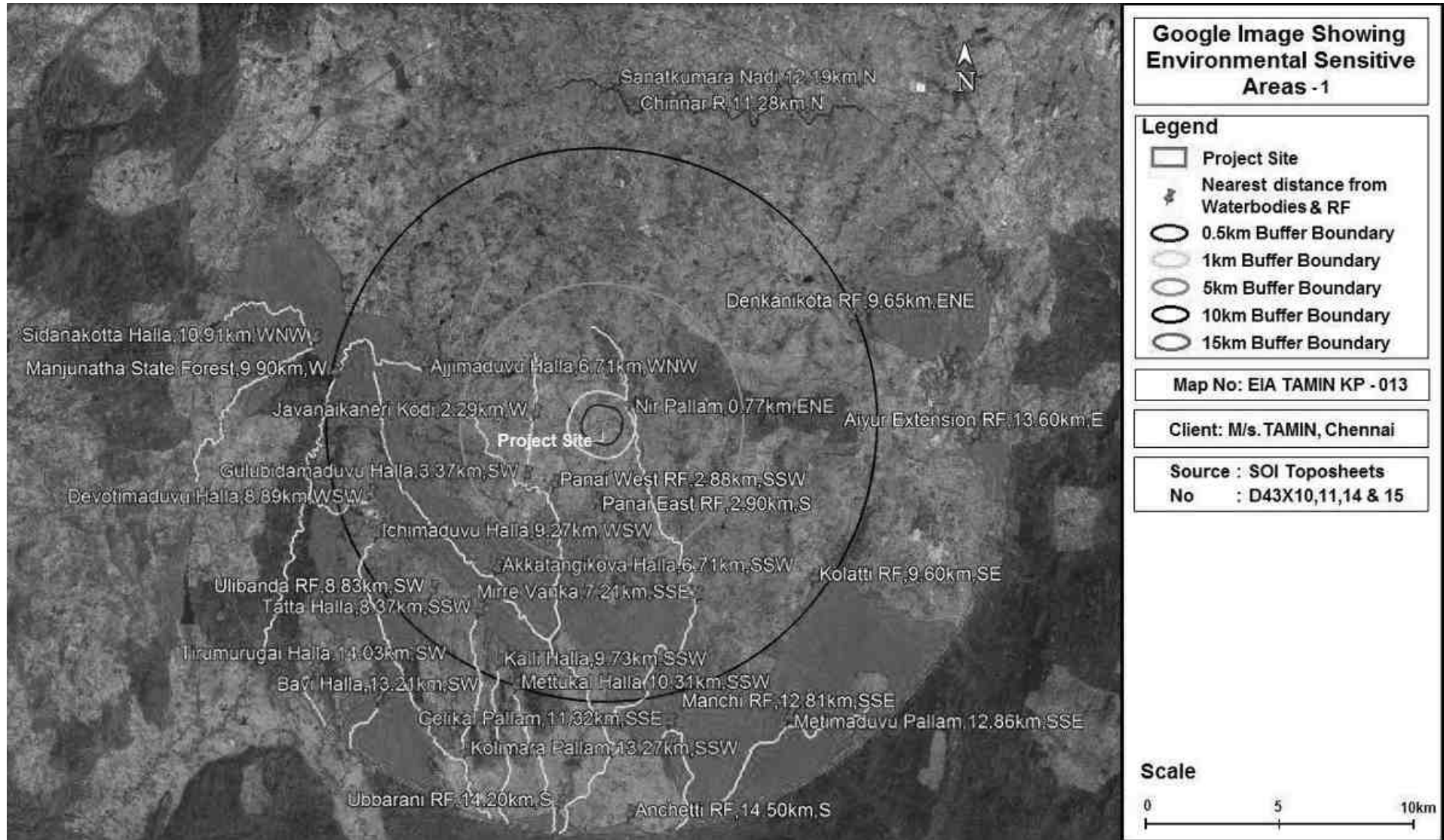


Figure 3-3 (a) Environmental sensitive areas covering within 15 km from project boundary





Figure 3-4 (b) Environmental sensitive areas covering within 15 km from project boundary

### 3.5 Physical Conditions of PIA district

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

- District profile
- Drainage, land use, geology, Physiographic
- Natural resources

Climatic conditions, seismic zone characteristics and natural hazard

#### 3.5.1 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 located 90 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](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)

#### 3.5.2 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 2010-11 was 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 July to 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](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)

#### 3.5.3 Natural Resources of PIA District

##### 3.5.3.1 Flora & Fauna

Krishnagiri district is mountain terrain, the flora and fauna in the district are rich. The flora include 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 pungam

tree, creating anon-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. Almost 20% 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](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)

### 3.5.3.2 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](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)

### 3.5.3.3 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 of 137 kms in length, 8599 tube wells, 1327 tanks, 57355 wells for irrigation purpose and 5801 wells for domestic purpose. According to the Village Records, 48894 hectares of land is irrigated. Of this irrigated land, 5951.6 hectares of land is irrigated by canals, 28888.7 hectares of land is irrigated by wells/tube wells and 12560.5 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](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)

### 3.5.3.4 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](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)

### 3.5.3.5 Mineral Resources

Krishnagiri district is famous for the Granite Industry with quarries and processing units spread around the district. "Paradise" is the most popular multicoloured 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-coloured 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 white metal called limestone from Uthangarai are mined. The mineral map of Tamil Nadu is shown in the **Figure 3-5**

*Source: [https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH\\_2011\\_3330\\_PART\\_A\\_D\\_CHB\\_KRISHNAGIRI.pdf](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 3-5 Mineral Map of Tamil Nadu

### 3.5.4 Land Use & Land Cover

Total geographic area of Krishnagiri district is 5026Sq.Km. Urban Built-up area is 67.23 Sq.Km and Rural Built-up area is 95.11 Sq.Km. Details of land use/land cover statistics for Krishnagiri district were given in **Table 3-2** and Land use/ Land cover pattern of Krishnagiri district is given in **Figure 3-6**. Land Use/ Land Cover map of Krishnagiri is given in **Figure 3-7**.

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

S. No	Division of Land Use/Land Cover	Area in Sq.Km	Area in Acres	Area in Ha	Total Area %
1	Built-up, Urban	67.23	16612.87	6723	1.57
2	Built-up ,Rural	95.11	23502.16	9511	2.22
3	Built-up, Mining	45.14	11154.32	4514	1.05
4	Agriculture, Crop land	2335.71	577165.62	233571	54.53
5	Agriculture, Plantation	486.05	120105.39	48605	11.35
6	Agriculture, Fallow	353.58	87371.39	35358	8.26
7	Forest, Evergreen/ Semi evergreen	2.1	518.92	210	0.05
8	Forest, Forest Plantation	4.25	1050.20	425	0.10
9	Forest, Deciduous	1076.93	266114.79	107693	25.14
10	Forest, Swamp/ Mangroves	0.02	4.94	2	0.00
11	Barren/ unculturable/ Wastelands, Salt Affected land	1	247.11	100	0.02
12	Barren/ unculturable/ Wastelands, Scrub land	375.56	92802.75	37556	8.77
13	Barren/unculturable/ Wastelands, Barren rocky	44.05	10884.98	4405	1.03
14	Wetlands/Water Bodies, CoastalWetland	0.04	9.88	4	0.00
15	Wetlands/Water Bodies, River/Stream/canals	50.34	12439.27	5034	1.18
16	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	88.9	21967.63	8890	2.08
<b>Total</b>		<b>5026.0</b>	<b>1241952.20</b>	<b>502601</b>	<b>100</b>

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

### Land Use/Land Cover Pattern of Krishnagiri District

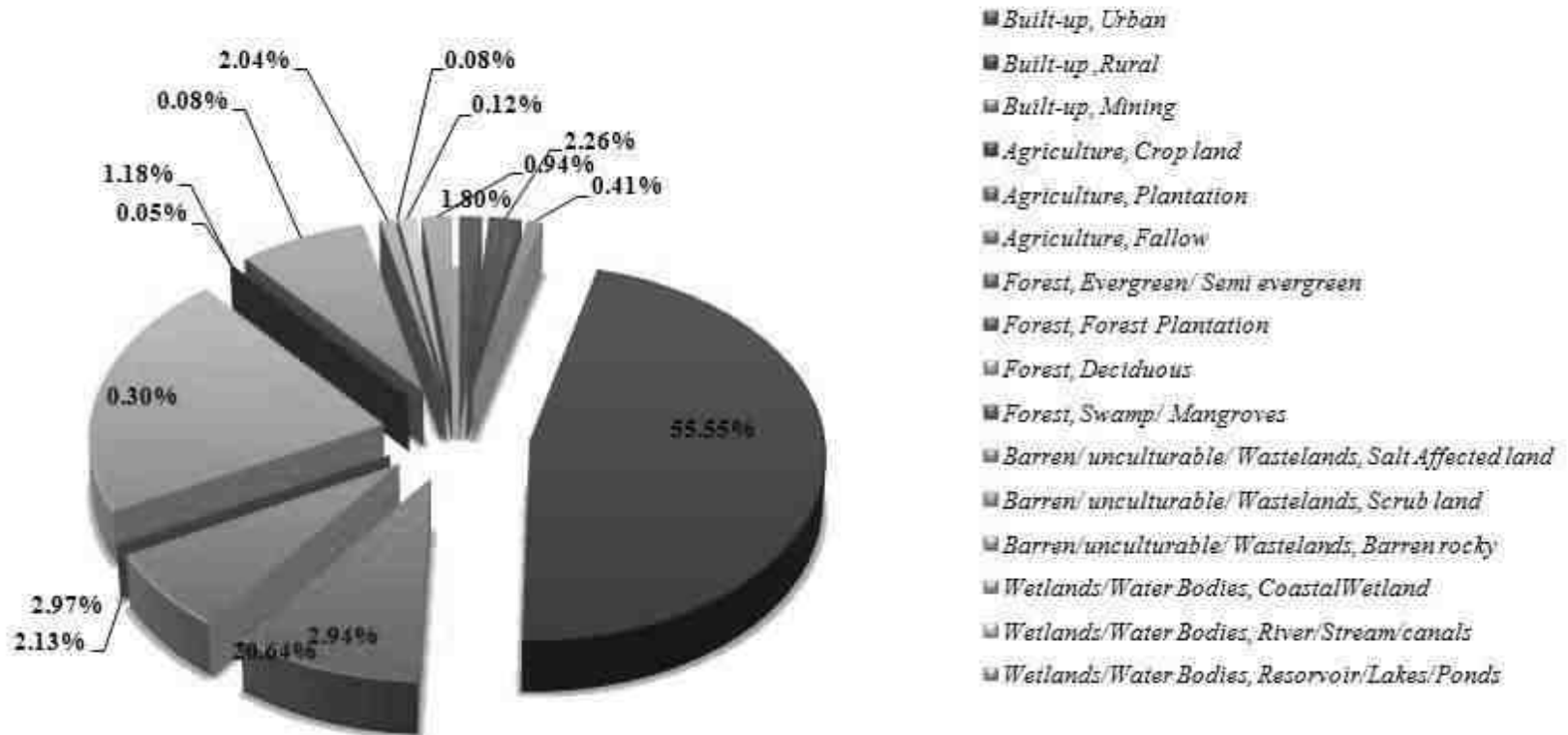


Figure 3-6 Land use/ Land cover pattern of Krishnagiri District

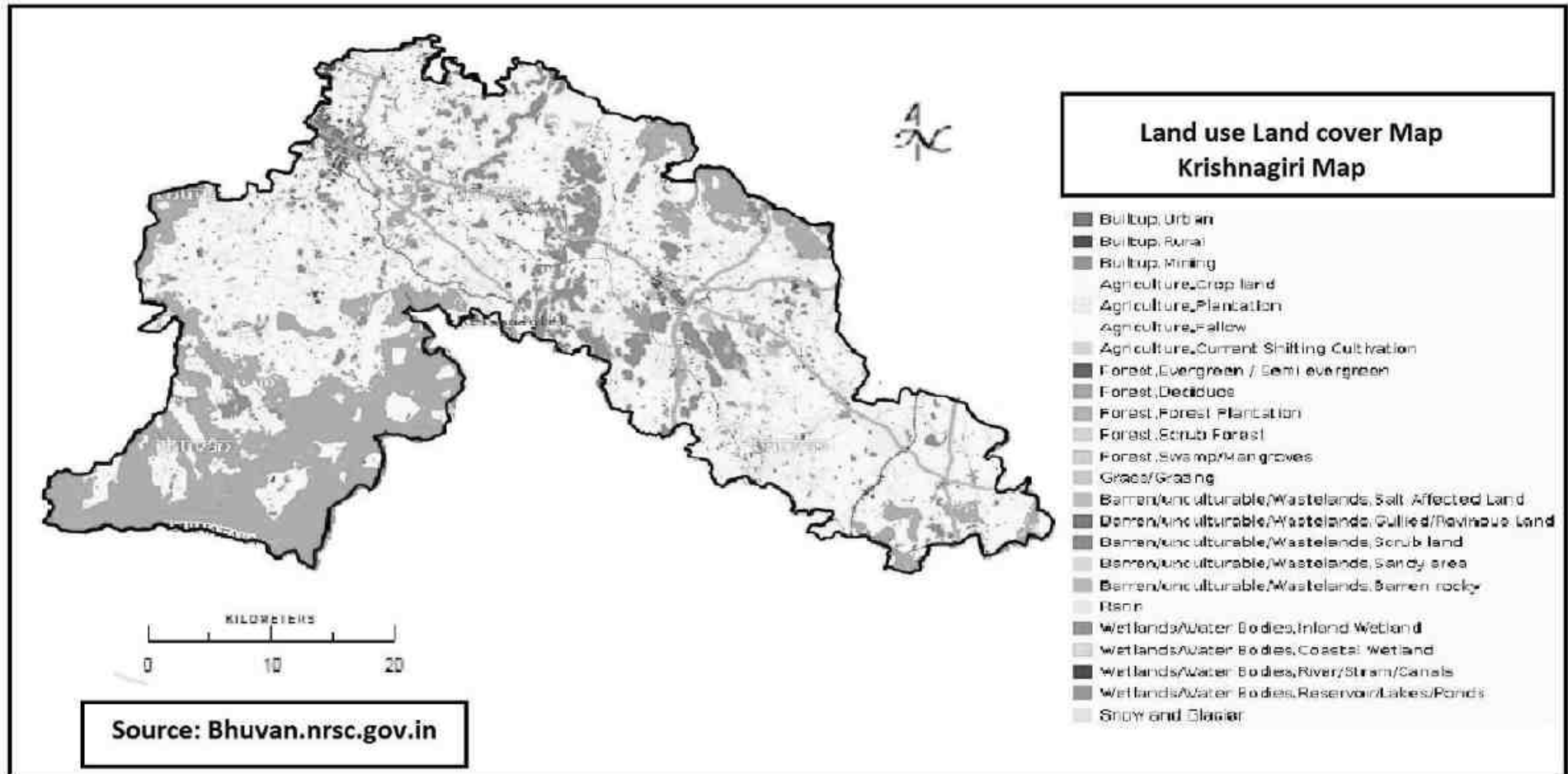


Figure 3-7 Land use/Land cover Map of Krishnagiri District



### 3.5.4.1 Land use land cover for the study area

The land use/ Land cover pattern of the study area is 331.92 Sq.Km given in **Table 3-3** Land use// Land cover pattern and land use / Land cover map of the study area is given in **Figure 3-8** and **Figure 3-9** respectively.

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

S.No.	Description	Area (Sq.Km)	Area (Acres)	Area (Hectares)	Percentage (%)
1	Crop land	187.77	46398.91	18777	56.57
2	Deciduous	68.92	17030.48	6892	20.76
3	Fallow	22.81	5636.47	2281	6.87
4	Plantation	21.71	5364.65	2171	6.54
5	Scrub land	12.01	2967.73	1201	3.62
6	Mining	6.66	1645.72	666	2.01
7	Reservoirs / Lakes / Ponds	4.30	1062.55	430	1.30
8	Rural	4.05	1000.78	405	1.22
9	Urban	1.60	395.37	160	0.48
10	Barren rocky	1.54	380.54	154	0.46
11	River / Stream / Canals	0.55	135.91	55	0.17
<b>Total</b>		<b>331.92</b>	<b>82019.09</b>	<b>33193</b>	<b>100.00</b>

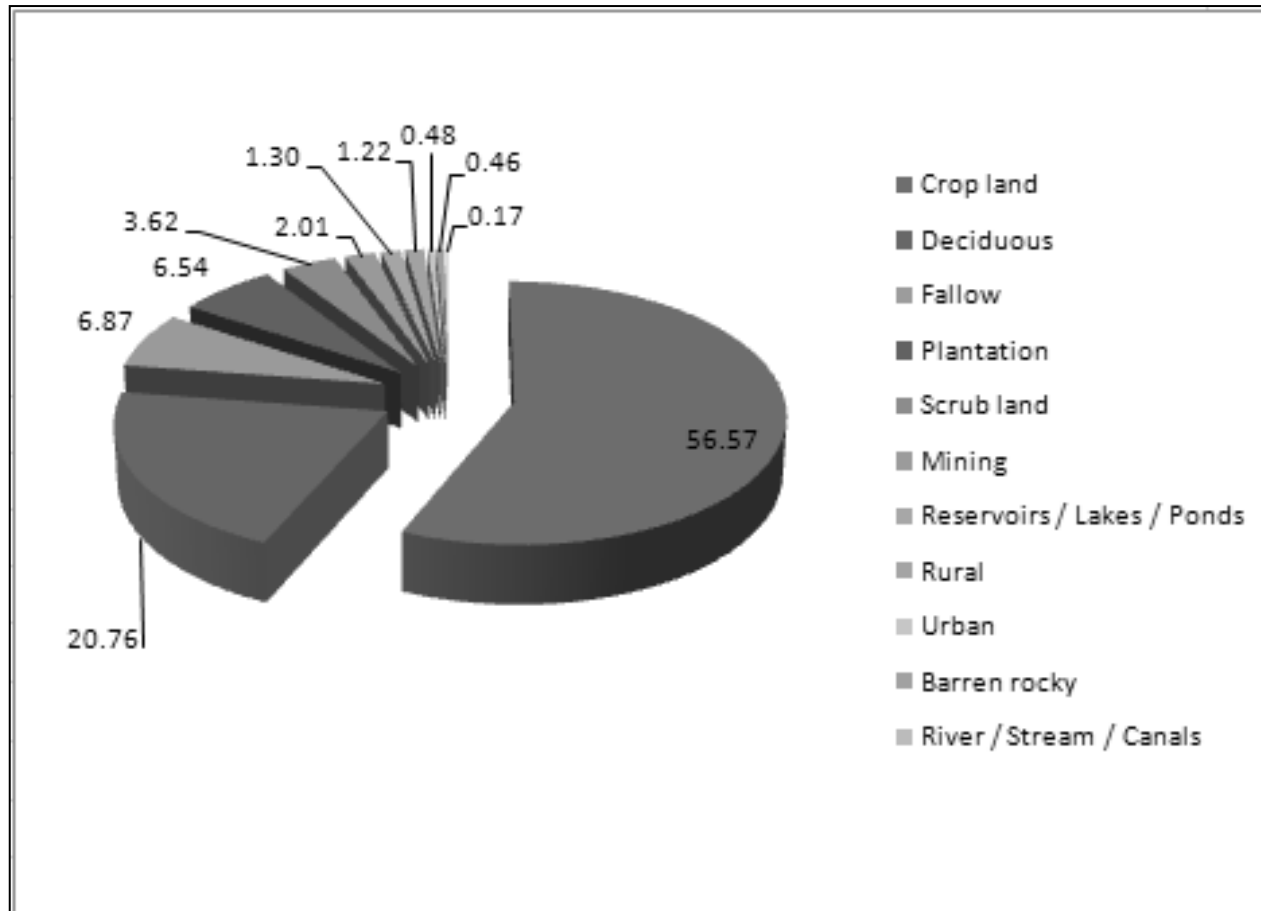


Figure 3-8 Land use/ Land cover pattern of the Study Area

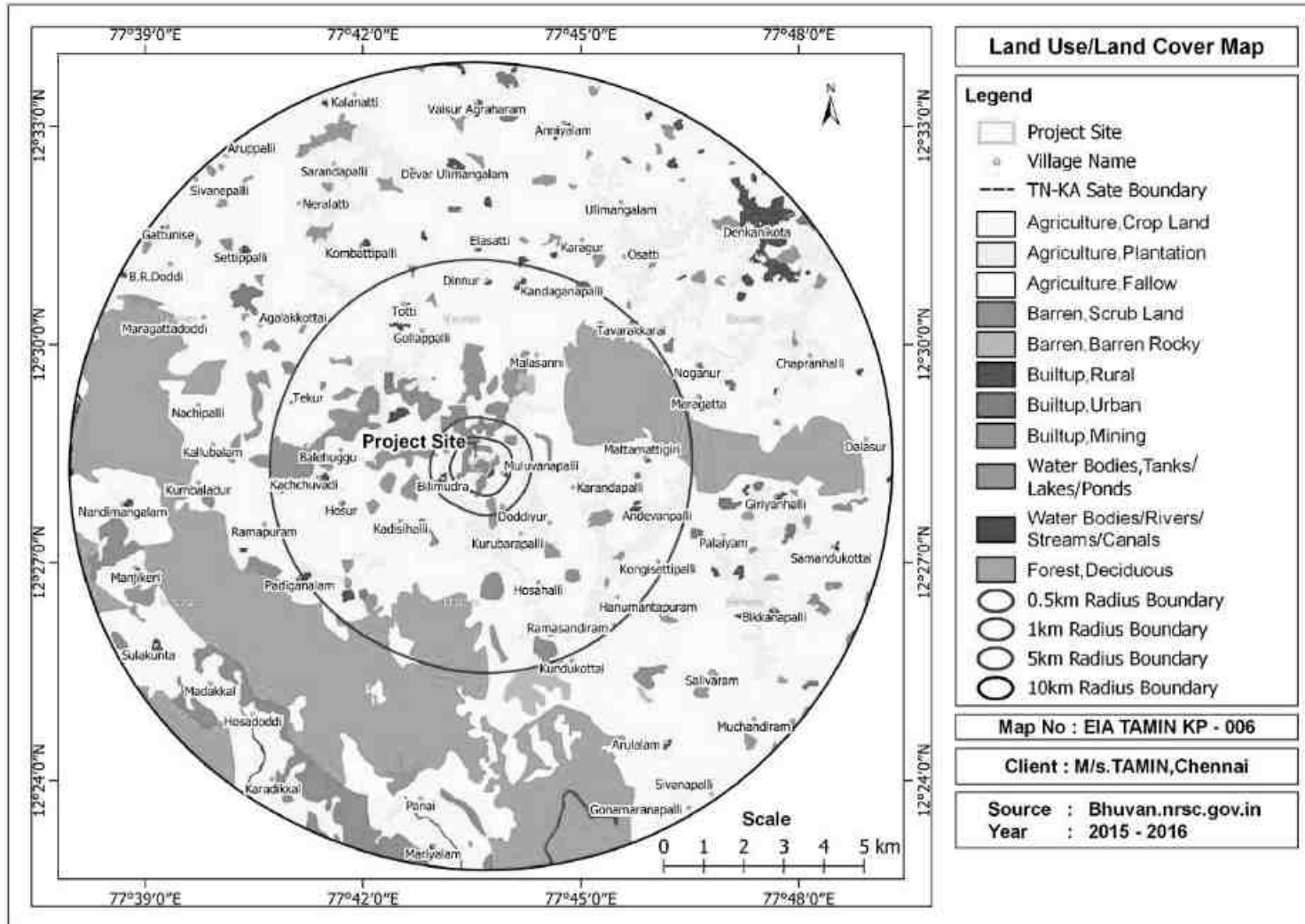


Figure 3-9 Land use/Land cover map of the Study Area

### 3.5.5 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 3-10** and Topo map of study area is given as **Figure 3-2** and contour map of the study area is given as **Figure 3-11**.

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

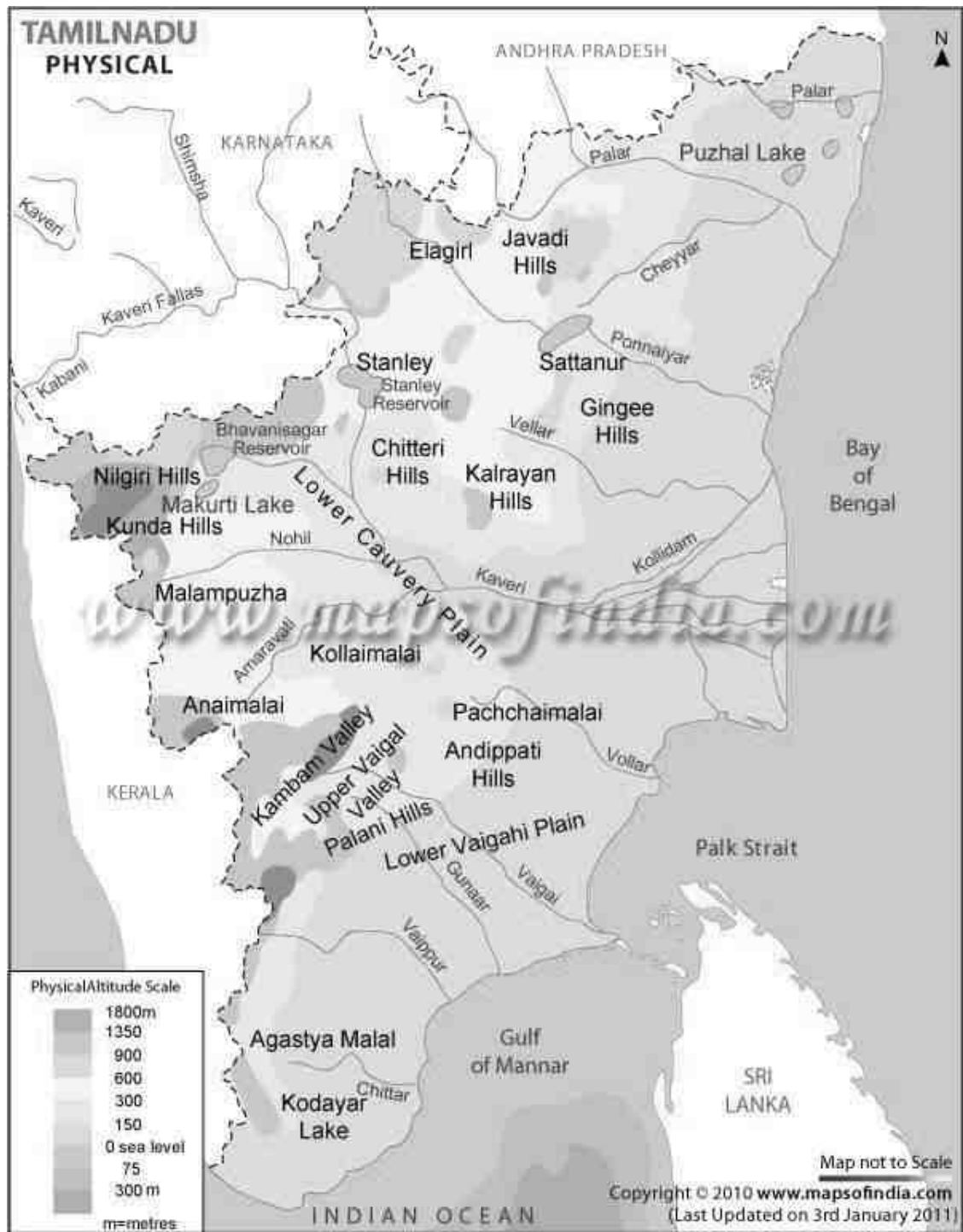


Figure 3-10 Physical Map of Tamil Nadu

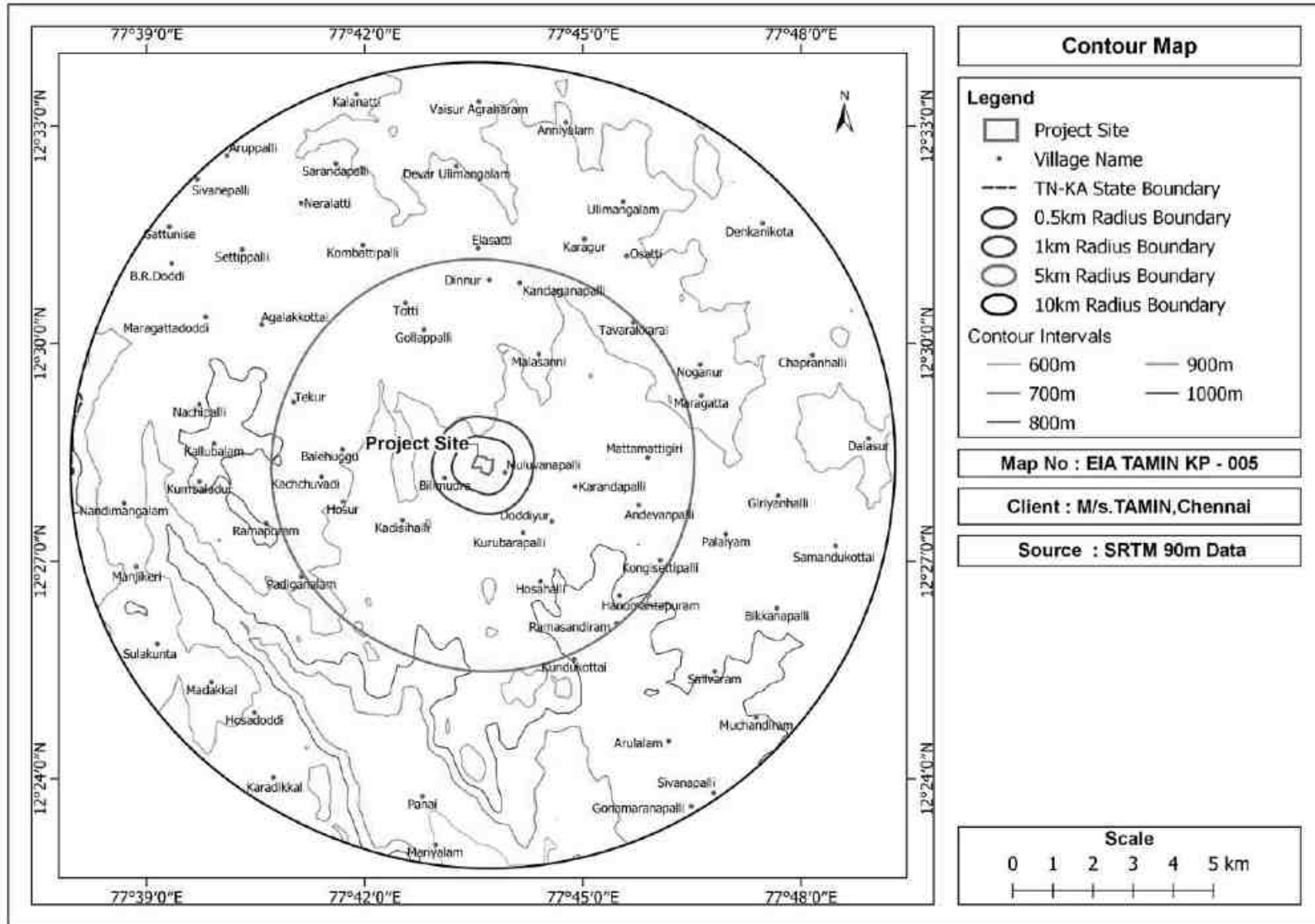


Figure 3-11 Contour map of the Study Area

### 3.5.6 Geomorphology of PIA District

The prominent geomorphic units identified in the district through interpretation of satellite imagery are structural hills in the southwestern part of the district, denudational land forms like buried pediments in the plains and inselbergs and plateaus represented by conical hills aligned with major lineaments. Krishnagiri district forms part of the upland plateau region with many hill ranges and undulating plains. The western part of the district has hill ranges of Mysore plateau with a chain of undulating hills and deep valleys extending in NNE-SSW direction. The plains of the district have an average elevation of 488 m amsl. The plateau region along the western boundary and the northwestern part of the district has an average elevation of 914 m amsl. The Guthrayan Durg with an elevation of 1395 m amsl is the highest peak in the district.

**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”)

#### 3.5.6.1 Geomorphology of the study area

Total geographical area of the study area is 331.92 Sq.Km. The Geomorphology pattern of the study area is given in **Table 3-4**, Geomorphology pattern of the study area is given in **Figure 3-12**. The Geomorphology map of the study area is shown in the **Figure 3-13**.

**Table 3-4 Geomorphology pattern of the study area**

S.No.	Description	Area (Sq.Km)	Area (Acres)	Area (Hectares)	Percentage (%)
1	Denudational Origin-Pediment-PediPlain Complex	243.29	60118.18	24329	73.30
2	Structural Origin-Moderately Dissected Hills and Valleys	82.03	20270.02	8203	24.71
3	Waterbodies	2.78	686.95	278	0.84
4	Structural Origin-Low Dissected Hills and Valleys	1.68	415.14	168	0.51
5	Anthropogenic Origin-Anthropogenic Terrain	1.32	326.18	132	0.40
6	Denudational Origin-Low Dissected Hills and Valleys	0.82	202.63	82	0.25
<b>Total</b>		<b>331.92</b>	<b>82019.09</b>	<b>33192</b>	<b>100.00</b>

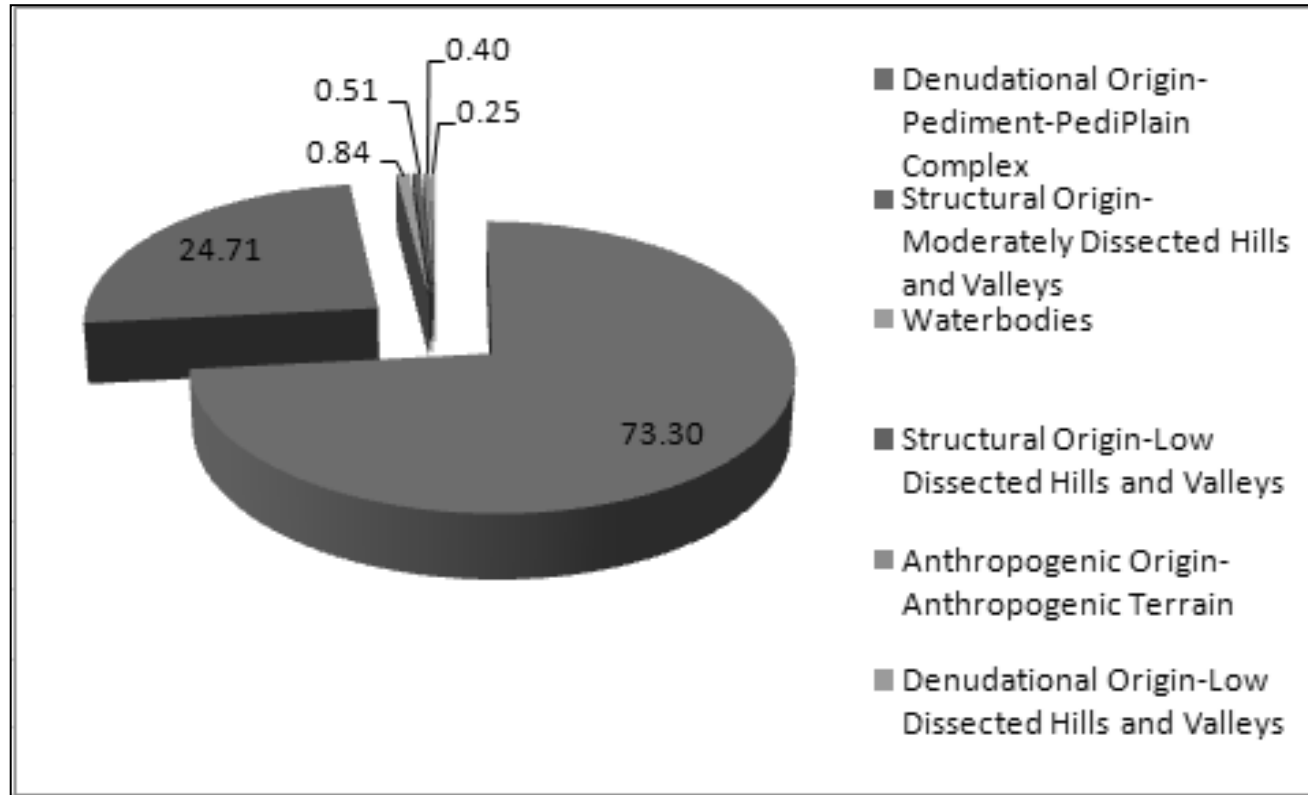


Figure 3-12 Geomorphology pattern of the study area



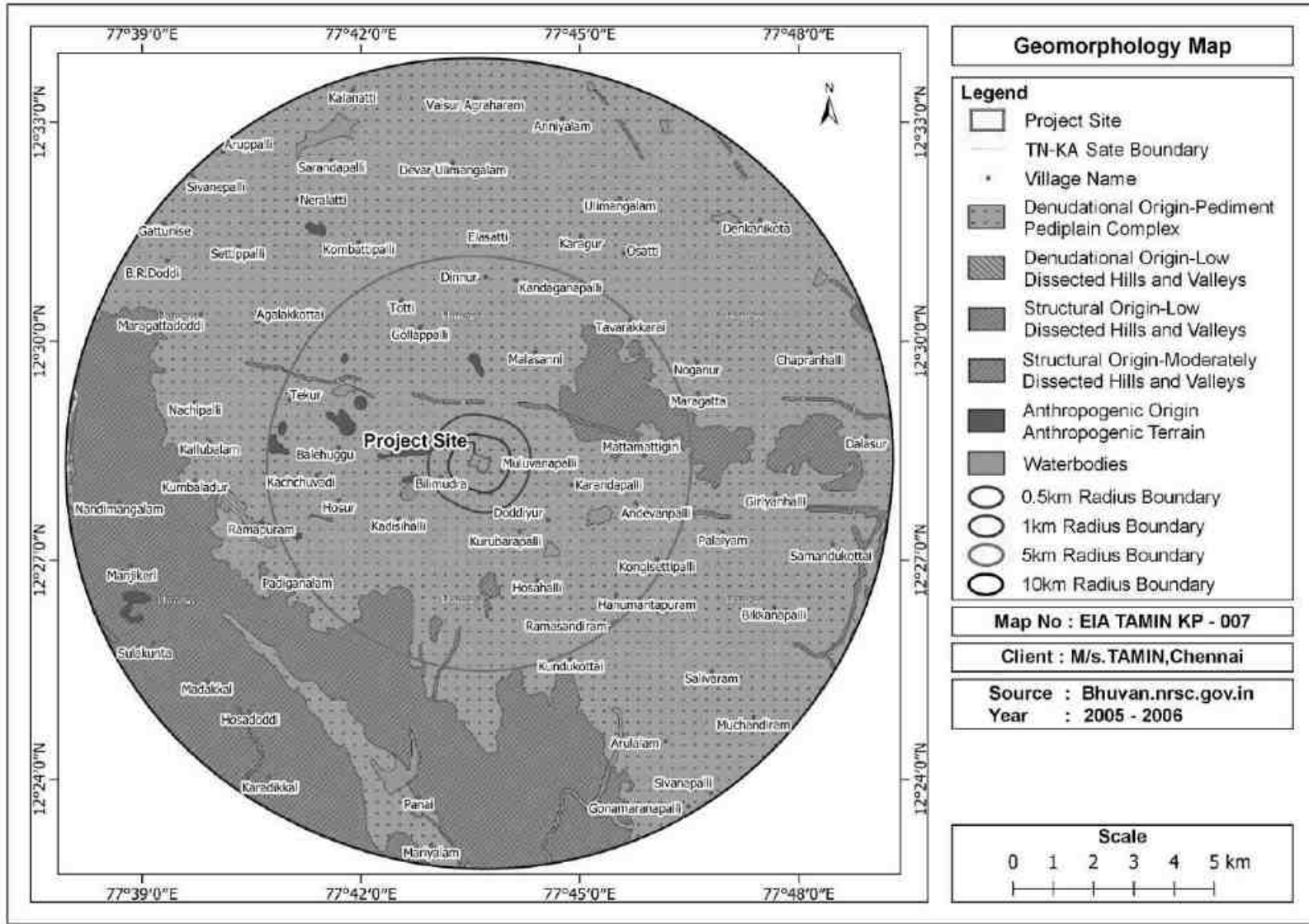


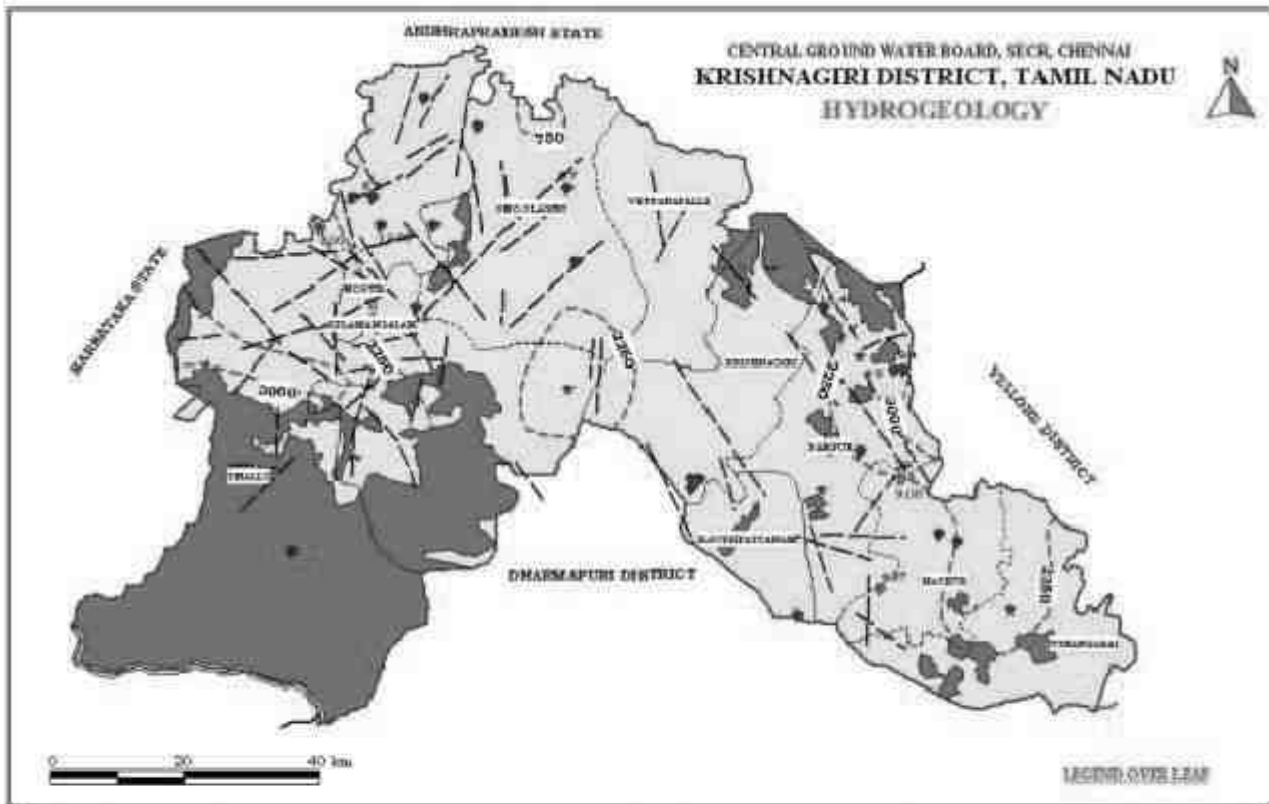
Figure 3-13 Geomorphology Map of Study Area

### 3.5.7 Hydrogeology of PIA District Profile

Krishnagiri district is underlain 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. The hydrogeology map of Krishnagiri District is given in **Figure 3-14**.

*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”)



**LEGEND FOR PLATE - II**

ADMINISTRATIVE SETUP		GROUND WATER HYDROLOGY				
STATE BOUNDARY		● DOUGLASSI BORE WELL (OWB)				
DISTRICT BOUNDARY		⊕ HIGH YIELDING BORE WELL (OWB)				
BLOCK BOUNDARY		★ FLOODS > 1.5 (MILL)				
TILLY AREA		<b>HYDROCHEMISTRY</b>				
		TSU				
		●●●●●●●● (by ELECTRICAL CONDUCTANCE) @ 25°C				
		<b>STRUCTURE</b>				
		— TRACE OF LINEAMENT				
AQUIFER	AGE	LITHOLOGY	GROUND WATER CONDITIONS	YIELD PROSPECTS (C/M/D)	GROUND WATER DEVELOPMENT STRATEGIES	
UNCONSOLIDATED	RECENT	SPIN ALLUVIAL, FLOOD PLAIN DEPOSITS	DISCONTINUOUS, UNCONSOLIDATED TO SANDY CLAY	> 200	DEVELOPMENT THROUGH LARGE DEEPER DOG WELLS AND SHALLOW TUBE WELLS	
CONSOLIDATED	ARCHAIC	GRANITE, GNEISS, GYPSUMS	DISCONTINUOUS, UNCONSOLIDATED TO SANDY CLAY, RESTRICTED TO WEATHERED BEDROCK AND FRACTURES	< 50 FEET WATERBORN, 2 FEET & MORE WITH TUBE WELLS STRONG AND LOW GROUND	SUITABLE FOR DEVELOPMENT THROUGH DOG WELLS BORE WELLS FRACKS IN FRACTURE ZONES, BEST LOCATIONS BEING INTERSECTION OF FRACTURES	

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

Figure 3-14 Hydrogeology Map of Krishnagiri District

### 3.5.8 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 3-15**.

**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”)

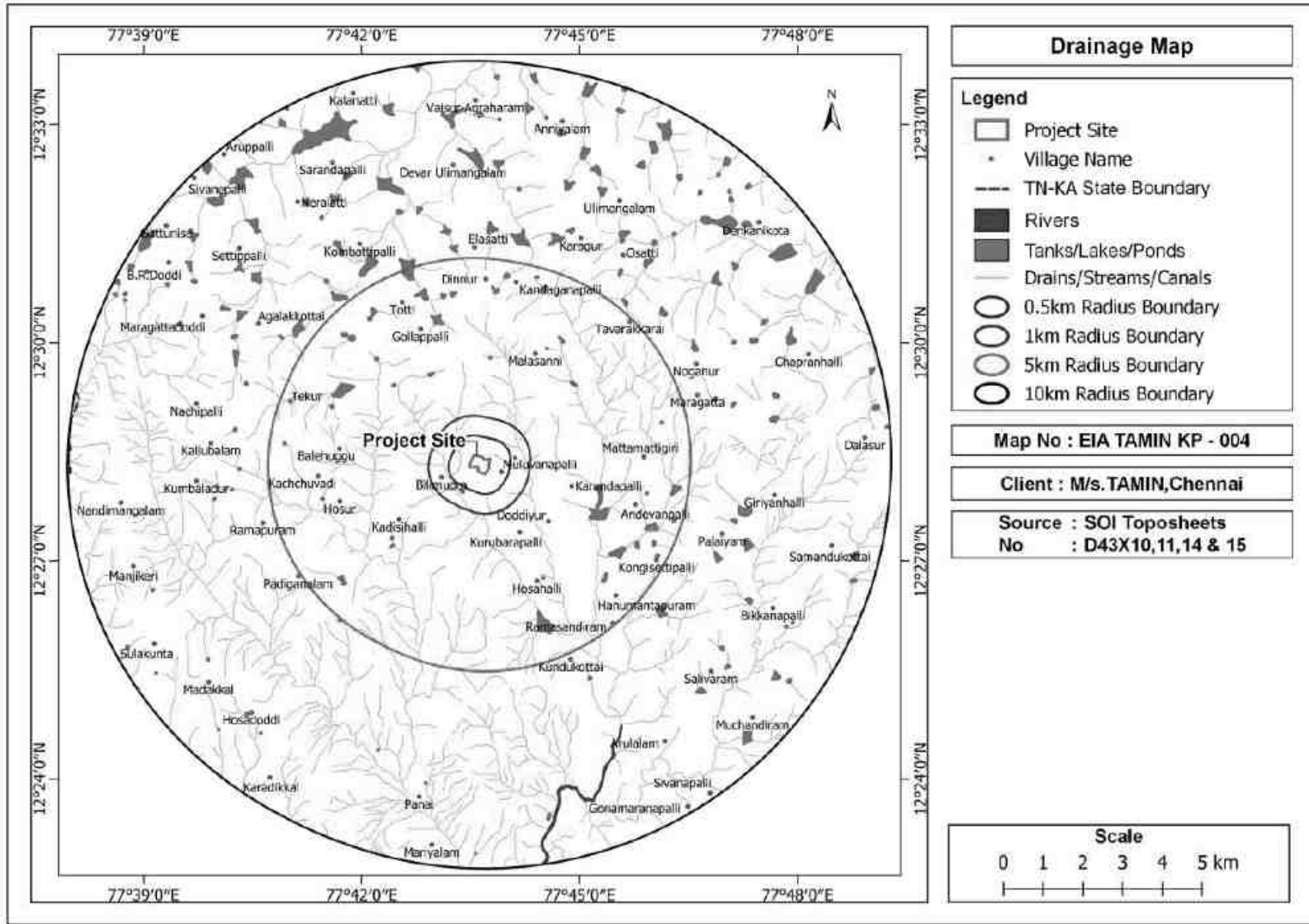


Figure 3-15 Drainage map of the study area

### 3.5.9 Geology

The geological formations of the district belong mainly to Archaean age along with rock of Proterozoic age. The former is represented by Khondalite Group of rocks, Charnockite Group of rocks, Migmatite 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 garnetiferous quartzo feldspathic gneiss and hornblende 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/>

(Ref: Department of Geology and Mining, Government of Tamil Nadu, Ministry of Mines, “District Survey Report, Krishnagiri District”)

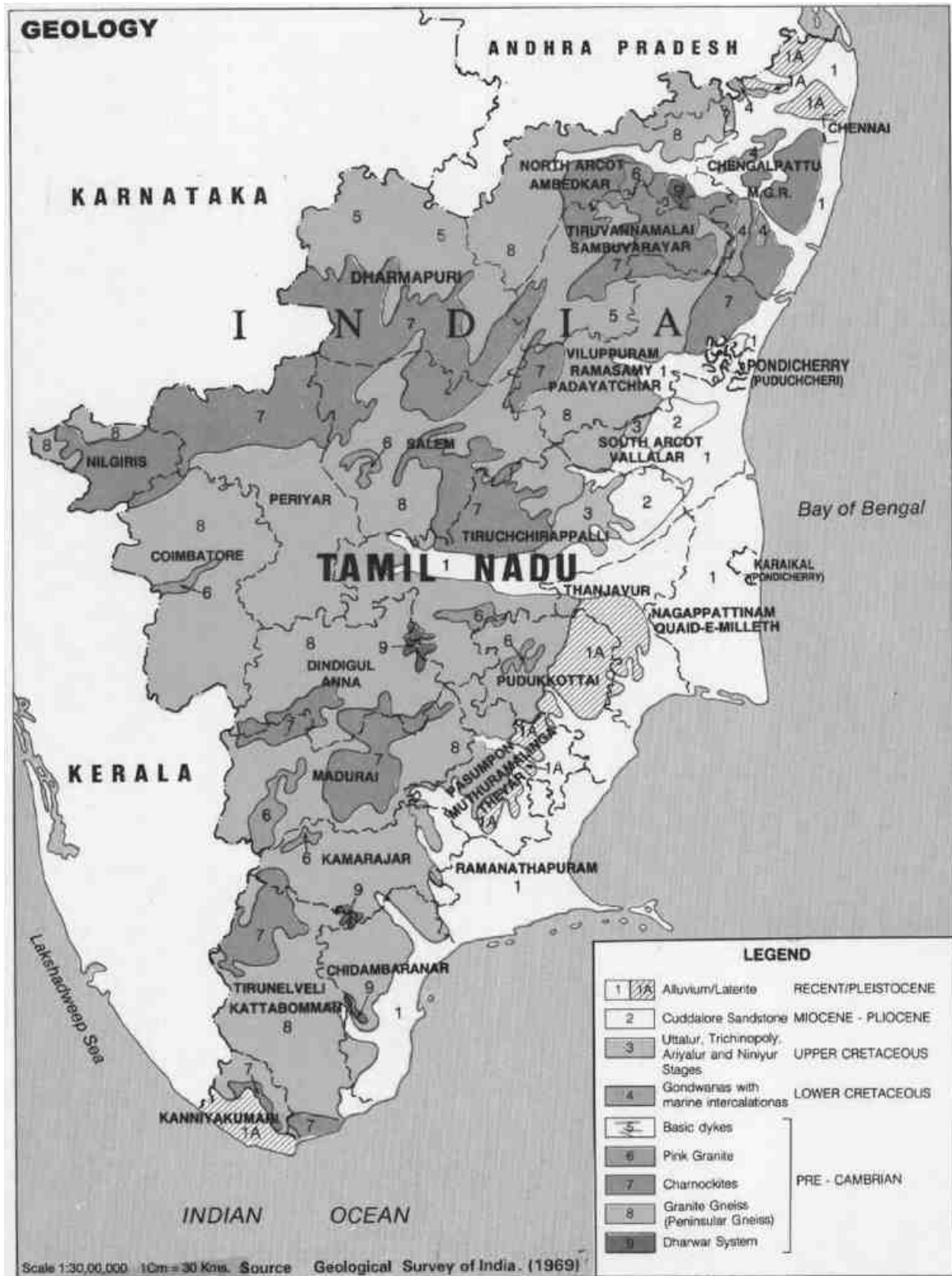


Figure 3-16 Geology Map of Tamil Nadu

3.5.10 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 Earthquake hazard map of Tamil Nadu is shown in **Figure 3-17**.

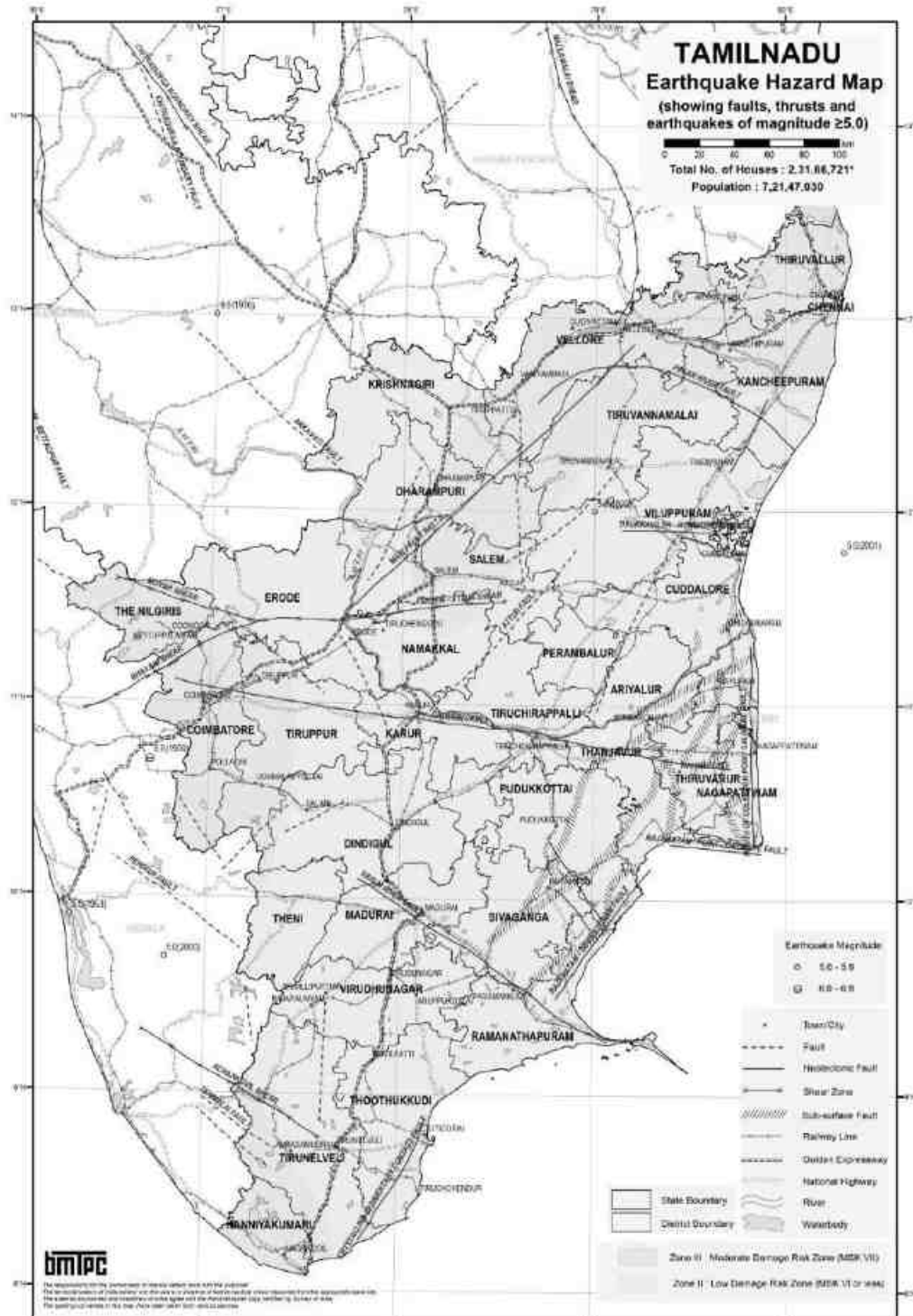


Figure 3-17 Seismicity Map of Tamil Nadu

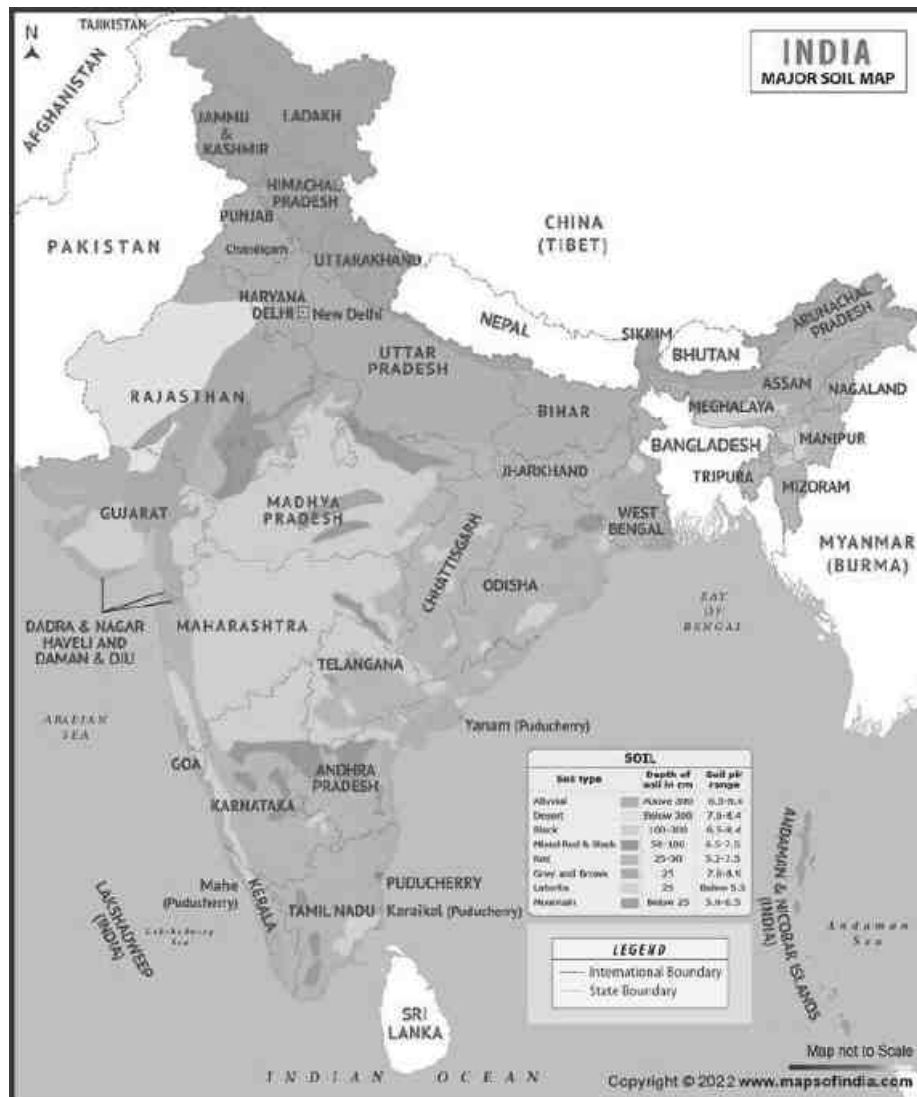


**3.5.11 Soils in PIA District**

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](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)



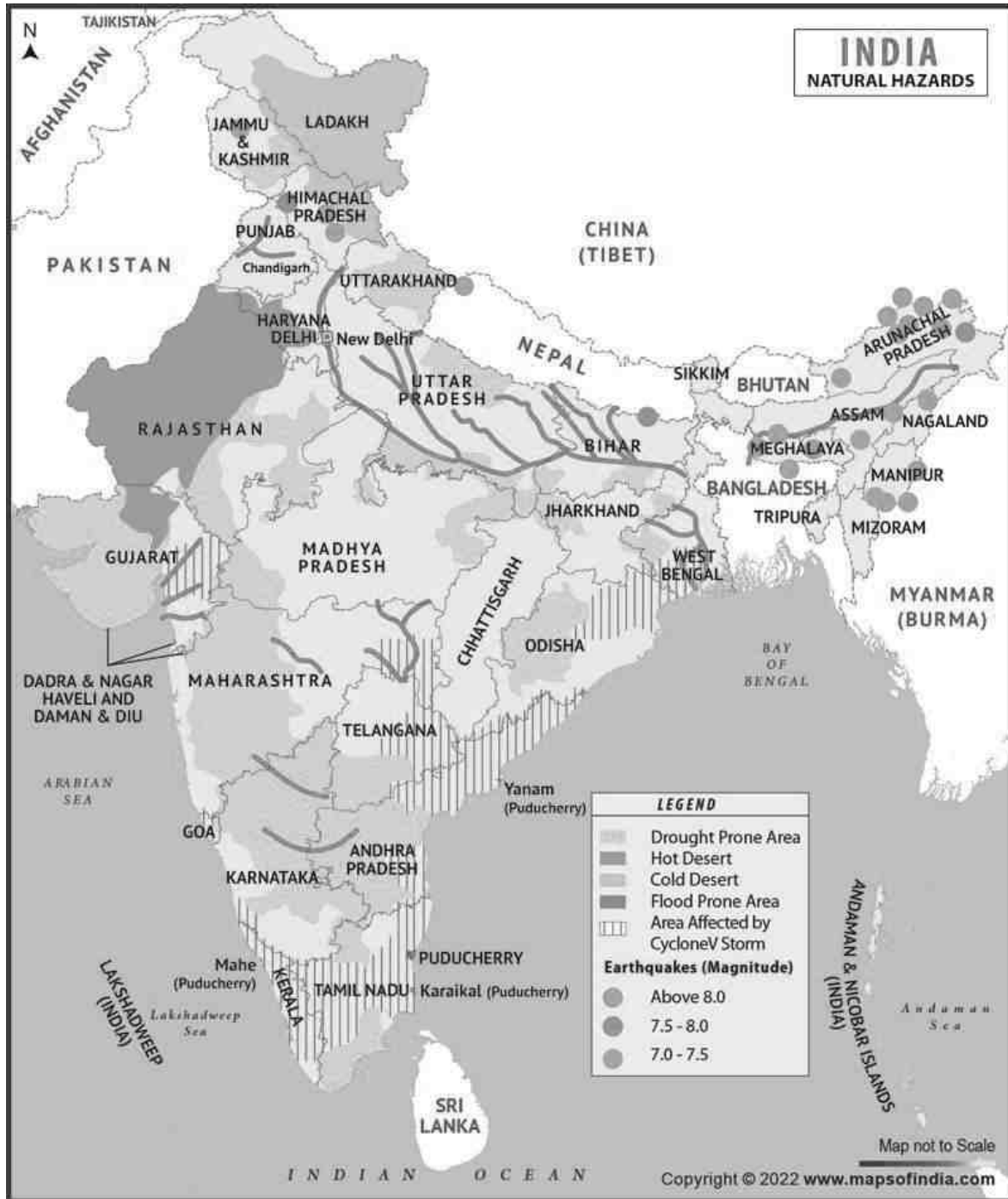
**Figure 3-18 Soil map of India**

**3.5.12 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 3-19**.

*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)



**Figure 3-19 Natural Hazards Map of India**

### 3.6 Establishment of Baseline for valued environmental components

#### 3.6.1 Air Environment

Baseline ambient air quality assessment gives the status in the vicinity of site and is an indispensable part of environmental impact assessment studies. 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

#### 3.6.2 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.

#### 3.6.3 Meteorological Data Collection

Available secondary data pertaining to the meteorological parameters was obtained from the IMD Climatological tables. In addition, baseline meteorological data was generated during the study period (**Mid of January 2023 to Mid of April 2023**). 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).

#### 3.6.4 General Meteorological Scenario based on IMD Data

The nearest Indian 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 3-5**.

**Table 3-5 Climatological Summary– Dharmapuri (1991-2020)**

Month	Temp (°C)		Rainfall		Relative Humidity (%)		Vapour Pressure hPa		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total (mm)	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
<b>Jan</b>	29.7	17.7	2.6	0.3	81	50	20.1	18.1	5.1	NE	E
<b>Feb</b>	32.7	18.9	2.3	0.2	75	41	20.9	17.9	5	NE	E
<b>Mar</b>	35.8	20.8	16.4	0.9	68	33	22.3	17.3	4.6	NE	E
<b>Apr</b>	36.8	23.8	52.9	2.8	68	38	25.5	20	4.3	SW	E
<b>May</b>	36.5	24.5	120.3	6.6	66	48	25.9	23.5	5.3	SW	SW
<b>Jun</b>	34.2	23.9	71.8	3.9	67	52	24.7	23.3	6.7	SW	SW
<b>Jul</b>	33.2	23.4	73.9	4.1	69	56	24.2	23.5	6.8	SW	SW
<b>Aug</b>	32.5	23.1	113.9	6.2	73	58	24.5	24	6.2	SW	W

Month	Temp (°C)		Rainfall		Relative Humidity (%)		Vapour Pressure hPa		Mean Wind Speed (Kmph)	Predominant Wind Directions (From)*	
	Daily Max.	Daily Min.	Total (mm)	No. of days	08:30	17:30	08:30	17:30		08:30	17:30
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 Data given in **Table 3-5**, the observations drawn are as follows

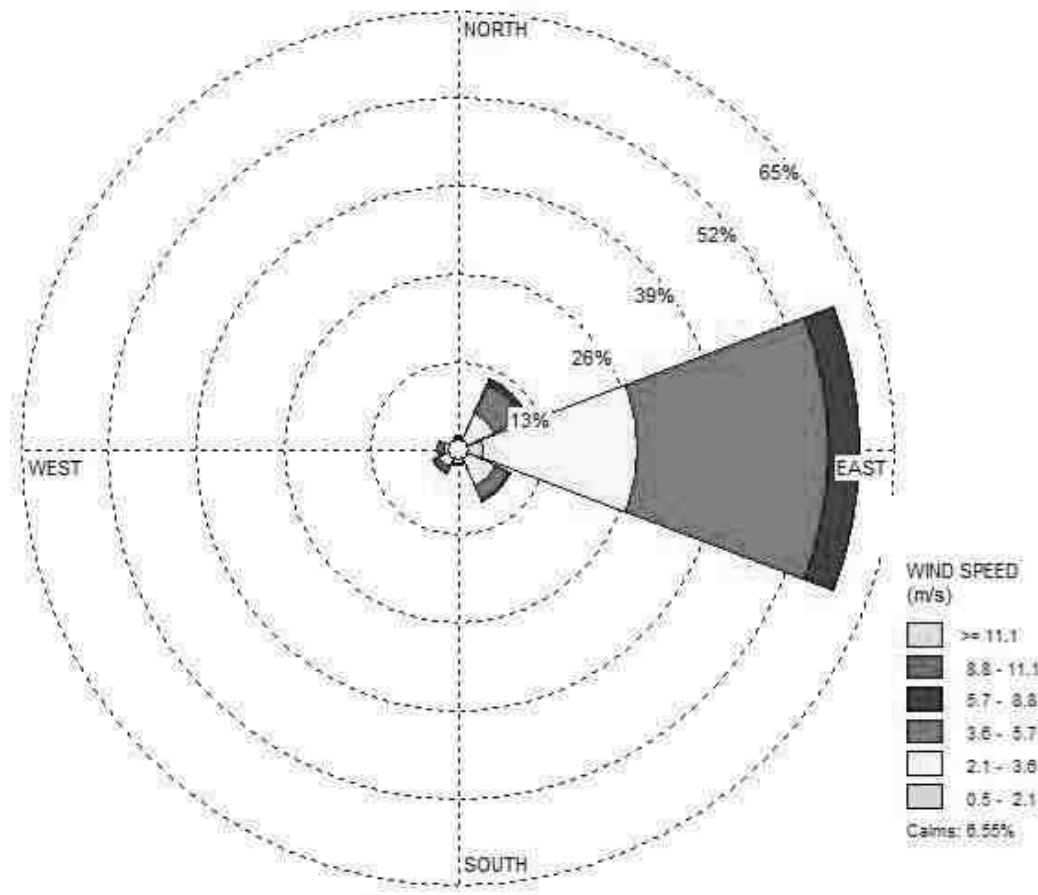
- Highest Daily maximum temperature is 36.8°C and the Lowest daily minimum temperature is 17.7°C were recorded in the months of April and January respectively
- Maximum and minimum relative humidity of 83% and 33% were recorded in the months of November and March respectively.
- Maximum and minimum rainfall of 193.2 mm and 2.3 mm was recorded in the months of October February 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**.

### 3.6.5 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 mid of **mid of January 2023 to mid of April 2023** and is presented in **Table 3-6**. The wind rose for the study period is given as **Figure 3-20**.

**Table 3-6 Meteorology Data for the Study Period (mid of January 2023 to mid of April 2023)**

S.No	Parameter	Observation
1	Temperature	Max. Temperature: 34°C Min. Temperature: 14°C Avg. Temperature: 25.08°C
2	Average Relative Humidity	52.51%
3	Average Wind Speed	3.12m/s
4	Predominant Wind Direction	North East



**Figure 3-20 Wind Rose during mid of January 2023 to mid of April 2023**

### 3.6.6 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: 25.08°C
- Average Relative humidity: 52.51%
- Average Wind speed: 3.12m/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 2887 m during 6 AM to 4 PM, the maximum recorded at 2887 m during March 2023. This is shown in the following **Figure 3-21**.

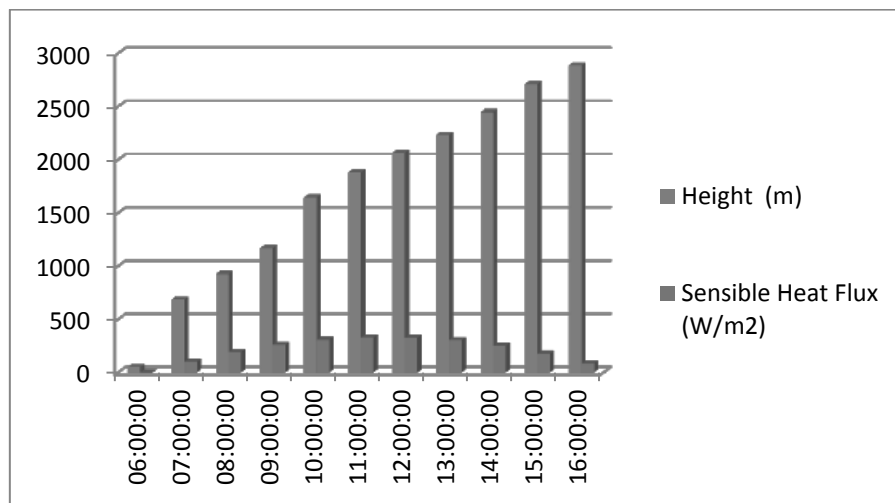


Figure 3-21 Atmospheric inversion level at the project site

### 3.7 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

#### 3.7.1 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 (Mid of January 2023 to Mid of April 2023 is from North East). AAQ monitoring locations are selected based on Annual wind predominance, map showing the AAQ monitoring locations is given in **Figure 3-22** and the details of the locations are given in **Table 3-7**.

Table 3-7 Details of Ambient Air Quality Monitoring Locations

Station Code	Location	Type of Wind	Distance (~km)	Azimuth Directions
AAQ1	Near Project Site (Muluvanapalli)	-	0.36	E
AAQ2	Tavarakkarai	u/w	4.90	NE
AAQ3	Karandapalli	c/w	2.23	E
AAQ4	Ramasandiram	c/w	4.92	SE
AAQ5	Mudugera	d/w	4.58	SW
AAQ6	Bilimudra	d/w	0.80	SW
AAQ7	Kanchchuvadi	c/w	3.72	W
AAQ8	Palaiyankottai	c/w	3.97	NNW

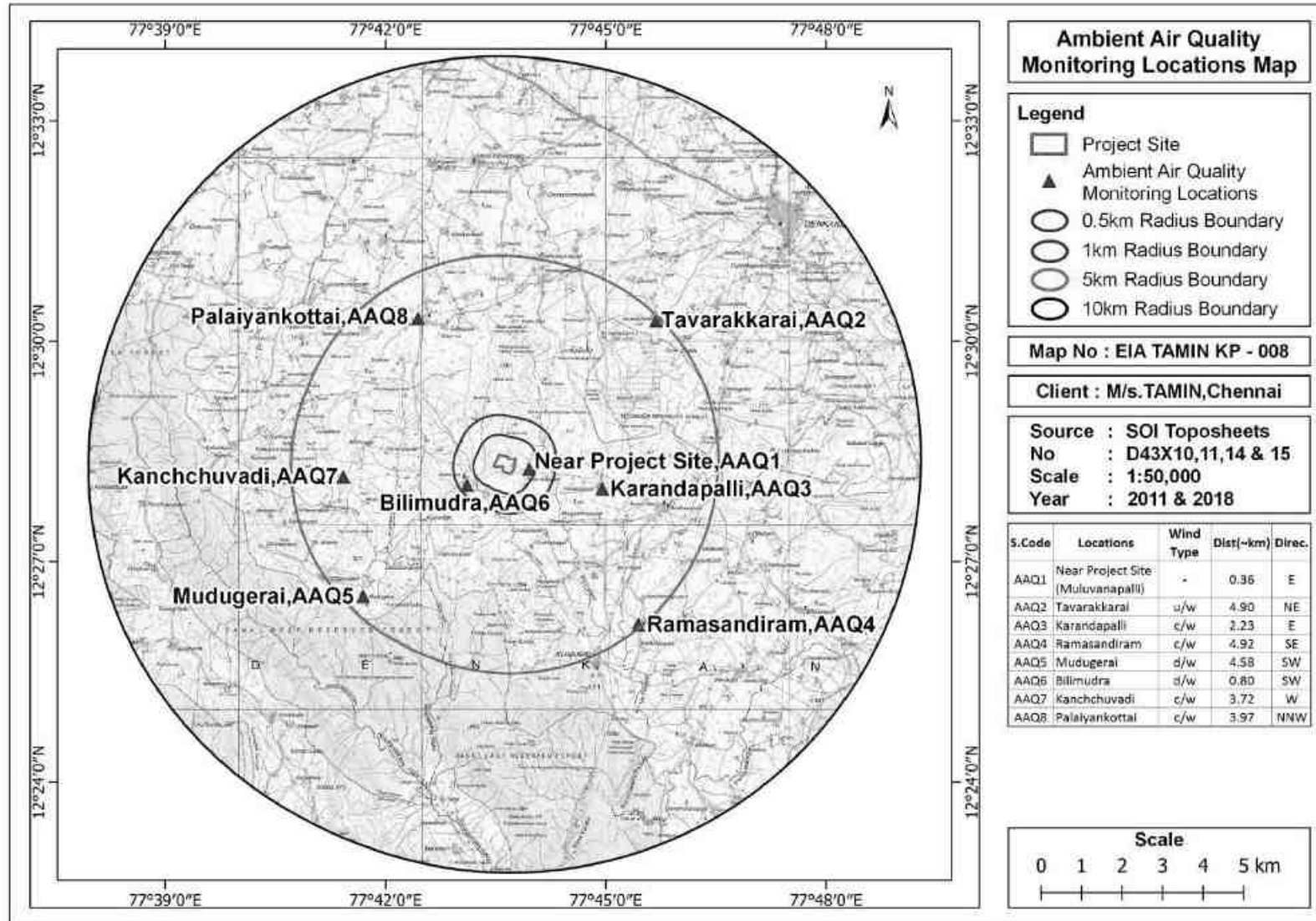


Figure 3-22 Map showing the Ambient Air Quality monitoring locations

### 3.7.2 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 **(Mid of January 2023 to Mid of April 2023)**. PM10, PM2.5, SO2, NOx, CO, Pb, O3, NH3, C6H6, C20H12, As, Ni, TVOC, and Methane Hydrocarbon and Non-Methane Hydrocarbon was 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 3-8**.

**Table 3-8 Analytical Methods for Analysis of Ambient Air Quality Parameters (NAAQ)**

S. No	Parameters	Analytical method	NAAQ standards: 2009		Sampling Time
1	Sulphur Dioxide (SO <sub>2</sub> ), µg/m <sup>3</sup>	IS 11255: (Part 2) / USEPA Method 6	50 (Annual)	80(24 Hours)	24 Hours
2	Nitrogen Dioxide (NO <sub>2</sub> ), µg/m <sup>3</sup>	IS: 5182 (Part - 6): 2006 / CPCB guidelines Volume1	40 (Annual)	80 (24 Hours)	24 Hours
3	Particulate Matter (PM <sub>2.5</sub> ), µg/m <sup>3</sup>	In house method (Gravimetric method) based on CPCB guidelines Volume1	40 (Annual)	60 (24 hours)	24 Hours
4	Particulate Matter (PM <sub>10</sub> ), µg/m <sup>3</sup>	IS:5182 (Part- 23): 2006 CPCB guidelines Volume1	60 (Annual)	100 (24 hours)	24 Hours
5	CO, mg/m <sup>3</sup>	IS:5182(Part-10):1999 (Reaff:2006) CPCB guidelines Volume1	2 (8 hours)	4 (1hour)	8 Hours
6	Pb, µg/m <sup>3</sup>	IS:5182(Part-22):2004 (Reaff:2006) CPCB guidelines Volume1	0.5(Annual)	1(24 hours)	24 Hours
7	O <sub>3</sub> , µg/m <sup>3</sup>	In house method (Spectrophotometric method) based on CPCB guidelines Volume1	100(8hours)	180 (1hour)	8 Hours
8	NH <sub>3</sub> , µg/m <sup>3</sup>	In house method (Spectrophotometric method) based on CPCB guidelines Volume1	100(Annual)	400(24 hours)	8 Hours
9	Benzene, µg/m <sup>3</sup>	GC FID/ GC MS based on IS 5182 (Part:12)/ CPCB guidelines Volume1	5 (Annual)	5 (Annual)	24 Hours
10	Benzo (a) pyrene, ng/m <sup>3</sup>	In House Validated method By HPCL , UV & GC MS Based on IS:5182(Part-12) CPCB guidelines Volume1	1 (Annual)	1 (Annual)	24 Hours
11	Arsenic, ng/m <sup>3</sup>	In house method (AAS method) Based on CPCB guidelines Volume 1	6 (Annual)	6 (Annual)	24 Hours
12	Nickel, ng/ m <sup>3</sup>	In house method (AAS method) Based on CPCB guidelines Volume 1	20(Annual)	20 (Annual)	24 Hours

#### 3.7.2.1 Results and Discussions

The variations of the pollutants Particulate matter <10 micron size (PM<sub>10</sub>), Particulate matter <2.5 micron size (PM<sub>2.5</sub>), Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Carbon Monoxide (CO), Lead (Pb), Ozone (O<sub>3</sub>), Benzene (C<sub>6</sub>H<sub>6</sub>), Benzo (a) pyrene (C<sub>20</sub>H<sub>12</sub>), Arsenic (As), Nickel (Ni), Ammonia (NH<sub>3</sub>) are compared with National Ambient Air Quality Standards (NAAQS), MoEF&CC Notification, November 2009. Ambient



Air Quality Monitoring Data (**Mid of January 2023 to Mid of April**) for the study area is given in **Table 3-9** and trends of measured ambient concentration in the study area were graphically represented in **Figure 3-23**.

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

Parameters	Conc.	NAAQ Standards	Locations							
			Near Project Site (Muluvanapalli)	Tavarakkarai	Karandapalli	Ramasandiram	Muduggerai	Bilimudra	Kanchchuvadi	Palaiyankottai
			AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
PM <sub>10</sub> Conc. (µg/m <sup>3</sup> )	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.		<b>58.57</b>	<b>57.24</b>	<b>58.17</b>	<b>56.35</b>	<b>57.29</b>	<b>58.20</b>	<b>57.89</b>	<b>57.51</b>
	98th 'tile		69.20	67.63	68.73	66.57	67.69	68.76	68.40	67.95
PM <sub>2.5</sub> Conc. (µg/m <sup>3</sup> )	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.		<b>35.50</b>	<b>33.43</b>	<b>35.22</b>	<b>33.18</b>	<b>34.07</b>	<b>35.36</b>	<b>35.13</b>	<b>34.17</b>
	98th 'tile		41.94	39.49	41.61	39.20	40.25	41.78	41.50	40.37
SO <sub>2</sub> Conc. (µg/m <sup>3</sup> )	Min.	80 (24 Hours)	14.94	13.39	14.40	12.79	13.03	14.64	14.35	13.54
	Max.		21.29	19.08	20.52	18.23	18.58	20.86	20.44	19.29
	Avg.		<b>17.92</b>	<b>16.06</b>	<b>17.27</b>	<b>15.34</b>	<b>15.64</b>	<b>17.56</b>	<b>17.21</b>	<b>16.24</b>
	98th 'tile		21.17	18.97	20.40	18.13	18.47	20.74	20.33	19.18
NO <sub>2</sub> Conc. (µg/m <sup>3</sup> )	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.,		<b>19.37</b>	<b>13.27</b>	<b>17.67</b>	<b>12.70</b>	<b>14.40</b>	<b>18.55</b>	<b>16.85</b>	<b>15.26</b>
	98th 'tile		22.88	15.68	20.87	15.00	17.01	21.91	19.90	18.03
Lead (Pb) (µg/m <sup>3</sup> )	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)
Carbon monoxide (CO) (mg/m <sup>3</sup> )	Avg.	4 (1hour)	2.01	1.23	2.91	1.51	0.94	1.75	1.23	1.11
Ozone O <sub>3</sub> (µg/m <sup>3</sup> )	Avg.	180 (1hour)	10.75	3.01	8.76	9.73	6.51	8.76	5.67	7.46
Benzene (C <sub>6</sub> H <sub>6</sub> ) (µg/m <sup>3</sup> )AQ	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)

Parameters	Conc.	NAAQ Standards	Locations							
			Near Project Site (Muluvanapalli)	Tavarakkarai	Karandapalli	Ramasandiram	Mudugerai	Bilimudra	Kanchchuvadi	Palaiyankottai
			AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	AAQ7	AAQ8
Nickel as Ni (ng/m <sup>3</sup> )	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)
Ammonia (NH <sub>3</sub> ) (µg/m <sup>3</sup> )	Avg.	400 (24 hour)	13.98	2.53	5.06	10.11	4.93	5.8	6.64	5.09

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

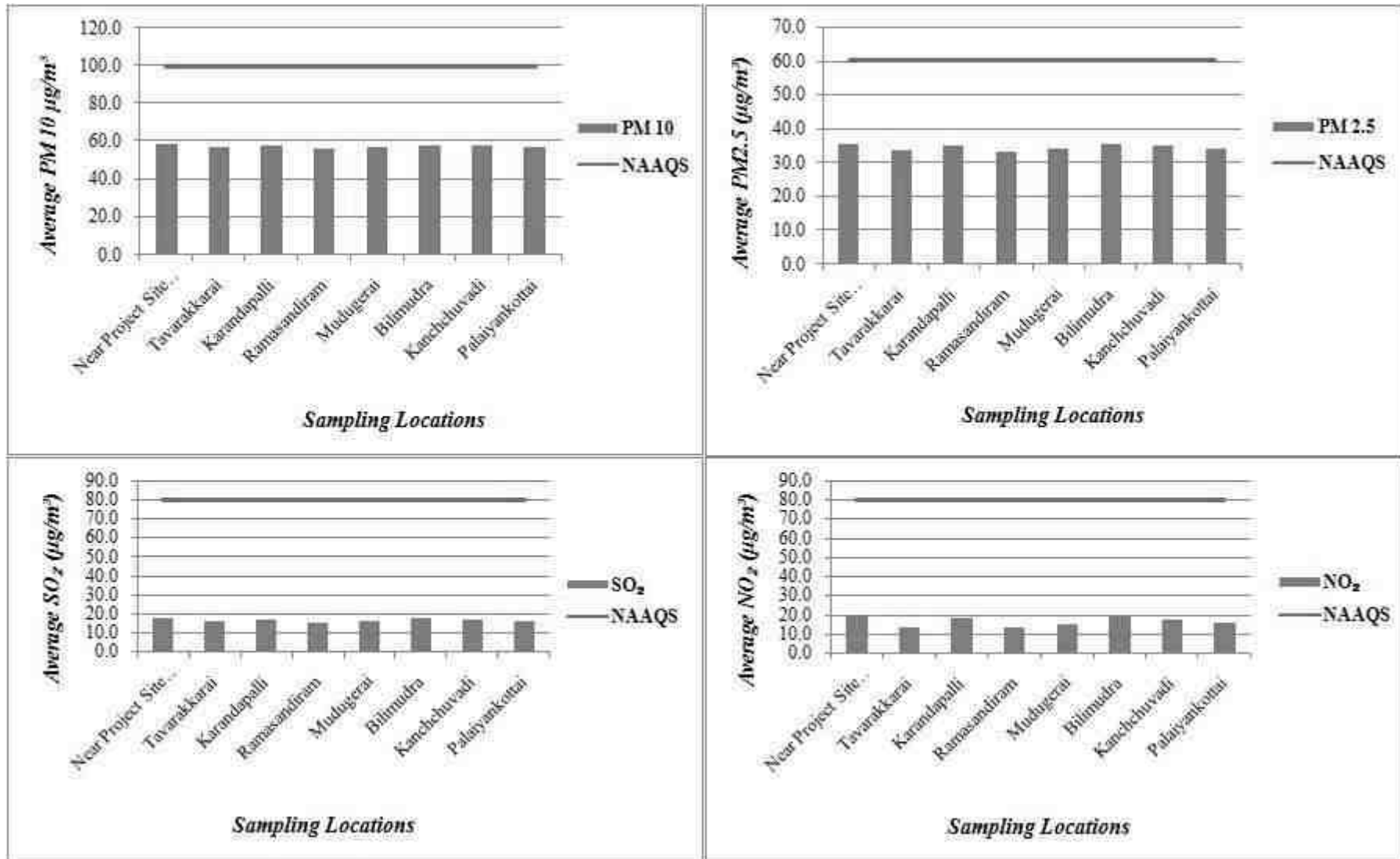


Figure 3-23 Trends of Measured Ambient Concentrations in the Study Area

### 3.7.2.2 Observations

The ambient air quality has been monitored at 8 locations as per NAAQS, 2009 within the study area. The results obtained are summarised as below:

- The average baseline levels of PM<sub>10</sub> vary from **56.27 µg/m<sup>3</sup>** to **58.49µg/m<sup>3</sup>**.
- The average baseline levels of PM<sub>2.5</sub> vary from **33.13µg/m<sup>3</sup>** to **35.45µg/m<sup>3</sup>**.
- The average baseline levels of SO<sub>2</sub> vary from **15.32µg/m<sup>3</sup>** to **17.89µg/m<sup>3</sup>**.
- The average baseline levels of NO<sub>2</sub> vary from **12.68µg/m<sup>3</sup>** to **19.34 µg/m<sup>3</sup>**.

## 3.8 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 10Km 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. Map showing noise monitoring locations is **Figure 3-24**.

### 3.8.1 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

The day and night equivalent noise levels given in **Table 3-10**.

Table 3-10 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	Tavarakkarai	4.90	NE	51.4	40.1	55	45	Residential
N4	Karandapalli	2.23	E	51.9	41.3	55	45	Residential
N7	Ramasandiram	4.92	SE	50.6	42.2	55	45	Residential
N6	Mudugerai	4.58	SW	52.5	41.9	55	45	Residential
N3	Bilimudra	0.80	SW	52.7	41.8	55	45	Residential
N5	Kanchchuvadi	3.72	W	50.4	41.6	55	45	Residential
N8	Palaiyankottai	3.97	NNW	53.9	42.9	55	45	Residential

### 3.8.1.1 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
- In Residential area night time noise levels varied from **40.1dB (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).

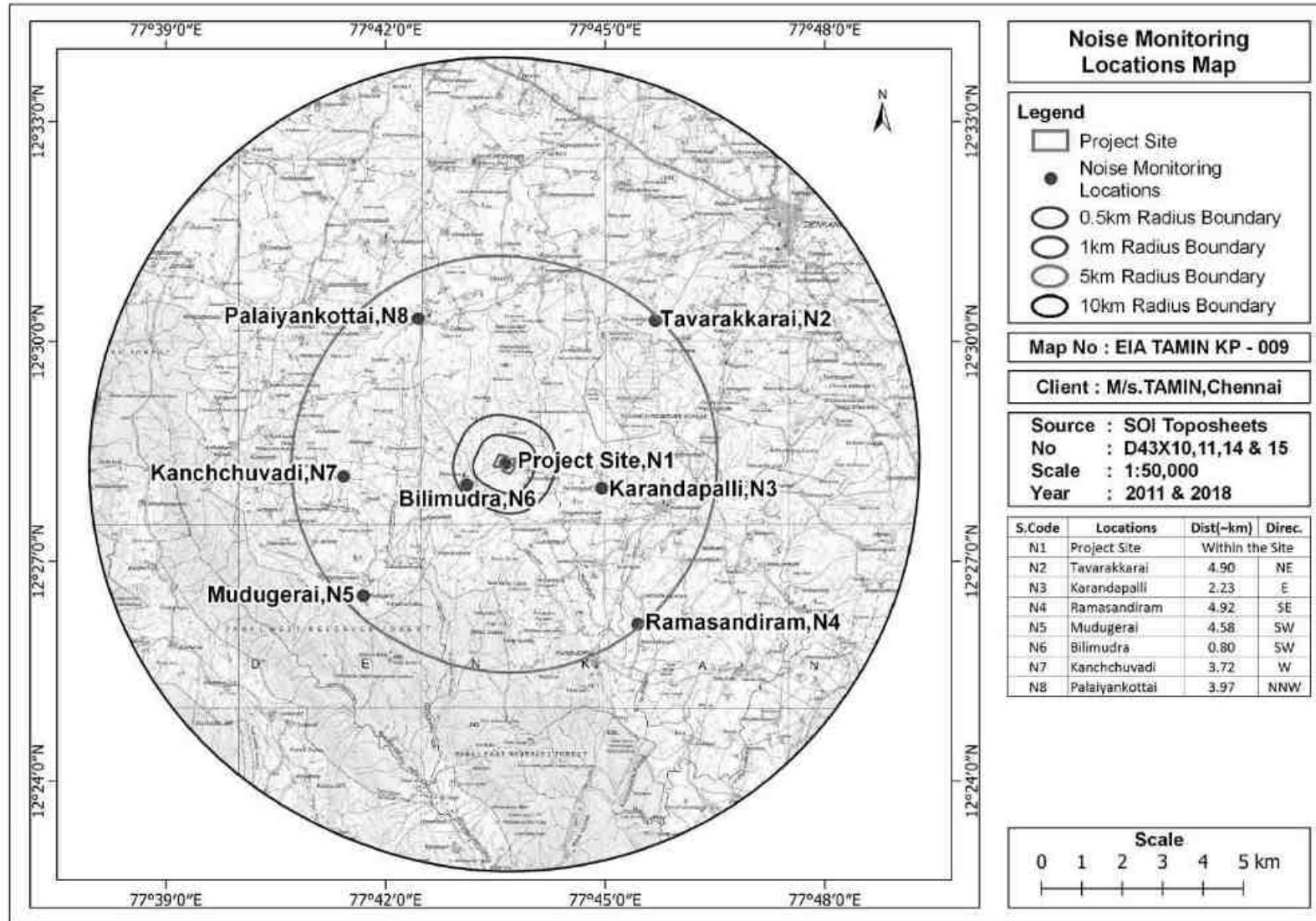


Figure 3-24 Map showing the noise monitoring locations

### 3.9 Water Environment

The main rivers that flow across the district are Cauvery and South Pennar. Cauveri enters the district from south west in Denkanikottai taluk and exists in southwest direction.

#### 3.9.1 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 km through Karnataka and Tamil Nadu, draining into the Bay of Bengal at Cuddalore. It has a catchment area of 3690 sq.kms, located in Karnataka, Tamil Nadu 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](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)

#### 3.9.2 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 10 Km from project site have been selected as per CPCB guidelines of Water Quality Monitoring through an adequate survey of the project area. Test methods used for the analysis of water quality parameters is given in **Table 3-11**. Water sampling and map of sampling location are given in **Table 3-12** And **Figure 3-25**. Physicochemical Parameters of Surface water samples from the study area given in

**Table 3-13.**

**Table 3-11 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 CaCO <sub>3</sub>	IS:3025,1 (Part - 23) 1986 (Reaff 2009)
7	Total Hardness as CaCo <sub>3</sub>	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 SO <sub>4</sub>	IS 3025(Part - 24):1986
14	Nitrate as NO <sub>3</sub>	ASTM (Part - 31)1978
15	Phosphate as PO <sub>4</sub>	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 <sub>2</sub>	5210B APHA22nd Edn 2012
29	Chemical Oxygen Demand as O <sub>2</sub>	IS:3025 (Part-58)-2006

**Table 3-12 Details of Surface water sampling locations**

Location Code	Location	Distance in km	Direction
SW1	Denkanikota Lake	8.55	NE
SW2	Andevanpalli Lake	3.21	ESE
SW3	Nir Pallam	1.81	SE
SW4	Periya Pallam	8.39	SSE
SW5	Lake near Panai	8.37	SSW
SW6	Adda Vanka	0.27	WSW
SW7	Lake near Tekur	3.44	WNW
SW8	Onnamma Cheruvu	8.78	NNW

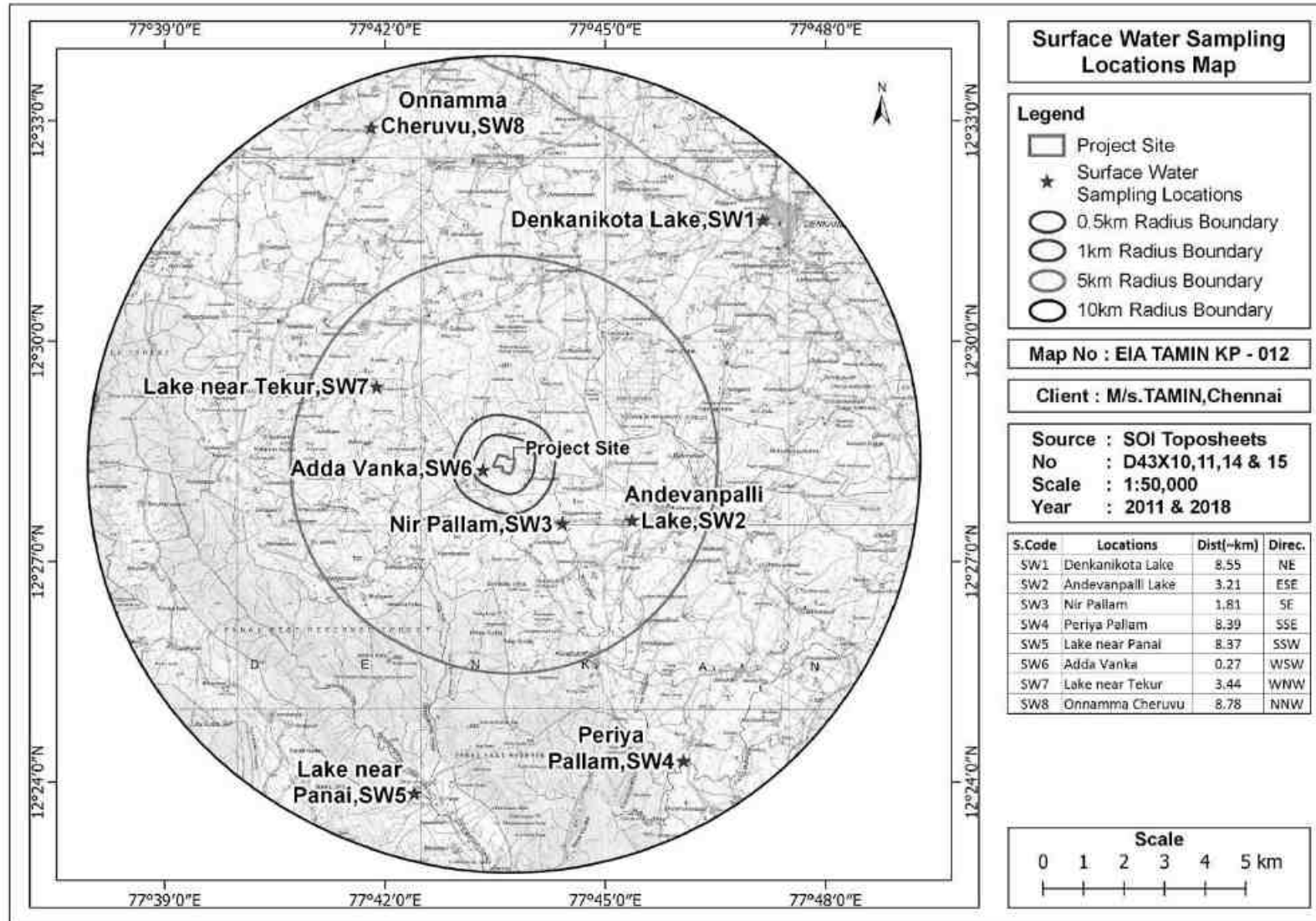


Figure 3-25 Map showing the surface water monitoring locations

Table 3-13 Physicochemical Parameters of Surface water samples from the study area

S. No	Parameter	Unit	Denkanikot	Andevanpa	Nir Pallam	Periya	Lake near	Adda	Lake near	Onnamma
			a Lake	lli Lake		Pallam	Panai	Vanka	Tekur	Cheruvu
			SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
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	758	773	748	754	712	718	755	719
3.	Total Dissolved Solids	mg/l	409	335	470	359	409	450	464	405
4.	Total Suspended Solids	mg/l	17.3	34	42	29	32	14	36	31
5.	Total Alkalinity as CaCO <sub>3</sub>	mg/l	134	127	179	139	144	168	179	153
6.	Total Hardness as CaCO <sub>3</sub>	mg/l	193	177	209	190	175	211	186	179
7.	Sodium as Na	mg/l	47	15	64	19	44	49	59	38
8.	Potassium as K	mg/l	17	6	12	4	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	24.0	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 <sub>4</sub>	mg/l	24.1	17.3	15.8	18.6	26.3	19.7	27.6	20.9
13.	Nitrate as NO <sub>3</sub>	mg/l	5.8	6.1	7.2	5.8	6.4	8.2	8.7	6.8
14.	Phosphate as PO <sub>4</sub>	mg/l	0.32	0.15	0.38	0.42	0.29	0.45	0.43	0.49
15.	Fluorides as F	mg/l	0.14	0.11	0.24	0.29	0.11	0.15	0.37	0.13
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 0.001)	BLQ (LOQ 0.001)	BLQ (LOQ 0.001)	BLQ (LOQ 0.001)	BLQ (LOQ 0.001)	BLQ (LOQ 0.001)	BLQ (LOQ 0.001)	BLQ (LOQ 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	5.3	4.8	5.6	5.9	5.1	4.5	6.2	5.5

S. No	Parameter	Unit	Denkanikot a Lake	Andevanpalli Lake	Nir Pallam	Periya Pallam	Lake near Panai	Adda Vanka	Lake near Tekur	Onnamma Cheruvu
			SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
27.	Chemical Oxygen Demand as O <sub>2</sub>	mg/l	33	28	24	31.5	24.9	17.3	15.2	14.8
28.	BOD, 3 days @ 27°C as O <sub>2</sub>	mg/l	6.5	7.1	6.8	7.3	6.3	6.9	7.2	6.4
29.	Total Coliform	MPN/100m L	61	33	54	21	46	41	43	39

*Note: BLQ – Below the Limit of Quantification; LOQ – Limit of Quantification*

### 3.9.2.1 Results and Discussions

Surface water sample results are discussed below:

- 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 **388 mg/l to 418 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 **6.3 mg/l to 7.3 mg/l**
- COD value of surface water varies from **14.8 to 33 mg/l**

Surface water standards (IS 2296:1992) given in **Table 3-14**

**Table 3-14 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 <sub>3</sub>	mg/l	---	---	---	---	---
6	Total Hardness as CaCO <sub>3</sub>	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 SO <sub>4</sub>	mg/l	400	---	400	---	1000
13	Phosphate	mg/l	---	---	---	---	---
14	Nitrate as NO <sub>3</sub>	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	---	---

S.No	Parameters	Unit	A	B	C	D	E
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	---	---	---	---
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.

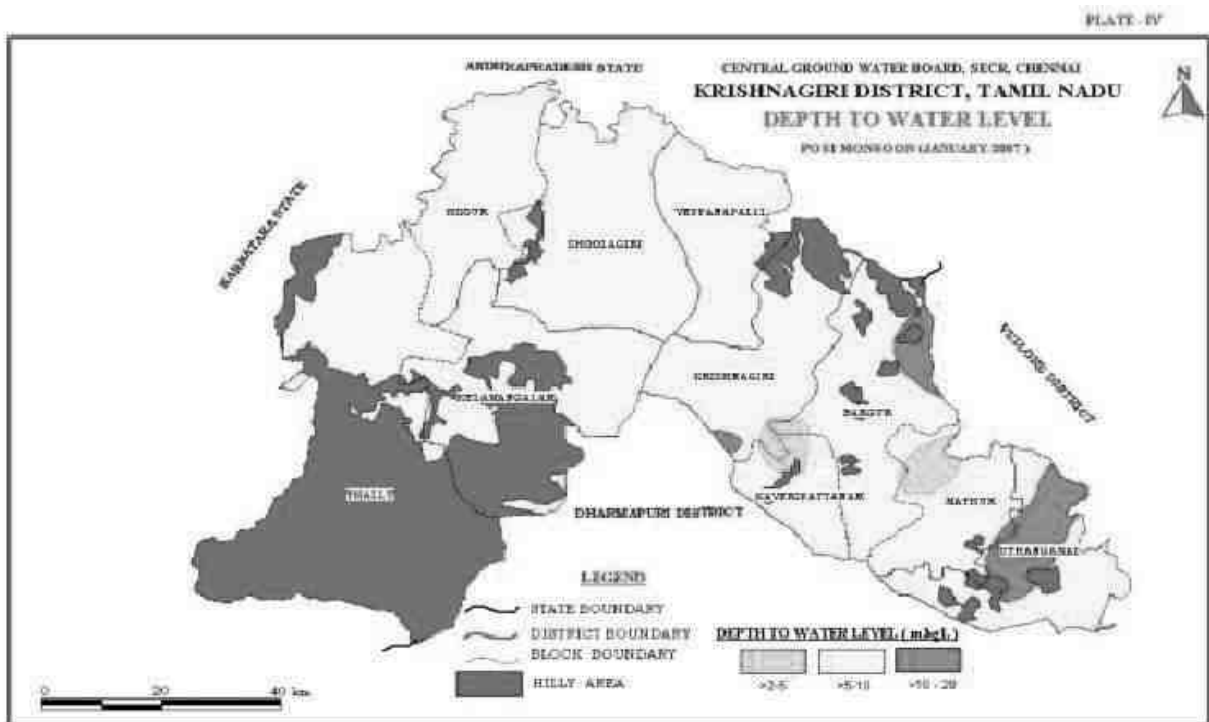
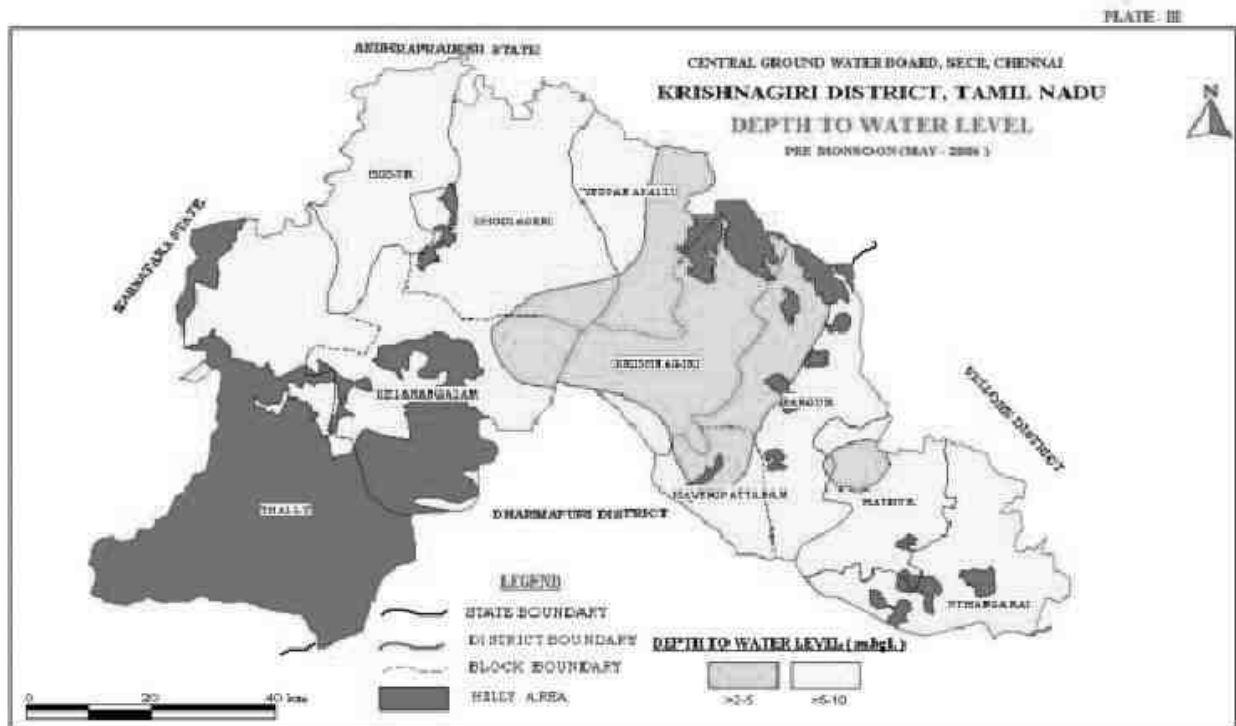
**Class E** – Water for irrigation, industrial cooling and controlled waste disposal

### 3.9.3 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 3-26**.

**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 3-26 Depth to water level during Pre-Monsoon & Post Monsoon in Krishnagiri District**

**3.9.3.1 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, organic components, pathogenic microorganisms, 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 desirable and permissible water quality standards as per IS 10500 (2012) for drinking water. Groundwater quality monitoring locations and results are given in **Table 3-15**.and **Table 3-16**. Map showing the groundwater monitoring locations are given in **Figure 3-27**.

**Table 3-15 Details of Groundwater Quality Monitoring Locations**

<b>Location Code</b>	<b>Location</b>	<b>Distance in km</b>	<b>Direction</b>
GW1	Near Project Site (Muluvanapalli)	0.36	E
GW2	Tavarakkarai	4.90	NE
GW3	Karandapalli	2.23	E
GW4	Ramasandiram	4.92	SE
GW5	Mudugera	4.58	SW
GW6	Bilimudra	0.80	SW
GW7	Kanchchuvadi	3.72	W
GW8	Palaiyankottai	3.97	NNW



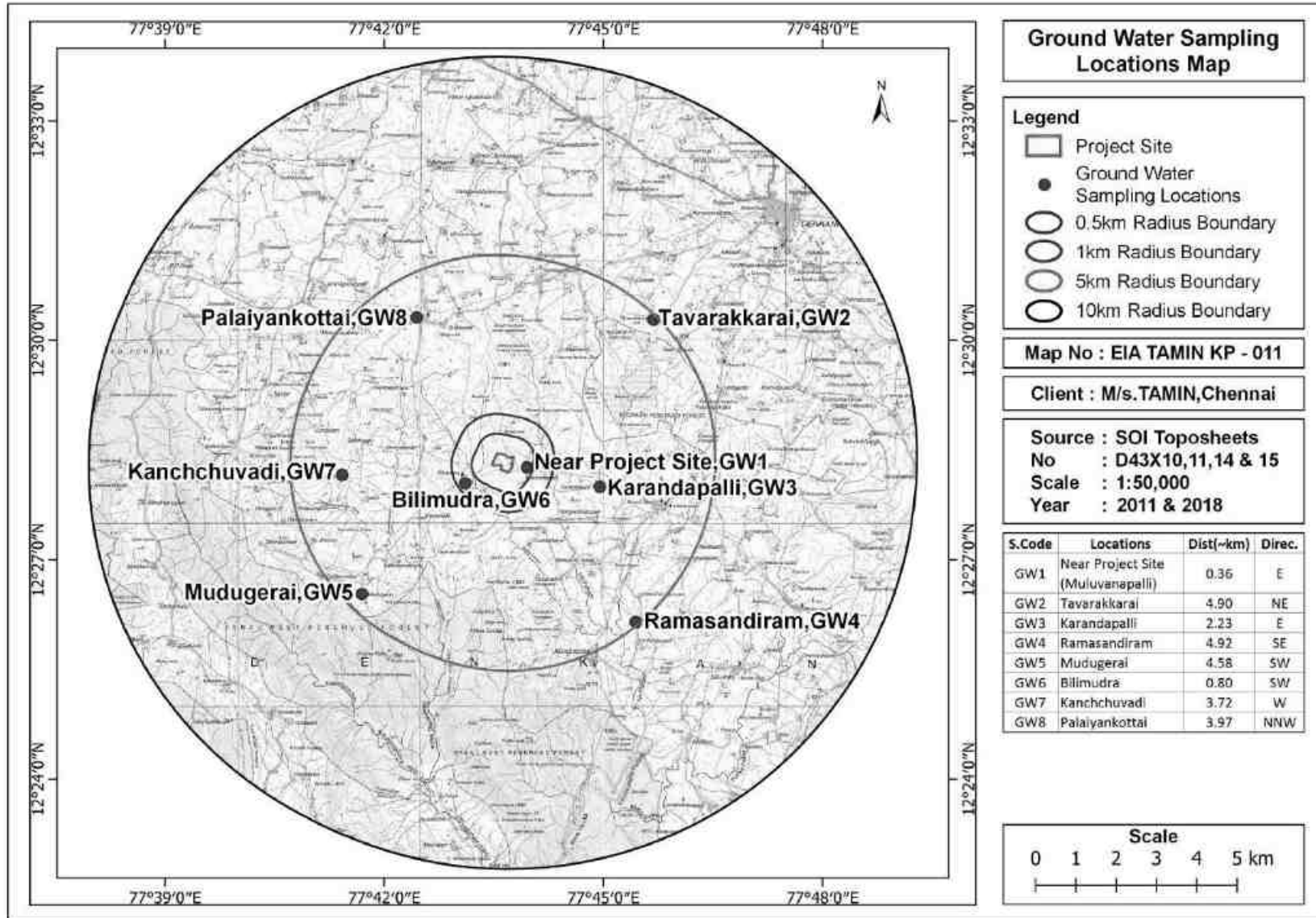


Figure 3-27 Map showing the groundwater monitoring locations

Table 3-16 Physico chemical analysis of Ground water samples from study area

SL NO	Parameters	Unit	Drinking water Standard (IS 10500: 2012)		Near Project Site (Muluvana palli)	Tavarakka rai	Karandapalli	Ramasand iram	Mudugera i	Bilimudra	Kanchchu vadi	Palaiyank ottai
			Permissible Limit	Acceptable Limit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
1	Colour	Hazen	15	5	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	5	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)	BLQ (LOQ 0.1)
3	pH	-	NR	6.5-8.5	7.49	7.36	7.79	7.66	7.48	7.31	7.42	7.56
4	Electrical Conductivity	µS/cm	-	-	656	684	680	697	786	614	638	681
5	Total Dissolve Solids	mg/l	2000	500	474	497	445	473	381	329	483	326
6	Total Suspended Solids		-	-	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	Total Alkalinity as CaCO <sub>3</sub>	mg/l	600	200	214	225	177	231	150	139	203	104
8	Total Hardness as CaCO <sub>3</sub>	mg/l	600	200	257	250	243	211	218	166	256	151
9	Sodium as Na	mg/l	-	-	25	13	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	200	75	84.8	72.2	69.5	74.5	47.98	45.67	72.41	27.84
12	Magnesium as Mg	mg/l	100	30	10.9	16.8	16.9	5.95	23.8	12.64	18.34	19.72
13	Chloride	mg/l	1000	250	44.9	48.2	37.2	27.9	52.01	15.37	18.34	52.14
14	Sulphate SO <sub>4</sub>	mg/l	400	200	14.5	19.8	42	16	12	37	49	31
15	Nitrate as NO <sub>3</sub>	mg/l	NR	45	17.45	35.1	26.8	24.2	35.1	18.64	34.15	28.34
16	Phosphate as PO <sub>4</sub>	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	mg/l	1.5	1	0.86	0.91	0.82	0.51	0.31	0.36	0.67	0.82
18	Cyanide	mg/l	NR	0.05	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	0.05	0.01	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	1.0	0.5	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)

SL NO	Parameters	Unit	Drinking water Standard (IS 10500: 2012)		Near Project Site (Muluvana palli)	Tavarakka rai	Karandapa lli	Ramasand iram	Mudugera i	Bilimudra	Kanchchu vadi	Palaiyank ottai
			Permissibl e Limit	Acceptabl e Limit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8
21	Cadmium as Cd	mg/l	NR	0.003	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	NR	0.05	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	1.5	0.05	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	NR	0.01	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	0.3	0.1	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	NR	0.001	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)
27	Nickel as Ni	mg/l	NR	0.02	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	NR	0.01	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 Limit of Quantification; LOQ – Limit Of Quantification; NR – No Relaxation*

### 3.9.3.2 Results and Discussions

A summary of analytical results are presented below:

- The pH of the collected ground water sample ranges from 7.31 to 7.66.
- The concentrations of Chloride in the collected ground water sample ranges from 15.37 to 52.14 mg/l.
- Total Dissolved Solids (TDS) value of the collected ground water samples are BLQ (LOQ 1)
- 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.

### 3.10 Soil Quality

Soil quality monitoring locations & results are given in **Table 3-17** & **Table 3-18**. Map showing the soil monitoring locations are given in **Figure 3-28**.

**Table 3-17 Soil & Sediment Quality Monitoring Locations**

Location Code	Location	Distance in km	Direction
S1	Project Site	Within the Site	
S2	Tavarakkurai	4.90	NE
S3	Karandapalli	2.23	E
S4	Ramasandiram	4.92	SE
S5	Mudugerai	4.58	SW
S6	Bilimudra	0.80	SW
S7	Kanchchuvadi	3.72	W
S8	Palaiyankottai	3.97	NNW

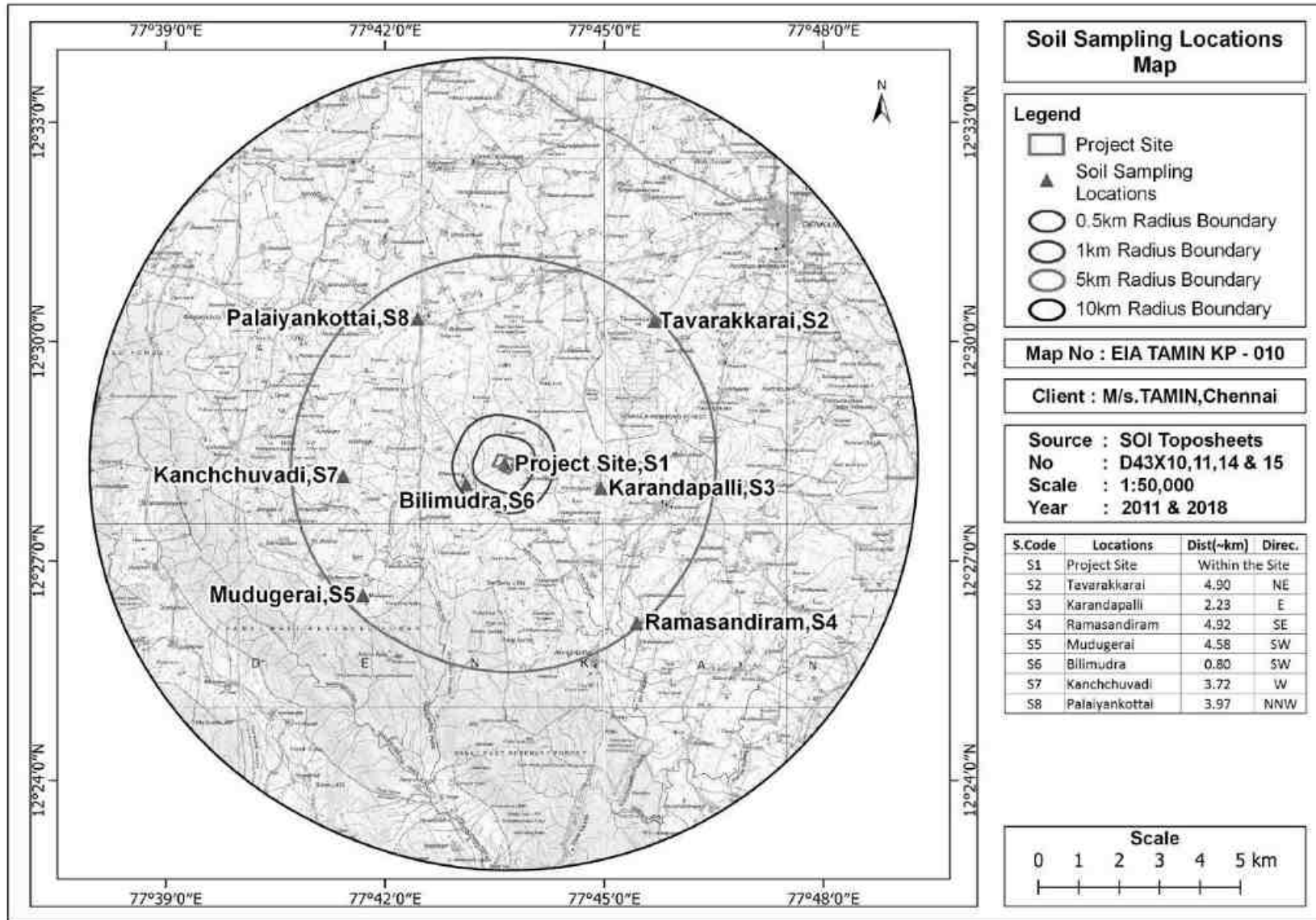


Figure 3-28 Map showing the soil monitoring location

Table 3-18 Physico Chemical parameters of soil samples from the study area

S. No	Parameters	Units	Project Site	Tavarakka rai	Karandap alli	Ramasandi ram	Mudugerai	Bilimudra	Kanchchu vadi	Palaiyankot tai
			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	µmho/cm	295	218	262	285	381	328	237	389
7	Nitrogen as N	mg/kg	285	408	217	193	216	124	183	181
8	Phosphorus	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	-	0.53	0.35	0.40	0.48	0.34	0.51	0.53	0.49
13	Water Holding Capacity	Inches of water per foot of soil	1.99	1.78	1.96	1.84	2.1	1.64	1.77	1.81

*Note: BLQ – Below Limit of Quantification; LOQ – Limit Of Quantification*

### 3.10.1 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 $\mu$ mho/cm.
- Nitrogen content ranged from 124 mg/kg to 408 mg/kg.
- Phosphorous ranged from 18.98 mg/kg to 33.05 mg/kg.
- Potassium content ranges from 73.30 mg/kg to 144.31 mg/kg.

### 3.11 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. Secondary information was collected 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. All the available information was recorded about the wild plants and cultivated crop plants.

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); and
- ❖ Assessment of Aquatic Ecology with specific reference to aquatic birds and plankton resources.

#### 3.11.1 Methodology

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

##### 3.11.1.1 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.

##### 3.11.1.2 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.

### 3.11.2 Flora

As per primary survey details, fair agro- vegetation cover in the study area. Growth of grasses in the study area is more in rainy season. The common trees in the study area are *Tamarindus indica*, *Pithecolobium dulce*, *Prosopis julifera* and *Eucalyptus* species. The shrub vegetation consists of *Zizyphus xylopyra*, *Adathoda vassica*, *Carisa* sp and *Randia dumetorum*. The common species of grasses in the study area are *Fimbristylus ovata*, *Aristida funiculata*, *Pennisetum* and *Heteropogon*. On the basis of distribution of trees, shrubs and Herbs the proposed project site (core zone) is having following vegetation as given in **Table 3-19**.

**Table 3-19 Flora/Vegetation in the Study Area**

S.No.	Botanical name	Family	Local name	IUCN
<b>Trees</b>				
1	<i>Acacia catechu</i>	Mimosaceae	Kaachu	NA
2	<i>Azadirachta indica</i>	Meliaceae	Turakabevu	NA
3	<i>Bauhunia purpurea</i>	Caesalpiniaceae	Devakanchan	NA
4	<i>Bombax ceiba</i>	Bombacaceae	Silk Cotton Tree	NA
5	<i>Buchanania lanzan</i>	Anacardiaceae	Charoli	NA
6	<i>Careya arborea</i>	Lecythidaceae	alagavvele	NA
7	<i>Cassia fistula</i>	Caesalpiniaceae	Amalataash	NA
8	<i>Erythrina stricta</i>	Fabaceae	Halivana	NA
9	<i>Gmelina arborea</i>	Verbenaceae	Shivani	NA
10	<i>Mammea longifolia</i>	Guttiferae	Surangi	NA
11	<i>Mimusops elengi</i>	Sapotaceae	Ranjal	LC
12	<i>Morinda citrifolia</i>	Rubiaceae	Tagase maddi	NA
13	<i>Moringa oleifera</i>	Moringaceae	Drumstick tree	NA
14	<i>Pithecolobium dulce</i>	Mimosaceae	Seeme hunase	NA
15	<i>Pongamia pinnata</i>	Fabaceae	Honge	LC
16	<i>Pterocarpus marsupium</i>	Fabaceae	Honne	NT
17	<i>Semecarpus anacardium</i>	Anacardiaceae	Geru	NA
18	<i>Syzigium cuminii</i>	Myrtaceae	Nerale Hannu	NA
19	<i>Tamarindus indica</i>	Caesalpiniaceae	Tamarind/ Hunase	NA
20	<i>Terminalia bellerica</i>	Combretaceae	Taarekaayi	NA
21	<i>Terminalia paniculata</i>	Combretaceae	Ulabe	NA
<b>Shrubs</b>				
22	<i>Calotropis procera</i>	Asclepiadaceae	bili aekka	NA
23	<i>Carissa congesta</i>	Apocynaceae	Karanda	NA
24	<i>Euphorbia ligularia</i>	Euphorbiaceae	Hedge Euphorbia	NA
25	<i>Helicterus isora</i>	Sterculiaceae	Yedmuri	NA
26	<i>Holarrhena antidysenterica</i>	Apocynaceae	Safed kuda	NA
27	<i>Ixora coccinea</i>	Rubiaceae	Devari	NA
28	<i>Jatropha curcas</i>	Euphorbiaceae	Kananeranda	NA



29	<i>Lantana camera</i>	Verbenaceae	Kakke	NA
30	<i>Thespesia lampas</i>	Malvaceae	Kilankoi	NA
31	<i>Wrightia tintoria</i>	Apocynaceae	Sweet Indrajao	NA
32	<i>Zizyphus rugosa</i>	Rhamnaceae	Belahadu	NA
<b>Herbs</b>				
33	<i>Cassia tora</i>	Caesalpiniaceae	Sogata	NA
34	<i>Eranthemum roseum</i>	Acanthaceae	Rosy Eranthemum	NA
35	<i>Hemidesmus indicus</i>	Asclepiadaceae	Indian Sarsaparilla	NA
<b>Climbers</b>				
36	<i>Abrus precatorius</i>	Fabaceae	Gulugunji	NA
37	<i>Asparagus racemosus</i>	Liliaceae	Aheruballi	NA
38	<i>Cocculus hirsutus</i>	Menispermaceae	Daagadi balli	NA
39	<i>Gymnema sylvestre</i>	Asclepiadaceae	Kadhasige	NA
40	<i>Jasminum malabaricum</i>	Oleaceae	Kadu mallige	NA
41	<i>Mucuna prurita</i>	Fabaceae	Nayisonanguballi	NA
42	<i>Phanera vahlii</i>	Caesalpiniaceae	Chambolli	NA
43	<i>Smilax ovatifolia</i>	Smilacaceae	Kaadu hambu	NA
44	<i>Tinospora cordifolia</i>	Menispermaceae	Madhuparni	NA
45	<i>Tylophora dalzellii</i>	Asclepiadaceae	Antamula	NA

**Grasses**

46	<i>Andropogon annulatus</i>	Poaceae	Marvel grass	NA
47	<i>Dendrocalamus strictus</i>	Poaceae	Bidiru	NA
48	<i>Heteropogon contortus</i>	Poaceae	Black Speargrass	NA
49	<i>Oxytenanthera ritchei</i>	Poaceae	Huda	NA
50	<i>Themeda quadrivalvis</i>	Poaceae	Grader grass	NA

**3.11.3 Fauna**

No major fauna observed in core zone. Only some egrets, herons and drongo are observed in the plant area. Among mammals, only mongoose is observed in the core zone. There is no endangered fauna observed in the proposed plant area.

A secondary information for faunal biodiversity of the study area with respect to birds, reptiles, amphibians and butterfly species. Fauna is a gift of nature, and the different beasts and birds, forming part of wild life, need to be preserved. The wild animal and birds help in protecting crops, by preying upon worms and insects, which might damage them. The IUCN Red List of Threatened Species 2016 is now applicable. The list of secondary information for faunal biodiversity in **Table 3-20**.

As per the Wild Life Act (1972) those animals, which have been enlisted in the schedules of the Wildlife Act, have been presented below. The schedules are based on the species namely, rare, endangered, threatened, vulnerable etc. According to the threat of extinction, Schedule-I contains those species which need topmost priority, while II, III, IV and V have lesser degree of threat. Most of the avi-fauna has been listed in Schedule-IV. As per the list of avi-faunal species, these are mostly local migrant species only.

Table 3-20 List of Birds

S. No	Common Name	Zoological Name	Family	IUCN status	WPA 72 Shedule
1.	Asian Open bill	Anastomus oscitans	Ciconiidae	LC	Sch-IV
2.	Asian palm-Swift	Tachymarpt is melba	Apodidae	LC	Sch-IV
3.	Asian Paradise Flycatcher	Terpsiphone paradisi	Monarchidae	LC	Sch-IV
4.	Black Drongo	Dicrurus macrocercus	Dicruridae	LC	Sch-IV
5.	Black Kite	Milvus migrans	Accipitridae	LC	Sch-IV
6.	Black-headed ibis	Eudocimus albus	Threskiornithidae	LC	Sch-IV
7.	Blue-tailed Bee-eater	Merops philippinus	Meropidae	LC	Sch-IV
8.	Brahminy kite	Haliastur indus	Accipitridae	LC	Sch-IV
9.	Cattle egret	Bubulcus ibis	Ardeidae	LC	Sch-IV
10.	Common coot	Fulica atra	Rallidae	LC	Sch-IV
11.	Common Kingfisher	Alcedo atthis	Alcedinidae	LC	Sch-IV
12.	Common Myna	Acridothere s tristis	Sturnidae	LC	Sch-IV
13.	Eastern Spotted Dove	Streptopelia chinensis	Columbidae	LC	Sch-IV
14.	Eurasian collared dove	Streptopelia decaocto	Columbidae	LC	Sch-IV
15.	Great egret	Ardea alba	Ardeidae	LC	Sch-IV
16.	Great Egret	Casmerodius albus	Ardeidae	LC	Sch-IV
17.	Green barbet	Stactolaema olivacea	Lybiidae	LC	Sch-IV
18.	House Crow	Corves splendens	Corvidae	LC	Sch-IV
19.	House Sparrow	Passer domesticus	Passeridae	LC	Sch-IV
20.	Indian Blue Robin	Luscinia brunnea	Muscicapidae	LC	Sch-IV
21.	Indian Pond-heron	Ardeola grayii	Ardeidae	LC	Sch-IV
22.	Indian Robin	Saxicoloides fulicata	Muscicapidae	LC	Sch-IV
23.	Indian roller	Coracias benghalensis	Coraciidae	LC	Sch-IV
24.	Indian Spot-bill Duck	Anas poecilorhyncha	Anatidae	LC	Sch-IV
25.	Jackobin Cuckoo	Clamator jacobinus	Cuculidae	LC	Sch-IV
26.	Large billed Crow	Corves macrorhynchos	Corvidae	LC	Sch-IV
27.	Lesser Cuckoo	Cuculus poliocephalus	Cuculidae	LC	Sch-IV
28.	Little Cormorant	Phalacrocor ax niger	Phalacrocoracidae	LC	Sch-IV
29.	Little Egret	Egretta garzetta	Ardeidae	LC	Sch-IV
30.	Median Egret	Egretta intermedia	Ardeidae	LC	Sch-IV
31.	Paddy field Pipit	Anthus rufulus	Motacillidae	LC	Sch-IV
32.	Purple Sunbird	Nectarinia asiatica	Nectariniidae	LC	Sch-IV
33.	Red-Vented Bulbul	Pycnonotus cafer	Pycnonotidae	LC	Sch-IV
34.	Red-wattled Lapwing	Vanellus indicus	Charadriidae	LC	Sch-IV
35.	Rose-Ringed Parakeet	Psittacula krameri	Psittacidae	LC	Sch-IV
36.	Shikra	Accipiter badius	Accipitridae	LC	Sch-IV
37.	Singing Bush Lark	Mirafra cantillans	Alaudidae	LC	Sch-IV
38.	White-breasted Kingfisher	Halcyon smyrnensis	Alcedinidae	LC	Sch-IV
39.	White-breasted Water hen	Amaurornis phoenicurus	Rallidae	LC	Sch-IV
40.	Yellow-billed babbler	Turdoides affinis	Leiothrichidae	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.

Table 3-21 List of Butterflies

S.No	Family	Zoological name	Common name	WPA 72 Shedule
1	Nymphalidae	Danaus chrysippus	Plain Tiger	Sch-IV
2	Nymphalidae	Danaus genutia	Striped Tiger	Sch-IV
3	Nymphalidae	Ariadne merione	Common Caster	Sch-IV
4	Nymphalidae	Neptis hylas	Common Sailor	Sch-IV
5	Nymphalidae	Phalanta phalantha	Common Leopard	Sch-IV
6	Nymphalidae	Melanitis leda	Common Evening Brown	Sch-IV
7	Nymphalidae	Mycalesis perseus	Common Bush Brown	Sch-IV
8	Nymphalidae	Ypthima asterope	Common Three Ring	Sch-IV
9	Nymphalidae	Euthala nais	Baronet	Sch-IV
10	Nymphalidae	Argynnis hyperbius	Indian Fritillary	Sch-IV
11	Nymphalidae	Byblia ilithya	Joker	Sch-IV
12	Pieridae	Colotis danae	Crimson Tip	Sch-IV
13	Pieridae	Colotis etrida	Small Orange Tip	Sch-IV
14	Pieridae	Eurema hecabe	Common Grass Yellow	Sch-IV
15	Pieridae	Catopsillia Pomona	Common Emigrant	Sch-IV
16	Pieridae	Cepora nerissa	Common Gull	Sch-IV
17	Pieridae	Leptosia nina	Psyche	Sch-IV
18	Lycaenidae	Castalius rosimon	Common Pierrot	Sch-IV
19	Lycaenidae	Arhopala centaurus	Large Obakblue	Sch-IV
20	Lycaenidae	Euchrysops cnejus	Gram Blue	Sch-IV
21	Lycaenidae	Jamides celeno	Common Cerulin	Sch-IV
22	Lycaenidae	Freyeria trochylus	Grass Jewel	Sch-IV
23	Papilionidae	Papilio polytes	Common Mormon	Sch-IV
24	Papilionidae	Papilio demoleus	Lime Butterflies	Sch-IV
25	Papilionidae	Atrophaneura aristolochiae	Common Rose	Sch-IV
26	Hesperiidae	Borbo cinnara	Rice Swift	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.

Table 3-22 List of Reptiles and Amphibians

S.No	Species name	Common Name	IUCN Status	WPA 72 Shedule
1	<i>Eutropis macularia</i>	Common skink	NE	Sch-IV
2	<i>Plyas mucosus</i>	Rat Snake	NE	Sch-IV
3	<i>Nerodia sipedon</i>	Fresh water snake	NE	Sch-IV
4	<i>Rana tigrina</i>	Common yellow frog	NE	Sch-IV
5	<i>Calotes versicolor</i>	Common Garden Lizard	NE	Sch-IV
6	<i>Hemidactylus sp.</i>	House lizard	NE	Sch-IV
7	<i>Ophisops leschenaultiix</i>	Snake-eyed lizard	NE	Sch-IV
8	<i>Rana hexadactyla</i>	Frog	LC	Sch-IV
9	<i>Varanus olivaceus</i>	Monitor lizard	VU	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.

Table 3-23 List of Mammals

Family	Common name	Scientific name	IWPA Status	IUCN Red List status
Felidae	Jungle cat	Felis chaus	II	
Viverridae	Asian palm civet	Paradoxurus hermaphroditus	II	
Viverridae	Brown palm civet	Paradoxurus jerdoni	II	VU
Herpestidae	Common mongoose	Herpestes edwardsii	IV	
Herpestidae	Ruddy mongoose	Herpestes smithii	IV	
Herpestidae	Stripe-necked mongoose	Herpestes vitticollis	IV	
Herpestidae	Brown mongoose	Herpestes fuscus	IV	DD
Mustelidae	Eurasian otter	Lutra lutra	II	
Mustelidae	Smooth-coated otter	Lutrogale perspicillata	II	
Mustelidae	Nilgiri marten	Martes gwatkinsii	II	VU

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

Source:

#### Birds

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

#### Butterflies

1. Kehimkar I. The Book of Indian Butterflies. Bombay Natural History Society, 2008, 497.
2. Evans WH. Identification of Indian butterflies. The Bombay Natural History Society, Bombay, 1927, 32.
3. Kunte K (2000a). Butterflies of Peninsular India. Indian Academy of Science, University of Press (India) Limited, Hyderabad, India, 354.

#### Mammals

1. Kumara H.N. and Mewa Singh (2007) Small Carnivores of Karnataka: Distribution and Sight Records, Journal of the Bombay Natural History Society, 104 (2), 155-162.

#### Reptiles

1. 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](http://www.zsi.gov.in) (Last update: May 2018)

#### 3.11.4 Impact on Biological Environment

The project site is found in non-forest area. Therefore, management plan is not required. The proposed project will not have any impact of terrestrial ecology of the area. Project area can be developed with greenbelt by planting native species to maintain the good environment.

#### ➤ Impact on Wildlife

There is no National Park, Wildlife Sanctuary, Biosphere Reserve, Wildlife corridors and Tiger/Elephant Reserve.

### ➤ Impact on Flora

Plantation will be developed in the undevelopment area as per plantation programme. These activities will help to improve the floral cover of the area. The greenery and plantation development will eventually attract micro fauna, birds etc in the area. Assistance will be taken from local forest department in selection of species of plants so that green coverage may improve fast. The varieties would include those plants, which are suitable to the area. The following plant species will be planted according to CPCB guidelines: *Acacia nilotica*, *Azadirachta indica*, *Albizia lebbek*, *Butea monosperma*, *Cassia fistula*, *Delbergia sisso*, *Delonix regia*, *Ficus benghalensis*, *Prosopis cineraria*, *Tectona grandis*, *Wrightia tinctoria* etc.

#### Following Plants will be planted on the periphery of Project area & along the Approachable Road

S.No	Botanical name	Common Name	Key future of Tree
1	<i>Albizia lebeck</i>	Sirisa	A middle-sized deciduous tree with a spreading crown.
2	<i>Azadirachta Indica</i>	Neem	It is adapted to various climate zones.
3	<i>Dalbergia latifolia</i>	Eeitti	It is common on deep loams or clays containing lime.
4	<i>Ficus benghalensis</i>	Alada mara	Nesting and food purpose for wildlife
5	<i>Ficus religiosa</i>	Alada mara	It is tolerant to various climate zones.
6	<i>Madhuca longifolia</i>	-	A large deciduous shapely, long lived tree
7	<i>Pongamia pinnata</i>	-	Dust reduce
8	<i>Pterocarpus marsupium</i>	-	--
9	<i>Syzygiumcumini</i>	Neerama	It is tolerant to temprature resistant.
10	<i>Termanilia arjuna</i>	Kere matti	It is reducing soil erosion

### ➤ Impact on Fauna

The project area is a non forest land. As such, there will be little adverse impact of the plant unit activity on fauna around the plant unit area. A comprehensive Central Legislation Namely Wild Life (Protection) Act was enforced in 1972 to provide protection to wild animals.

### 3.12 Socio Economic profile

Krishnagiri district was ranked 17<sup>th</sup> 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](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)

### 3.12.1 Socio Economic Aspects

A socio-economic study was undertaken in assessing aspects which are dealing with social and cultural conditions, and economic status in the study area. The study provides information such as demographic structure, population dynamics, infrastructure resources, and the status of human health and economic attributes like employment, per-capita income, agriculture, trade, and industrial development in the study area. The study of these 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 3-24** provides the certain important social indicators of Krishnagiri districts in Tamil Nadu.

**Table 3-24 Social Indicators of Krishnagiri Districts**

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

### 3.12.1.1 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 in 2001 census was 1561118; rural and urban population returned as 1299726 and 261392 respectively. Thiruvallur district having a population of 3,728,104 consists of 1,876,062 male populations and 1,852,042 female populations.

*Source: [https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH\\_2011\\_3330\\_PART\\_A\\_D\\_CHB\\_KRISHNAGIRI.pdf](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)

### 3.12.1.2 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 up to 6 years. The total sex ratio in the district as per 2011 census was 958. This was recorded as 944 in 2001 census. The child sex ratio in the district during 2011 census was 926 and this was 905 in 2001 census.

*Source: [https://censusindia.gov.in/nada/index.php/catalog/1148/download/3606/DH\\_2011\\_3330\\_PART\\_A\\_D\\_CHB\\_KRISHNAGIRI.pdf](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)

### 3.12.1.3 Scheduled Caste (SC) and Scheduled Tribes (ST)

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 2011 census. The rural-urban composition of SCs was 15.0 percent and 11.6 per cent respectively in 2011 census. The rural-urban SCs population share was 14.5 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](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)

### 3.12.1.4 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 3-25** 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](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 3-25 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](http://udise.in/Downloads/Publications/Documents/District_Report_Cards-2016-17-Vol-II.pdf)

### 3.12.1.5 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 workers 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. Thenon-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](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)

### 3.12.2 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 3-26** shows the list of locations which comes under the study area.



Table 3-26 Population profile within the study area

S. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
<b>0-5 km</b>								
<b>Denkanikottai Taluk- Krishnagiri District</b>								
1.	Noganoor	692	2984	1546	1438	319	424	19
2.	Thavarakarai	541	2382	1247	1135	229	173	0
3.	Palayamkotta	734	3292	1738	1554	321	309	369
4.	Karandapalli	863	3678	1934	1744	437	283	6
5.	Andevanapalli	1101	4908	2509	2399	504	383	1
6.	Erudukotta	1190	5563	2914	2649	685	821	29
7.	Kolatti	500	2223	1118	1105	227	245	0
8.	Salivaram	817	3407	1735	1672	348	477	148
9.	Malligarjunadurgam	718	3175	1664	1511	412	422	90
<b>5-10 km</b>								
<b>Denkanikottai Taluk- Krishnagiri District</b>								
10.	Anniyalam	614	2558	1308	1250	250	823	0
11.	Marudanapalli	736	2898	1496	1402	263	143	397
12.	Kasi Agraharam	3	14	9	5	0	0	0
13.	Mallasandram	907	4062	2130	1932	480	343	26
14.	Kakkadasam	881	3748	1943	1805	344	626	0
15.	Ulimangalam	341	1779	954	825	145	331	0
16.	Arasakuppam	988	4196	2148	2048	459	313	87
17.	Hanumanthapuram	1125	5241	2712	2529	705	652	739
18.	Santhanapalli	1433	6545	3417	3128	673	1922	112
19.	Kottur	637	2712	1415	1297	252	458	6
20.	Ballapalli	522	2146	1116	1030	235	240	0
21.	Serandapalli	480	2004	1022	982	211	281	55
22.	Daravendram	493	2140	1095	1045	174	435	10
23.	Agalakotta	1026	4435	2286	2149	503	595	427
24.	Settipalli	401	1696	879	817	184	533	3
25.	Bilalam	154	774	414	360	105	6	0
26.	Madakkal	1175	5383	2819	2564	666	954	384

S. No	Name	Households	Total Population	Male	Female	Children below 6	Scheduled Caste	Scheduled Tribe
27.	Nendimangalam	105	578	311	267	63	0	59
28.	Anchetty	3750	16578	8596	7982	2136	2116	119
29.	Denkanikottai (TP) WARD NO.-0001	451	2104	1042	1062	310	619	0
30.	Denkanikottai (TP) WARD NO.-0002	353	1518	776	742	193	16	1
31.	Denkanikottai (TP) WARD NO.-0003	375	1732	880	852	221	13	2
32.	Denkanikottai (TP) WARD NO.-0004	250	1157	575	582	166	16	0
33.	Denkanikottai (TP) WARD NO.-0005	335	1665	861	804	210	516	0
34.	Denkanikottai (TP) WARD NO.-0006	218	1239	619	620	164	9	0
35.	Denkanikottai (TP) WARD NO.-0007	133	589	306	283	66	0	0
36.	Denkanikottai (TP) WARD NO.-0008	107	572	286	286	87	7	0
37.	Denkanikottai (TP) WARD NO.-0009	202	824	405	419	82	9	0
38.	Denkanikottai (TP) WARD NO.-0010	414	1709	890	819	195	1118	0
39.	Denkanikottai (TP) WARD NO.-0011	278	1445	742	703	176	927	0
40.	Denkanikottai (TP) WARD NO.-0012	583	2568	1289	1279	307	67	21
41.	Denkanikottai (TP) WARD NO.-0013	202	843	422	421	107	6	36
42.	Denkanikottai (TP) WARD NO.-0014	128	532	272	260	49	10	11
43.	Denkanikottai (TP) WARD NO.-0015	426	1698	873	825	190	114	0
44.	Denkanikottai (TP) WARD NO.-0016	541	2226	1125	1101	260	132	215
45.	Denkanikottai (TP) WARD NO.-0017	150	717	368	349	87	8	0
46.	Denkanikottai (TP) WARD NO.-0018	247	1114	594	520	116	290	1
	<b>Total</b>	<b>28320</b>	<b>125351</b>	<b>64800</b>	<b>60551</b>	<b>14316</b>	<b>18185</b>	<b>3373</b>

(Source: Census 2011)

### 3.12.2.1 Employment and Livelihood within 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 3-27**.

Table 3-27 Summaries of Employment and Livelihood within the study area

S. 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				
<b>0-5 Km</b>												
<b>Denkanikottai Taluk- Krishnagiri District</b>												
1)	Noganoor	1662	1533	129	805	10	343	89	28	2	357	28
2)	Thavarakarai	1309	1293	16	796	1	328	13	6	0	163	2
3)	Palayamkotta	1502	1383	119	1116	22	78	6	11	2	178	89
4)	Karandapalli	1857	1836	21	1402	11	310	6	8	0	116	4
5)	Andevanapalli	2739	2254	485	781	137	886	207	80	26	507	115
6)	Erudukotta	2862	2242	620	1556	144	328	216	40	8	318	252
7)	Kolatti	1035	960	75	713	2	18	14	15	13	214	46
8)	Salivaram	2102	2043	59	1547	9	343	25	12	0	141	25
9)	Malligarjunadurgam	1854	1713	141	984	5	571	24	23	3	135	109
<b>5-10 Km</b>												
<b>Denkanikottai Taluk- Krishnagiri District</b>												
10)	Anniyalam	1486	1423	63	1120	2	92	27	10	5	201	29
11)	Marudanapalli	1803	1776	27	1405	11	191	3	5	0	175	13
12)	Kasi Agraharam	7	7	0	6	0	0	0	0	0	1	0
13)	Mallasandram	1945	1720	225	848	52	402	29	24	1	446	143
14)	Kakkadasam	2089	1919	170	1305	69	216	59	41	2	357	40
15)	Ulimangalam	518	386	132	207	1	84	130	18	0	77	1
16)	Arasakuppam	2251	2169	82	1112	5	484	54	4	0	569	23
17)	Hanumanthapuram	2983	2694	289	1011	217	1367	65	17	1	299	6
18)	Santhanapalli	3697	3330	367	1426	26	1340	174	36	7	528	160
19)	Kottur	1194	862	332	593	39	122	233	0	3	147	57
20)	Ballapalli	1227	862	365	630	235	94	100	17	6	121	24
21)	Serandapalli	1349	1211	138	998	92	140	38	11	2	62	6
22)	Daravendram	1333	1138	195	1007	28	51	130	10	4	70	33
23)	Agalakotta	2156	1798	358	1144	23	396	165	27	1	231	169
24)	Settipalli	859	824	35	389	5	295	14	7	0	133	16
25)	Bilalam	423	333	90	184	26	15	1	11	0	123	63
26)	Madakkal	3310	2985	325	2517	147	266	167	47	1	155	10
27)	Nendimangalam	366	366	0	352	0	4	0	1	0	9	0
28)	Anchetty	8836	6948	1888	3413	432	2202	1065	76	128	1257	263
29)	Denkanikottai (TP) WARD NO.-0001	789	776	13	7	2	43	1	48	0	678	10
30)	Denkanikottai (TP) WARD NO.-	573	561	12	30	1	72	4	32	0	427	7

S. 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				
	0002											
31)	Denkanikottai (TP) WARD NO.-0003	614	500	114	5	0	2	13	21	11	472	90
32)	Denkanikottai (TP) WARD NO.-0004	453	437	16	6	0	16	0	27	1	388	15
33)	Denkanikottai (TP) WARD NO.-0005	600	577	23	3	0	16	0	0	0	558	23
34)	Denkanikottai (TP) WARD NO.-0006	343	324	19	2	0	4	0	3	1	315	18
35)	Denkanikottai (TP) WARD NO.-0007	248	243	5	5	0	8	0	7	1	223	4
36)	Denkanikottai (TP) WARD NO.-0008	163	147	16	0	0	1	0	2	0	144	16
37)	Denkanikottai (TP) WARD NO.-0009	295	291	4	0	0	2	0	1	0	288	4
38)	Denkanikottai (TP) WARD NO.-0010	700	685	15	13	0	47	1	39	1	586	13
39)	Denkanikottai (TP) WARD NO.-0011	568	500	68	15	4	242	10	1	4	242	50
40)	Denkanikottai (TP) WARD NO.-0012	1065	1042	23	22	2	36	4	110	1	874	16
41)	Denkanikottai (TP) WARD NO.-0013	277	95	182	26	7	6	26	3	53	60	96
42)	Denkanikottai (TP) WARD NO.-0014	204	188	16	7	0	27	0	3	1	151	15
43)	Denkanikottai (TP) WARD NO.-0015	640	634	6	12	0	28	0	27	1	567	5
44)	Denkanikottai (TP) WARD NO.-0016	1014	891	123	53	1	139	9	8	2	691	111
45)	Denkanikottai (TP) WARD NO.-0017	440	344	96	80	26	79	7	5	0	180	63
46)	Denkanikottai (TP) WARD NO.-0018	537	525	12	240	0	95	3	2	5	188	4
	<b>Total</b>	<b>64277</b>	<b>56768</b>	<b>7509</b>	<b>29893</b>	<b>1794</b>	<b>11829</b>	<b>3132</b>	<b>924</b>	<b>297</b>	<b>14122</b>	<b>2286</b>

(Source: Census 2011)

Table 3-28 Literates population and the percentage within the study area

S.No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
<b>0-5 Km</b>								
<b>Denkanikottai Taluk- Krishnagiri District</b>								
1.	Noganoor	2984	1695	968	727	1289	578	711
2.	Thavarakarai	2382	1309	779	530	1073	468	605
3.	Palayamkotta	3292	1791	1073	718	1501	665	836
4.	Karandapalli	3678	1806	1145	661	1872	789	1083
5.	Andevanapalli	4908	2653	1550	1103	2255	959	1296
6.	Erudukotta	5563	2636	1571	1065	2927	1343	1584
7.	Kolatti	2223	1238	698	540	985	420	565
8.	Salivaram	3407	1770	1064	706	1637	671	966
9.	Malligarjunadurgam	3175	1486	893	593	1689	771	918
<b>5-10 Km</b>								
<b>Denkanikottai Taluk- Krishnagiri District</b>								
10.	Anniyalam	2558	1561	890	671	997	418	579
11.	Marudanapalli	2898	1813	1035	778	1085	461	624
12.	Kasi Agraharam	14	14	9	5	0	0	0
13.	Mallasandram	4062	2272	1349	923	1790	781	1009
14.	Kakkadasam	3748	2355	1379	976	1393	564	829
15.	Ulimangalam	1779	1154	772	382	625	182	443
16.	Arasakuppam	4196	2405	1378	1027	1791	770	1021
17.	Hanumanthapuram	5241	2667	1578	1089	2574	1134	1440
18.	Santhanapalli	6545	3400	1974	1426	3145	1443	1702
19.	Kottur	2712	1534	904	630	1178	511	667
20.	Ballapalli	2146	1083	641	442	1063	475	588
21.	Serandapalli	2004	1074	625	449	930	397	533
22.	Daravendram	2140	1156	674	482	984	421	563
23.	Agalakotta	4435	2408	1404	1004	2027	882	1145
24.	Settipalli	1696	983	602	381	713	277	436
25.	Bilalam	774	256	174	82	518	240	278
26.	Madakkal	5383	2236	1370	866	3147	1449	1698
27.	Nendimangalam	578	211	123	88	367	188	179
28.	Anchetty	16578	8439	4948	3491	8139	3648	4491

S.No	Name	Total Population	Literates Population	Literates Population Male	Literates Population Female	Illiterates Population	Illiterates Population Male	Illiterates Population Female
29.	Denkanikottai (TP) WARD NO.-0001	2104	1305	703	602	799	339	460
30.	Denkanikottai (TP) WARD NO.-0002	1518	1074	583	491	444	193	251
31.	Denkanikottai (TP) WARD NO.-0003	1732	1216	650	566	516	230	286
32.	Denkanikottai (TP) WARD NO.-0004	1157	698	373	325	459	202	257
33.	Denkanikottai (TP) WARD NO.-0005	1665	1162	634	528	503	227	276
34.	Denkanikottai (TP) WARD NO.-0006	1239	957	491	466	282	128	154
35.	Denkanikottai (TP) WARD NO.-0007	589	395	222	173	194	84	110
36.	Denkanikottai (TP) WARD NO.-0008	572	445	223	222	127	63	64
37.	Denkanikottai (TP) WARD NO.-0009	824	718	354	364	106	51	55
38.	Denkanikottai (TP) WARD NO.-0010	1709	1129	623	506	580	267	313
39.	Denkanikottai (TP) WARD NO.-0011	1445	852	462	390	593	280	313
40.	Denkanikottai (TP) WARD NO.-0012	2568	1583	867	716	985	422	563
41.	Denkanikottai (TP) WARD NO.-0013	843	539	294	245	304	128	176
42.	Denkanikottai (TP) WARD NO.-0014	532	436	233	203	96	39	57
43.	Denkanikottai (TP) WARD NO.-0015	1698	1291	708	583	407	165	242
44.	Denkanikottai (TP) WARD NO.-0016	2226	1465	808	657	761	317	444
45.	Denkanikottai (TP) WARD NO.-0017	717	375	198	177	342	170	172
46.	Denkanikottai (TP) WARD NO.-0018	1114	698	405	293	416	189	227
<b>Total</b>		<b>125351</b>	<b>69743</b>	<b>40401</b>	<b>29342</b>	<b>55608</b>	<b>24399</b>	<b>31209</b>

(Source: Census 2011)

### 3.12.3 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 3-29**.

**Table 3-29 Summaries of Socio-economic indicators within the study area**

S.No	Particulars	Study area	Unit
<b>0-5 km</b>			
1	Number of villages in the Study Area	9	Nos.
2	Total Households	7156	Nos.
3	Total Population	31612	Nos.
4	Children Population (<6 Years Old)	3482	Nos.
5	SC Population	3537	Nos.
6	ST Population	662	Nos.
7	Total Working Population	16922	Nos.
8	Main Workers	15257	Nos.
9	Marginal Workers	1665	Nos.
10	Cultivators	10041	Nos.
11	Agricultural labours	3805	Nos.
12	Household Industries	277	Nos.
13	Other Workers	2799	Nos.
14	Literates	16384	Nos.
15	IllLiterates	15228	Nos.
<b>5-10 km</b>			
1	Number of villages in the Study Area	19	Nos.
2	Number of Wards in the Study Area	18	Nos.
3	Total Households	21164	Nos.
4	Total Population	93739	Nos.
5	Children Population (<6 Years Old)	10834	Nos.
6	SC Population	14648	Nos.
7	ST Population	2711	Nos.
8	Total Working Population	47355	Nos.
9	Main Workers	41511	Nos.
10	Marginal Workers	5844	Nos.
11	Cultivators	21646	Nos.
12	Agricultural labours	11156	Nos.
13	Household Industries	944	Nos.
14	Other Workers	13609	Nos.
15	Literates	53359	Nos.
16	IllLiterates	40380	Nos.

(Source: Census 2011)



## 4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

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

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

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

### 4.1 Land Environment

The total extent of lease area is 14.53.0 Ha. The Land is classified as a Government land. The lease area exhibits hilly terrain (~277mAMSL) topography covered by massive granite formation. Quarry lease was granted over an extent of 14.53.0Ha. In S.F.No.155/2, Karandapalli Village, Denkanikottai Taluk, Krishnagiri District, and Tamil Nadu state. Precise area communication letter was granted vide Rc.No. 957/MM4/2022, dated: 01.03.2022 for 30 years of mining. Precise area communication letter is enclosed as **Annexure-2**. The land use pattern is given in **Table 4-1**.

#### 4.1.2 Land Degradation

The impact on land pattern in the area has been and 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.
- Exposure of topsoil to wind and water erosion.

**Table 4-1 Land Use Pattern of the lease area**

S. No	Land Use	Area to be required during the mining plan(Ha)	Area at the end of the quarrying period (Ha)
1	Area under Quarry	1.32.5	3.60.5
2	Waste Dump	1.88.0	5.70.0
3	Infrastructure	0.01.0	0.01.0
4	Village Road	0.01.0	0.01.0
5	Mine Road	0.50.0	0.30.0
5	Green Belt	0.17.0	0.36.5
6	Un utilized Area	10.63.5	4.54.0
<b>Total</b>		<b>14.53.0</b>	<b>14.53.0</b>

#### 4.1.3 Mitigation Measures

- Dust suppression on exposed areas using water tankers.
- Contour overburden dump to minimize erosion
- Plantation around service building, along road, in and around safety zone using native plant sapling.
- Compliance with mine decommissioning plan.
- The following precautions will be taken to reduce the risk of dump failure:
  - OB benches will be made of <10m height in each tier. Angle of repose of OB dump to be around 26°. Construction of toe wall around the OB dump.
  - Drainage control structures like garland drain to be made around OB dump area to avoid water flow during monsoon below the OB dump.
  - Leveling, grading and drainage arrangement for OB dumps.
  - The deeper working pits, after completion of mining /quarrying left as it is which would serve as water ponds/water reservoirs.
  - The quarried pits after the end of the life of lease will be fenced to prevent inherent entry of public and cattle.
  - Management plan for topsoil utilization and conservation.
  - Progressive year-wise green belt development inside.

#### 4.2 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 4-2**.

**Table 4-2 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

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 Blasting, Drilling, Excavation, Loading, Unloading, and transportation etc. Machinery like compressors and jack hammers are used for Drilling.

#### 4.2.1 Mitigation measures

- Use of dust aprons on drilling equipment and adopting wet drilling methods.
- Delay blasting under unfavorable 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.
  - Development of greenbelt.

**Table 4-3 Fugitive dust control in mine**

S. No	Activities	Best practices
1	Drilling	➤ Drills should be provided with dust extractors (dry or wet system)
2	Blasting	<ul style="list-style-type: none"> <li>➤ Water spray before blasting</li> <li>➤ Water spray on blasted material prior to transportation</li> <li>➤ Use of control blasting technique</li> </ul>
3	Transportation of mined material	<ul style="list-style-type: none"> <li>➤ Covering of the trucks/dumpers to avoid spillage</li> <li>➤ Compacted haul road</li> <li>➤ Speed control on vehicles</li> <li>➤ Development of a green belt of suitable width on both sides of road, which acts as wind break and traps fugitive dust</li> </ul>

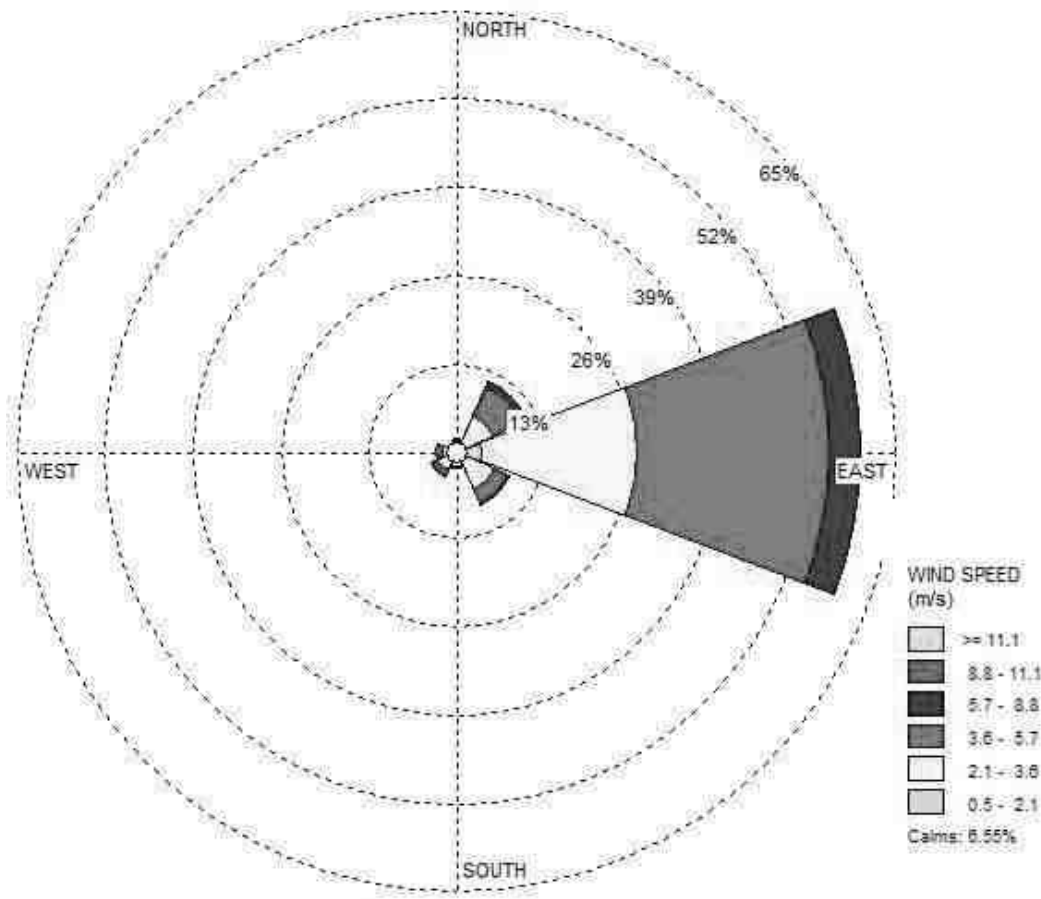
**Table 4-4 Dust control measures in quarry**

S. No	Operation or source	Control options
1	Drilling	➤ Liquid injection (water or water plus a wetting agent)

		➤ Capturing and venting emissions to a control device.
2	Blasting	<ul style="list-style-type: none"> <li>➤ Water spray before blasting</li> <li>➤ Water spray on blasted material prior to transportation</li> <li>➤ Use of control blasting technique</li> </ul>
3	Loading	➤ Water spray
4	Hauling (emissions from roads)	➤ Water spray, treatment with surface agents, soil stabilization, paving, traffic control.

**4.2.2 Meteorological Data**

The meteorological data for three months, i.e. from **Mid of January 2023 to Mid of April 2023** was considered for the study. 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. Meteorology considered for modeling is shown below.



**Figure 4-1 Wind rose diagram considered for dispersion modeling**

**4.2.3.1 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.

#### **4.2.3.2 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 modeling as shown in **Table 4.5 to Table 4.7**.

Maximum incremental value for SO<sub>2</sub>, NO<sub>x</sub> and PM are shown in **Figure 4.2 to Figure 4.6** and Top 10 highest Ground Level Concentration (GLC) obtained from modeling are given in **Table 4.10 to Table 4.14** respectively.

#### **4.2.3.3 Emission Calculations**

Each mining activity 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 qty of emissions 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.

#### **4.2.3.4 Mining Operational data**

Table 4-5 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)		18
4	Waste Dumping Area (Sq.Km)	a	0.02315
5	Open Pit Area (Sq.Km)	Aa	0.00635

**Source:**

Emission Estimation Technique Manual for Mining and Processing of Non-Metallic Minerals by NPI, Nov 1999

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.*

Chaulya, S., 2006. Emission rate formulae for surface iron mining activities. *Environmental Modeling Assessment*, Issue 11, pp. 361-370.

*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.*

**4.2.3.5 Emission dispersion models**

Each mining activity is a source of emission and the estimation of emissions depends on parameters such as meteorological, topographic conditions and material characteristics. The emission factors for PM<sub>2.5</sub>, which is particulate matter of 2.5µm or less in diameter, were not available in literature. Thus, PM<sub>2.5</sub> emissions have been calculated considering an assumption that 60% of for PM<sub>10</sub> emissions contribute to PM<sub>2.5</sub>.

Table 4-6 Emission from Mining Equipment's

Source	Fuel used	Stack Details					Emissions (g/s)			
		No of Stack	Height (m) AGL	Dia (m)	Temp (°C)	Exit Velocity (m/s)	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
125 KVA DG	Diesel	1	3	0.3	180	10	5.81E-03	3.48E-03	5.38E-03	8.16E-02

Table 4-7 Vehicular Source Emission details

Source	Emission (g/s)		
	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>
4 Wheeler (1no.)	6.94E-05	4.17E-05	6.94E-04

Heavy Duty Vehicles (2 no.)	1.11E-04	6.67E-05	1.94E-02
<b>Total</b>	<b>1.81E-04</b>	<b>1.08E-04</b>	<b>2.01E-02</b>

Table 4-8 Emissions considered for mining

Activities	TSPM Emission rate	PM <sub>10</sub> Emission rate	PM <sub>2.5</sub> Emission rate
Wet Drilling (g/s)	7.90E-06	1.58E-06	9.48E-07
Haulage (g/s)	1.03E-03	2.06E-04	1.24E-04
Waste Dumping (g/s)	5.00E-05	9.99E-06	6.00E-06
Open Pit (g/s.m <sup>2</sup> )	1.57E-06	3.13E-07	1.88E-07

Table 4-9 Emission input for modelling

Activities	TSPM	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>
Line Source (Haul Road) (g/s)	1.03E-03	2.06E-04	1.24E-04	-	-
Area Source (Open Pit) (g/s.m <sup>2</sup> )	1.57E-06	3.13E-07	1.88E-07	-	-
Area Source (Waste Dumping) (g/s)	5.00E-05	9.99E-06	6.00E-06	-	-
Point Source (DG) (g/s)	-	5.81E-03	3.48E-03	5.38E-03	8.16E-02
Point Source (Drilling) (g/s)	5.00E-05	9.99E-06	6.00E-06	-	-
Point Source (Vehicle)(g/s)	-	1.81E-04	1.08E-04	-	2.01E-02

**Note:**

a. Since emission factors are available for PM<sub>10</sub> the following assumptions are made for PM<sub>10</sub> and PM<sub>2.5</sub> estimation

1. TSPM is considered as 5 times of PM<sub>10</sub>
2. 60% of PM<sub>10</sub> is considered as PM<sub>2.5</sub>

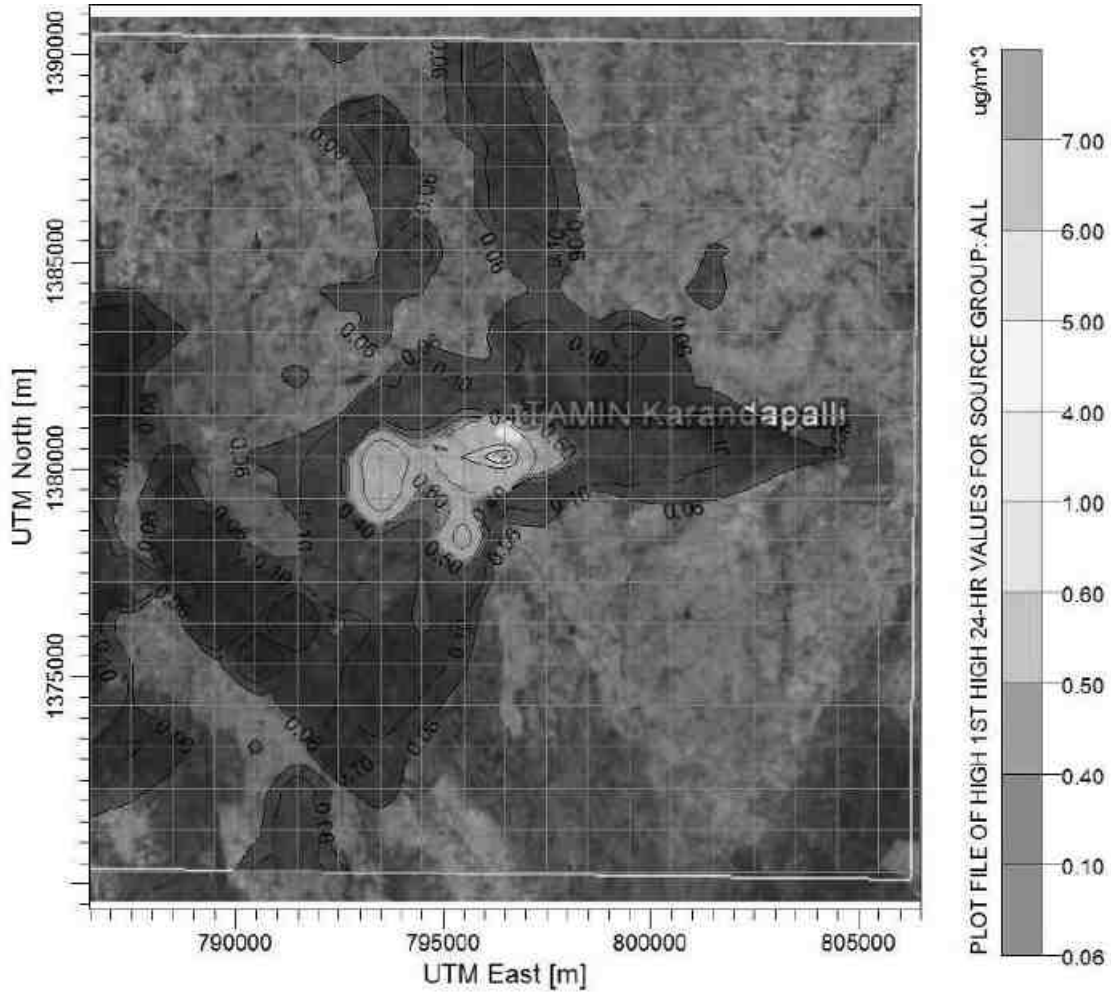


Figure 4-2 Predicted 24-Hrs GLC of Particulate matter TSPM within 10km Radius of the Study Area

Table 4-10 Predicted Top 10 Highest Concentrations TSPM

S.No	UTM coordinates (m)		Conc. ( $\mu\text{g}/\text{m}^3$ )	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	796486	1380299	6.25926	Project Site	
2.	795486	1380299	4.20954	1	W
3.	793486	1380299	1.77105	3	W
4.	793486	1379299	1.43336	3.16	WSW
5.	795486	1378299	1.31705	2.24	SSW
6.	797486	1380299	0.91059	1	E
7.	794486	1380299	0.70604	2	W
8.	795486	1379299	0.68838	1.41	SW
9.	794486	1376299	0.51738	4.46	SSW
10.	795486	1381299	0.48172	1.41	NW



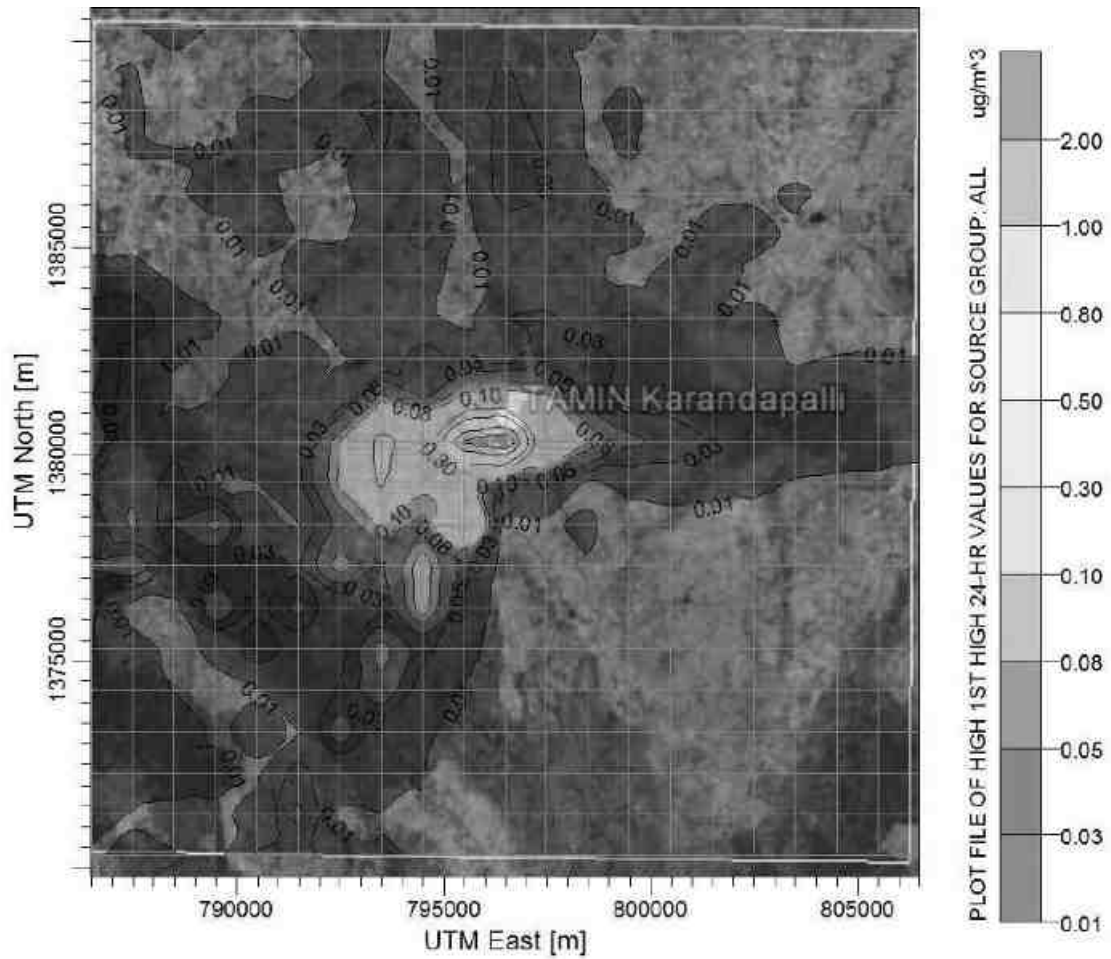


Figure 4-3 Predicted 24 Hrs GLC's of PM<sub>10</sub> within 10km radius of the study area

Table 4-11 Predicted Top 10 Highest Concentrations Particulate Matter PM<sub>10</sub>

S.No	UTM coordinates (m)		Conc. (µg/m <sup>3</sup> )	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	796486	1380299	1.2782	Project Site	
2.	795486	1380299	1.01972	1	W
3.	793486	1380299	0.36471	3	W
4.	793486	1379299	0.32557	3.16	WSW
5.	795486	1378299	0.27307	2.24	SSW
6.	797486	1380299	0.22797	1	E
7.	794486	1380299	0.19666	2	W
8.	795486	1379299	0.13915	1.41	SW
9.	796486	1381299	0.12823	1	N
10.	794486	1376299	0.11991	4.46	SSW

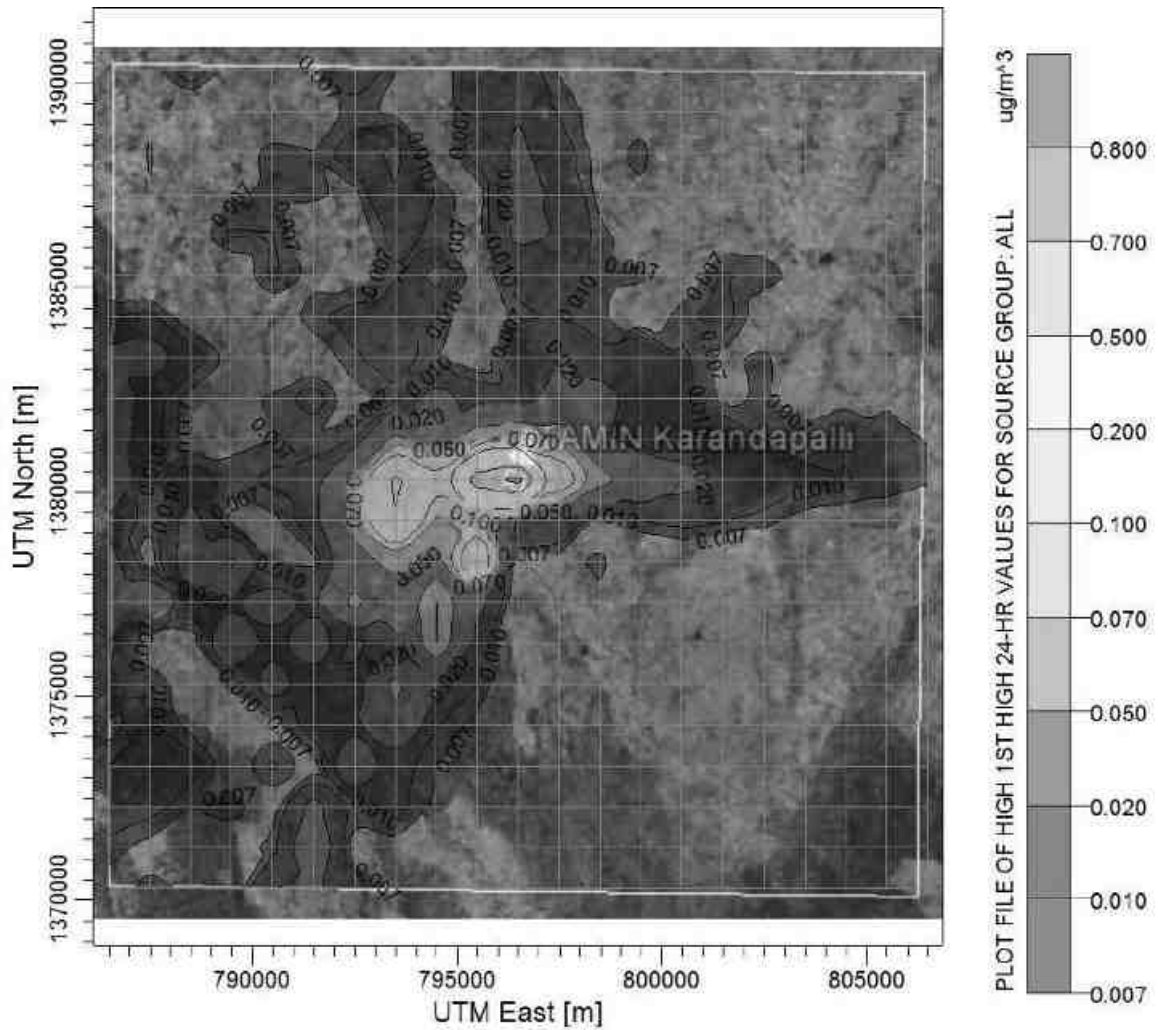


Figure 4-4 Predicted 24-Hrs GLC of Particulate matter PM<sub>2.5</sub> within 10 km radius of the study area

Table 4-12 Predicted Top 10 Highest Concentrations Particulate Matter PM<sub>2.5</sub>

S.No	UTM coordinates (m)		Conc. (µg/m <sup>3</sup> )	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	796486	1380299	0.76768	Project Site	
2.	795486	1380299	0.61214	1	W
3.	793486	1380299	0.21904	3	W
4.	793486	1379299	0.19548	3.16	WSW
5.	795486	1378299	0.164	2.24	SSW
6.	797486	1380299	0.13685	1	E
7.	794486	1380299	0.11803	2	W
8.	795486	1379299	0.08357	1.41	SW
9.	796486	1381299	0.07695	1	N
10.	794486	1376299	0.072	4.46	SSW

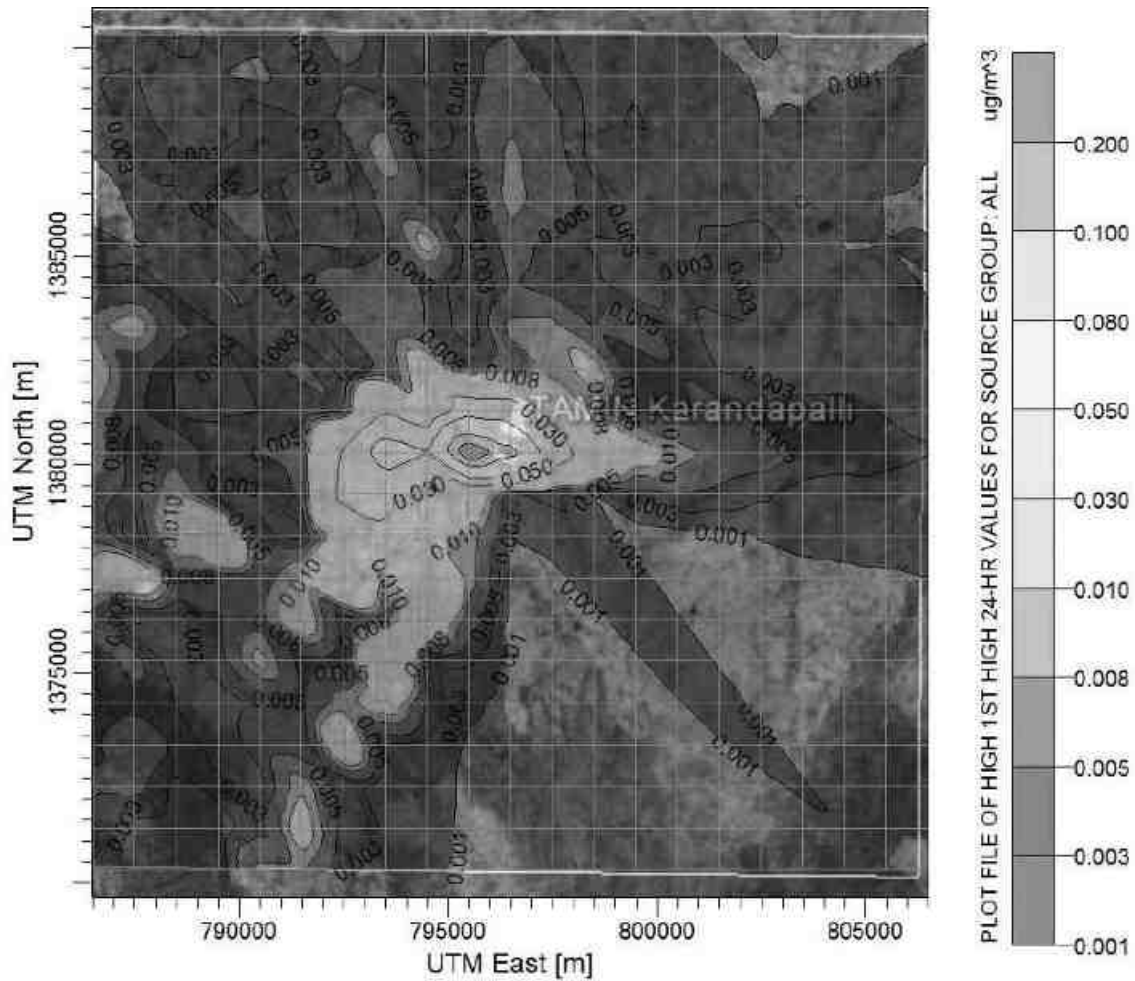


Figure 4-5 Predicted 24-Hrs’ GLC’s of SO<sub>2</sub> within 10 km Radius of the Study Area

Table 4-13 Predicted Top 10 Highest Concentrations of Sulphur Dioxide

S.NO	UTM coordinates (m)		Conc. (µg/m <sup>3</sup> )	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	795486	1380299	0.11843	1	W
2.	796486	1380299	0.08843	Project Site	
3.	793486	1380299	0.06247	3	W
4.	794486	1380299	0.05051	2	W
5.	797486	1380299	0.04149	1	E
6.	795486	1381299	0.04021	1.41	NW
7.	796486	1381299	0.03964	1	N
8.	793486	1379299	0.03543	3.16	WSW
9.	792486	1379299	0.03486	4.12	WSW
10.	792486	1380299	0.03146	4	W

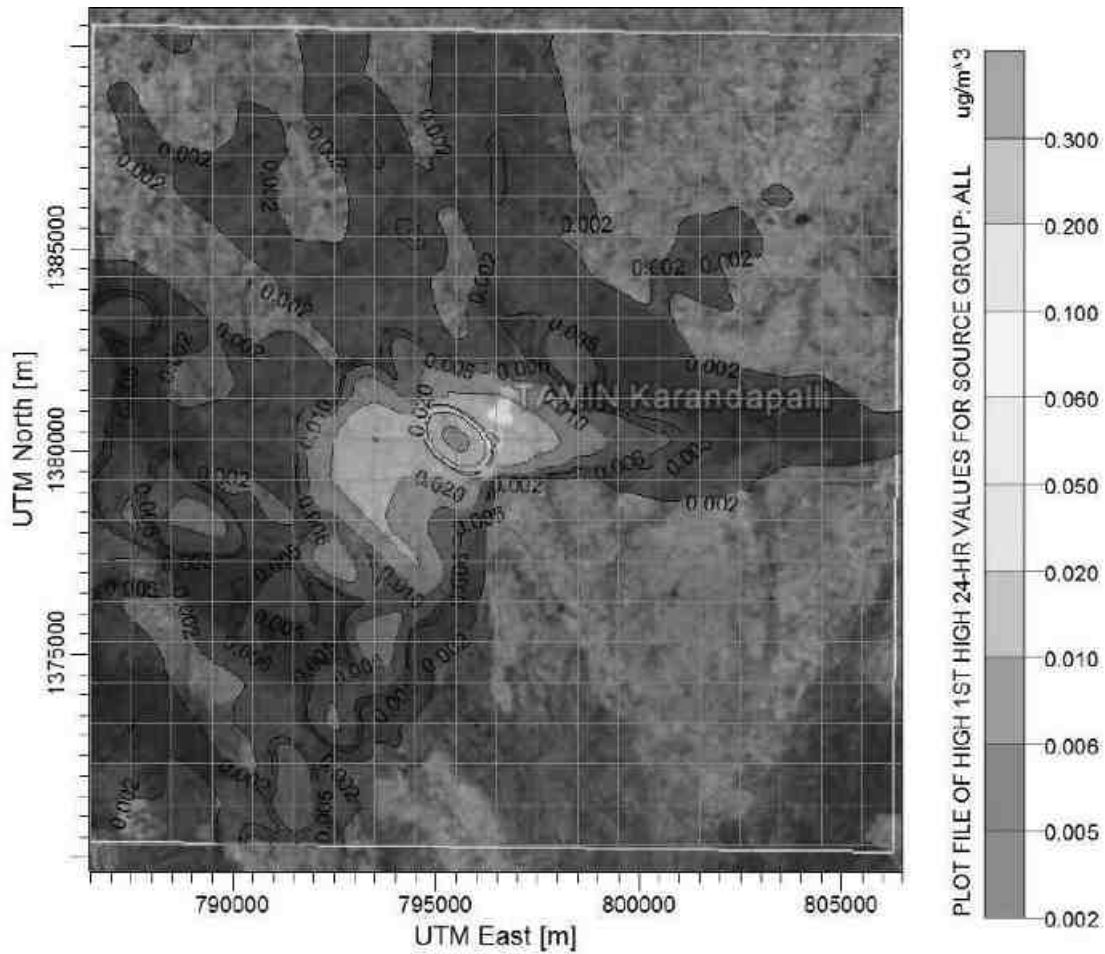


Figure 4-6 Predicted 24-Hrs' GLC's of NO<sub>x</sub> within 10 km Radius of the Study Area

Table 4-14 Predicted Top 10 Highest Concentrations Nitrogen Oxide

S.NO	UTM coordinates (m)		Conc. (µg/m <sup>3</sup> )	Distance from Centre of the project (km)	Direction from project Centre
	E	N			
1.	795486	1380299	0.28246	1	W
2.	796486	1380299	0.05209	Project Site	
3.	793486	1380299	0.05202	3	W
4.	794486	1380299	0.03389	2	W
5.	797486	1380299	0.02994	1	E
6.	793486	1379299	0.02623	3.16	WSW
7.	795486	1379299	0.02426	1.41	SW
8.	795486	1381299	0.02291	1.41	NW
9.	796486	1381299	0.02234	1	N
10.	794486	1377299	0.02212	3.60	SSW

#### 4.2.4 Conclusion

The total increase in concentrations above baseline status to estimate the percentage increase is summarized in the below **Table 4.15**.

Table 4-15 Total maximum GLCs from emissions

Pollutant	Max. Base Line Conc. ( $\mu\text{g}/\text{m}^3$ )	Estimated Incremental Conc. ( $\mu\text{g}/\text{m}^3$ )	Total Conc. ( $\mu\text{g}/\text{m}^3$ )	NAAQ standard	% contribution of concentration above Base line
PM <sub>10</sub>	69.6	1.27	70.87	100	1.82
PM <sub>2.5</sub>	42.1	0.76	42.86	60	1.80
SO <sub>2</sub>	21.29	0.11	21.4	80	0.51
NO <sub>x</sub>	23.01	0.28	23.29	80	1.21

#### 4.2.5 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 4.16.

Table 4-16 Existing &amp; proposed vehicular movement per Hour (Peak Hour) SH-61

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	97	72.75	7	5.25	104	0.75	78
2	3 wheelers	22	26.4	0	0	22	1.2	26.4
3	4 wheelers/cars	59	59	2	2	61	1	61
4	truck/Lorry	43	159.1	11	40.7	54	3.7	199.8
5	agricultural tractor	27	135	0	0	27	5	135
6	light emission vehicle	4	5.6	0	0	4	1.4	5.6
	<b>Total</b>	252	457.850	20	47.95	272		505.8

Table 4-17 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	252	457.85	1500	0.31	"A"	Free Flow Traffic
After implementation	272	505.8	1500	0.34	"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.

#### 4.2.5.1 Mitigation Measures

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

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

### 4.3 Water Environment

The existing water environment quality has been studied and the study results are discussed in **Section 3.9 of 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.
- Deterioration in surface / ground water quality of receiving body.
- Changes to hydraulic regime.

#### 4.3.3 Wastewater Generation

There is no process effluent generation. The domestic sewage of 1.27 KLD will be disposed through septic tank followed by soakpit.

#### 4.3.4 Mitigation Measures

##### 4.3.4.1 Surface Water Pollution Control Measures

- A safety distance of 50m has been provided in the Southern side of the applied area and running through Patta lands of the Karandapalli village.
- 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.
- 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.

#### **4.3.4.2 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.

#### **4.3.4.3 Rain Water Harvesting**

- The rainwater will be diverted towards the middle of the mine to prevent water entering the mine working. The rainwater flows will also contain fines both from surface and waste dumps during seasonal flows. As such, it is proposed to have structures in such a way to act as settling pond and also for rainwater harvesting.
- Construct barriers at suitable intervals along the path of the drains.
- Divert the water to de-silting cum rainwater harvesting pond in the mine area.
- Provide necessary overflow arrangement to maintain the natural drainage system.

#### **4.3.4.4 Drainage pattern and Hydrogeology**

- Catchment area inside the mine will be affected.

#### **4.3.4.5 Mitigation measures**

- The study has recommended new alignment in line with upstream drainage slope of the area to facilitate smooth entry of water into the diversion channel and ultimate discharge of water into the original stream. No reduction in surface run-off is envisaged.

#### 4.4 Impact of Noise / Vibrations & Mitigation Measures

##### 4.4.3 Impact of Noise on Working Environment

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

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

##### 4.4.4 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 4.18**.

**Table 4-18 Permissible Exposure in Cases of Continuous Noise (OSHA, Govt. of India)**

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

##### 4.4.5 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.

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.

##### 4.4.5.1 Mitigate Measures

- 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 favorable atmospheric condition and less human



activity timings.

- The prime movers/diesel engines will be properly maintained.
- Provision of sound insulated chambers for the workers deployed on machines.
- 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.
- Greenbelts around infrastructure site, service building area and township.
- Trees will be planted on both sides of haul roads.

Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators.

#### **4.4.5.2 Mitigate Measures**

- 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.
- The prime movers/diesel engines will be properly maintained.
- Provision of sound insulated chambers for the workers deployed on machines.
- 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.
- Greenbelts around infrastructure site, service building area and township.
- Trees will be planted on both sides of haul roads.
- Personal Protective Equipment (PPE) like ear muffs/ear plugs will be provided to the operators.

#### **4.4.6 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. Proposed Peripheral green belt will be developed in 7.5m safety zone around the quarry. This will mitigate the Vibration.

##### **4.4.6.1 Mitigation Measures**

- Proper quantity of explosive, suitable stemming materials and appropriate delay system are to be adopted for safe blasting.
- 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.

#### 4.5 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, NO<sub>x</sub> and SO<sub>2</sub> 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. Further, the noise generated in the lease area will get attenuated due to plantation and green belt 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. Further, they will also be medically examined at periodical interval.

#### 4.6 Biological Environment

##### 4.6.3 Mining activities and their impact on biodiversity

**Table 4-19 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

#### 4.6.4 Existing Biological Scenario

- 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 and there will be no discharge of effluent from the mine.
- 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.
- There are no any wetlands, fish breeding grounds, marine ecology nearby the quarry area, which will be affected due to this project.
- No such significantly important medicinal value species within both the ML areas and its nearby region.
- There are no any wetlands, fish breeding grounds, marine ecology nearby the quarry area, which will be affected due to this project.

##### 4.6.4.1 Mitigate 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.

#### 4.6.5 Flora and Fauna

- ❖ 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.

- ❖ 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

#### 4.6.5.1 Impact

- Displacement of existing fauna.
- Loss of vegetation

#### 4.6.5.2 Mitigation measures

- Education and training etc.
- Logistic support in the form of equipment, Vehicles etc as required by the implementing DFO will be extended.

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

- Noise abatement
- Reuse of wastewater to the extent possible
- Prevention of soil erosion
- Ecological restoration
- Aesthetic, biological and visual improvement of area due to improved vegetative and plantation covers.
- Green belt around mine, dumps, etc:
  - Tall growing, closely spaced, evergreen trees native to the area
  - Easy, quick early growth and establishment
  - Uniform spreading of crown habit.
  - 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.

## 4.7 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 0.06.5-hectare land was earmarked for greenbelt development during first 5 years of mining plan, at the end of life of quarry; the green belt area will be 0.06.5 Ha, TAMIN proposed to plant 20 No's of trees per year and Rs. 30,000/- per year 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 existing 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. Plants are chosen to provide aesthetic, ecological and economical value. Trees will help to arrest propagation of noise and help to lessen dust pollution due to dust arresting action.

### 4.7.3 Impacts on Occupational Health due to project operations

Anticipated occupational illness is equal 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

#### 4.7.3.1 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 4-20 Mitigation for occupational health and safety**

<b>S. No</b>	<b>Activity</b>	<b>Mitigation measures</b>
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. 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.

#### 4.7.3.2 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.

#### 4.8 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.

Indirectly scores of people will be benefited by gainful indirect employment opportunities through various service related activities connected with the project operations as shown under.

#### 4.8.3 Corporate Environmental Responsibility

TAMIN Karandapalli site had no Relocation and Rehabilitation. Most villages have benefitted mutually at Karandapalli where the mining industry has provided indirect jobs for labour and villages provide accommodation for the labour and staff. Supportive industries like food supply and essential shops are economic growth in the villages. The site has provided road access to a few nearby village sites. 2% from the Total Project cost will be used for CER activity given in **Table 4.21**.

**Table 4-21 Corporate Environmental Responsibility Plan**

S. No	CER Activity	Beneficiary	Amount allocated (INR)	Remarks
1	Providing Smart screen facilities for nearby Govt.School& Solar Pannel(CER activity will be implemented as per moEF&CC OM date 20.10.2020)	--	--	--

#### Other benefits to Community

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

The project will provide ample opportunity to the local people for direct and in-direct employment. The proposed project may create opportunities for indirect employment in the field of vehicle hiring, labours, trading of construction materials, carpenters etc. The major areas which required immediate attention relates to infrastructure support, health & sanitation, Anganwadi services, school education, youth development, income generation activities & veterinary services.

## 5 ANALYSIS OF ALTERNATIVES

### 5.1 Alternate Technology

The project is a fresh granite quarry. 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 TAMIN is being processed to take care of any technological failures.

### 5.2 Method of mining

#### 5.2.1 Opencast Method

Open cast, semi-mechanized mining with 6m vertical bench with a bench width is 6m with vertical slope. Under the regulation 106(2) (a) of the Metalliferous Mines Regulation 1961 in all open cast working in hard ore body, the benches and sides should be properly benched and sloped. The height of any bench shall not exceed 6m and the width thereof shall not be less than the height. The benches shall be sloped at an angle of more than 45° from the horizontal.

### 5.3 Alternate Site

The mineral deposits are site specific in nature, hence question of seeking alternate site does not arise. The project site is located at S.F.155/2, Karandapalli Village, Denkanikottai Taluk, Krishnagiri District, Tamil Nadu state. It is Government Poramboke land the applicant has obtained lease from the Government is enclosed as **Annexure -2**.

### 5.4 Connectivity

SH 17B (Hosur-Denkanikottai) at  $\approx 8.24$ km towards NNE. The nearest railway station is Periya Naga Thunai Railway station located at  $\approx 21.80$ Km towards ENE direction. NH-948 A(Dobbaspeth-Thalli-Attibele) situated at distance of  $\approx 13.97$ Km (NNW).



## 6 ENVIRONMENTAL MONITORING PROGRAMME

### 6.1 General

The mitigation measures suggested in **Chapter 4** will be implemented so as to reduce the impact on the environment due to the operations of the project. 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& CC, 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 firefighting 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 Monitoring Schedules for Various Environmental Parameters

The proponent shall adopt the following monitoring schedule for environmental parameters. However, based on the need and priority it may be suitably modified / improved. However, since the

proponents are different, monitoring, fulfilling of all the statutory obligations and maintaining records are to be carried out separately by the proponents.

### 6.2.3 Ambient Air Quality

The following monitoring schedule is given for ambient air quality.

#### ➤ Parameters

Sulphur dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Suspended Particulate Matter (SPM), Respirable Particulate Matter (PM<sub>2.5/10</sub>).

#### ➤ Frequency of Monitoring

Once in a year in each location.

#### ➤ Location

2 or 3 locations in buffer zone and 1 location in work zone. The environmental standards for Ambient air quality prescribed by CPCB/MOEF/SPCB.

### 6.2.4 Water Environment

Water quality monitoring at least before and after monsoon from ground water near the lease area and mine pit water sample shall be monitored. General, Physical and chemical parameters, COD, BOD, TSS etc shall be analyzed.

### 6.2.5 Noise Measurement

Work Zone noise and Ambient Noise level shall be monitored at least once in a year. Noise monitoring at ambient air monitoring locations will be carried out. Besides, vibration studies in the nearby villages shall be carried out, as per necessity and direction of DGMS, etc. The noise level standards as given by CPCB / MOEF given in **Table 6-1** will be enforced in the mine.

**Table 6-1 Environment (Protection) Rules 1986**

S. No	Area code	Category of area	Limits in dB(A) Leg	
			Day Time	Night Time
1	A	Industrial area	75	70
2	B	Commercial area	65	55
3	C	Residential area	55	45
4	D	Silence Zone	50	40

**Note:**

- Day time shall mean from 6 a.m. and 10.0 p.m.
- Night time shall mean from 10.0 p.m. and 6 a.m.
- Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.

- Mixed categories of areas may be average as one of the four above mentioned categories by the competent authority.

\* dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

A “decibel” is a unit in which noise is measured.

“A”, in dB (A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

*Leq: It is energy mean of the noise level over a specified period.*

### 6.3 Post Project Environmental Monitoring

It is imperative that the Project Authorities set up regular monitoring stations to assess the quality of the neighboring environment of the project. An environmental monitoring programme is important as it provides useful information and helps to:

- Verify the predictions on environmental impacts presented in this study
- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and
- Identify the effectiveness of mitigate measures suggested in the EMP.

**Table 6-2 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	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , and NO <sub>2</sub>
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	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> & 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 ISO 10500 Standard parameters

### 6.3.3 Occupational Health and Safety

- Occupational health survey of staff and permanent workers will be undertaken at least once in 3 years to detect early incidence of diseases and for prompt remedial medical follow up in the matter. Audiometric test for the workers will be done at regular interval for workers of the noise prone area. Safety matters also will be reviewed periodically by safety in-charge.
- Occupational health and safety is very closely related to productivity and good employer-employee relationship. The main factors of occupational health in mines are fugitive dust and noise. Safety of employees during blasting operation and maintenance of mining equipment and handling of explosive materials is to be taken care of as per the Mine Regulations, 1961 and Circulars of DGMS. To avoid any adverse effects on the health of workers due to dust, heat, noise and vibration, sufficient measures have been proposed in the EMP. These include
  - Provision of wet drilling /or dust collectors
  - Provision of rest shelters for mine workers with amenities like drinking water, fans, toilets etc.
  - Provision of personnel protection devices for the workers
  - Rotation of workers exposed to high noise areas
  - First-aid facilities

Occupational Health Survey of the employees will be carried out at regular intervals.

## 6.4 Environmental Monitoring Programme

**Table 6-3 Environmental Management Plan**

S. No	Salient Items	Position at the end of five years of Mining period
1	Land Reclamation	The pit boundaries shall be safely fenced and used for agricultural purpose when the pit is filled with underground seepage or rain waters
2	Waste Management	The waste materials can be dumped along the north eastern part of the lease area. By adding suitable variety of soil brought from outside and planting trees over the waste dump

3	Afforestation program with precautions for survival and protection of plantation.	As proposed, 20 plants per year were planted during the mining Period along the eastern boundary of lease area and achieved survival rate of 50%.
4	Quality of mine water and any interference with surface waterspruces	Followed the Procedure as proposed in the Mining plan.
5	Measures for dust suppression	Water will be sprinkled for the suppression of air borne dust from mine approach roads, waste dumps on regular intervals using water tankers.

## 7 ADDITIONAL STUDIES

### 7.1 Introduction

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

1. Public consultation
2. Risk assessment /Disaster Management Plan
3. Mine closure plan as per GCDR 1999
4. Occupational Health and safety studies have been conducted and a safety plan was prepared.

#### Public Consultation

The proposed project is categorized as 'B1' category Schedule 1(a) as per EIA Notification 2006 and its amendments thereafter. The total area of the quarry is 14.53.0 Ha.

However, the proposed project falls under 'B1' category, Schedule 1(a), Public Hearing is Mandatory. So, EIA report has been prepared as per the obtained ToR vide. TN/F.No.6709/SEAC/1(a)/ToR-1339/2022, dated: 16.02.2023. Draft EIA report will be submitted for Public Hearing (PH). After PH, the minutes obtained will be incorporated in the EIA report along with action plan by the proponent. Final EIA will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

### 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 their 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.
- Occupational Health and Safety Plan.

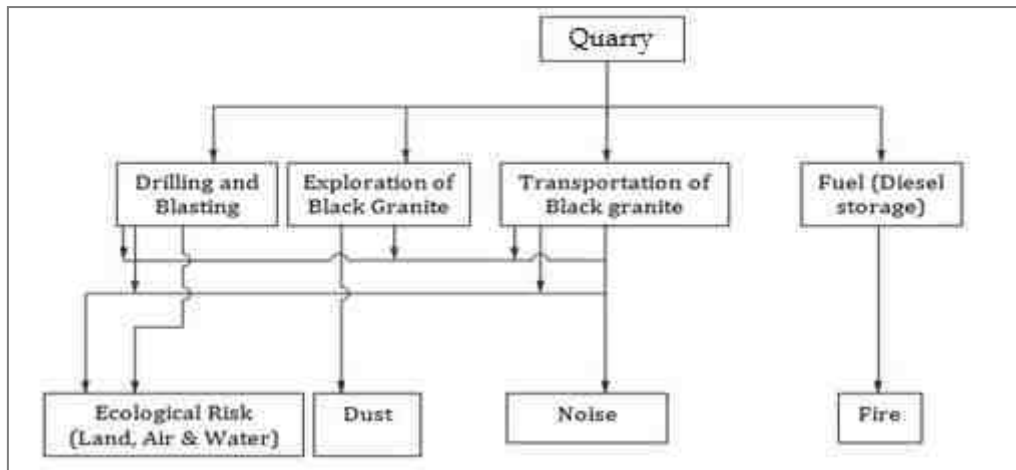
The complete mining will be carried out under the management control and direction of a qualified mine manager holding a first class manager's certificate of competency. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial 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
- Firefighting 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.
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines.
- Suppression of dust on the haulage roads
- 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**

### 7.2.2.1 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 1.5m depth having a diameter of 30-32 mm.

### 7.2.2.2 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, and 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.



### 7.2.2.3 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 Wire saw and crack powder will be utilized extensively to reduce the requirement for blasting.
- 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 on any 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.

### 7.2.2.4 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.

### 7.2.2.5 Heavy Machinery

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

### 7.2.2.6 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 the guidance 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 long way 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 and may damage equipment.

- The movement of the dumpers will be governed under the Code of Traffic rule, this is already formulated & implemented.

#### **7.2.2.7 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.

#### **7.2.2.8 Safety Measures at the quarry**

- 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 60 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 storm water drainage.

#### **7.2.3 Disaster Management Plan**

The disaster management plans 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 objectives 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.

**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 firefighting, rescue, rehabilitation, transport and provide essential and support services.

**Emergency Communication (EC)**

Whoever notices an emergency situation such as fire, growth of fire etc. would inform the Mines Foreman. The Mines Foreman would appraise the site controller. Site Controller verifies the situation from the incident controller takes a decision about an impending on site emergency. Simultaneously, the emergency warning system would be activated on the instructions of the site controller.

In order to handle disaster/emergency situations, the following personnel shall deal with the disaster/Emergency

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

**7.2.3.1 Emergency Services**

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

1. Fire Protection System
2. Off Site Emergency Plan

**7.2.3.2 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.

### **7.2.3.3 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.

### **7.2.4 Mine Closure Plan**

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids and also in the form of waste dumps. As per the petro genetic character, the depth persistence of the black granite body in the area is beyond the workable limits. However, it is very difficult to operate granite dimensional stone mine economically below a depth of 30m by observing the statutory of mine safety rules and regulations. Hence in the proposed mining plan, only 30m depth has been envisaged as 'Workable depth' for safe and economic mining.

However, it is proposed not to back fill the ultimate pit, in as much as quantity of reserves is available below the workable depth of 30m and there is possibility of technology up-gradation in granite mining for greater depths. The site boundaries shall be safely fenced and used as a reservoir after mining activities are over.

There is no proposal for back filling, reclamation and rehabilitation. The quarried pits after the end of the life of lease will be fenced to prevent inherent entry of public and cattle. There is no proposal for back filling, reclamation and re habitation

#### **7.2.4.1 Progressive Mine Closure Plan**

The various schedules for mining activities regarding mining of granite block, waste disposal, proposed land use pattern, environmental preservation measures, disaster management plan, etc. have been fully covered in the earlier chapters in this EIA/EMP report.

Concurrent planning for various steps to be adopted for final mine closure, along with regular working schedules and systems of the mine, will facilitate to effect smooth switchover to final mine closure stages ultimately

#### **7.2.4.2 Water Quality Management**

The ground water quality in the region indicates neutral range with pH values. 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.

#### **7.2.4.3 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 will be used for dust suppression on working faces, haul roads and dump surfaces.

#### **7.2.4.4 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 (**June-August 2018**). PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>x</sub>, Pb, NH<sub>3</sub>, C<sub>6</sub>H<sub>6</sub>, C<sub>20</sub>H<sub>12</sub>, 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 for abatement of air pollution in the black granite mine area:

- Water sprinkling shall be carried out at the active working faces, on all haul-roads and the dump surfaces.
- Regular cleaning and removal of spillage black 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.

#### **7.2.4.5 Solid waste Management**

As is stated earlier, mining will be 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.

#### **7.2.4.6 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.

#### **7.2.4.7 Mine Drainage**

The lease applied area is hillock 30m height with slope towards northern and southern sides. Through the area receives scanty rainfall, the ground water level is at 15m depth. The Production faces are operated at shallow depths. During the rainy seasons the surface run of water and the ground water are collected at one point called as sump and dewatered nearby agricultural field with the help of 10HP oil engines.

#### **7.2.4.8 Disposal of Waste**

The Mine waste in the mine includes the over burden, side burden, rock fragments and rubbles generated as mineral rejects during production works and the country rock fragments generated during development works as approach road formation, formation of dumping yard sites etc., During the first five years of Mining Plan period, such waste material are proposed to be dumped along the Southern part of the lease area where it comprises of country rock terrain.

#### **7.2.4.9 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.

#### **7.2.4.10 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 compliant 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.

#### **7.2.4.11 Other Infrastructure**

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

#### **7.2.4.12 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 be used for human & cattle consumption and for agriculture purposes.

#### **7.2.5 Social Impact Assessment R & R Action plan**

There will be no Rehabilitation and Resettlement in this proposed project.

## **8 PROJECT BENEFITS**

### **8.1 Improvements in the physical infrastructure**

- Providing Smart screen facilities for nearby Government School & Solar Panel in Karandapalli village.

### **8.2 Improvement in the Social infrastructure**

- Improvement in Per Capita Income.
- The socio - Economic conditions of the village and distance will enhance due to the 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 quarrying activities in this belt will benefit to the local people both directly 30 persons & indirect persons are 20 Nos.
- The direct beneficiaries will be those who get employed in the mines as skilled and unskilled workers.

### **8.4 Other tangible benefits**

Cultural & economic Development of the near by villages.



## **9 ENVIRONMENTAL COST & BENEFIT ANALYSIS**

(Not recommended during scoping stage)

## 10 ENVIRONMENTAL MANAGEMENT PLAN

### 10.1 Environmental Management Plan

Environmental Management Plan covers the genesis of pollution, the principal sources of pollution, the nature of pollution, the proposed measures required for meeting the prevailing statutory requirements of air emissions, waste water discharge characteristics, noise levels, land use, socio economics etc for environmental management purpose in connection with the mining and quarrying related activities in the study area.

### 10.2 Emission Source Identification

The Emission sources are activities related to pits and quarries including, overburden operations, drilling, hauling, loading and unloading stockpiles. The emission sources may be subdivided into six broad categories:

- Emissions of PM and road dust due to HEMM & Mining Tippers.
- Emissions from generators.

### 10.3 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 SO<sub>2</sub>, NO<sub>x</sub> etc.

#### 10.3.1 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 32 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.

#### 10.3.2 Emissions from Material Handling

PM emissions occur during the handling and transfer operations of material from one process to another within the facility. Open storage piles of raw material and products are generated at various points throughout the operational area. The environmental control measures, which will be taken and proposed to control the fugitive dust released during the stone 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.

### 10.4 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 <sup>3</sup> /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.
- Use of Diamond Wire Saw machine and crack powder to reduce noise.
- 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 is enclosed in acoustic enclosure so as to reduce the noise level.

## 10.5 Water Pollution Control Measures

### 10.5.1 Surface Water

There are no major streams and rivers, which can get effected 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.

### 10.5.2 Mine Drainage Water

Mine water will be used in mechanized cutting of the blocks and for wetting purpose. The runoff from the dumps will be channelized and care will be taken.

- 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.

## 10.6 Land Environment

Landscape 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 effected, 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. Landscape will be changed due to open cast quarry. There will be no land subsidence as area is made up of hard rock. Aesthetic environment will be effected.
- Soil cover and the weathered material accounts for the Over Burden
- Top soil will be removed & 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.

### 10.6.1 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.

## 10.7 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 where there are no granite deposits. 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 on the Southern side of 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.
- All the care will be taken to minimize the waste generation at the source.

### **10.8 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. 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.

### **10.9 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.

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

### **10.10 Granite Conservation and Development**

The mining plan proposed has fully covered the aspects of granite conservation with a future plan to extend the proposed working of the mine to the full depth of the deposit. Extreme care will be taken to ensure proper supervision of quality control of the granite dimensional stone aimed at the recovery of the maximum saleable quantity / quality of granite dimensional stones suitable for full utilization of the consumers

### **10.11 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 Scheme of Mining 20 plants per year is proposed to be planted for complying Afforestation program with the arrived survival rate of 50% in the North western portion of the lease area in the phased manner.
- Only Shrubs and bushes are seen in the quarry Lease area.

### **10.12 Occupational Health & Safety Measures**

Granite stone 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 equipments.

### **10.13 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.

#### **10.13.1 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.

#### **10.13.2 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.

### 10.13.3 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.

### 10.14 Budget for Environmental Protection

It is necessary to include the environmental cost as a part of the budgetary cost component. Total of Rs.2,05,000/- allocated for environmental protection activities. Environmental Management cost is given in Table 10-1.

**Table 10-1 Environmental Management Plan Cost**

S.No	Details	Amount (Rs.)
1	Afforestation	30,000/-
2	Water Sprinkling	50,000/-
3	Water Quality Test	25,000/-
4	Air Quality Test	25,000/-
5	Noise / Vibration Test	25,000/-
6	CSR Activities	50,000/-
<b>Total</b>		<b>2,05,000</b>

### 10.15 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, Metalliferous Mines Regulation etc., will be adopted to ensure risks-free and safe mining operations. All personal protective devices supplied to workers and staff should be used while they work in the mines and any 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**.

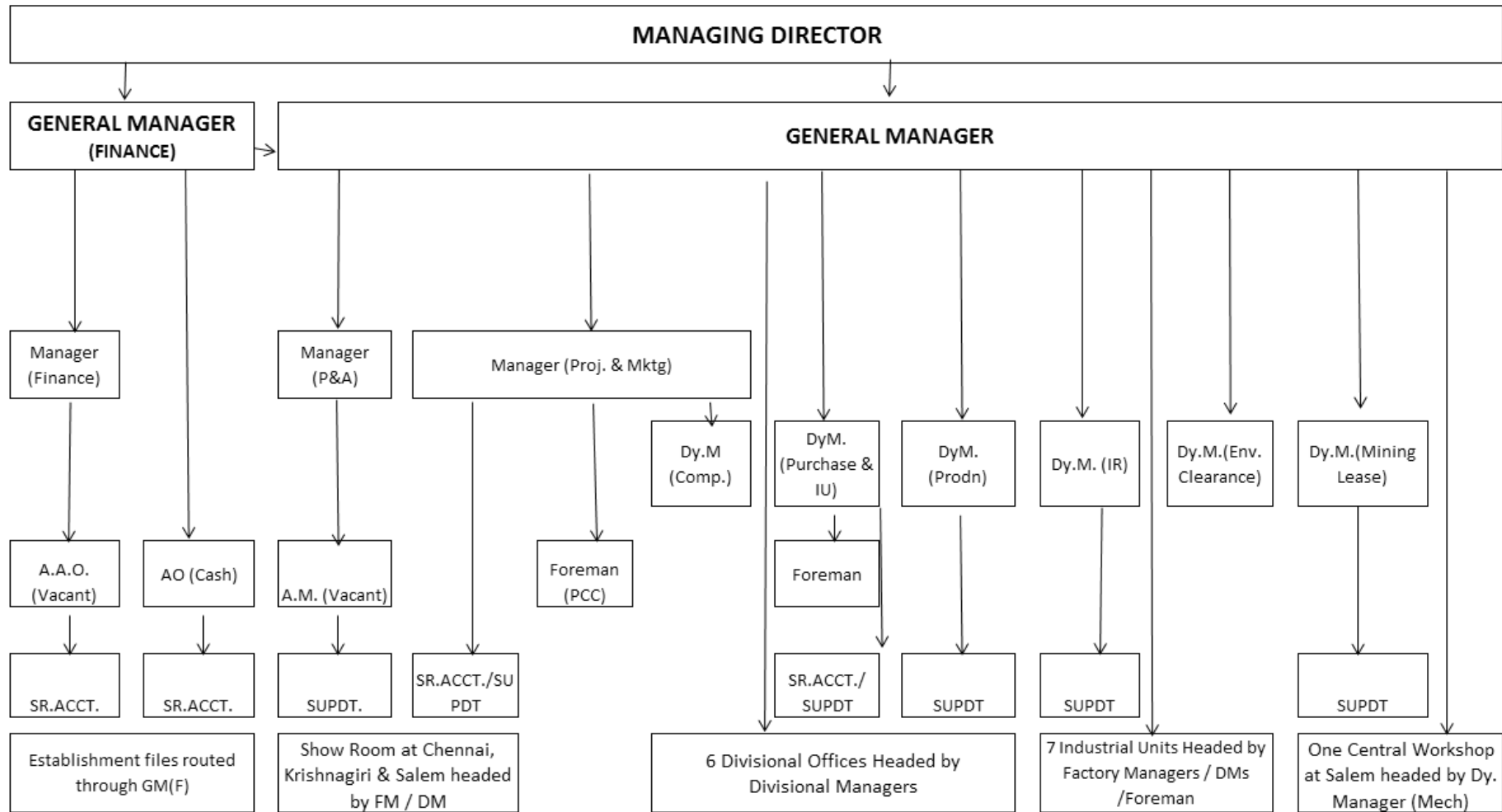


Figure 10-1 Hierarchical System of the TAMIN

# 11 SUMMARY & CONCLUSION

## 11.1 Background

The extent area of the quarry is 14.53.0 Ha at S.F. 155/2 at Karandampalli Village, Denkanikottai Taluk, Krishnagiri District, Tamil Nadu. TAMIN has been proposed to get a fresh lease for Black Granite (Dolerite) quarry over an extent of 14.53.0 Ha for 30 years lease vide TAMIN's G.O(3D)No.58, Industries (MME-1) department, dated: 29.11.2011. Accordingly, the Government of Tamil Nadu issued the precise area communication letter under Rule, 8-C (3b) of Tamil Nadu Mineral Concession Rules, 1959.

The project falls under B1 Category, Schedule 1(a) Mining of Minerals as per EIA Notification dated 14<sup>th</sup> September 2006 and its subsequent amendments. The EC application was submitted under category B1, schedule 1(a) to TN SEIAA vide File No. 6708/2022.

The proposal was appraised during 329<sup>th</sup> SEAC meeting held on 16.11.2022 and 574<sup>th</sup> SEIAA meeting held on 29.11.2022 and ToR was issued vide Lr No. SEIAA-TN/F.No.6708/ToR-1302/2022, dated: 29.11.2022 for the preparation of EIA/EMP report. The draft EIA/EMP report will be submitted for Public Hearing (PH). After completion of Public Hearing, the minutes issued will be incorporated in the EIA report along with action plan by the proponent. Final EIA will be submitted to TNSEAC for further appraisal of the project and obtaining Environment Clearance.

TAMIN as part of the compliance from MoEF&CC has appointed M/s Hubert Enviro Care systems (P) Ltd, Chennai as Environmental Consultants who are accredited by National Accreditation Board for Education and Training (NABET), Quality Council of India (QCI), New Delhi.

The production capacity of the quarry during the mining plan period was 53,824 m<sup>3</sup> Mine lease area falls in the survey of India Topo sheet 57H/10,11,14&15 and lies between the GPS coordinates of Longitude: 77°43'28.43"E to 77°43'46.40"E Latitude: 12°28'11.55"N to 12°28'27.29"N.

## 11.2 Management Commitment

The company is assigning prime importance for environmental protection. The company will comply the environmental laws. TAMIN will maintain well developed Greenbelt. Also all the environmental statutory requirements will be implemented and maintained continually.

## 11.3 Environmental Sensitive Areas

There are no notified ecologically sensitive areas within 15km from project boundary. The Tamilnadu State / Karnataka State boundary as per google runs in W direction at about  $\approx$  9.90km from the project boundary. Project doesn't attract the special conditions and general conditions as per EIA

notifications. The detailed Environmental Sensitivity areas within the 15km radius of the project site are given in **Chapter 3, Section 3.4** and **Table 3-1**.

#### 11.4 Black Granite Quarry Reserves

- The estimated Geological Reserves of Black Granite estimated based on the Geological cross sections was 3,29,201 m<sup>3</sup>. By applying the effective Geological recoverable reserves @ 10 % 32,920 m<sup>3</sup>& granite waste @90% is 2,96,281 m<sup>3</sup>. By applying the effective Geological recoverable reserves @ 10 % 32,920 m<sup>3</sup>& granite waste @90% is 2,96,281 m<sup>3</sup>.
- The updated Mineable Reserves have been arrived as 3,01,972 m<sup>3</sup>and by applying 10% recovery, the updated mineable reserves as 30,197 m<sup>3</sup>.
- Mineable Reserves have been worked out as 30,197 m<sup>3</sup> by applying the recovery factor 10%. The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 10,255m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery.

#### 11.5 Summary of the Magnitude of Operation

- The black 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. Major machineries are Compressor, Jack hammer, Diamond wire saw machine and excavator and DG set is used in proposed quarry. Tippers and dumpers will be used for transportation
- Proposed Production Capacity is 2,052 m<sup>3</sup> per annum.
- The geological cross sections up to the economically average depth of 30m from the ground level and top surface of the granite body works out to 3,29,201 m<sup>3</sup>
- The mineable reserves have been computed as 3,01,972 m<sup>3</sup>.
- The effective geological reserves and mineable have been worked out as 32,920 m<sup>3</sup> and 30,197 m<sup>3</sup> by applying the recovery factor 10%.
- Mineable Reserves have been worked out as 30,197 m<sup>3</sup> by applying the recovery factor 10%. The annual peak production per year would be 2,052m<sup>3</sup> of ROM of saleable and 10,255m<sup>3</sup> of ROM during the first five year of Mining plan period at the rate of 10% recovery.

#### 11.6 Requirements

##### 11.6.1 Land requirement

- The Black granite mine is over an extent of 14.53.0 Ha. The entire area is under possession of TAMIN.
- Lease area located at S. F. No.55/2 Karandapalli Village, Denkanikottai Taluk, Krishnagiri District lies in the latitude of 12°28'11.55"N to 12°28'27.29"N and longitude of 77°43'28.43"E to 77°43'46.40"E.
- The lease area topography is hilly terrain; site elevation is 277m (max) AMSL. The area is marked in the survey of India Topo sheet No. 57 H/10,11,14&15.

- Mining Lease obtained from Tamil Nadu Government for 30 years vide G.O (3D)No.58, Industries (MME-1) department, dated: 29.11.2011. Out of 14.53.0 Hectare of lease area 3.60.5 Ha is considered for mining, waste dump is 5.70.0 Ha, & for Greenbelt 0.36.5 is allocated.

#### 11.6.2 Water Requirement

- The total water requirement is 1.5KLD Drinking & Domestic purpose-0.5 KLD, Wire Saw cutting -0.3 KLD, Dust suppression -0.3 KLD & for Greenbelt-0.4KLD. The total water requirement will be met from Road tankers.
- Hazardous waste like waste oil will be disposed through TNPCB Authorized dealers.
- Sewage will be disposed through septic tank followed by soak pit. Septic Tank will be cleaned periodically.

#### 11.6.3 Power & Fuel Requirement

- Power requirement will be 60 kVA will be met through 125 kVA DG Set. Diesel consumption will be 200 liters/day.
- Diesel will be brought from nearby diesel pumps. No electricity is required for the project.

#### 11.6.4 Manpower

- Direct manpower will be 30 persons directly and indirectly 20 Nos.

#### 11.6.5 Solid Waste Generation & Management

- Municipal solid waste (13.5 kg/day) will be segregated as Organic will dispose through local municipal bins and inorganic waste (5.4kg/day) will be disposed through TNPCB authorized recyclers.
- Waste diesel Oil will be collected in leak proof containers and disposed to TNPCB Authorized Agencies for Reprocessing/Recycling.

#### 11.7 Project Cost

- The total capital investment on the project is Rs. 99, 97,000/- Lakhs including EMP cost is 2, 05,000/-.

#### 11.8 Baseline Study

**Project Influence Area (PIA)/Study Area:** An area covering 10 km radius from Karandapalli Black granite quarry boundary has been earmarked as study area for baseline studies.

#### Study Period:

The baseline environmental surveys were carried out during **(mid January 2023- mid April 2023)** within the study area.

#### Summary of Baseline Studies:

- Site has an undulating terrain with level 277m Above MSL.
- The project site falls under Zone- III (Low Risk Zone) as per IS 1893 (Part- I).
- The predominant wind direction is North East during study period.

- Max Temperature: 34<sup>0</sup>C Min Temperature: 14<sup>0</sup>C & Avg Temperature: 25.08<sup>0</sup>C
- Average Relative Humidity: 52.51 %
- Average Wind Speed : 3.12 m/s

### **Ambient Air Quality**

Maximum concentrations of PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, NO<sub>2</sub>, CO, Pb, O<sub>3</sub>, NH<sub>3</sub>, C<sub>6</sub>H<sub>6</sub>, C<sub>20</sub> H<sub>12</sub>, As & Ni, are well within the National Ambient Air Quality Standards for Industrial, Commercial and Residential areas at all monitoring locations during the study period. The ambient air quality has been monitored at 8 locations for 12 parameters as per NAAQS, 2009 within the study area. The average baseline levels of PM<sub>10</sub> (56.27 μg/m<sup>3</sup>-58.49 μg/m<sup>3</sup>), PM<sub>2.5</sub> (33.13 μg/m<sup>3</sup> -35.45 μg/m<sup>3</sup>), SO<sub>2</sub> (15.32 μg/m<sup>3</sup>-17.89 μg/m<sup>3</sup>), NO<sub>2</sub> (12.68 μg/m<sup>3</sup>-19.34 μg/m<sup>3</sup>), 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..

### **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
- In Residential area 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).

### **Water Environment**

The prevailing status of water quality at 08 locations for surface water and 8 locations for ground water have been assessed during the study period. The standard methods prescribed in IS were followed for sample collection, preservation and analysis in the laboratory for various physiochemical parameters.

### **Surface water quality**

- pH ranges from 7.21 to 7.81.
- Total Dissolved Solids range from 388 mg/l to 418 mg/l.
- Total hardness ranges between 175 mg/l – 211 mg/l.
- The BOD value ranges from 6.3 mg/l to 7.3 mg/l
- COD value 14.8 mg/l to 33 mg/l.

- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se at all locations are within the limits of IS 2296:1992(Class-C: Drinking water with conventional treatment followed by disinfection)

### Ground Water Quality

- The average pH ranges from 7.31-7.66.
- Total Dissolved Solids (TDS) value of the collected ground water samples are BLQ (LOQ 1)
- 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.
- It is observed that all the collected ground water samples meets the drinking water standards (IS 10500:2012) and can be used for drinking.

### Land Environment

Assessment of soil characteristics is of paramount importance since the vegetation growth, agricultural practices and production is directly related to the soil fertility and quality. Soil sampling was carried out at eight (08) locations in the study area. It is observed that,

- The pH of the soil samples ranged from 6.78 -8.31.
- Conductivity of the soil samples ranged from 218 – 389umhos/cm
- Nitrogen content ranged from 124 mg/kg to 408 mg/kg
- Phosphorous ranged from 18.98 mg/kg – 33.05 mg/kg
- Potassium content ranges from 73.30 mg/kg – 144.31 mg/kg.

### Biological Environment

The floral diversity is grouped into trees, shrubs, climbers and herbs. Similarly, the faunal diversity is grouped into mammals, birds, reptiles and amphibians. There is no extinct flora and fauna species found in the study area.

#### Flora

As per primary survey details, fair agro- vegetation cover in the study area. Growth of grasses in the study area is more in rainy season. The common trees in the study area are *Tamarindus indica*, *Pithecolobium dulce*, *Prosopis julifera* and *Eucalyptus* species. The shrub vegetation consists of *Zizyphus xylopyra*, *Adathoda vassica*, *Carisa* sp and *Randia dumetorium*. The common species of grasses in the study area are *Fimbristylus ovata*, *Aristida funiculata*, *Pennisetum* and *Heteropogon*.

#### Fauna

No major fauna observed in core zone. Only some egrets, herons and drongo are observed in the plant area. Among mammals, only mongoose is observed in the core zone. There is no endangered fauna observed in the proposed plant area.

A secondary information for faunal biodiversity of the study area with respect to birds, reptiles, amphibians and butterfly species. Fauna is a gift of nature, and the different beasts and birds, forming part of wild life, need to be preserved. The wild animal and birds help in protecting crops, by preying upon worms and insects, which might damage them.

### Socio Economic Environment

In 2011 census, the total population of Krishnagiri district was 1879809. Of this, rural population was 1451446 and urban population was 428363. In 2001, they were 1561118, 1299726 and 261392 respectively.

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 detailed information provided in **Chapter 3, Section 3.12**.

## 11.9 Anticipated Environmental Impacts

### Air Environment

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. Fugitive dust control in mine is shown in **Table 11-1**.

**Table 11-1 Fugitive dust control in mine**

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 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

### Noise Environment

- Baseline study showed that the noise levels in both Industrial area and in Residential area are slightly exceeded the limit prescribed by CPCB. The designed equipment with noise levels not exceeding beyond the requirements of Occupational Health and Safety Administration



Standard will be employed.

### **Land Use**

- The quarry is in operations since 1995 and extent of lease area is 14.53.0Ha. Land classifies as a Government land, Mining Lease obtained from Tamil Nadu Government for 30 years vide G.O (3D) No.58, Industries (MME-1) department, dated: 29.11.2011.

### **Wastewater Management**

- Sewage (1.27KLD) will be sent to septic tank followed by soak pit. There is no industrial effluent generation during quarry operation.

### **Biological Environment**

- 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.

### **Solid/ Hazardous Waste Management**

- Municipal Solid Wastes including food waste will be disposed to municipal bin.

### **Environmental Monitoring Program**

- A monitoring schedule with respect to Ambient Air Quality, Water & Wastewater Quality, Noise Quality as per Tamil Nadu State Pollution Control Board (TNPCCB), shall be maintained.

### **11.10 Greenbelt 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. The plantation will be developed inside the mining lease about 0.06.50Ha, out of 14.53.0Ha. 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.

### **11.11 Disaster Management Plan**

The salient features of Disaster Management Plan include

- Emergency shutdown procedure
- Fire protection system, Emergency safety equipment & Reporting and response to emergency. Emergency Help from nearby industries and tie up with nearby industries

**11.12 Corporate Environmental Responsibility**

- TAMIN Karandapalli site had no Relocation and Rehabilitation.
- Most villages have benefitted mutually at Karandapalli where the mining industry has provided indirect jobs for labor and villages provide accommodation for the labor and staff. Supportive industries like food supply and essential shops are economic growth in the villages.

**11.13 Benefits of the Proposed Project**

- The quarrying activities in this belt will benefit to the local people both directly 30 persons & indirect persons are 20 Nos
- Improvement in Per Capita Income.
- The socio - Economic conditions of the village and distance will enhance due to the 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.

## 12. DISCLOSURE OF CONSULTANTS

In order to assess the potential environmental impacts due to the proposed project at Survey No: 155/2 Karandapalli village, Denkanikottai 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 HubertEnviro 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 as on till date

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

## 12.3 Copy of QCI NABET Accreditation


**QUALITY COUNCIL  
OF INDIA**  
Creating an Ecosystem for Quality



**National Accreditation Board  
for Education and Training**



**Certificate of Accreditation**

**Hubert Enviro Care Systems Pvt. Ltd.,**  
*A-21, (Behind Lions Club School) III Phase, Thiru Vi Ka Industrial Estate, Gulindy, Chennai - 600 032.*  
*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 open cast/ 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 & nonferrous)- both primary & secondary	8	3 (a)	B
7	Cement plant	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 (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	18	5 (c)	A
11	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes)	20	5 (e)	A
12	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of Schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	28	-	B
13	Synthetic organic chemicals industry	21	5 (f)	A
14	Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes.	31	7 (c)	A
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 SAAC minutes dated Feb 3, 2023 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/23/2696 dated March 6, 2023. The accreditation needs to be renewed before the expiry date by Hubert Enviro Care Systems Pvt. Ltd, following due process of assessment*

  
**Sr. Director, NABET**  
**Dated: March 6, 2023**

**Certificate No.**  
**NABET/EIA/2224/SA 0190**

**Valid up to**  
**July 27, 2024**

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](http://www.hecs.in).