DRAFT EIA / EMP REPORT

FOR

LIMEKANKAR QUARRY LEASE

Extent	**22.145 Ha**
Production	**3,36,724 Tonnes of Lime Kankar for a period of 5 Years**
Location	**Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu .**
Ultimate Depth	**1.40m bgl (0.30m Top soil + 1.10m Kankar)**
Mining Method	**Opencast Mechanized Mining without drilling & blasting**

- **Terms of Reference issued by SEIAA Tamil Nadu vide TO25B0108TN5896547N. Dated: 05/03/2025**
- **Baseline Monitoring – Summer Season (March 2025 to May 2025)**

PROJECT PROPONENT

CHETTINAD CEMENT CORPORATION PVT. LTD.

Ariyalur Works, Trichy Road, Keelapulur, Ariyalur District-621707.

CONSULTANT

CREATIVE ENGINEERS & CONSULTANTS

ABET ACCREDITED CONSULTANCY, NABL ACCREDITED TESTING LAB

Creating Possibilities

9B/4, Bharathwajar Street, East Tambaram, Chennai-600059.

Cell: 09444133619 Email : cecgiri@yahoo.com,

Category-B1 **JULY 2025** **CEC/EMP/MI-242**

REVISIONS OF EIA/EMP REPORT

Revision number	Report Status	Date of submission
00/JUL/25	Draft EIA /EMP Report	31.07.2025

Environmental Impact Assessment & Environmental Management Plan Report for Limekankar Quarry Lease of Chettinad Cement Corporation Pvt. Ltd over an area of 22.145 Ha in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu was prepared by Creative Engineers & Consultants and authorized for submission by Mr. B.Swamynathan, EIA Coordinator, CEO, of Creative Engineers & Consultants on 31.07.2025 after due review by the personnel and consultation with Chettinad Cement Corporation Pvt. Ltd. Current Revision number of the EIA/EMP report is 00/JUL/25, signifying as per the revision mentioned in the above table that this is a Draft EIA/EMP report.

PROJECT PROPONENT DECLARATION

We, Chettinad Cement Corporation Pvt. Ltd. received ToR under EIA Notification 2006 from SEIAA, Tamil Nadu vide their Lr No. TO25B0108TN5896547N. Dated: 05/03/2025 for mining lease for Lime Kankar Quarry over an area of 22.145 Ha in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu

We have entrusted the EIA study to M/s. Creative Engineers & Consultants (CEC), Chennai who have been accredited by the National Accreditation Board for Education & Training (NABET), Quality Council of India with their accreditation valid upto 23.12.2026.

The Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) have been prepared as per the generic structure proposed in the EIA notification 2006, ToR issued by SEIAA, Tamil Nadu. The prescribed ToR along with compliance is also incorporated in the EIA/EMP Report.

This report is prepared based on the information and data obtained from the Mining Plan and other records and the field study carried out by the consultant. The data given in the EIA/EMP report are factually correct to the best of my knowledge.

For M/s. Chettinad Cement Corporation Pvt. Ltd.,

R. A.

RA. Krishnakumar
Chief Operating officer

Chettinad Cement Corporation Private Limited
CIN : U93090 TN1962PTC004947
E info@chettinadcement.com
www.chettinad.com

Regd. Office : Chettinad Towers
603, Anna Salai, Chennai 600 006
T +91 44 2829 2727, 4295 1800 (100 lines)
F +91 44 2829 1558

Corporate Office : Meyyammai Building
16/33, Gandhi Nagar 2nd Main Road,
Gandhi Nagar, Adyar, Chennai - 600 020.
T +91 44 4369 1000

EIA Consultant Undertaking

[In compliance with MoEF Office Memorandum No. J-11013/41/2006-IA.II (I) dated 04.08.2009]

Creative Engineers & Consultants (CEC) is an NABL accredited testing Laboratory, and also NABET accredited Category–A environment consultancy organization for preparing EIA/EMP reports for the sectors Mining of minerals, Thermal power plants, Mineral Beneficiation & Cement plants.

CEC has been accredited by the National Accreditation Board for Education & Training (NABET), Quality Council of India for empanelment of EIA Consultants with their accreditation valid upto 23.12.2026.

Chettinad Cement Corporation Pvt. Ltd. received ToR under EIA Notification 2006 from SEIAA, Tamil Nadu vide their Lr No. TO25B0108TN5896547N. Dated: 05/03/2025 for mining lease for Lime Kankar Quarry over an area of 22.145Ha in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu.

The prescribed TOR is complied with and incorporated in the EIA Report and submitted. This report is based on the information and data obtained from Approved Mining Plan, other records and data from the field study by CEC. The data generated and given in the EIA/EMP Report are factually correct. The sample analyses are carried out through CEC's laboratory.

(P. Giri)
Chief Executive & EIA Coordinator
Creative Engineers & Consultants

9/4b, Bharathwajar Street, East Tambaram, Chennai – 600 059.
Ph : 22395170, 9444133619, fax : 91-44-22396643.
e-mail : cecgiri@yahoo.com, web : www.creativeengineers.co.in

Annexure – VII

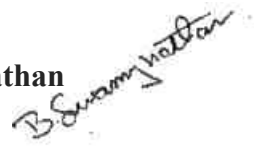
Declaration by Experts contributing to the EIA Report for

EIA/EMP Report For Limekankar Quarry Lease of Chettinad Cement Corporation Pvt. Ltd. over an area of 22.145 Ha in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu.

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

EIA coordinator:

Name: **B.Swamynathan**

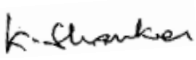
Signature and Date: 

Period of involvement: **Feb 2025 onwards**

Contact information: **09444133619**

Functional area experts:

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
1	AP*	**P.Giri**	• **Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards.** • **Identification of sources of air pollution comprising dust, gaseous emission due to mining & other activities** • **Identification of Impacts & suggestion of mitigation measures** **Period: March 2025 onwards**	
		B.Swamynathan	• **Data interpretation of Micro meteorological data for wind rose.** • **Identification of polluting source and suggestion of suitable mitigation measures.** **Period: Feb 2025 onwards**	
2	WP*	**G.Sandhya**	• **Study of the monitored data with respect to the applicable standards.** • **Study of water requirement, preparation of water balance diagram.** • **Identification of impact of the project on the water quality and suggestion of suitable mitigation measures.**	

			• **Preparation of sections relevant to WP functional area in the EIA/EMP report.** **Period: March 2025 onwards**	
3	SHW*	**P.Giri**	• **Quantification of mineral & waste from mining operation** • **Waste disposal method evaluation** • **Providing dump management plan** • **Providing Surface Runoff Management Structure Requirements.** • **Identification of Hazardous waste and its details of disposal** **Period: March 2025 onwards**	
4	SE*	**R.Baburaj**	• **Identification of villages in the study area and finalization of demographic profile of the villages within the study area.** • **Preparation of sections relevant to SE functional area in the EIA/EMP report** **Period: March 2025 onwards**	
5	EB*	**B.Swamynathan**	• **Perusal of existing data relevant to this project.** • **Studying the details of flora and fauna, separately for core, buffer zone and forest area based on primary field survey.** • **Identification of species , Indicating the Schedule of the fauna present in the study area** • **Assessment of impact on Biological environment and suggestion of mitigative measures** • **Collecting & providing details of existing and proposed Green belt development /plantation in the core zone** **Period: Feb 2025 onwards**	
6	HG*	**K.Shankar**	• **Study of existing surface drainage arrangements in the core and buffer zone, impact due to mining on these drainage courses and suggestion of mitigative measures** • **Perusal of site specific ground water table details for the core zone and the study area.** • **Studied the hydrological aspects of surface and groundwater in study area** • **Study about impact on the hydrology due to mining operation** • **Suggesting mitigative measures like RWH for**	

			enhancement of ground water level **Period: March 2025 onwards**	
7	GEO*	**K.Shankar**	• **Study of geology of the ML area and the surrounding areas.** • **Provide details about Mineral composition** **Period: March 2025 onwards**	
8	SC*	**B.Swamynathan**	• **Study of soil profile** • **Assessment of Impact on soil and suggesting plantation scheme.** **Period: Feb 2025 onwards**	
9	AQ*	**G.Sandhya**	• **Quantification of emission particulars** • **Preparation of meteorological data in suitable form for input into the model** • **Simulation of model for generation of Isopleth and data interpretation. Analysis of the Isopleth generated** • **Studying the impact on AAQ monitoring locations due to the generated emissions.** • **Preparation of sections relevant to AQ functional area in the EIA/EMP report.** **Period: March 2025 onwards**	
10	NV*	**P.Giri**	• **Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards.** • **Predict the noise level and vibration level due to proposed mining operation based on scientific evaluation.** • **Suggesting the Mitigation measures to control noise pollution, Suggesting the Mitigation measures to control ground vibration** **Period: March 2025 onwards**	
11	LU	**B.Swamynathan**	• **Collection of Remote sensing satellite data to study the land use pattern.** • **Primary field survey and limited field verification** • **Preparation of Land use map using Satellite data of the project area separately for the core zone and the buffer zone and providing the land use pattern.** **Period: Feb 2025 onwards**	

12	RH*	**K.Shankar**	• **Identified Major risks involved in the project Mitigation measures suggested to avoid risk.** • **Preparation of onsite and offsite emergency management plan** **Period: March 2025 onwards**	

*One TM against each FAE may be shown
**Please attach additional sheet if required

Declaration by the Head of the accredited consultant organization/ authorized person

I, **P.Giri** hereby,confirm that the above mentioned experts prepared the EIA report for **EIA/EMP Report For Limekankar Quarry Lease of Chettinad Cement Corporation Pvt. Ltd. Over an area of over an area of 22.145 Ha in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu**

I also confirm that EIA Coordinator (EC) has gone through the report, and the consultant organization shall be fully accountable for any misleading information. It is certified that no unethical practices, plagiarism involved in carrying out the work and external data / text has not been used without proper acknowledgement while preparing this EIA report.

Signature: 

Name: **P.Giri**

Designation: **Chief Executive**

Name of the EIA consultant organization: **Creative Engineers & Consultants, Chennai – 59**
NABET Certificate No. & Issue Date: **NABET/EIA/23-26/RA 0331 & date 23.12.2026**

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NABET

National Accreditation Board for Education and Training

Certificate of Accreditation

Creative Engineers and Consultants, Chennai

9B/4, Bharathwajar street, East Tambaram, Chennai, Tamil Nadu

*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- opencast mining only	1	1 (a) (i)	A
2.	Thermal power plants	4	1 (d)	A
3.	Mineral beneficiation	7	2 (b)	A
4.	Cement plants	9	3 (b)	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated May 03, 2024, posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/24/3250 dated May 24, 2024. The accreditation needs to be renewed before the expiry date by Creative Engineers and Consultants, Chennai following due process of assessment.

Issue Date
May 24, 2024

Valid up to
December 23, 2026

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

Certificate No.
NABET/EIA/23-26/RA 0331

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

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

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TERMS OF REFERENCE & ITS COMPLIANCE

File No: 11686
Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Environment Impact Assessment Authority(SEIAA), TAMIL NADU)
***

Dated **05/03/2025**

To,

Thiru.R.Nithianandan
M/s. Chettinad Cement Corporation Private Limited,
"Meyyammai Building", 2nd Floor, No.17/35,Gandhi nagar, Second main Road, Adayar, Chennai, Ariyalur, TAMIL NADU, Near Anna Flyover, 600020
tech@chettinadcement.com

Subject: Grant of Terms of Reference under the provision of the EIA Notification 2006- as amended regarding.

Sir/Madam,

Sub: SEIAA, Tamil Nadu – Proposed Lime kankar Quarry lease over an extent 22.14.5Ha at S.F.Nos. 575/2B, 582/8A, 8B, 8C, 8D, 8E, 585/22, 23,24, 586/6A, 6B, 8, 587/1, 3A, 3B, 3C, 3D, 3E, 3F, 4, 5, 6, 7A, 7B, 8A, 8B, 8C, 8D, 9, 10, 11, 12, 590/1, 2, 3A, 3B, 4, 5, 6A, 6B, 7, 8, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B1, 12B2, 12B3, 13A1, 13A2, 13A3, 13B, 591/1, 2A, 2B, 3, 592/1A, 1B1, 1B2, 2 & 3 in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu by M/s. Chettinad Cement Corporation Pvt. Ltd- under project category – "B1" and Schedule S.No.1(a) "Mining of Minerals Projects" of EIA Notification, 2006, as amended – ToR issued along with Public Hearing - preparation of EIA report – Regarding.

Ref: 1. Online proposal No. SIA/TN/MIN/517552/2025, Dated: 11/01/2025.
2. Your application submitted for Terms of Reference dated: 20.01.2025.
3. Minutes of the 532nd meeting of SEAC held on 13.02.2025.
4. Minutes of the 798th Authority meeting held on 26.02.2025.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO25B0108TN5896547N
(ii) File No.	11686
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals
(vii) Name of Project	Sendurai-Unjini Limekankar Quarry Lease of Chettinad Cement Corporation Pvt. Ltd
(viii) Name of Company/Organization	CHETTINAD CEMENT CORPORATION PRIVATE LIMITED

(ix) Location of Project (District, State)	Ariyalur, TAMIL NADU
(x) Issuing Authority	SEIAA
(xii) Applicability of General Conditions	no
(xiii) Applicability of Specific Conditions	no

1.In view of the particulars given in the Para 1 above, the project proposal interalia including Form-1(Part A and B) were submitted to the SEIAA for an appraisal by the SEAC under the provision of EIA notification 2006 and its subsequent amendments.

2.The above-mentioned proposal has been considered by SEIAA in the meeting held on 26.02.2025. The minutes of the meeting and all the Application and documents submitted [(viz. Form-1 Part A, Part B,] are available on PARIVESH portal which can be accessed by scanning the QR Code above.

3.The State Expert Appraisal Committee (SEAC), based on the information & clarifications provided by the project proponent and after detailed deliberations on all technical aspects recommended the proposal for grant of Terms of Reference with public hearing under the provision of EIA Notification, 2006 and as amended thereof subject to the stipulation of specific and general conditions as detailed in Annexure (2).

4.The SEIAA has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the SEAC hereby decided to issue the following Terms of Reference with public hearing for instant proposal of M/s. Chettinad Cement Corporation Pvt. Ltd under the provisions of EIA Notification, 2006 and as amended thereof.

5.The Ministry/SEIAA-TN reserves the right to stipulate additional conditions, if found necessary.

6.The Terms of Reference with public hearing to the aforementioned project is under provisions of EIA Notification, 2006. It does not tantamount to approvals/consent/permissions etc. required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/ Regulations or Statutes, as applicable, to the project.

7.This issues with the approval of the Competent Authority.

8.The TORs with public hearing prescribed shall be valid for a period of three years from the date of issue, for submission of the EIA/EMP report as per OM No. J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.

Copy To

1. The Secretary, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi.
2. The Principal Secretary to Government, Environment, Climate Change and Forests Department, Tamil Nadu.
3. The Additional Chief Secretary to Government, Natural Resources Department, Tamil Nadu.
4. The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-Cum-Office Complex, East Arjun Nagar, New Delhi-110 032.
5. The Chairperson, TNPC Board,76, Mount Salai, Guindy, Chennai-32
6. The District Collector, Ariyalur District.
7. The Commissioner of Geology and Mines, Guindy, Chennai-32
8. Assistant Director, Department of Geology & Mining, Ariyalur District.
9. EI Division, Ministry of Environment & Forests, Paryavaran Bhawan, New Delhi.
10. Integrated Regional office of MoEF&CC, Sasthri Bhawan, Nungambakkam, Chennai.
11. File Copy.

Annexure 1

Specific Terms of Reference for (Mining Of Minerals)

1. Seiaa Specific Conditions:

S. No	Terms of Reference
1.1	The authority noted that the subject was appraised in the 532nd SEAC meeting held on 13.02.2025. After detailed discussions, the Authority accepts the recommendation of SEAC and **decided to grant Terms of Reference (ToR) along with Public Hearing for the quantity of 3,36,724T of Lime kankar up to the depth of 1.4m BGL** as per the approved mining plan, under cluster for undertaking the combined Environment Impact Assessment Study and preparation of separate Environment Management Plan subject to the conditions as recommended by SEAC & normal conditions & the conditions mentioned in Annexure of this minutes. 1.The concerns of public hearing with respect to impact of mining on water bodies and agriculture should be obtained and addressed in the EMP with financial allocation.

2. Seac Conditions - Site Specific

S. No	Terms of Reference
2.1	1. **A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal:** **(i) Copy of the agreement forming CMC.** **(ii) The Organisation chart of the Committee with defining the role of the members** **(iii) The 'Standard Operating Procedures' (SoP) executing the planned activities**. 2. The Boundary pillars to be erected as per the mine rules and the evidence should be submitted along with the EIA report. 3. The PP should explore the possibility of transporting the quarry material through closed trucks. 4. The details of enumeration of structures including schools, colleges, primary health centres should be submitted along with the EIA report. 5. The structures within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m & upto 1km shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc. and spell out the mitigation measures to be proposed for the protection of the above structures, if any during the quarrying operations. 6. The proponent shall furnish photographs of adequate fencing, garland drainage built with siltation tank & green belt along the periphery including replantation of existing trees; maintaining the safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan. 7. The Proponent shall carry out Bio diversity study as a part of EIA study and the same shall be included in the Report. 8. The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine. 9. The PP shall carry out the comprehensive studies on the cumulative environmental impacts of the existing & proposed quarries which included ripping (or) any other non-explosive ground breaking techniques, loading & hauling on the surrounding village and structures. 10. The PP shall install the CCTV camera for the continuous surveillance of mining activity & furnish the photographic/videographic evidence along with the EIA report. 11. The PP shall furnish the details of transportation through the trucks supported with hydraulic operated covers while passing through the village/highway in order to avoid the spillage of material & dust pollution.

3. Seac Standard Conditions

S. No	Terms of Reference
3.1	1. In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone/benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m. 2. Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site. 3. The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building, number of residents, their profession and income, etc. 4. The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry. 5. The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report. 6. The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site. 7. In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC. 8. However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level. 9. The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent. 10. The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site. 11. The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences. 12. If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,

S. No	Terms of Reference
	13. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines? 14. Quantity of minerals mined out. · Highest production achieved in any one year · Detail of approved depth of mining. · Actual depth of the mining achieved earlier. · Name of the person already mined in that leases area. · If EC and CTO already obtained, the copy of the same shall be submitted. · Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches. 15. All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone). 16. The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc., 17. The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan. 18. The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same. 19. The Project Proponent shall provide the Organization chart indicating the appointment of various statutory officials and other competent persons to be appointed as per the provisions of the Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment. 20. The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. 21. The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study. 22. The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind. 23. Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted. 24. Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given. 25. Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided. 26. Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court

S. No	Terms of Reference
	restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered. 27. Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided. 28. Impact on local transport infrastructure due to the Project should be indicated. 29. A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity. 30. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific. 31. As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible. 32. The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner. 33. Taller/one year old Saplings raised in appropriate size of bags, preferably ecofriendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner 34. A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period. 35. A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period. 36. Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed. 37. Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations. 38. The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation. 39. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given. 40. Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc. 41. If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB. 42. The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine. 43. Concealing any factual information or submission of false/fabricated data and failure to comply

S. No	Terms of Reference
	with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.

4. Seiaa Standard Conditions:

S. No	Terms of Reference
4.1	**<u>Cluster Management Committee</u>** 1. Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry. 2. The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc., 3. The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines. 4. Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network. 5. The committee shall deliberate on risk & emergency management plan, fire safety & evacuation plan and sustainable development goals pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan. 6. The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the law. The role played by the committee in implementing the Environmental policy devised shall be given in detail in the EIA Report. 7. The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner. 8. The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public in the vicinity. **<u>Agriculture & Agro-Biodiversity</u>** 9. Impact on surrounding agricultural fields around the proposed mining Area. 10. Impact on soil flora & vegetation around the project site. 11. Details of type of vegetation including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetation all along the boundary of the proposed mining area shall committed mentioned in EMP. 12. The Environmental Impact Assessment should study the agro-biodiversity, agro- forestry, horti-cultural plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem. 13. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services. 14. The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock. **<u>Forests</u>** 15. The project proponent shall detailed study on impact of mining on Reserve forests and free ranging wildlife. 16. The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna. 17. The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection. 18. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.

S. No	Terms of Reference
	Water Environment 19. Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period. 20. Erosion Control measures. 21. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas. 22. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. 23. The project proponent shall study and furnish the details on potential fragmentation impact on natural Environment, by the activities. 24. The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts. 25. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components. 26. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites. 27. The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment. b) Bio-geochemical processes and its foot prints including Environmental stress. c) Sediment geochemistry in the surface streams. **Energy** 28. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished. **Climate Change** 29. The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities. 30. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features. 31. Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood. **Mine Closure Plan** 32. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued. **EMP** 33. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs. 34. The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan. **Risk Assessment** 35. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining. **Disaster Management Plan** 36. To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the

S. No	Terms of Reference
	proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued. **Others** 37. The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc. 38. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan. 39. The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the Environment. The ecological risks and impacts of plastic & microplastics on aquatic Environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.

Standard Terms of Reference for (Mining of minerals)

1.

S. No	Terms of Reference
1.1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994
1.2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given
1.3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee
1.4	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the areashould be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone)
1.5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics
1.6	Details about the land proposed for mining activities should be givenwith information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority
1.7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for

S. No	Terms of Reference
	ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large,may also be detailed in the EIA Report
1.8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided
1.9	The study rea will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period
1.10	Land use of the study rea 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
1.11	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
1.12	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 above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the State Expert Appraisal Committees
1.13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished
1.14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated
1.15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given
1.16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted
1.17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlifeand copy furnished
1.18	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the

S. No	Terms of Reference
	periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled- I fauna found in the study area, the necessary plan alongwith budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost
1.19	Proximity to Areas declared as Critically Polluted or the Project areas likely to come under the Aravali Range, (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered
1.20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority)
1.21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report
1.22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given
1.23	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality 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
1.24	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
1.25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided

S. No	Terms of Reference
1.26	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
1.27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided
1.28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from State Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished
1.29	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
1.30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same
1.31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution
1.32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines
1.33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report
1.34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report
1.35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed
1.36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations

S. No	Terms of Reference
1.37	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
1.38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project
1.39	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
1.40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given
1.41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out
1.42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report
1.43	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
1.44	Besides the above, the below mentioned general points are also to be followed:- a) All documents to be properly referenced with index and continuous page numbering. b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated. c) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project. d) Where the documents provided are in a language other than English, an English translation should be provided. e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed. g) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation. h) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable. i) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area

A. STANDARD TERMS OF REFERENCE

1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
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.
4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
5) Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.
7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.
8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The

proposed safeguard measures in each case should also be provided.

9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
10) 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.
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.
12) Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.
14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.
17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from

the Standing Committee of National Board of Wildlife and copy furnished.

18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.

19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should

also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.

20) Similarly, for Coastal Projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease with respect to CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).

21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.

22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The

location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.

23) Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of Vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.
24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.
28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
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.
30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.

31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.

32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.

33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.

34) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.

35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.

36) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.

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.

38) Detailed Environmental Management Plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the

proposed Project.

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.

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.

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.

42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.

44) Besides the above, the below mentioned general points are also to be followed:-

    a) Executive Summary of the EIA/EMP Report
    b) All documents to be properly referenced with index and continuous page numbering.
    c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
    d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.
    e) Where the documents provided are in a language other than English, an English translation should be provided.
    f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
    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.
    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.

i) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the Environment Clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.

j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

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 points:

1. Project name and location (Village, District, State, Industrial Estate (if applicable).
2. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
3. Measures for mitigating the impact on the environment and mode of discharge or disposal.
4. Capital cost of the project, estimated time of completion.
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.
6. A detailed study of the lithology of the mining lease area shall be furnished.
7. Details of village map, "A" register and FMB sketch shall be furnished.
8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be shall be submitted along with EIA report.
9. Obtain a letter /certificate from the Assistant Director of Geology and Mining standing that there is no other Minerals/resources like sand in the quarrying area within the approved depth of mining and below depth of mining and the same shall be furnished in the EIA report.
10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010.
11. Detail plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.
12. The EIA study report shall include the surrounding mining activity, if any.
13. Modeling 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.

14. A study on the geological resources available shall be carried out and reported.
15. A specific study on agriculture & livelihood shall be carried out and reported.
16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.
17. Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)
18. Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
19. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
20. Likely impact of the project on air, water, land, flora-fauna and nearby population
21. Emergency preparedness plan in case of natural or in plant emergencies
22. Issues raised during public hearing (if applicable) and response given
23. CER plan with proposed expenditure.
24. Occupational Health Measures
25. Post project monitoring plan
26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited agencies.
27. A detailed report on the green belt development already undertaken is to be furnished and also submit the proposal for green belt activities.
28. The proponent shall propose the suitable control measure to control the fugitive emissions during the operations of the mines.
29. A specific study should include impact on flora & fauna, disturbance to migratory pattern of animals.
30. Reserve funds should be earmarked for proper closure plan.
31. A detailed plan on plastic waste management shall be furnished. Further, the proponent should strictly comply with, Tamil Nadu Government Order (Ms) No.84 Environment and forests (EC.2) Department dated 25.06.2018 regarding ban on one time use and throw away plastics irrespective of thickness with effect from 01.01.2019 under Environment (Protection) Act, 1986. In this connection, the project proponent has to furnish the action plan.

Besides the above, the below mentioned general points should also be followed:-

a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.
b. All documents may be properly referenced with index, page numbers and continuous page numbering.
c. Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.
d. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF& CC vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry should also be followed.
e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J -l1013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website http://www.moef.nic.in/ may be referred.
    - After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
    - The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
    - The TORs with public hearing prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August, 2017.

TOR COMPLIANCE - TOR No :TO25B0108TN5896547N

S.No	TOR Points	Reply	Pg.No
1. SEAC CONDITIONS - SITE SPECIFIC			
1	A Cluster Management Committee (CMC) shall be constituted including all the mines in the cluster as Committee Members for the effective management of the mining operation in the cluster through systematic & scientific approach with appointment of statutory personnel, appropriate environmental monitoring, good maintenance of haul roads and village/panchayat roads, authorized blasting operation etc. The PP shall submit the following details in the form of an Affidavit during the EIA appraisal: (i) Copy of the agreement forming CMC. (ii) The Organisation chart of the Committee with defining the role of the members (iii) The 'Standard Operating Procedures' (SoP) towards executing the planned activities.	• **Environmental Management Cell of projects in the cluster will act as a Cluster Management Committee. The various activities to be undertaken by this committee are detailed in para 10.2.2, Chapter – X.** • **Affidavit in this regard will be submitted during EIA appraisal.**	**10-4**
2	The Boundary pillars to be erected as per the mine rules and the evidence should be submitted along with the EIA report.	• **Agreed**	**-**
3	The PP should explore the possibility of transporting the quarry material through closed trucks.	• **Transporting quarry material using closed truck vehicles**	**-**
4	The details of enumeration of structures including schools, colleges, primary health centres should be submitted along with the EIA report.	• **Details of the socio economic survey conducted in the buffer zone has been provided in Para 3.2.4, Chapter-III.**	**3-8**
5	The structures within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m & upto 1km shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc. and spell out the mitigation measures to be proposed for the protection of the above structures, if any during the quarrying operations.	• **The detail s of features within 500m radius has been provided in Table 2.4, Chapter-II.**	**2-16**
6	The proponent shall furnish photographs of adequate fencing, garland drainage built with siltation tank & green belt along the periphery including replantation of existing trees; maintaining the safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	• **Safety distance provided as per statutes.**	**2-16**
7	The Proponent shall carry out Bio diversity study as a part of EIA study and the same shall be included in the Report.	• **Bio diversity details are provided in Para 3.5, Chapter-III**	**3-34**
8	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the	• **EMP is prepared for the entire life of the mine. Affidavit in this regard will be**	**-**

	EMP for the entire life of mine.	**submitted during EIA appraisal.**	
9	The PP shall carry out the comprehensive studies on the cumulative environmental impacts of the existing & proposed quarries which included ripping (or) any other non-explosive ground breaking techniques, loading & hauling on the surrounding villages and structures.	• **The details of the quarries located within the 500m radius of the project is given vide Annexure-3.** • **A cumulative impact study has been carried out and furnished in Para 7.6, Chapter-VII.** • **Environmental Management Plan is provided under Chapter-X.**	**A-12** **7-3** **10-1**
10	The PP shall install the CCTV camera for the continuous surveillance of mining activity & furnish the photographic/videographic evidence along with the EIA report.	**Agreed**	
11	The PP shall furnish the details of transportation through the trucks supported with hydraulic operated covers while passing through the village/highway in order to avoid the spillage of material & dust pollution.	• **From this proposed quarry the entire output will be transported to the Chettinad Cement Plant on the southern side of the lease area. Details of the impact on logistical system is provided under Section 4.9, Chapter-IV.**	**4-19**
3. SEAC STANDARD CONDITIONS			
1	In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining (vi) Violation in the quarry during the past working. (vii) Quantity of material mined out outside the mine lease area (viii) Condition of Safety zone/benches (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.	**Not applicable**	--
2	Details of habitations around the proposed mining area and latest VAO certificate regarding the location of habitations within 300m radius from the periphery of the site.	**There are structures near the lease area**	--
3	The proponent is requested to carry out a survey and enumerate on the structures located within the radius of (i) 50 m, (ii) 100 m, (iii) 200 m and (iv) 300 m (v) 500m shall be enumerated with details such as dwelling houses with number of occupants, whether it belongs to the owner (or) not, places of worship, industries, factories, sheds, etc with indicating the owner of the building, nature of construction, age of the building,	• **Details of the features within 500m radius are provided in Figure 2.3, Chapter-II.**	**2-4**

	number of residents, their profession and income, etc.		
4	The PP shall submit a detailed hydrological report indicating the impact of proposed quarrying operations on the waterbodies like lake, water tanks, etc are located within 1 km of the proposed quarry.	• **Hydrogeological Study is detailed under Section 3.6, Chapter-III.**	**3-42**
5	The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	• **A detailed study of flora and fauna composition in the core and buffer zone of the project has been made through primary field surveys. The details are furnished in para 3.5, Chapter III.**	**3-34**
6	The DFO letter stating that the proximity distance of Reserve Forests, Protected Areas, Sanctuaries, Tiger reserve etc., up to a radius of 25 km from the proposed site.	• **There area no Protected Areas, Sanctuaries, Tiger reserve etc., within 10km Radius. The details are furnished in Table no 3.2, Chapter III.**	**3-4**
7	In the case of proposed lease in an existing (or old) quarry where the benches are not formed (or) partially formed as per the approved Mining Plan, the Project Proponent (PP) shall the PP shall carry out the scientific studies to assess the slope stability of the working benches to be constructed and existing quarry wall, by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, Division of Geotechnical Engineering-IIT-Madras, NIT-Dept of Mining Engg, Surathkal, and Anna University Chennai-CEG Campus. The PP shall submit a copy of the aforesaid report indicating the stability status of the quarry wall and possible mitigation measures during the time of appraisal for obtaining the EC.	• **This is a proposed quarry. No mining activities have been carried out in this lease area.**	**2-18**
8	However, in case of the fresh/virgin quarries, the Proponent shall submit a conceptual 'Slope Stability Plan' for the proposed quarry during the appraisal while obtaining the EC, when the depth of the working is extended beyond 30 m below ground level.	• **Various risks likely to arise due to mining activities are detailed under section 7.4, Chapter-VII. This being an opencast mine, subsidence is not applicable. There is no drilling or blasting involved in this project.**	**7-3**
9	The PP shall furnish the affidavit stating that the blasting operation in the proposed quarry is carried out by the statutory competent person as per the MMR 1961 such as blaster, mining mate, mine foreman, II/I Class mines manager appointed by the proponent.	• **Not applicable since no drilling and blasting is involved**	**--**
10	The PP shall present a conceptual design for carrying out only controlled blasting operation involving line drilling and muffle blasting in the proposed quarry such that the blast-induced ground vibrations are controlled as well as no fly rock travel beyond 30 m from the blast site.	• **Not applicable**	**--**
11	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the	• **Agreed**	**--**

	proponent in the past, either in the same location or elsewhere in the State with video and photographic evidences.		
12	If the proponent has already carried out the mining activity in the proposed mining lease area after 15.01.2016, then the proponent shall furnish the following details from AD/DD, mines,	• **This is a proposed quarry. No mining activities have been carried out in this lease area.**	**2-18**
13	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	• **Replied above in point no.12**	**--**
14	Quantity of minerals mined out. · Highest production achieved in any one year · Detail of approved depth of mining. · Actual depth of the mining achieved earlier. Name of the person already mined in that leases area. · If EC and CTO already obtained, the copy of the same shall be submitted. · Whether the mining was carried out as per the approved mine plan (or EC if issued) with stipulated benches.	• **Replied above in point no.12**	**--**
15	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology and geology of the mining lease area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	• **Project coordinates superimposed in satellite imagery and given as Figure No - 2.4 in Chapter – II.** • **The 10km Radius Index plan showing buffer zone is given in Figure No.3.1 in Chapter – III.** • **Geology Map, Geomorphology, Lithology map are enclosed as Figure No.3.18, 3.19 and 3.20, Chapter-III.**	**2-6 3-2 3-45 & 3-47**
16	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,	• **Agreed**	**--**
17	The proponent shall furnish photographs of adequate fencing, green belt along the periphery including replantation of existing trees & safety distance between the adjacent quarries & water bodies nearby provided as per the approved mining plan.	• **Site photographs have been provided in Chapter-II.**	**2-7**
18	The Project Proponent shall provide the details of mineral reserves and mineable reserves, planned production capacity, proposed working methodology with justifications, the anticipated impacts of the mining operations on the surrounding environment, and the remedial measures for the same.	• **The details of geological and mineable reserves are provided in Table 2.4, Chapter-II.** • **The production schedule is provided in Table 2.7, Chapter-II.** • **The working methodology is detailed under Section 2.8, Chapter-II.** • **Anticipated impacts of mining operations on surrounding environment is provided under Chapter-IV.**	**2-17** **2-19** **2-19** **4-1**
19	The Project Proponent shall provide the Organization chart indicating the appointment of various statutory	• **The organization chart has been provided in Figure No.10.1, Chapter-X.**	**10-3**

	officials and other competent persons to be appointed as per the provisions of the Mines Act'1952 and the MMR, 1961 for carrying out the quarrying operations scientifically and systematically in order to ensure safety and to protect the environment.		
20	The Project Proponent shall conduct the hydro-geological study considering the contour map of the water table detailing the number of groundwater pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds, etc. within 1 km (radius) along with the collected water level data for both monsoon and non-monsoon seasons from the PWD / TWAD so as to assess the impacts on the wells due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided.	• **Details of hydrogeological scenario of this project is provided under section 3.6, Chapter-III.**	**3-42**
21	The proponent shall furnish the baseline data for the environmental and ecological parameters with regard to surface water/ground water quality, air quality, soil quality & flora/fauna including traffic/vehicular movement study	• **The baseline data on micro-meteorology, ambient air quality, Water quality, noise level, soil and flora & fauna are collected during Summer Season (March 2025to May 2025) and detailed in Section 3.3 to 3.5 of Chapter-III. The details of Traffic is provided under Section 4.9, Chapter-IV.**	**3-10 & 3-34** **4-19**
22	The Proponent shall carry out the Cumulative impact study due to mining operations carried out in the quarry specifically with reference to the specific environment in terms of soil health, biodiversity, air pollution, water pollution, climate change and flood control & health impacts. Accordingly, the Environment Management plan should be prepared keeping the concerned quarry and the surrounding habitations in the mind.	• **The details of the quarries located within the 500m radius of the project is given vide Annexure-3.** • **A cumulative impact study has been carried out and furnished in Para 7.6, Chapter-VII.** • **Environmental Management Plan is provided under Chapter-X.**	**A-14** **7-3** **10-1**
23	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	• **Shallow mined out area itself will act as a rainwatet harvesting pond.** • **Towards surface runoff management, garland drain will be constructed which will be connected to settling ponds with silt traps.** • **Water requirement for this project is 5 KLD. The required water will be procured from outside agencies. Details of rainwater harvesting are provided under Section 4.3.4.2, Chapter-IV.**	**4-11**
24	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological	• **The land use of the study area was studied to demarcate various LULC categories and its details are provided under section 3.4, Chapter-III.**	**3-28**

	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.	• **The land use pattern at present and at the end of the quarrying period has been provided under section 4.5.1, Chapter-IV.** • **The post mining land use has been provided in Table No. 4.13. .The post mining land use plan showing afforestation is shown in Figure No-4.5.**	**4-13** **4-17**
25	Details of the land for storage of Overburden/Waste Dumps (or) Rejects outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be provided.	• **There is no waste generation anticipated in this quarry. As such there are no OB dumps involved.**	**--**
26	Proximity to Areas declared as 'Critically Polluted' (or) the Project areas which attracts the court restrictions for mining operations, should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the TNPCB (or) Dept. of Geology and Mining should be secured and furnished to the effect that the proposed mining activities could be considered.	• **Not Applicable**	**--**
27	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	• **The methods for reducing water consumption and rainwater harvesting is provided in section 4.3.4, Chapter-IV.**	**4-11**
28	Impact on local transport infrastructure due to the Project should be indicated.	• **From this proposed quarry the entire output will be transported to the Chettinad Cement Plant on the southern side of the lease area. Details of the impact on logistical system is provided under Section 4.9, Chapter-IV.**	**4-19**
29	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300m buffer zone and its management during mining activity.	• **An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological conditions. Details are provided under section 3.5.1, Chapter-III.**	**3-34**
30	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	• **Details of Mine Closure Plan is provided under section 7.5, Chapter-VII.**	**7-3**
31	As a part of the study of flora and fauna around the vicinity of the proposed site, the EIA coordinator shall strive to educate the local students on the importance of preserving local flora and fauna by involving them in the study, wherever possible.	• **An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological conditions. Details are provided under section 3.5.1, Chapter-III.**	**3-34**

32	The purpose of Green belt around the project is to capture the fugitive emissions, carbon sequestration and to attenuate the noise generated, in addition to improving the aesthetics. A wide range of indigenous plant species should be planted as given in the appendix-I in consultation with the DFO, State Agriculture University. The plant species with dense/moderate canopy of native origin should be chosen. Species of small/medium/tall trees alternating with shrubs should be planted in a mixed manner.	• **Agreed**	--
33	Taller/one year old Saplings raised in appropriate size of bags, preferably ecofriendly bags should be planted as per the advice of local forest uthorities/ botanist/ Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner	• **Agreed**	--
34	A Disaster management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	• **The disaster management plan has been provided under section 7.3.1, Chapter-VII.**	**7-3**
35	A Risk Assessment and management Plan shall be prepared and included in the EIA/EMP Report for the complete life of the proposed quarry (or) till the end of the lease period.	• **Various risks likely to arise due to mining activities are detailed under section 7.3, Chapter-VII.**	**7-1**
36	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed	• **Details of occupational health and safety aspects are given under the subsections of Para 4.8, Chapter-IV.**	**4-18**
37	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	• **Details of the socio-economic survey conducted in the buffer zone has been provided in Para 3.2.4, Chapter-III.** • **Public health facilities will be further aimed to be developed through CER activities wherein periodic health checkups, medical camps for the locals will be conducted.**	**3-8**
38	The Socio-economic studies should be carried out within a 5 km buffer zone from the mining activity. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	• **Nearby villages were visited for conducting study to know about socio-economic conditions, including aspirations and requirements of the people for a better living and collected relevant data. The details are provided under section 3.2.4, Chapter-**	**3-8**

		III.	
39	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	• **PP informed that there is no litigation pending against the project.**	**--**
40	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	• **project will also provide employment, social welfare facilities by way of CER activities and also meet the raw material requirement of their plant**	**8-1**
41	If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	• **This is a proposed quarry. As such no mining activities have been carried out in this lease area.**	**2-12**
42	The PP shall prepare the EMP for the entire life of mine and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine.	• **EMP is prepared for the entire life of the mine. Affidavit in this regard will be submitted during EIA appraisal..**	**--**
43	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	• **Agreed**	**--**
Cluster Management Committee			
1	Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry.	• **Details of the cluster management committee is provided under Section 10.2.2, Chapter-X.**	**10-4**
2	The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development. Water sprinkling, tree plantation, blasting etc.,	• **Agreed**	**-**
3	The List of members of the committee formed shall be submitted to AD/Mines before the execution of mining lease and the same shall be updated every year to the AD/Mines.	• **Agreed**	**-**
4	Detailed Operational Plan must be submitted which must include the blasting frequency with respect to the nearby quarry situated in the cluster, the usage of haul roads by the individual quarry in the form of route map and network.	• **Agreed**	**-**
5	The committee shall deliberate on risk & emergency management plan, fire safety & evacuation plan and sustainable development goals pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan	• **Agreed**	**-**
6	The Cluster Management Committee shall form Environmental Policy to practice sustainable mining in a scientific and systematic manner in accordance with the	• **Agreed**	**-**

	law. The role played by the committee in implementing the environmental policy devised shall be given in detail in the EIA Report.		
7	The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner.	• **Agreed**	**-**
8	The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public in the vicinity.	• **Agreed**	**-**
Agriculture & Agro-Biodiversity			
9	Impact on surrounding agricultural fields around the proposed mining Area.	• **Since the lease and its nearby area is barren land with thorny bushes / shrubs , it remain uncultivated and only in patches of land far away from the lease area, agricultural activities are carried during monsoon rainfall. Due to poor quality of the soil, inconsistent rainfall,high agricultural labor cost, manpower shortage and less yield are reason for very little agricultural activity in this region.By adoption of systematic mining adhering to all the environmental mitigation measures as explained earlier, no adverse impact on the far away agricultural or surrounding environs envisaged.**	**4-14**
10	Impact on soil flora & vegetation around the project site.	• **The impact of mining on biological environment is provided under Table 4.13, Chapter-IV.**	**4-14**
11	Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP.	• **The details of flora in the core zone is provided in Table 3.24, Chapter-III. There is no major clearance of vegetation or transplantation involved.**	**3-38**
12	The Environmental Impact Assessment should study the agro-biodiversity, agro- forestry, horticultural plantations, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem.	• **An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological conditions. Details are provided under Section 3.5.1, Chapter-III.**	**3-34**
13	Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	• **The post mining land use has been provided in Table No. 4.11.**	**4-13**
14	The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture. Agriculture and livestock.	• **Replied in sl no 13 above.**	**--**
Forests			
15	The project proponent shall detailed study on impact of mining on Reserve forests free ranging wildlife.	• **Vannankurichi RF-1.6km (S), Manageri RF 6.4km (SE), Udaiyarpalaiyam**	**3-3**

		RF-9.5km (SE), Palakkurichi RF--7.4km (E), Sedalavadi RF 3.0km (NE) are present in the study area. The forest department is converting the low yielding species to high yielding species in the forest area like Munthiri & mango (Mangifera indica) . Adoption of mitigative measures in this working like dust suppression, proper maintenance of equipment's, roads will ensure noimpact on the far away forests.	
16	The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna.	• **An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological conditions. Details are provided under Section 3.5.1, Chapter-III.**	**3-34**
17	The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection.	• **Replied in point 20. Above**	**--**
18	The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	• **There are no national parks or corridors in the 10k radius. There are no reserve forest in the proximity of the lease area**	**3-2**
Water Environment			
19	Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may he provided. covering the entire mine lease period.	• **The details of hydrogeological study is provided under Section 3.6, Chapter-III.**	**3-42**
20	Erosion Control measures.	• **Since the entire material from the quarry face will be directly dispatched to the consumers, there will not be any stockpiles. There are no waste dumps in this quarry. As such there will not be any wash out due to stock pile or waste dumps.** • **Towards surface runoff management, a garland drain will be constructed around the quarry and will be connected to a settling pond with silt traps. The supernatant clear water from the settling pond will be flow to the downstream users**	**4-20**

21	Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas.	• **There is no proposal to discharge any effluent into this waterbody. No major impact is envisaged on the nearby water bodies due to project operations**	**11-11**
22	The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir.	• **There is no major perennial waterbody in close proximity of the lease area.**	**7-3**
23	The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities.	• **The post mining land use has been provided in Table No. 4.13. The post mining land use plan showing afforestation and water body is shown in Figure No- 4.5.**	**4-13 & 4-17**
24	The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts.	• **An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological conditions. Details are provided under section 3.5.1, Chapter-III.**	**3-34**
25	The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	• **Soil samples were collected in 5 locations in the core and buffer zone to analyse the physiochemical characteristics of the soil in the area. The soil quality data is provided in Table No.3.18, Chapter-III.**	**3-28**
26	The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	• **The nearest major water bodies is provided in Table No.3.1, Chapter-III.** • **There are no perineal water courses in lease areas.** • **There are no perineal water courses in the lease areas. South of the lease area, vari course situated in S.F.No.39/2, 40/2 & 41 of Unjani village, S.F.No.288 of Rayampuram village and a drainage channel originating from S.F.No.590/14 in the North eastern side**	**3-1**
27	The EIA shall include the impact of mining activity on the following: a) Hydrothermal/Geothermal effect due to destruction in the Environment. b) Bio-geochemical processes and its foot prints including Environmental stress. c) Sediment geochemistry in the surface streams.	**a)As such the production from this lease is very low to cause any appreciable impact.** **b) No adverse impact on the surrounding environment is envisaged since the number of equipments to be used to achieve this small production is very less and the magnitude of operation is of very small level.** **c)Besides, as is it a mining project, no adverse generation of heat is envisaged.** **d) Certified vehicles with low**	**4-18**

		carbon emissions will only be used. These equipments will be properly and regularly maintained. Besides, regular vehicular emission tests will be done for the transport vehicles to ensure minimal impact due to carbon emissions. To further mediate the carbon emissions, a good greenbelt and plantation plan has been planned. **e) Geologically the area in and around the lease area contains charnokite type rock formation containing mostly fallow land. As such there no major vegetation or agricultural activities are observed.** **f) There are no Protected or Eco-Sensitive Zone or forest land nearby wherein it can have an impact.** **g) It will be ensured that mining will be carried out adhering to all the statutory rules and regulations and maintaining the environmental quality within the prescribed standards by effective implementation of varioius mitigative measures.** **h) These mitigative measures will be continued for the entire lease period ensuring no impact on the environment.** **As such release of Greenhouse gases (GHG), rise in temperature, affecting livelihood of the local people ,loss of Agriculture, Forestry and Traditional Practices is not envisaged. Such a limited scope will not induce any climatic change leading to droughts, floods etc.**	
Energy			
28	The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	• **The dust control measures are listed under Table 4.1, Water pollution control measures under Section 4.3.2, and noise pollution control measures under Section 4.4.1.2, Chapter-IV. Besides, energy consumption in this project will be optimum and as per requirement.**	**4-2** **4-13**
Climate Change			
29	The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other	• **Certified vehicles with low carbon emissions will only be used. These equipments will be properly and regularly maintained. Besides, regular**	**4-16**

	emission and climate mitigation activities.	**vehicular emission tests will be done for the transport vehicles to ensure minimal impact due to carbon emissions. To further mediate the carbon emissions, a good greenbelt and plantation plan has been planned wherein 2000 number of plants will be planted in and around the lease area.**	
30	The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock, soil health and physical, chemical & biological soil features.	• **Replied in point no.29 above**	--
31	Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	• **Replied in point no.29 above**	
Mine Closure Plan			
32	Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	• **Details of Mine Closure Plan is provided under section 7.5, Chapter-VII.**	**7-3**
EMP			
33	Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued and the scope for achieving SDGs.	• **Detailed environmental management plan is provided under Chapter-X.**	**10-1**
34	The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	• **Detailed environmental management plan is provided under Chapter-X.**	**10-1**
Risk Assessment			
35	To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	• **The disaster management plan has been provided under section 7.3.1, Chapter-VII.**	**7-1**
Disaster Management Plan			
36	To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	• **The disaster management plan has been provided under section 7.3.1, Chapter-VII.**	**7-3**
Others			
37	The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools. Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai. vaari, canal, channel, river, lake pond. tank etc.	• **Given in 500m radius details Table No – 2.2 in Chapter - II**	**2-9**
38	As per the MoEF& CC office memorandum F.No.22-65/2017-1A.111 dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	**Will be provided in the Affidavit in this regard will be submitted during EIA appraisal..**	--

39	The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	• **Single use plastics/ use and throwaway plastics will be banned in the site as directed by the Tamil Nadu Government vide GO(Ms)No.84 regarding ban on use of plastic products. The employees will be encouraged to use compostable material or reusable material.**	**4-21**
STANDARD TERMS OF REFERENCE			
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	• **This is a fresh lease area. No mining has been carried out in this lease area so far by the proponent.**	**2-19**
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	• **Precise Area Communication letter received from the Industries (MMC2) Department vide Lr.No.6152/MMC.2/2023-2 dated 03.01.2024 (Annexure-1)**	**A-1**
3	All documents including approved mine plan. EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	• **The production capacity, quantity of waste, its management and mining technology in mine plan and EIA, etc., are compatible with one another.**	**--**
4	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	• **Project coordinates superimposed in satellite imagery and given as Figure No - 2.4 in Chapter – II.** • **The geology and geomorphology map is provided in Figure No.3.16, 3.17, Chapter-III. The Lithology map and Soil map are provided under Figure No. 3.18, 3.19, Chapter-III.** • **The 10km Radius Index plan showing buffer zone is given in Figure No.3.1 in Chapter – III.**	**2-6** **3-45 &** **3-48** **3-2**
5	Information should be provided in Survey of India Topo sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	• **Replied in Standard ToR point no.4**	**--**
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	• **Not Applicable**	**--**

7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	• **The proponent will frame a well-planned environmental policy. Its details are provided under Section 10.2.1, Chapter-X.** • **The Mines Manager will undertake effective monitoring and implementation of various environmental control measures promptly and effectively and to oversee various environmental management schemes for air quality control, water quality status, noise level control, plantation programme, social development schemes, etc in the mine. The organizational chart for the same has been provided in Figure No.10.1, Chapter-X.**	**10-1** **10-3**
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	• **Various risks likely to arise due to mining activities are detailed under section 7.4, Chapter-VII. This being an opencast mine, subsidence is not applicable. The impact due to ground vibrations due to blasting is given in para 4.3.2, Chapter-IV.**	**7-3** **4-8**
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	• **The study area chosen for collecting existing environmental status covers 10 km radial distance from the project periphery (Figure No - 3.1). Data given in the report is for the life of the mine.**	**3-2**
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	• **The land use of the study area was studied to demarcate various LULC categories and its details are provided under section 3.4, Chapter-III.** • **The land use pattern at present and at the end of the quarrying period has been provided under section 4.5, Chapter-IV.** • **In the post mining stage, Mined out area of 13.605 Ha will be backfilled with available material and restored to premising condition. Balance area will be used for rainwater water harvesting pit..**	**3-28** **4-13**

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.	• **There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilized. Hence, there is no external overburden dump involved. Besides, there is no proposal for overburden dump outside the lease area.**	**2-19**
12	A Certificate from the Competent Authority in the State Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the State Expert Appraisal Committees.	• **There is no forest land in the lease area.**	**--**
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	• **There is no forest land in the lease area.**	**--**
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	• **Not Applicable**	**--**
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	• **There is no forest land in the lease area.**	**--**
16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	• **The mining lease area and the 10 km buffer zone from the periphery of the core zone is devoid of declared ecologically sensitive features like national parks, biospheres, sanctuaries, etc.**	**4-14**
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	• **Replied in Standard ToR point No.16**	**--**
18	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine	• **A detailed study of flora and fauna**	**3-34**

	lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	**composition in the core and buffer zone of the project has been made through primary field surveys. The details are furnished in para 3.5, Chapter III.**	
19	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	• **Not Applicable**	--
20	Similarly, for coastal Projects, a CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	• **Not Applicable**	--
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmers prepared and submitted accordingly, integrating the sectoral programmers of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	• **The mining activities will be carried out within the mine lease area only. The entire mine lease area is a patta land in proponent's possession. There is no population within the ML area. Hence, the question of R& R does not arise.**	**7-3**
22	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)} primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in	• **The baseline data on micro-meteorology, ambient air quality, Water quality, noise level, soil and flora & fauna are collected during summer Season (March 2025 to May 2025) and detailed in para 3.3 to 3.5 of Chapter-III.** • **Monitoring stations were selected taking into account, wind direction and location of sensitive receptors.**	**3-10 & 3-34**

	view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM 10, particularly for free silica, should be given.	• **Free silica composition in PM10 sample has been done and the values are found to be Below Detectable Limit (DL 0.05mg/m3) which is well within the prescribed limit of 5mg/m3.**	
23	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of Vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	• **Air quality modeling details are furnished in para 4.2.2 and its continuous sub paras in Chapter-IV of EIA report.** • **The impact on air quality due to the proposed project is estimated using AERMOD View Gaussian Plume Air Dispersion Model developed by Lakes Environmental Software which is based on steady state Gaussian plume dispersion.** • **The model simulations are done for the air pollutant arising from the mining operations, namely, PM10, PM2.5. Ground Level Concentration (GLC) have been computed using hourly meteorological data.** • **The Isopleths of PM10, PM2.5 concentrations for with control measures scenario have also been drawn and these are given in Figure No.4.1 and 4.2.** • **It can be seen that the resultant added concentrations with baseline figures even at worst scenario, show that the values of ambient air quality with respect to PM10 are within the statutory limits in each case.**	**4-3** **4-5 & 4-7**
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	• **The total water requirement for this project will be 5.0 KLD comprising 1.0 KLD for drinking water and domestic use, 3.0 KLD for dust suppression and 1.0 KLD for greenbelt. The water will be sourced from outside agencies. The water balance diagram for the same is shown in Figure No 4.3..**	**4-8**
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	• **Not Applicable.**	**--**
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.	• **Towards surface runoff management, garland drain of length 2400m will be constructed around the quarry and will be connected to a settling pond**	

		with silt traps. The supernatant clear water from the settling pond will be flow to the downstream users. The surface runoff management structures diagram is given in Figure No 4.4 • **The methods for reducing water consumption and rainwater harvesting is provided in section 4.3.4, Chapter-IV.**	**4-9** **4-11**
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	• **There are no perineal water courses in the lease areas. South of the lease area, vari course situated in S.F.No.39/2, 40/2 & 41 of Unjani village, S.F.No.288 of Rayampuram village and a drainage channel originating from S.F.No.590/14 in the North eastern side.** • **Safety distance of 50m has been left based on precise area conditions. As a protective measures, an Earthen bund of 3 ft height will be constructed in the safety zone and it will be developed with plantation.** • **Mining operations are proposed to be quarried upto a depth of 1.4m only. The groundwater table in this area is much below this level. There is no groundwater intersection envisaged**	**4-10** **2-18**
28	Based on actual monitored data. it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	• **Mining operations are proposed to be quarried upto a depth of 1.4m only. The groundwater table in this area is much below this level. There is no groundwater intersection envisaged**	**2-18**
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.	• **Replied above in Standard ToR point No.27.**	**--**
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	• **The area applied for mining lease is a gentle plain terrain..** • **Mining operations are proposed to be quarried upto a depth of 1.4m only. The groundwater table in this area is much below this level..**	**2-2**

31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	• **In the lease area, safety barrier 7.5m around the periphery and 50m safety zone for vari and road. Greenbelt / Plantation will be carried out to enhance the vegetative growth and aesthetic in the safety zone area. About 2000 trees will be planted in and around the lease area. Details are provided under Section 4.6.4, Chapter-IV.**	**4-16**
32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	• **From this proposed quarry the entire output will be transported to the crusher units and other buyers etc. Details of the traffic study is provided under section 4.9, Chapter-IV.**	**4-19**
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	• **This is a proposed project. Site services like mine office, first aid room, rest shelters, toilets etc. will be provided as semi-permanent structures.**	**2-24**
34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	• **The post mining land use has been provided in Table No. 4.13. The post mining land use plan showing afforestation and water body is shown in Figure No- 4.5.**	**4-13 & 4-17**
35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	• **Details of occupational health and safety aspects are given under the subsections of Para 4.8, Chapter-IV.**	**4-18**
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	• **Details of the socio economic survey conducted in the buffer zone has been provided in Para 3.2.4, Chapter-III.** • **Public health facilities will be further aimed to be developed through CER activities wherein periodic health**	**3-8**

		checkups, medical camps for the locals will be conducted.	
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.	• **Nearby villages were visited for conducting study to know about socio-economic conditions, including aspirations and requirements of the people for a better living and collected relevant data. The details are provided under section 3.2.4, Chapter-III.**	**3-8**
38	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	• **Detailed Environmental Management plan and its implementation, etc., are furnished in Chapter X.**	**10-1**
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.	• **This draft EIA/EMP report will be exposed to public consultation as per mandatory procedures through the District Collector and State Pollution Control Board officials after giving 30 days advance notice in two local newspapers about the scheduled date and time for conduct of the public hearing procedures.** • **The opinions, concerns and objections of stakeholders will be recorded during the public hearing. All the public queries and the replies to the query by the project proponent and officials concerned will be recorded and incorporated in the EIA/EMP report for approval by SEIAA, Tamil Nadu.**	**7-1**
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.	• **PP informed that there is no litigation pending against the project.**	**--**
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	• **The cost of the project is Rs. 252/- LakhsTowards EMP measures, Rs. Rs.9.67 Lakhs is allocated under capital cost. Besides, Rs.14.36 lakhs per annum will be spent under recurring cost. All the recurring cost of maintenance of pollution control measures, environmental monitoring etc., will be met from revenue.**	**4-24** **10-11**
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	• **The disaster management plan has been provided under section 7.3.1, Chapter-VII.**	**7-3**

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.	• **The proposed kankar Quarry will benefit this region in the fields of employment opportunities, improved per capita income for local people, improved social welfare facilities in respect of education, health, infrastructural etc.** • **Direct employment to 10 people and indirect employment to scores of people.** • **By means of carrying out the socio economic development activities, local community development is expected. Towards the same, the proponent has planned to allocate Rs. 2 Lakhs for various activities under CER. From the CER activities allocated for various social welfare activities, the villages near the lease area will be benefited.**	**8-1**
44	Besides the above, the below mentioned general points are also to be followed:- a) All documents to be properly referenced with index and continuous page numbering. b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated. c) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the Original analysis/testing reports should be available during appraisal of the Project. d) Where the documents provided are in a language other than English, an English translation should be provided. e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&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. g) 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	• **Agreed**	

	have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation. h) As per the circular no. J-11011/618/2010-1A.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable. j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.		

CHAPTER - I

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 PURPOSE OF THE REPORT:

Chettinad Cement Corporation Pvt. Ltd. propose to operate Lime Kankar Quarry Lease over an area of 22.145 Ha in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu and has initiated action towards obtaining environmental clearance.

This project involves the production of 3,36,724 Tonnes of Lime Kankar and 61,223 Tonnes of Topsoil upto a depth of 1.40 m bgl (Top soil of 0.30m + limekankar of 1.10m)for the period of 5 years. It will meet the part requirement of the Kilapaluvur Cement Plant of the proponent.

Since the lease area is >5 Ha., this proposal is considered under Category – B1 and as per MoEF & CC notification necessitates preparation of EIA/EMP report and public hearing. The details of the quarries located within the 500m radius of the project is given vide **Annexure-3.** A cumulative impact study has been carried out and furnished in **Para 7.3, Chapter-VII.**

This EIA/EMP report is prepared based on standard and additional Terms of Reference issued by SEIAA, Tamil Nadu in conformance of the generic structure prescribed by MOEF&CC in their notification of September 2006 and the approved mining plan.

1.2 IDENTIFICATION OF PROJECT &PROJECT PROPONENT:

Table 1.1Identification of project

1	**Project Name**	Lime Kankar Quarry Lease of Chettinad Cement Corporation Pvt. Ltd.
2	**Extent**	22.145 Ha
3	**Production**	Limekankar - 3,36,724 Tonnes and Topsoil - 61,223 Tonnes for 5 years
4	**Ultimate Depth**	1.40 m bgl
5	**Land Classification**	Patta land registered in the name of the company
6	**Location**	**Survey Number:** 575/2B, 3, 582/8A, 8B, 8C, 8D, 8E, 585/22, 23, 24, 586/6A, 6B, 8, 587/1, 3A, 3B, 3C, 3D, 3E, 3F, 4, 5, 6, 7A, 7B, 7C, 588/1, 2A, 2B, 3A, 3B, 4, 5, 6, 7A, 7B, 8A, 8B, 8C, 8D, 9, 10, 11, 12, 590/1, 2, 3A, 3B, 4, 5, 6A, 6B, 7, 8, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B1, 12B2, 12B3, 13A1, 13A2, 13A3, 13B, 591/1, 2A, 2B, 3, 592/1A, 592/1B1, 1B2, 2 and 3
		Village: Sendurai

		Taluk: Sendurai
		District:Ariyalur
		State: Tamil Nadu

Table 1.2: Identification of Project Proponent

1	**Proponent Name**	Chettinad Cement Corporation Pvt. Ltd.
2	**Address**	Ariyalur Works, Trichy Road, Keelapulur, Ariyalur District- 621707
3	**Contact Number**	9698011144
4	**Email-ID**	tech@chettinadcement.com

Chettinad Cement Corporation Private Ltd is operating 3 cement plants is Tamil Nadu. The capacity of these cement plants are provided below:

Table 1.3: Capacity of Cement Plants

Cement Plant	Capacity
Keelapalur, Ariyalur Taluk	5.5 MTPA
Puliyur cement unit, Karur Taluk	1.7 MTPA
Karikalli, Guziliamparai Taluk	4.5 MTPA

Towards the requirement for raw material in their Kilapaluvur plant, the company has purchased Lime Kankar bearing lands and applied for mining lease. This proposed Lime Kankar Quarry Lease will meet the part requirement of this cement plant.

Table 1.4: Statutory Approvals

S.No	Statutory Approval	Authority	Letter Number and Date	Reference
1.	**Precise Area Communication Letter**	Industries (MMC2) Department	Lr.No.6152/MMC.2/2023-2 dated 03.01.2024	**Annexure-1**
2.	**Mining Plan Approval**	Department of Geology & Mining,	Rc.No.8884/MM7/2018 dated 05.04.2024	**Annexure-2**
3.	**Details of other quarries within 500m radius**	Department of Geology & Mining,	Rc.No.72/G&M/2017 dated 21.02.2019	**Annexure-3**

Based on the conditions of Precise Area Communication letter, the following safety distances will be maintained:

Table 1.5: Safety Distances

7.5m	Adjoining patta lands
10m	Cart track situated in S.F.No.582/1, 587/2
10m	Foot path situated in S.F.Nos. 591/3, 592/2, 3.
50m	Vari course in S.F.No.590/14 Sendurai village & vari course in S.F.No.39/2, 40/2 & 41 of Unjini village and S.F.No.288 of sendurai village
50m	Low tension power line passing from north east to south west through the S.F.Nos.575/A1, 2A2, 589/11, 12B, 582/8A, 588/1,3A, 588/3A, 3B, 4, 5, 9, 10, 587/1, 585/12, 14, 18, 19, 20, 21, 586/2, 3A, 3B, 4, 5A, 5B. & low tension power line passing from north east to south west in S.F.No. 582/1, 7A, 7B, 7C.

1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION &PROJECT IMPORTANCE

Table 1.6: Brief Description of Nature of project

1.	**Sector**	1(a), Non-Coal Mining
2.	**Type**	Fresh Project
3.	**Category**	B1
4.	**Mineral Mined**	Limekankar
5.	**Major/Minor Mineral**	Minor
6.	**Mining method**	Opencast Semi mechanized mining without drilling and blasting
7.	**End use**	Lime Kankar mined out from this quarry will be used in Kilapaluvur Cement Plant

Table 1.7: Location of the project

S.No	Particulars	Details
1.	**Location**	Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu
2.	**Corner Coordinates**	**Latitude:** 11°13' 43.3021"Nto 11°14' 2.803"N **Longitude:** 79°11' 18.0165"Eto 79°11' 34.2221"E
3.	**Toposheet Number**	58 M/4

Location details are elaborated in Para **2.3, Chapter-II.**

1.3.1 IMPORTANCE TO THE COUNTRY AND REGION:

Chettinad Cement is operating its Kilapaluvur Cement Plant near Ariyalur since 2009 and the existing production capacity of the plant is 5.5 MTPA Cement along with 3x15 MW Captive Thermal Power Plants**.** The cement Plant requires both Cement grade Limestone and Lime Kankar for Cement manufacturing. Lime Kankar is required for blending with high/low grade Limestone to meet the requirement of raw material. Accordingly, the Company has applied for new Lime Kankar Quarry Leases (Minor Mineral) in Ariyalur Region. This proposed Lime Kankar Quarry Lease will meet the part requirement for the Kilapaluvur Cement Plant.

This project in the area will provide both direct and indirect employment opportunities through allied opportunities in logistics, trading, repairing works etc., improved per capita income for local people, improved social welfare facilities like infrastructural build-up, improvement in facilities due to the proposed CER activities of the proponent etc.

1.4 SCOPE OF THE STUDY:

Particulars	Details
Proposal no	SIA/TN/MIN/517552/2025
File no	11686/2025
SEAC meeting for issue of TOR	532th SEAC Meeting held on 13.02.2025
SEIAA meeting for issue of TOR	798th SEIAA Meeting held on 26.02.2025
Terms of Reference	Received from SEIAA, Tamil Nadu vide their TO25B0108TN5896547N. Dated: 05/03/2025
Baseline Data Collection	Carried out by Creative Engineers & Consultants , Chennai for Summer Season (March – May 2025)

Based on the terms of reference, data collection, the Environmental Impact Assessment was carried out for the project area (core zone and the buffer zone (10km radius from the core zone) and the following studies were covered:

- Collection of primary and secondary data relevant to the project.

- One-Season baseline monitoring for environmental parameters such as air, water, noise, soil, flora & fauna, etc. Analysis of parameters in in-house laboratory.
- Documentation of EIA/EMP report with inclusion of relevant studies conducted by other bodies into the EIA/EMP report.
- Identification of significant environmental parameters that are prone to get affected due to pollution. Namely, Air, Water, Noise, Soil, Biological and Land Environment.
- Evaluation and determination of suitable mitigation measures to reduce and control the said pollution.
- Prediction of post project concentration (baseline + incremental) with respect to air environment for core zone and buffer zone.
- Formulation of an Environmental Management planincluding administrative aspects for proposed implementation of mitigative measures in time.

This draft EIA/EMP report will be submitted for public consultation, as per rules and procedures in this respect, as per the EIA notification 2006. The opinions, concerns and objections, if any, of the surrounding public and other stake holders connected, will be taken into consideration and compliance report thereon will be submitted to SEIAA, Tamil Nadu in the final EIA/EMP report.

* * * * * * * *

CHAPTER - II

PROJECT DESCRIPTION

CHAPTER 2

PROJECT DESCRIPTION

2.1 TYPE OF PROJECT:

This project involves the mining of 3,36,724 Tonnes of Lime Kankar and 61,223 Tonnes of Topsoil upto a depth of 1.40 m bgl (Top soil of 0.30m will be side casted and the limekankar of 1.10m)for the period of 5 years for captive consumption in Kilapaluvur Cement Plant using mechanized opencast mining method.

2.2 NEED & JUSTIFICATION FOR THE PROJECT:

- Availability of good quality proved lime kankar reserves
- Desperate Need for the raw material
- Techno economic viability of the scheme
- Better approachability to the project & availability of logistic facility in proximity to the site
- Economic and Socio Economic Benefits to the locals and the Government

Considering all the above said favorable factors it is practically possible to achieve the proposal within the planned period and this proposal is fully justified.

2.3 LOCATION:

A brief description of the mining area, along with the location, coordinates, accessibility, etc. has been details below in Table No.2.1.

Table 2.1: Mine site description

Location	Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu
Survey No.	575/2B, 3, 582/8A, 8B, 8C, 8D, 8E, 585/22, 23, 24, 586/6A, 6B, 8, 587/1, 3A, 3B, 3C, 3D, 3E, 3F, 4, 5, 6, 7A, 7B, 7C, 588/1, 2A, 2B, 3A, 3B, 4, 5, 6, 7A, 7B, 8A, 8B, 8C, 8D, 9, 10, 11, 12, 590/1, 2, 3A, 3B, 4, 5, 6A, 6B, 7, 8, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B1, 12B2, 12B3, 13A1, 13A2, 13A3, 13B, 591/1, 2A, 2B, 3, 592/1A, 592/1B1, 1B2, 2 and 3
Coordinates	**Latitude:** 11°13' 43.3021"Nto 11°14' 2.803"N **Longitude:** 79°11' 18.0165"Eto 79°11' 34.2221"E

Nearest Village	Periya Elangaicheri – 530m (NW)
Nearest Town	Unjini – 1Km (SE)
Nearest Highway	SH-217 - 2.5Km (NW)
Nearest Railway Station	Sendurai Railway Station – 3.2Km (NW)
Nearest Airport	Trichy Airport-74Km (SW)
Accessibility	Lease area is approachable through existing approach road on the southern side of the lease area which joins Rayampuram-Unjini Road at a distance of 1.5Km (S) and 15km form Ariyalur.
Topography	Plain terrain, dry lands with thorny bushes.
Drainage	First order streams/ vari courses control the drainage near the lease area

Location map is provided in **Figure No.2.1.**The approachability map is provided in **Figure No.2.2.** Lease plan & Corner co-ordinates of the lease area and satellite imagery are shown in **Figure No. 2.3 & 2.4** respectively. Village map for 500m radius from the lease is shown in **Figure No. 2.5.**

Figure 2.1: Location Map

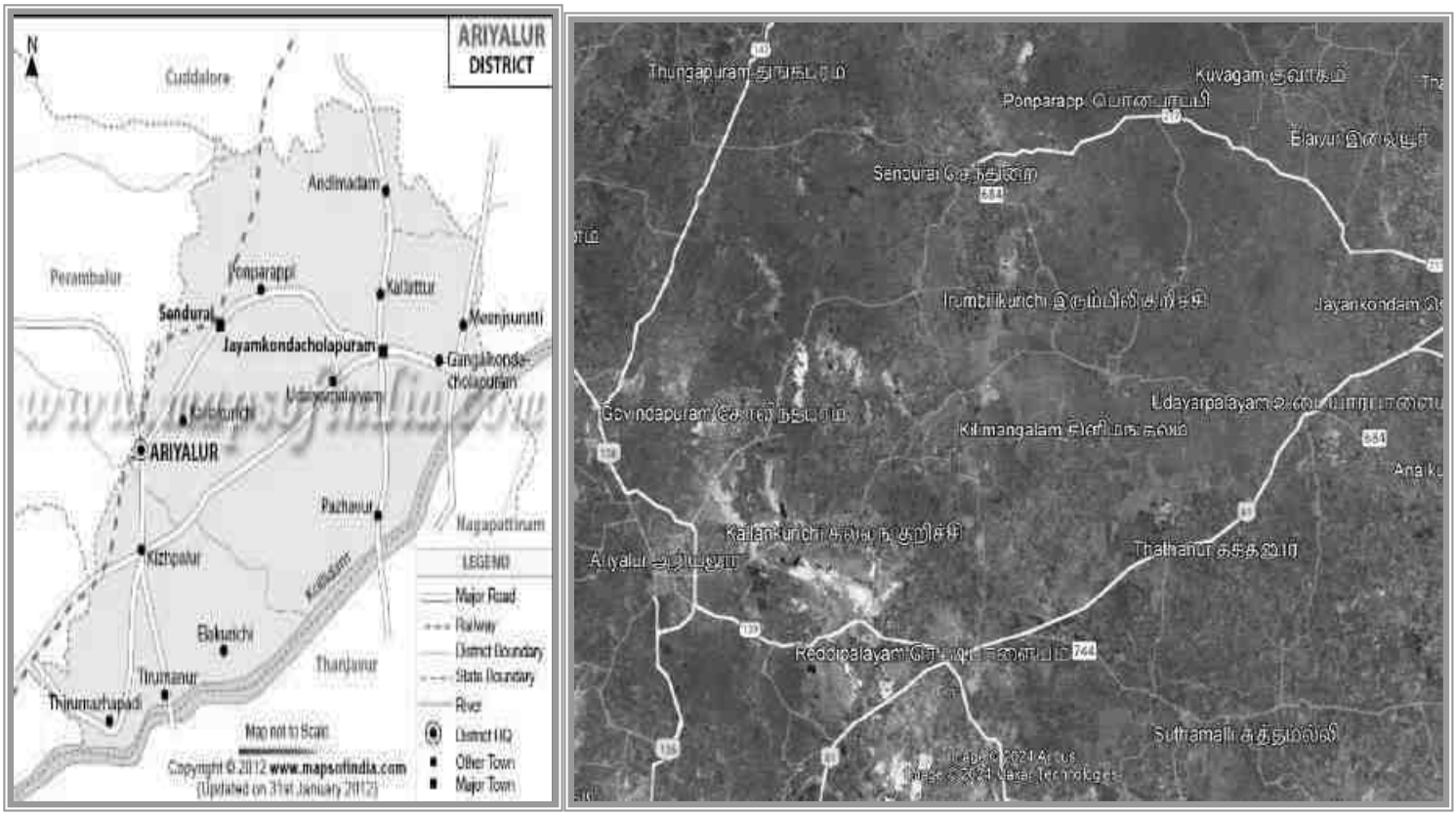


Figure 2.2: Approachability Map

Figure 2.3: Lease Plan

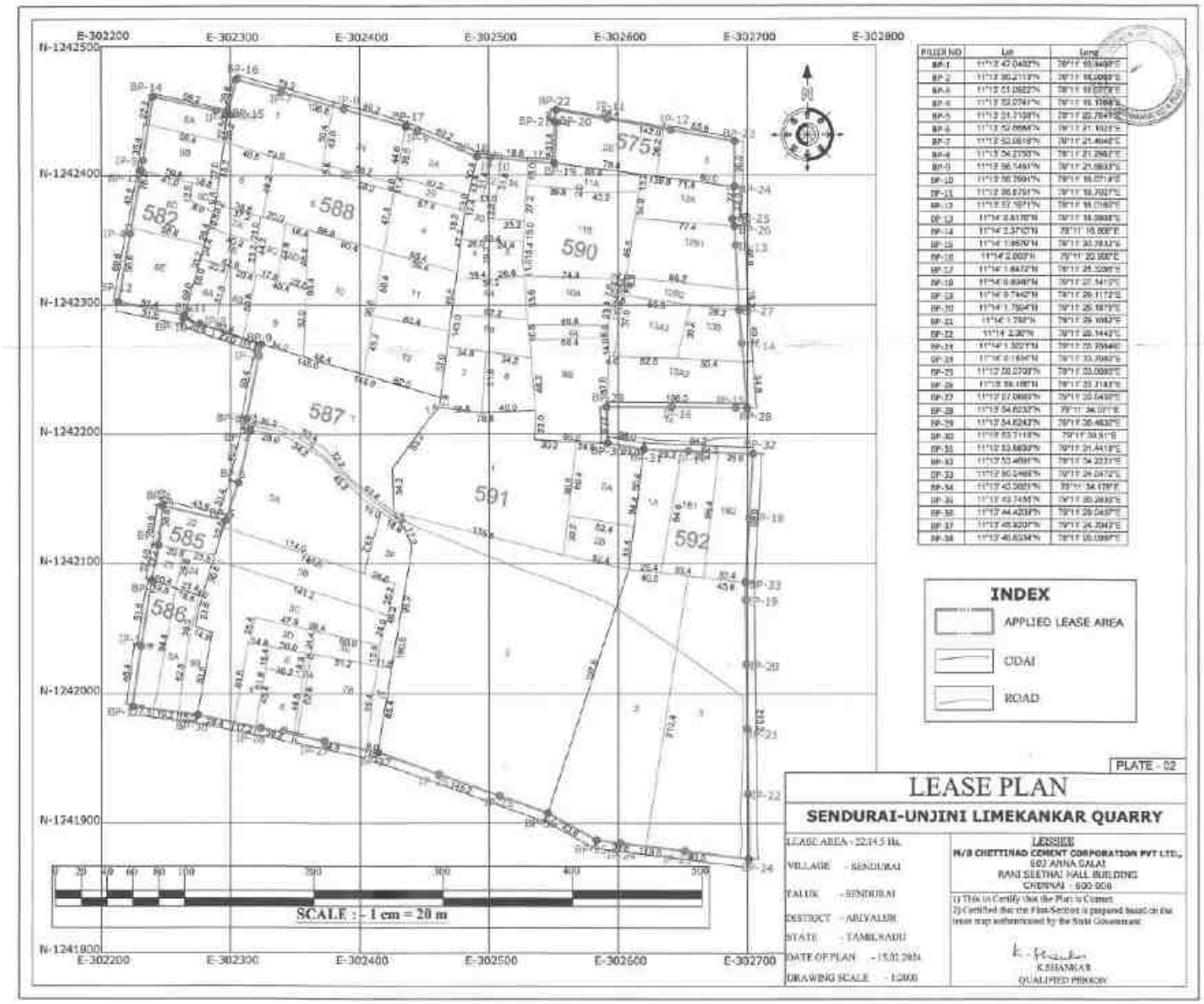
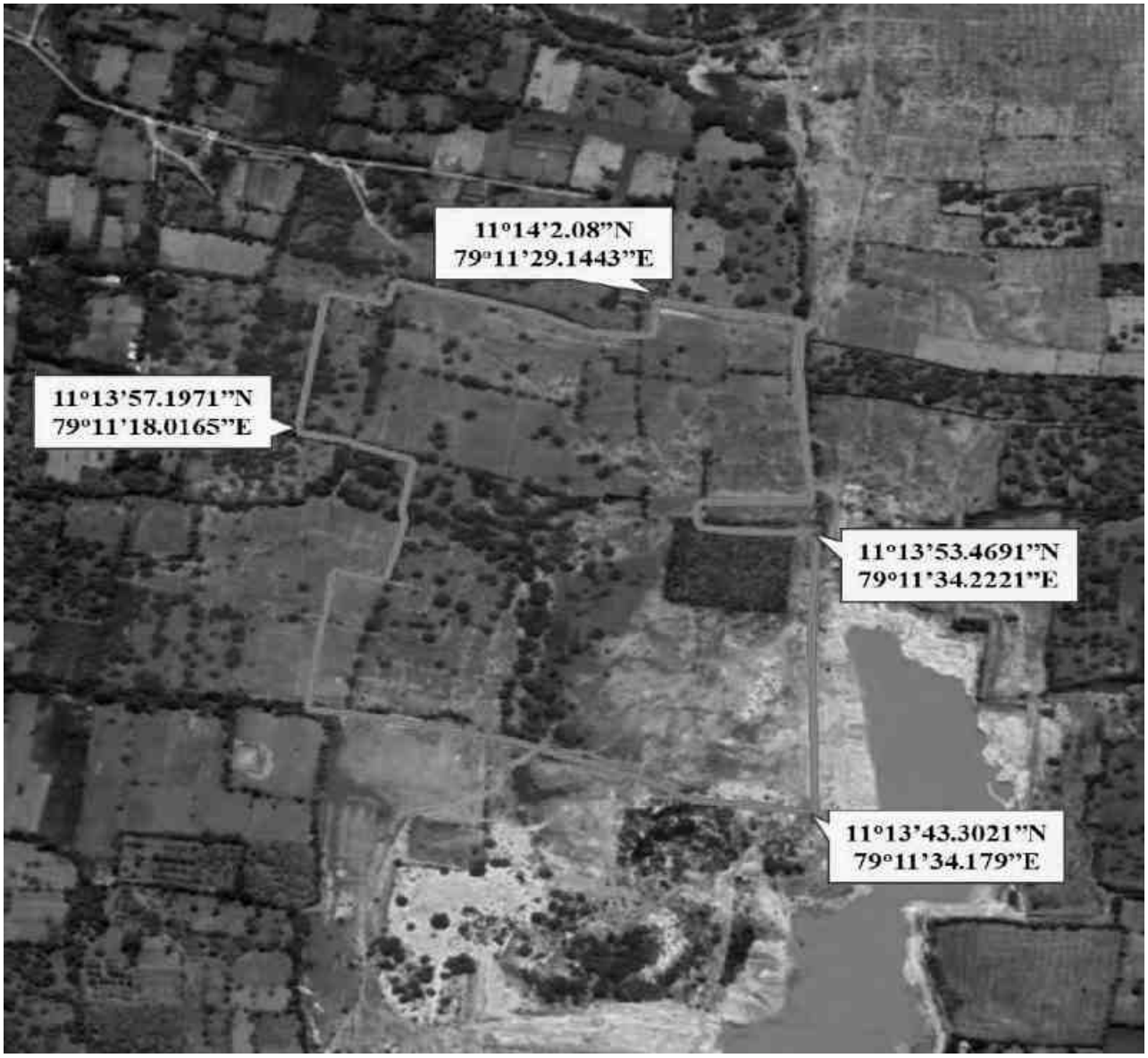


Figure 2.4: Satellite Imagery Showing Corner Co-ordinates of the Project Area



SITE PHOTOGRAPH

Figure 2.5: Village Map

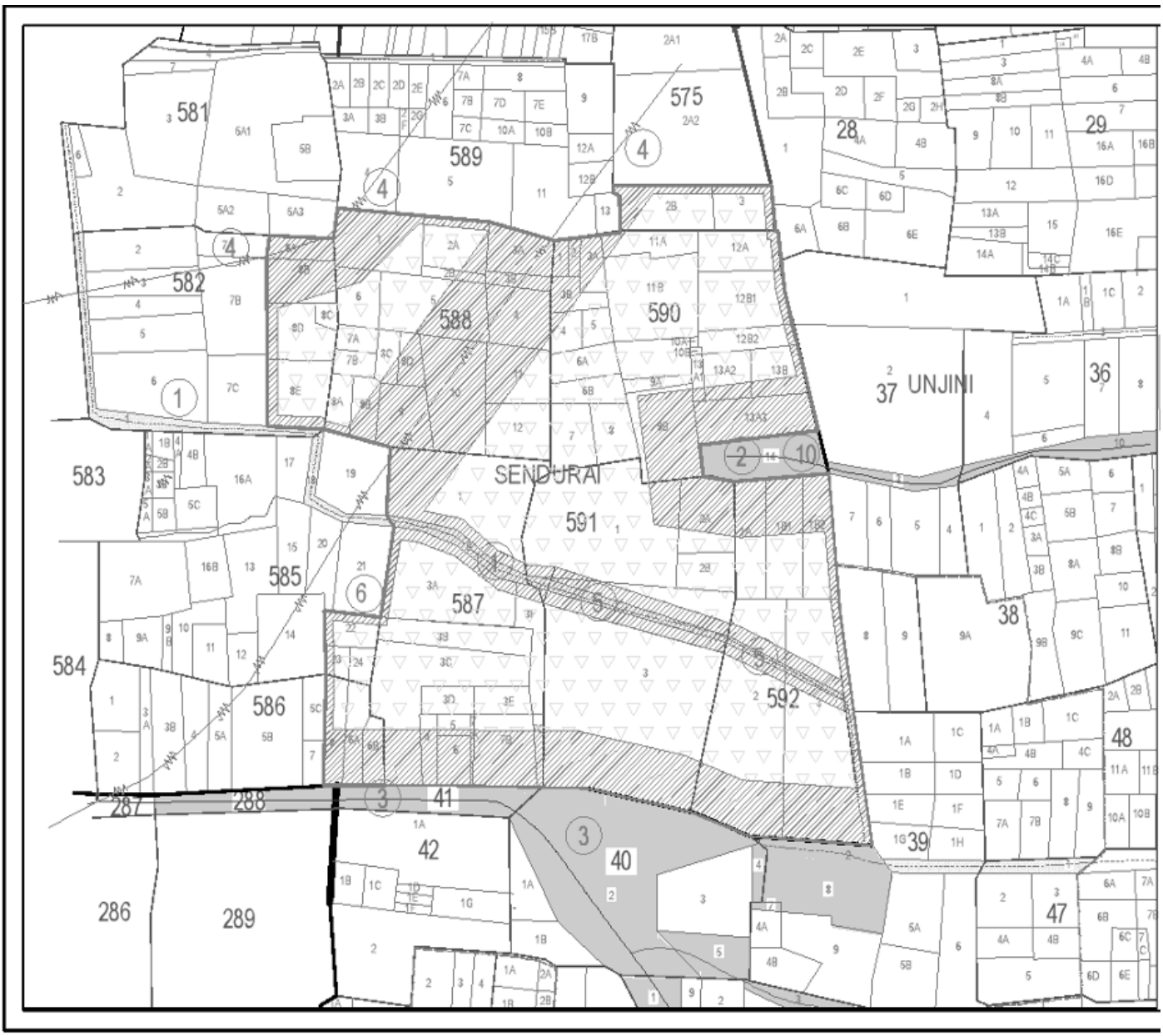


Table 2.2: DETAILS OF FEATURES IN AND AROUND THE LEASE AREA

SLNo	Feature	Location (S.F. Nos.)	Safety distance	Photos
1	Cart Track	582/1, 587/2	10m	
2	Vari Course	590/14	50m	
3	Vari Course	39/2, 40/2, 41, 288	50m	
4	LT Power Line	575/2A1 2A2, 582/8A 589/11, 12B, 588/1, 3A, 3B, 4,5,9, 587/1, 585/12, 14, 18, 19, 20, 21, 586/2, 3A, 3B, 4,5A,5B,588/1,582/8A and 582/1,7A,7B,7C	50m	
5	Foot Path	591/3,592/2,3	10m	

2.4 LAND CLASSIFICATION:

The lease area of 22.145 Ha is a patta land in the name of the applicant Chettinad Cement Corporation Pvt Ltd. vide Patta No. 2651. The survey no. wise area breakup has been provided below:

Table 2.3: Survey Number wise Area Breakup

S.F. No.	Sub-Division No.	Extent in Hect.
575	2B	0.31.0
	3	0.20.0
582	8A	0.13.5
	8B	0.21.0
	8C	0.03.0
	8D	0.24.0
	8E	0.32.0
585	22	0.14.5
	23	0.05.5
	24	0.07.0
586	6A	0.18.0
	6B	0.10.0
	8	0.18.5
587	1	0.91.0
	3A	0.75.5
	3B	0.36.0
	3C	0.67.0
	3D	0.12.5
	3E	0.12.5
	3F	0.18.5
	4	0.10.5
	5	0.04.5
	6	0.13.0
	7A	0.02.0
	7B	0.34.0
	7C	0.07.0
588	1	0.39.5
	2A	0.25.5
	2B	0.03.0
	3A	0.20.0
	3B	0.07.0
	4	0.27.0
	5	0.46.5

	6	0.19.0
	7A	0.07.5
	7B	0.10.0
	8A	0.12.0
	8B	0.11.0
	8C	0.09.0
	8D	0.09.5
	9	0.22.5
	10	0.51.0
	11	0.28.5
	12	0.30.5
590	1	0.05.0
	2	0.03.5
	3A	0.10.5
	3B	0.10.5
	4	0.08.5
	5	0.07.0
	6A	0.15.5
	6B	0.15.5
	7	0.19.5
	8	0.19.5
	9A	0.06.0
	9B	0.45.5
	10A	0.20.0
	10B	0.00.5
	11A	0.13.0
	11B	0.58.5
	12A	0.24.0
	12B1	0.37.0
	12B2	0.14.5
	12B3	0.00.5
	13A1	0.02.0
	13A2	0.19.0
	13A3	0.36.5
	13B	0.19.0
591	1	1.23.0
	2A	0.32.5
	2B	0.16.0
	3	3.03.0
592	1A	0.26.0
	1B1	0.29.0

	1B2	0.29.0
	2	1.31.5
	3	1.32.5
	TOTAL	**22.14.5**

2.5 GEOLOGY:

The area around Ariyalur forms parts of the well-known cretaceous formation of Trichinapoly. These formations have been studied in detail during the past several decades by various organizations in view of their geological and paleontological interest. The Cretaceous formations of Trichinapoly exposed in the area may be generally classified as follows.

Geological Age	Formation with Geological period	Lithology
Recent and Quaternary		Alluvium, kankar, Laterite, etc
Palaecene	-Unconformity- Niniyur (Danian)	Variegated clays with nodular limestones and marls with occasional boulders of flint and chest.
Cretaceous	-Unconformity- Ariyalur (Maestrichtian) Upper Lower	 White friable sandstone with purple clays, etc Clayey sandstones, loose conglomerates and yellowish fossiliferous limestone, marls and hard limestones.
	-Unconformity- Trichinopoly (Turonian to Senonian)	Calcareous gritty sandstone, shell limestones and conglomeratic sandstones.

Kankar has developed over the limestone extensively and ranges in thickness from one to two meters. The formation of Kankar is evidently due to the alternating wet and dry spells of tropical climate, which has caused leaching out of the clayey and siliceous portions in the top layer of limestone. Though the Kankar is porous, pisolitic and red in colour due to dispersion of

iron oxide, it analyses very high in calcium carbonate content (generally 85 to 95 per cent CaCO3). The fragments of shells as well as cementing calcareous medium make the Kankar hard and difficult to break. The Kankar is at present being mined for use as road metal, and for manufacturers of slaked lime in country kilns for use in construction.

Most of the soils in the area are of residual intermixed with kankarand are generally clayey nature.

The geological sequence.

Topsoil
Lime kankar
Limestone
Sandstone

Major geological disturbances are totally absent in this area. Recovery of minerals is estimated as 100% of the total excavation of the kankar. The recovery percentage is based on the knowledge gained from the adjacent mine in this belt. The average chemical analysis of Lime kankar is given below.

Figure 2.6: Surface Geological Plan

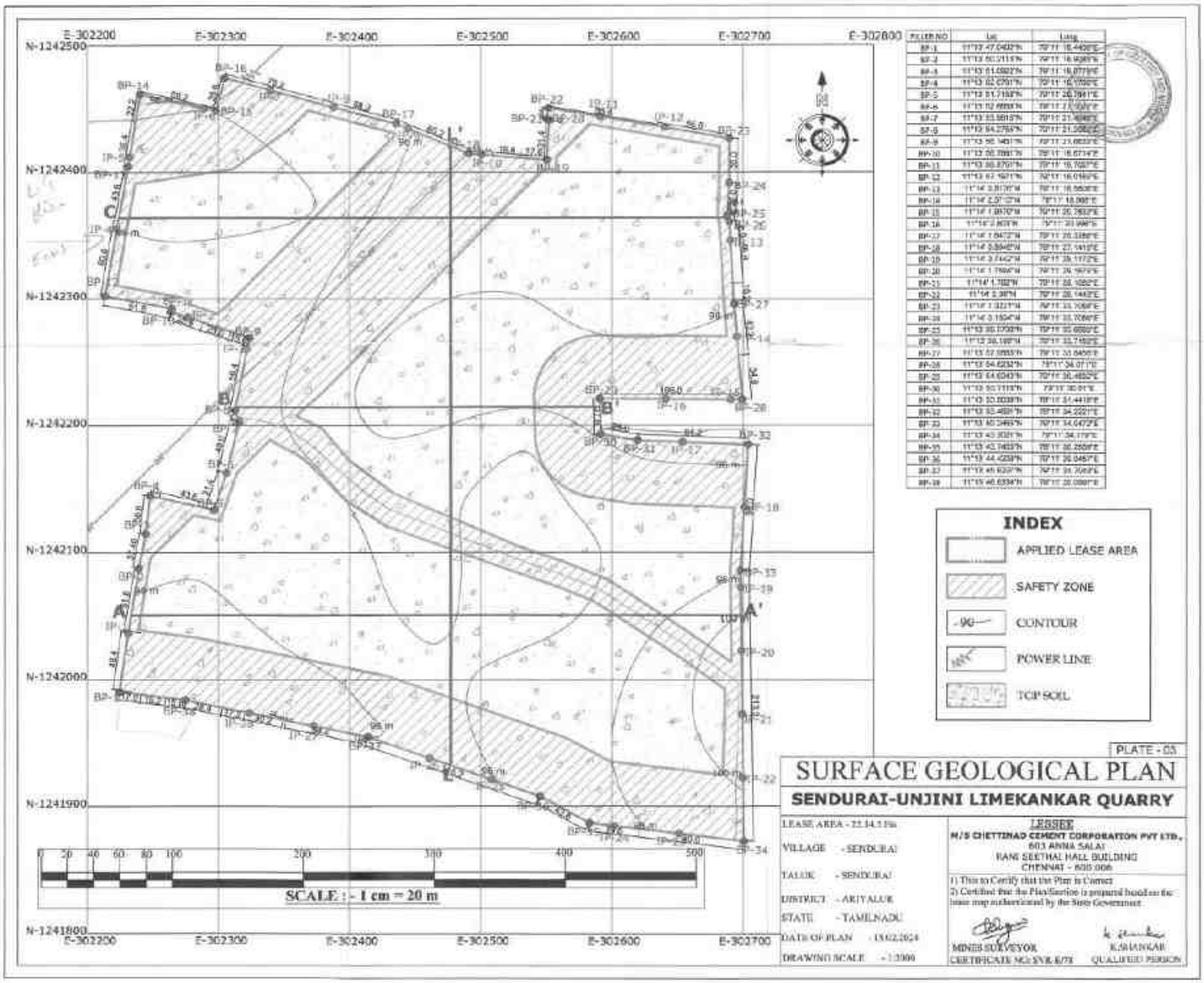
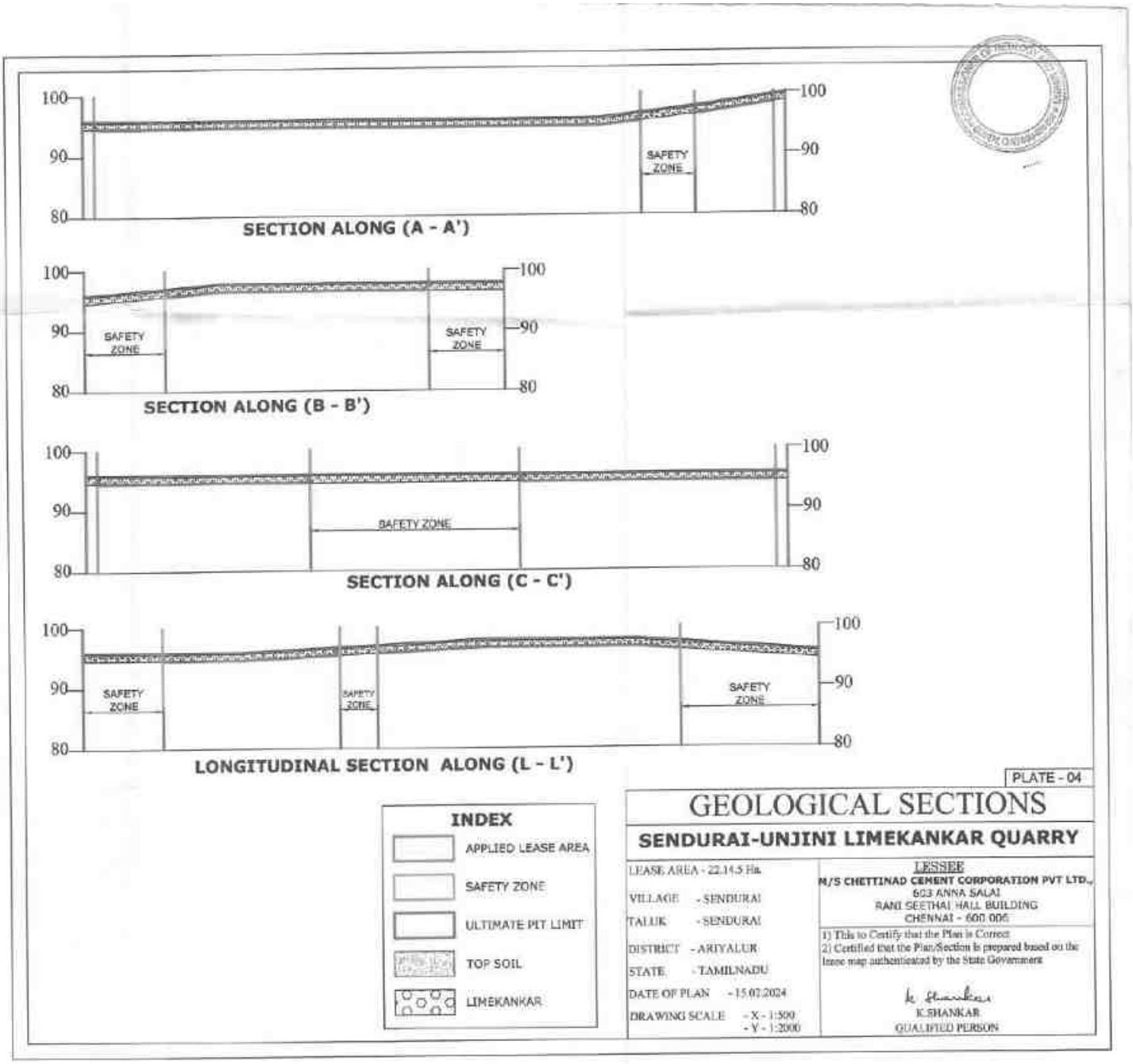


Figure 2.7: Geological Cross Section



2.6 SIZE AND MAGNITUDE OF THE OPERATION:

- The mining will be done by open cast semi mechanized mining method.
- Life of mine will be 5 years.
- It is proposed to mine 3,36,724 Tonnes of Lime Kankar and 61,223 Tonnes of Topsoil upto a depth of 1.40 m bgl (top 0.30m of top soil and 1.10m of kankar) for the period of 5 years.
- There will be no generation of mineral rejects as the entire estimated mineable Kankar reserves are to be recovered. The topsoil that would be generated during plan period is proposed to be utilized for afforestation purposes in the Safety barrier area.

2.6.1 RESERVES:

The existence of mineralization in the area applied for Quarry Lease has been ascertained from the nearby existing ML granted CCCPL mine where the thickness of Limekankar and Topsoil clay were proved by Trial pits and prospecting works. The thickness of Topsoil is found to a depth of 0.3 m BGL and Lime Kankar is found to a depth of 1.10 m BGL. Bulk Density of 1.50 Tons/cu.m and 2.25 Tons/cu.m is considered for Topsoil and Lime Kankar respectively. It is estimated that 3,36,724 Tonnes of Lime Kankar is mineable from the estimated In-situ Geological Reserve of 5,48,089 Tonnes Lime kankar.

Table 2.4: Geological and Mineable Reserves

S.No	Particulars	Extent (Ha)	Reserves
1	Blocked up Reserves	8.54	2,11,365
2	Mineable Reserves	13.60.5	3,36,724
3	In-situ Geological Reserves	22.145	5,48,089

The mineable reserve calculations are done after leaving safety distance of the following:

7.5m	Adjoining patta lands
10m	Cart track situated in S.F.No.582/1, 587/2
10m	Foot path situated in S.F.Nos. 591/3, 592/2, 3.
50m	Vari course in S.F.No.590/14 sendurai village & vari course in S.F.No.39/2, 40/2 & 41

	is Unjani village and S.F.No.288 of Rayampuram village
50m	Low tension power line passing from north east to south west through the S.F.Nos.575/A1, 2A2, 589/11, 12B, 582/8A, 588/1 & 3A, 3B, 4, 5, 9, 10, 587/1, 585/12, 14, 18, 19, 20, 21, 586/2, 3A, 3B, 4, 5A, 5B. & low tension power line passing from north east to south west in S.F.No. 582/1, 7A, 7B, 7C.

2.6.2 MINING METHOD:

The method of mining by opencast method without drilling and blasting will be carried out. One only bench will be formed for a height of 1.10 m. The total depth of mining is 1.40 m only which includes top 0.30m of top soil and 1.10m of kankar.

Table 2.5: Details ofEquipments

SI. NO	NAME OF THE EQIPMENT	CAPACITY	REQUIRED
1	Excavator/Loader	TATA Hitachi	1
2	Tipper	20 Tonnes	3

2.6.3 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION:

The proponent propose to implement the production immediately after obtaining all the statutory approvals such as CTE, CTO, etc. The proponent will comply with the environmental clearance conditions during mining operations. The schedule of project implementation envisaged for this project is provided below. This is a tentative schedule subject to various factor, hence unforeseen variations may occur.

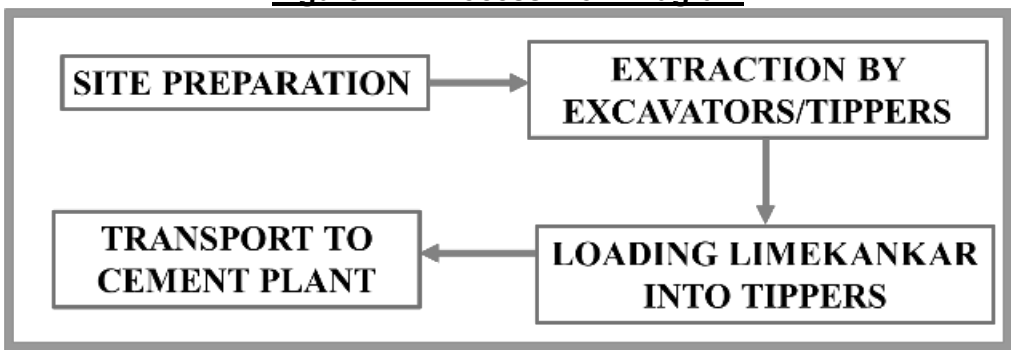
Table 2.6: Proposed Schedule of Implementation

Activities	Months					
	Zero Date	1	2	3	4	5
Obtaining Environmental Clearance						
Obtaining Consent from State Pollution Control Board						
Lease Execution						
Equipment mobilization and Commencement of Mining activity after following all the Statutory Requirements						

2.6.4 TECHNOLOGY AND PROCESS DESCRIPTION:

The quarry operations, involve direct excavation, loading and transportation. No drilling and blasting is involved in mining lime kankar. An excavator of 0.9 cu.m capacity will be deployed for formation of benches and the quarried out mineral will be loaded into tippers for transporting it from the mine pit to the plant. One only bench will be formed for a height of 1.10 m. The total depth of mining is 1.40 m only which includes top 0.30m of top soil and 1.10m of kankar..

Figure 2.7: Process Flow Diagram



2.7 PROJECT DESCRIPTION:

2.7.1 PAST PRODUCTION:

This is a proposed project. No mining has been carried out in this lease area so far by the proponent.

2.7.2 PLAN PERIOD-PRODUCTION & WASTE DISPOSAL:

There is no generation of mineral rejects in the applied area. The topsoil that would be generated during the present plan period is proposed to be utilized for afforestation.

Table 2.7: Production Schedule During Plan Period

Year	Lime Kankar ROM (Tonnes)	Top Soil (Tonnes)	Ore: OB Ratio
I	99510	18093	1 : 0.18
II	99720	18131	1 : 0.18
III	96961	17629	1 : 0.18
IV	40533	7370	1 : 0.19
V	--	--	--
Total	**336724**	**61223**	1 : 0.18

Although the applied lease period is 5 years the total production of **336724 T** of mineable quantity with be mined within the first 4 years of the plan period as the available quantity is very meager. During V year afforestation will be carried out in the area

Table 2.8: Ultimate Pit Dimensions

Due to intervening features within the lease area for which safety distance is left, mining area will be of 3 blocks as shown in the conceptual **plan**	**DEPTH(m)**
	1.40

The ground water table on the surface in this area is quite deeper. Hence, ground water intersection in not envisaged. The Conceptual Plan & Cross section are shown in **Figure No. 2.11& 12.**

Figure 2.8: 5th Year Plan

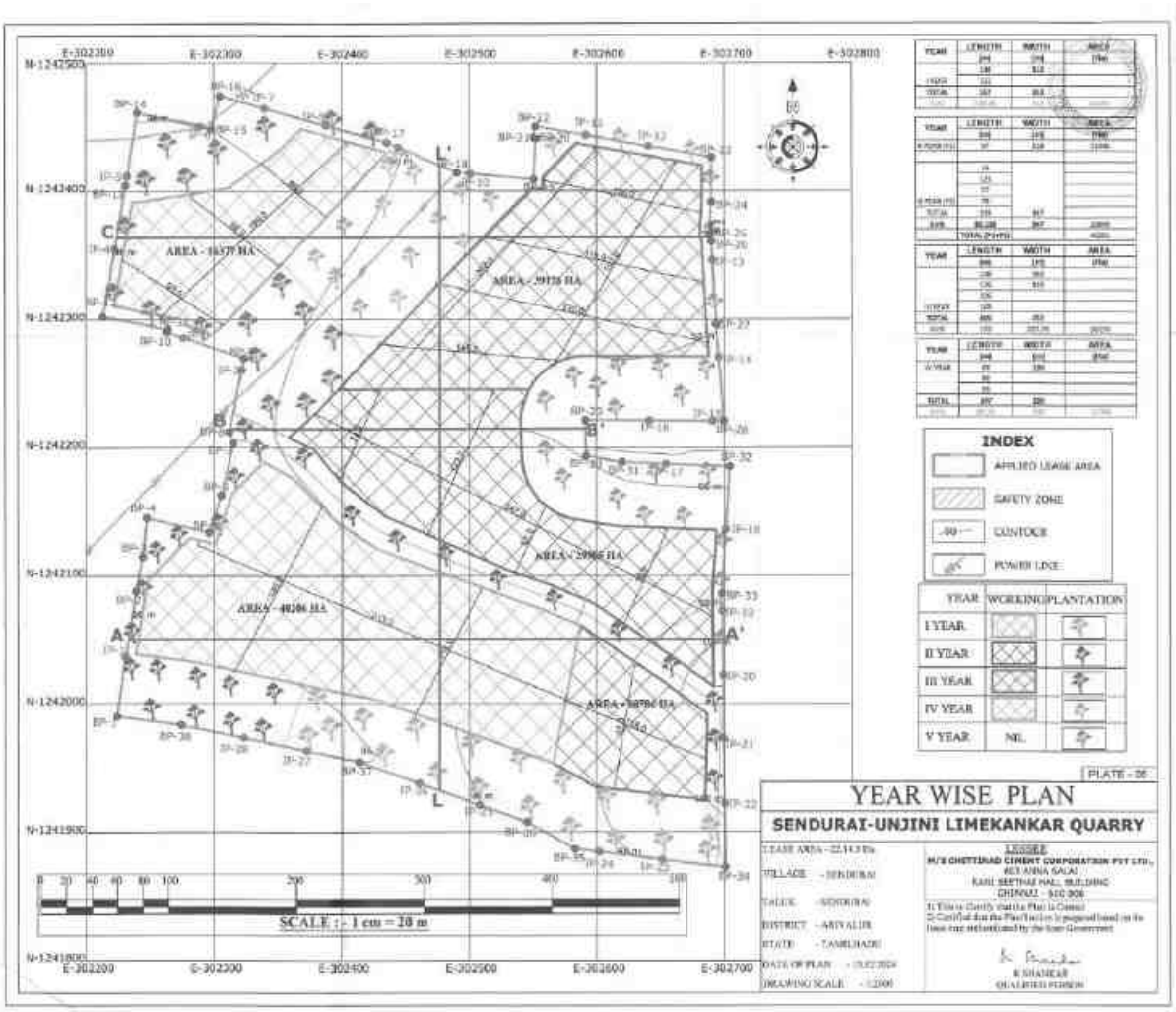


Figure 2.10: 5th Year wise Cross Section

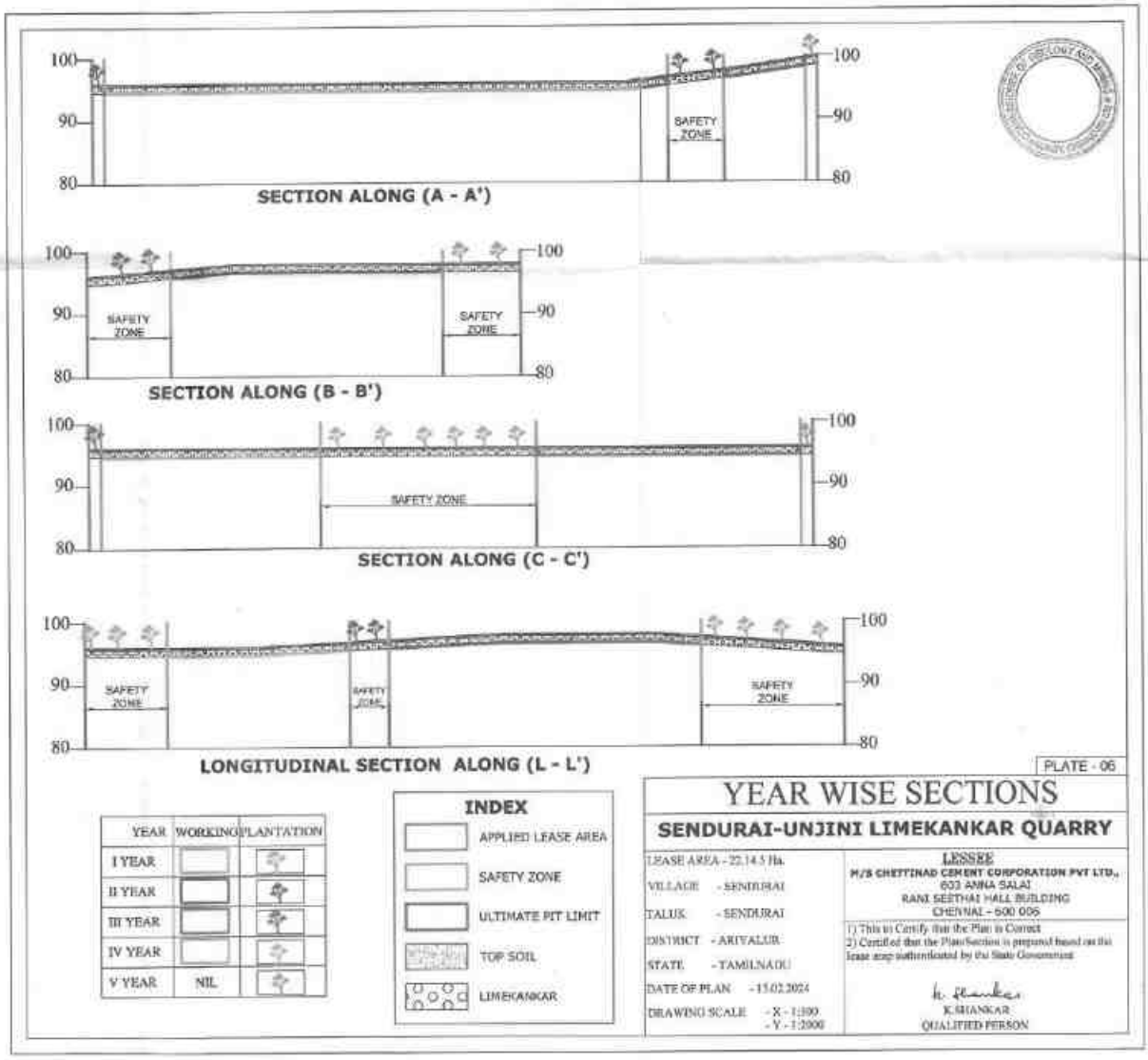


Figure 2.9: Conceptual Plan

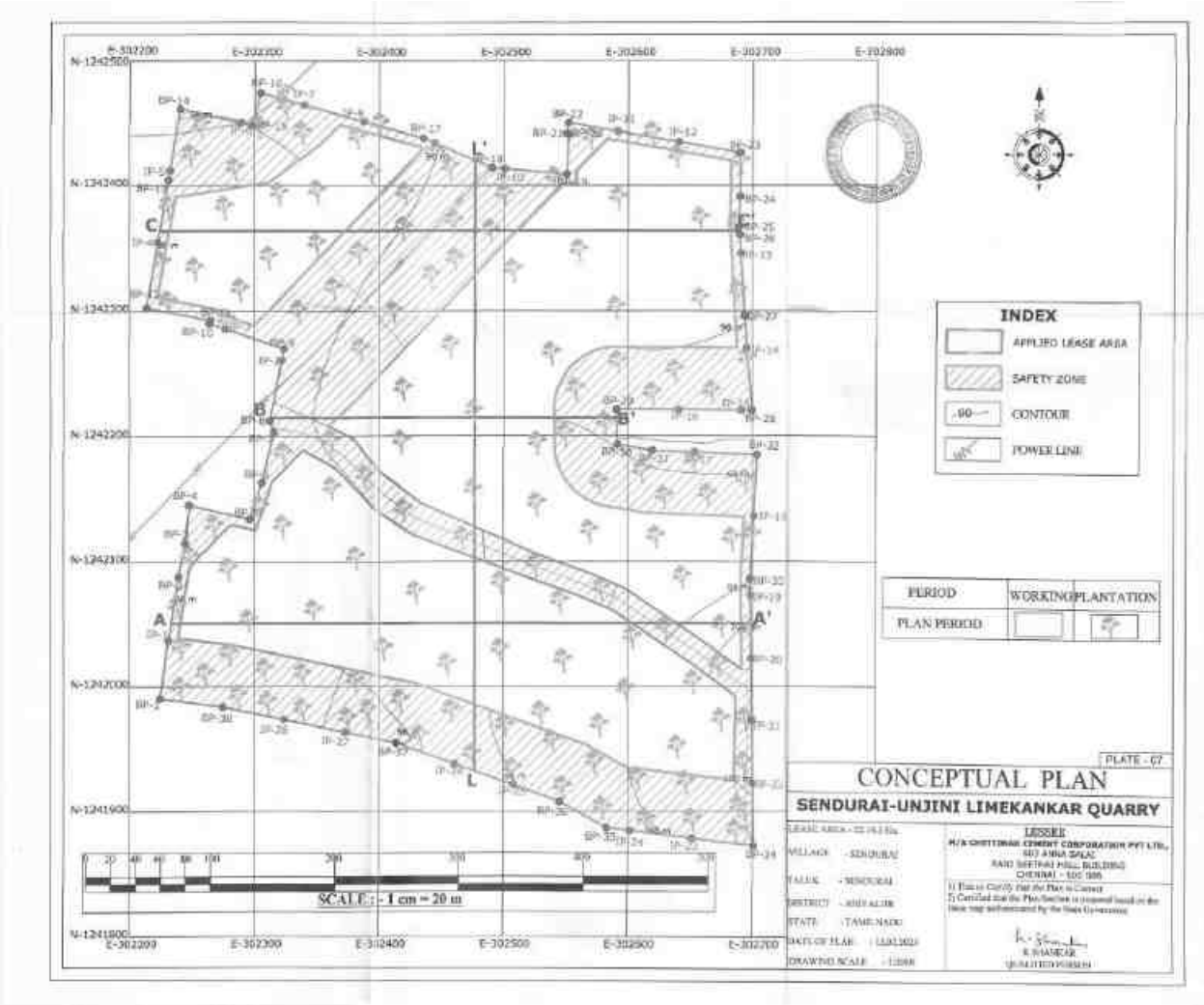
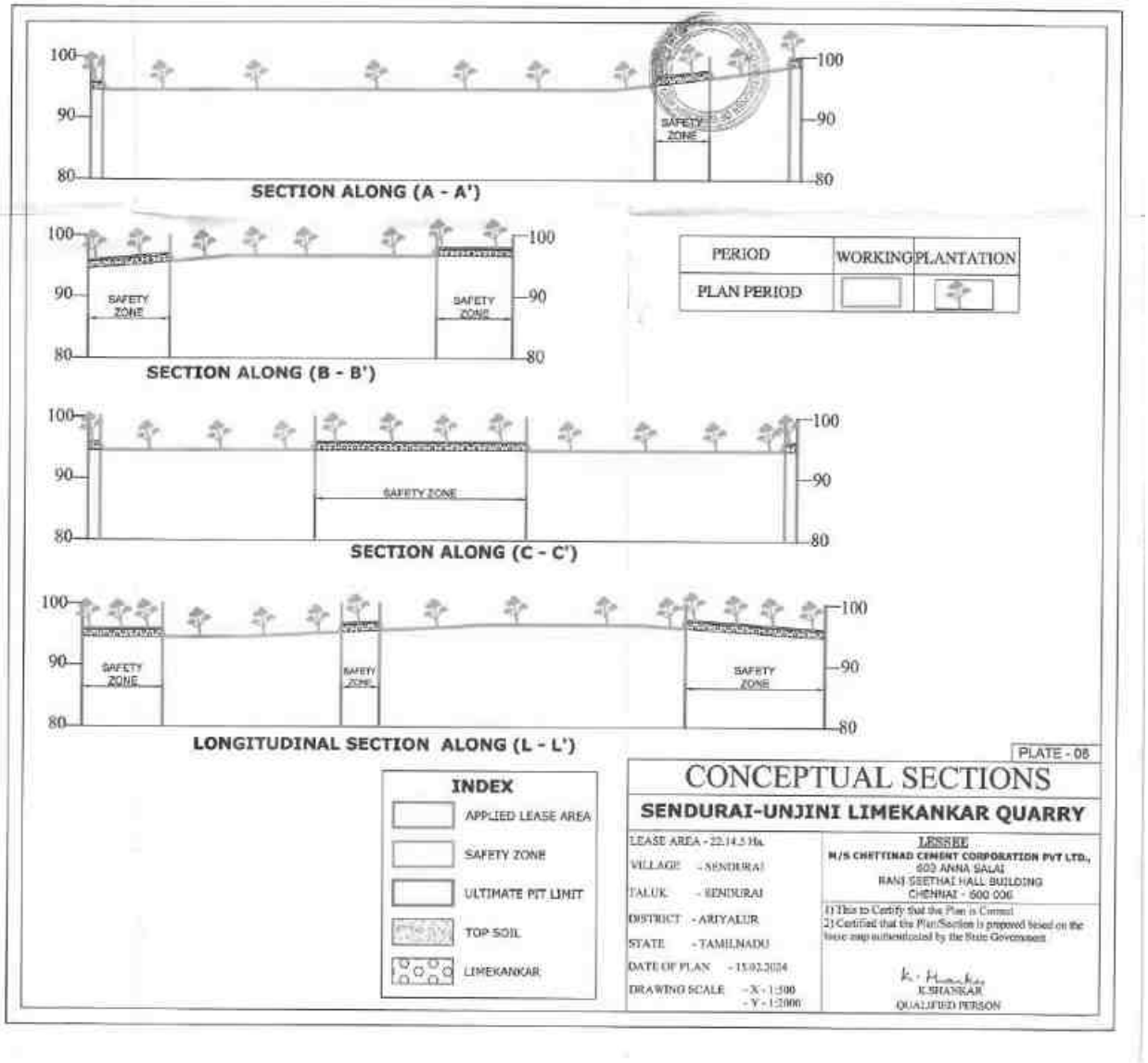


Figure 2.10: Conceptual Cross Section



2.7.3 LAND DEGRADATION/UTILIZATION:

The land use pattern at present and at the end of the quarrying period has been provided below.

Table 2.3: Land Use

S.No	Land Use	Present Area (Ha)	Area in use – End of 5 years period (Ha)
1	Mining \Excavation	-	13.60.5
2	Infrastructure	-	-
3	Greenbelt and Safety Zone	-	8.54
4	Unutilized Area	22.14.5	-
5	Roads	-	-
	Total	**22.14.5**	**22.14.5**

Plantation will be carried out over 8.54Ha of safety zone area during the plan period. Mined out area of 13.605 Ha will be backfilled with available material and restored to premising condition. Balance area will be used for rainwater water harvesting pit

2.7.4 PROJECT REQUIREMENTS:

Table 2.4: Project Requirements

<table>
<tr><td>Manpower</td><td>10 People directly and more than 50 people indirectly</td></tr>
<tr><td>Water Requirement and Source</td><td>Water Requirement:5 KLD
<table>
<tr><th>Details</th><th>Quantity (KLD)</th></tr>
<tr><td>Drinking water and Domestic Use</td><td>1.0</td></tr>
<tr><td>Dust Suppression</td><td>3.0</td></tr>
<tr><td>Green belt</td><td>1.0</td></tr>
<tr><td>Total</td><td>5.0</td></tr>
</table>
Source:The required water will be procured from outside agencies.</td></tr>
<tr><td>Power Requirement</td><td>No electricity needed for mining operation. The minimum power requirement for office, etc will be met from state grid.</td></tr>
<tr><td>Site Services</td><td>This is a proposed project. Site services like mine office, first aid room, rest shelters, toilets etc. will be provided as semi-permanent structures.</td></tr>
<tr><td>Project Cost</td><td>Rs.252.0 Lakhs</td></tr>
<tr><td>Funds allocated for socio-economic development</td><td>Rs.2.0 Lakhs is allocated under CER budget.</td></tr>
</table>

2.8 DESCRIPTION OF MITIGATION MEASURES:

Scientific and systematic development of mines will be carried out by the project authorities for preserving as well as improving the environmental conditions in and around the mining lease area.Elaborate analysis on impacts and mitigation measures to be adopted on implementation of this project and the same has been dealt in Chapter- IV.

2.9 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY:

There is no new technology that is being implemented. Opencast method of mining which is the proposed method of mining is a proven technology which is technologically and economically viable. No major technological failures are anticipated. A disaster management plan shall be put into place to take care of any unforeseen situation.

2.10 CONCLUSION:

As good environmental preservation is one of the prime motive of the project proponent. It is expected that the project activity will not have any major impact on environmental equilibrium in the study area.

* * * * * * * *

CHAPTER - III

DESCRIPTION OF ENVIRONMENT

CHAPTER 3

DESCRIPTION OF ENVIRONMENT

3.1 GENERAL:

The existing environmental baseline data for the various environmental components were collected in the study area for the purpose of assessing the impact on present environment due to the project activities.

Monitoring was carried out systematically and meticulously as per relevant IS codes, CPCB, MoEF&CC guidelines during **Summer Season (March 2025 to May 2025)** The details of the study are given in this chapter.

For the purposes of this study, the area has been divided into two zones, namely, core and buffer zones. The entire lease area is considered to be the core zone while the buffer zone encompasses a 10km radius from the periphery of the core zone. The details of villages falling in the study area and other features are given in Index Plan in **Figure No - 3.1**

The primary data collection was done by means of field monitoring and the secondary data collection was obtained from published sources and Government documents. The details of the baseline data collection which has been elaborated through the course of this chapter has been concised below:

Table 3.1: Type of Baseline Data

S.No	Studies	Parameters / Study	Location
1	Socio Economy	Demographic Data from Census 2011	Core and Buffer Zone
		Sample Survey	Buffer Zone
2	Micro Meteorology	Rainfall Data from IMD, Ariyalur	Ariyalur
		Temperature, Humidity, Wind Speed, Wind Direction	1 Representative Location
3	Ambient Air Quality	PM10, PM2.5, SO2, NOx, CO	1 Core Zone, 4 Buffer Zone
4	Water Quality	Physical and Chemical Parameters	1 Core Zone, 4 Buffer Zone
5	Noise Levels	Ambient Noise	1 Core Zone, 4 Buffer Zone
6	Soil Quality	Physical and Chemical Parameters	1 Core Zone, 4 Buffer Zone
7	Land Use and Land Cover	Land use pattern within 10km study area using RS Satellite	Buffer Zone
		Land use based on Census 2011	Core and Buffer Zone
8	Biological Environment	Flora and Fauna	Core Zone and Buffer Zone
9	Hydrology & Hydro Geology	Hydrogeological profile of the area	Core Zone and Buffer Zone

Figure 3.1: Study Area Map

Table 3.2: Environmental Setting of the Study Area

S.No	Particulars	Details	22.14.5Ha	
			Distance	Direction
I	**Connectivity**			
1.	Highway	SH-217	2.7Km	NE
2.	Railway Station	Sendurai Railway Station	3.3Km	NW
3.	Airport	Trichy Airport	75Km	SW
4.	Village	Nallampalayam	850m	NE
		Elangaicherry	550m	NW
		Adhikudikadu	1.2km	SW
		Unjini	1.1km	SE
5.	Town/City	Sendurai	2.6Km	NW
II	**Environmental Features**			
6.	Water Bodies	Anaivari Odai	5.7Km	NW
		Vilangudi Odai	7.5Km	S
7.	Reserve Forests	Vannankurichi RF	1.6km	(S)
		Manageri RF	6.4km	(SE)
		Udaiyarpalaiyam RF	9.5km	(SE)
		Palakkurichi RF	7.4km	(E)
		Sedalavadi RF	3.0km	(NE)
III	**Sensitive Areas**			
8.	Notified Archaeologically important places, Monuments	Nil within 10km radius	--	--
9.	Local Places of Historical and Tourism Interest	Nil within 10km radius	--	--
10.	Environmental sensitive areas, Protected areas as per Wildlife Protection Act, 1972*	Nil within 10km radius	--	--
11.	Defense Installations	Nil within 10km radius	--	--

3.2 SOCIO-ECONOMIC CONFIGURATIONS OF THE AREA:

3.2.1 GENERAL:

The Socio-Economic details of the study area are collected through:

- Identification of villages falling from the study area map with combined Taluk map.
- Collection of primary data through sample survey, village meetings and focused group discussion.

- Collection of the demographic pattern of villages falling in the area through NIC 2011 census data.
- Occupational structure of villages falling in the study area through NIC 2011 census data.
- Details of the amenities available in villages falling in the study area through NIC 2011 census data. The findings of the study are illustrated below:

3.2.2 SECONDARY DATA DESCRIPTION:

The proposed lease is located in Sendurai Village, Sendurai Taluk, Ariyalur District. Based on 2011 census data, in the 10km radius there are 45 Rural villages and part of 1 urban area namely Udaiyarpalayam from Sendurai Taluk, Ariyalur District. The demographic profile of the study area is given below:

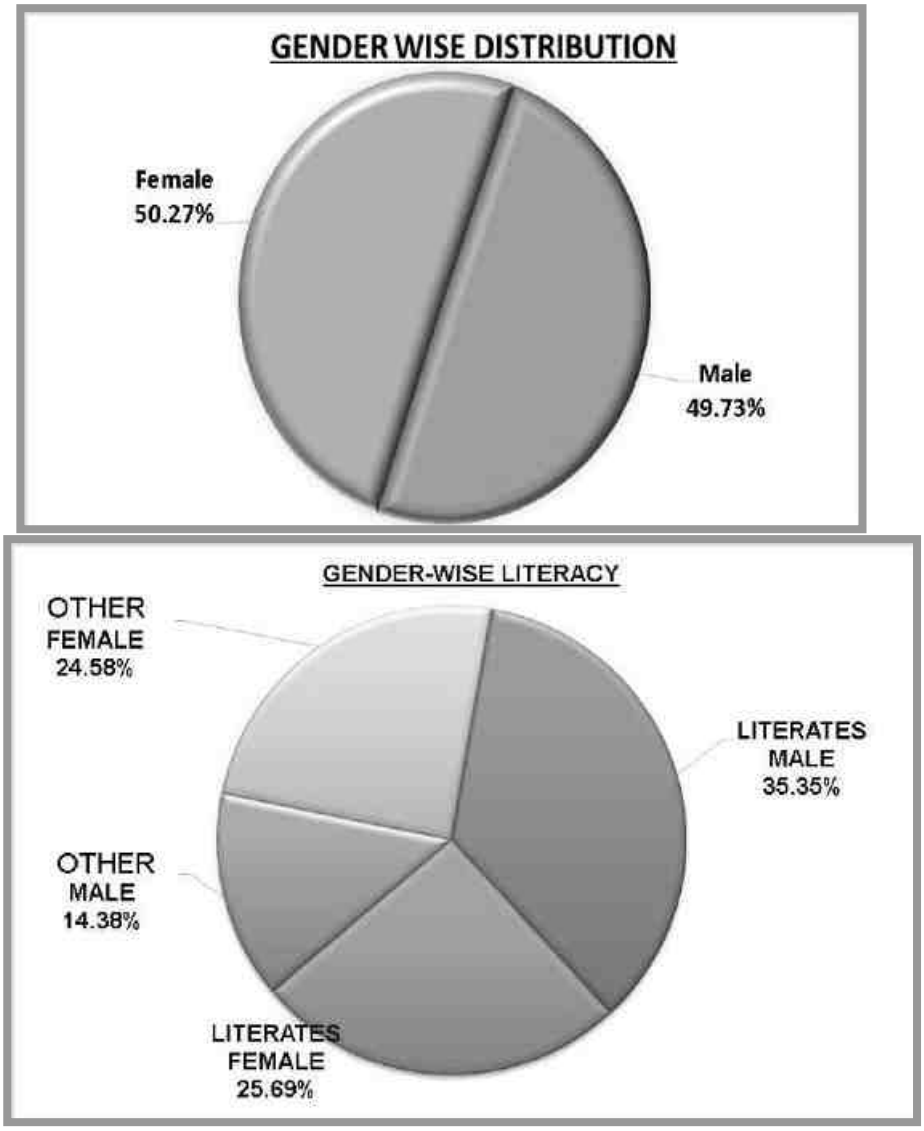
Table 3.3: Social, Economic and Demographic Profile of the Study Area

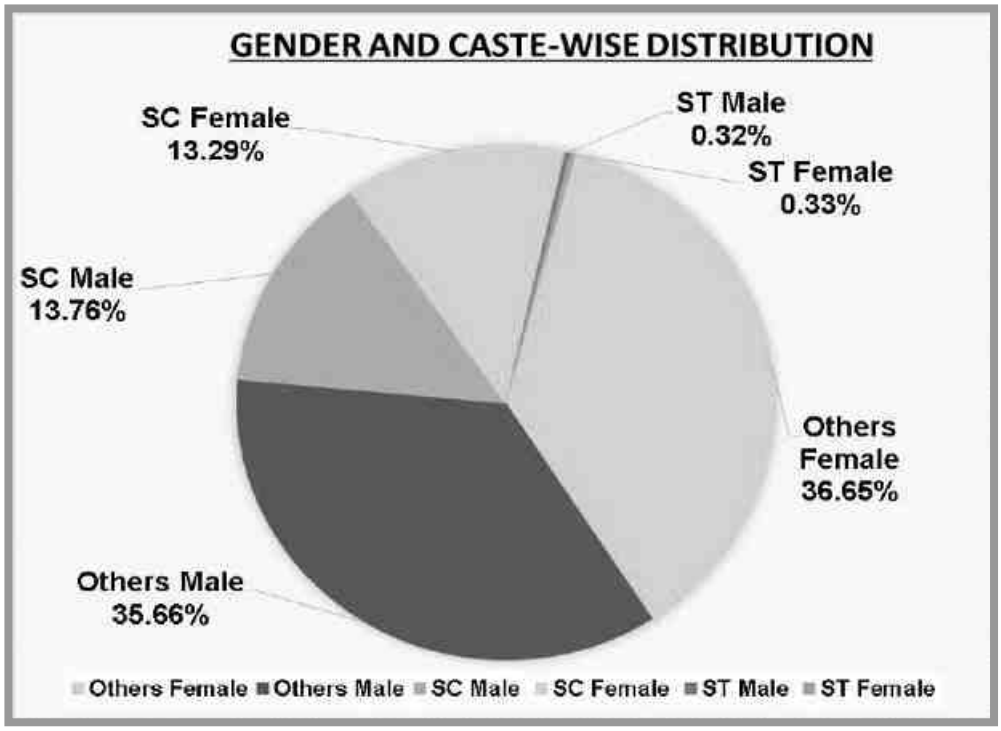
Details	Population	Percentage
A. Gender-wise distribution		
Male Population	86953	49.73
Female Population	87904	50.27
Total	**174857**	**100**
B. Caste-wise population distribution		
Scheduled Caste	47291	27.05
Scheduled Tribes	1130	0.65
Other	126436	72.31
Total	**174857**	**100**
C. Literate and Illiterate population		
Literate Males	61811	35.35
Literate Females	44929	25.69
Total Literate Population	**106740**	**61.04**
Other Males	25142	14.38
Other Females	42975	24.58
Others Population	**68117**	**38.96**
Total	**174857**	**100**
D. Occupational structure		
Main workers	68186	39.00
Marginal workers	25884	14.80
Total Workers	**94070**	**53.80**
Total Non-workers	93475	5
Total	**174857**	**100**

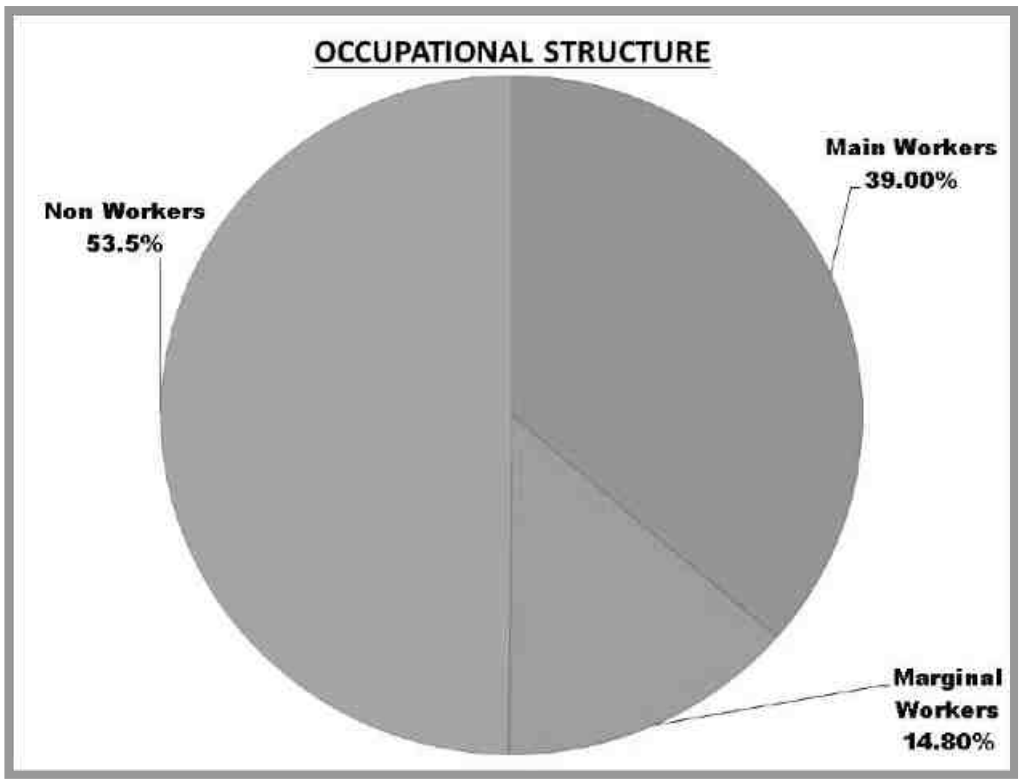
The total population of these 45 rural villages is 174857 in which the male population is 86953 (49.73%) and the female population is 87904 (50.27%). This shows that the male and female population ratio is almost equal. Among the total population 0.65% belong to Scheduled Tribes, 27.05% are Scheduled Caste and the balance people belong to other castes. Among the total population, 61.04% of the people are literate.

The village wise population, literacy levels and occupational structure details area given in **Annexure-4 and 5.** The demographic structure within the buffer zone is shown diagrammatically in **Figure No – 3.2.**

Figure 3.2: Demographic Structure in Buffer Zone




GENDER AND CASTE-WISE DISTRIBUTION
SC Female
13.29%
ST Male
0.32%
ST Female
0.33%
SC Male
13.76%
Others
Female
36.65%
Others Male
35.66%
Others Female
Others Male
SC Male
SC Female
ST Male
ST Female


OCCUPATIONAL STRUCTURE
Main Workers
39.00%
Non Workers
53.5%
Marginal
Workers
14.80%

3.2.3 DETAILS OF AMENITIES:

Based on 2011 census data, regarding the educational facilities, 45 rural villages have educational facilities. There are totally 115 Primary Schools functioning in these 45 rural villages. Among them 9 villages have one primary school, 12 villages have 2 primary schools, 15 villages have 3 primary schools, 3 villages has 4 primary schools & 5 villages has 5 primary schools With regards to educational facilities, from Primary School level to Senior Secondary School level, there is availability of some schools in the area. However, beyond this, college level education is not available in the buffer zone. Out of 45 villages, 37 villages have primary health sub centers. Better medical facilities are available in the nearby larger towns. Details of the infrastructural faciltiies in the area is provided under Table No.3.7.

Table 3.4: Primary Schools in the Buffer Zone Rural Villages

S.No	Villages	Number of primary schools	Total
1	1	0	0
2	9	1	9
3	12	2	24
4	15	3	45
5	3	4	12
6	5	5	25
Total	**45**		**100**

Table 3.5: Education Facility Availability

Particulars	Available in village
Govt Primary School	44
Govt Middle School	36
Govt Secondary School	24
Govt Senior Secondary School	11
Govt Arts and Science Degree College	0
Govt Engineering College	1
Govt Medicine College	0
Govt Management Institute	0
Govt Polytechnic	0
Govt Vocational Training School/ITI	0

Table 3.6: Healthcare Amenities Availability

Particulars	Available in village
Primary Health Centre	11
Primary Heallth Sub Centre	37
Maternity And Child Welfare Centre	24
TB Clinic	12
Dispensary	11

Veterinary Hospital	10
Family Welfare Centre	11

Table 3.7: Infrastructure Facilities

Particulars	Available in village
Tap Water-Treated	42
Covered Well	22
Hand Pump	16
Tube Wells/Borehole	42
Spring	12
Post office	12
Bus services	44
Commercial Bank	9
Cooperative bank	6

The details of the educational, medical and infrastructural facilities available in the buffer zone is provided in **Annexures- 6-8.** The above figures area based on 2011 census data , however drastic improvements in the above said amenities are observed in the area.

3.2.4 SAMPLE SURVEY:

3.2.4.1 OBJECTIVE:

The objective of the study is to understand the present socio-economic condition, availability of existing infrastructure facilities in the area & to know the needs of the people in the project peripheral villages, to provide an implementable future CER proposal pertaining to specific needs addressing local requirements.

3.2.4.2 APPROACH:

Nearby villages were visited for conducting study to know about socio-economic conditions, including aspirations and requirements of the people for a better living and collected relevant data. Informal discussions were conducted in the villages to capture the overall scenario of the village including their socio-economic problems and the aspirations, desires of the community in overall terms.

Salient details of the study:

- Studied villages have different community people which include different religion and different castes.
- Predominantly the study area is dry, barren land with sprodic agriculture dependent on rain.

- Patches of plantation and agriculture are observed during the monsoon season.
- Majority of the people are small farmers and others are working in the nearby mines and cement industries.
- Since agriculture is predominantly rainfed and the water is available only for few months, during the rest of the time they have less employment opportunities. Other occupations include construction workers, vendors, etc.
- Other allied activities livestock rearing and poultry farming are also found.
- Reasonably better amenities like approach road bus facility, electricity, mobile phone connectivity, Public Distribution System , banks etc are available.
- Bore well is the main source for drinking water. There are OHT's, Ground level tanks, public taps are available .
- Education facilities from primary upto higher secondary school are available locally.
- Basic medical facilities are available locally.
- Higher education faciltiies and also better medical facilities are available in Ariyalur and Trichy, etc.
- Chettinad Cement Corporation Private Ltd through their CER measures of existing mines and cement plant has carried out improvements in road, transport facilities, school infrastructural facility, water provision, etc. around the plant area. Besides, it has also brought about direct and indirect benefits to scores of people by way of employment opporutunities in the plant (direct and indirect), vendors, shops, renting of houses, etc.


11°14'14.70775"N 79°11'58.16227"E


11°13'29.80574"N 79°12'15.72448"E


11°13'26.38852"N 79°12'16.72236"E


11°13'30.24887"N 79°12'13.99975"E


11°14'13.74184"N 79°11'58.00794"E

3.3 EXISTING ENVIRONMENTAL QUALITY

3.3.1 MICRO-METEOROLOGY

3.3.1.1 General:

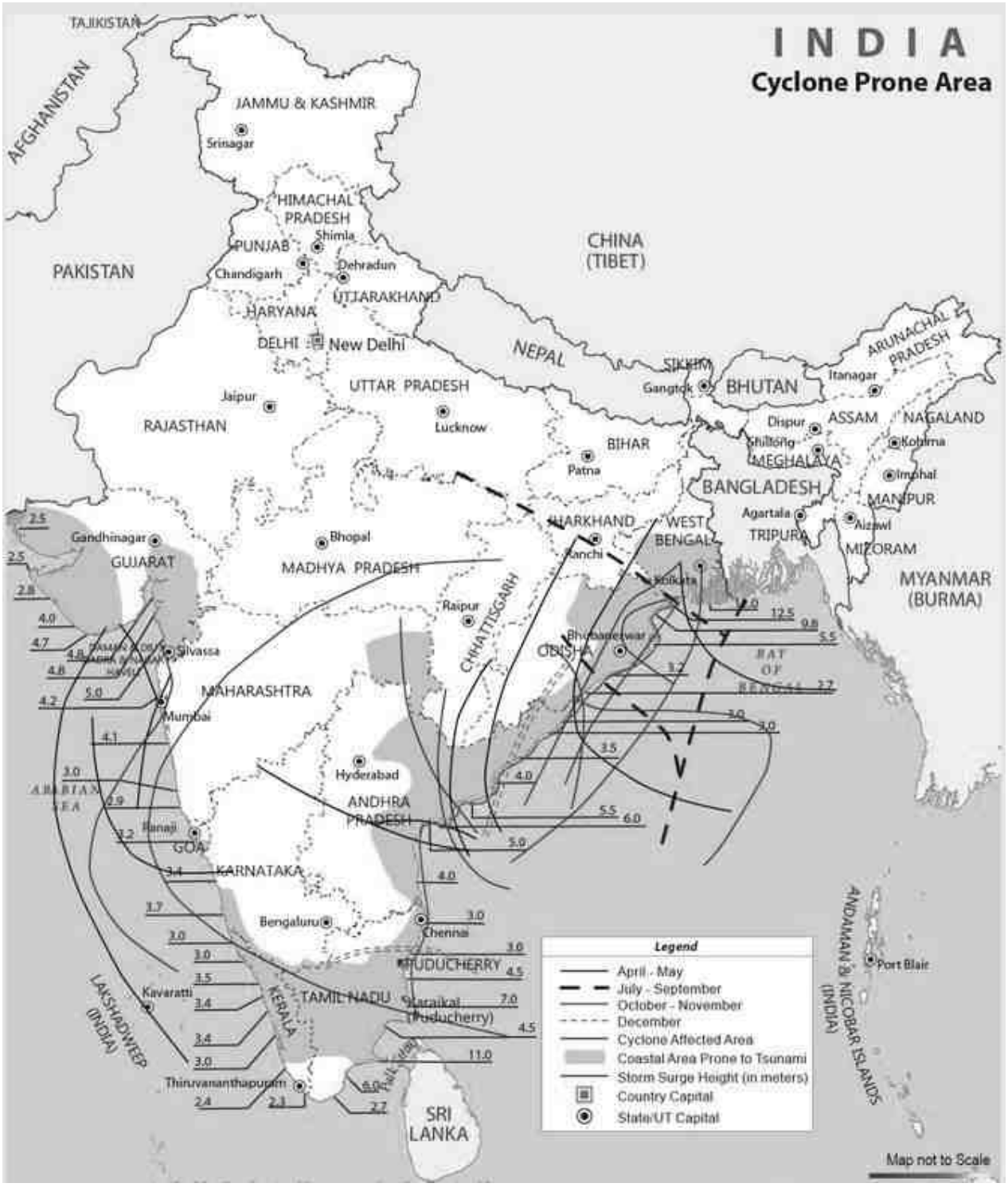
The meteorological conditions in an area regulate the dispersion of air pollutants being released into the atmosphere. The principal variables are horizontal convective transport i.e. wind speed and direction and vertical convective transport, i.e. mixing height, stability class and topography of the area.

3.3.1.2 Historical Meteorological Data:

A. Cyclones And Depressions

Cyclonic storms and depressions in Bay of Bengal affect the East Coast of India. Isolated ones, forming in January to March in the South Bay of Bengal move West-North-westwards and hit Tamil Nadu coast. In April and May, cyclonic storms and depressions form in the South and adjoining Central Bay and move initially to the Northwest, then North and then recurve to the Northeast striking the Arakan coasts in April and Andhra Pradesh (AP)-Orissa-West Bengal (WB) – Bangladesh coasts in May. Most of the monsoon (June – September) storms develop in the central and in the north bay and move west – north - west wards affecting AP – Orissa – WB coasts. Post monsoon (October – December) storms form mostly in the south and central Bay, recurve between 15° and 18 ° N affecting Tamil Nadu – AP – Orissa – WB – Bangladesh coasts. **Figure No - 3.3** depicts the history of cyclonic storms, which have struck the Indian coast during the months of October, November and December during the last 75 years. (**Source: Vulnerability Atlas of India series, above figure accessed from www.maps of india.com)**. East coast is prone to cyclonic storms round the year but mostly these occur prior to SW i.e., in May and after SW monsoon i.e., in October and November.

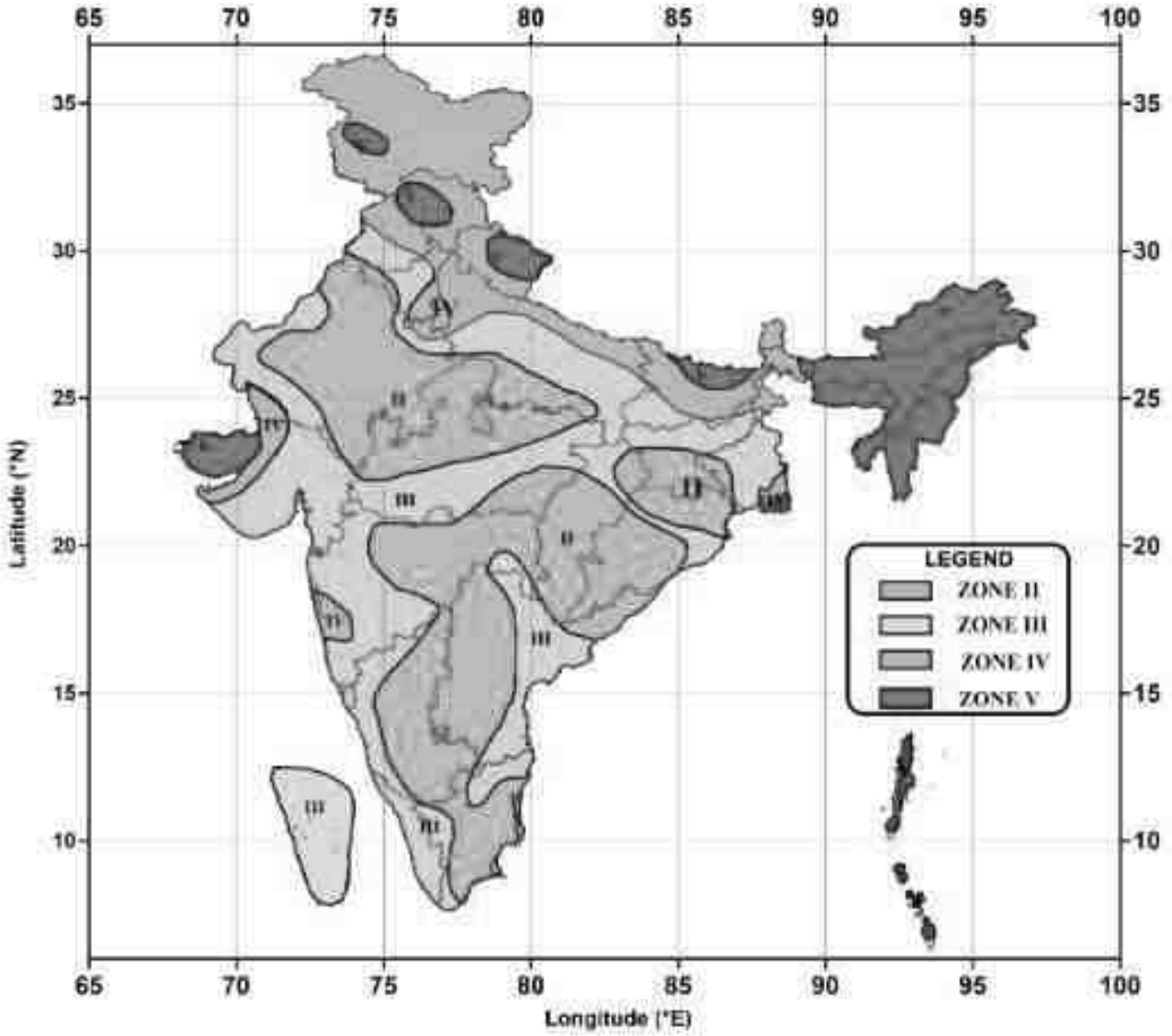
Figure 3.3: Cyclone Prone Areas



B. SEISMIC DATA

From the seismic zone map of India as depicted in the **Figure No - 3.4,** it can be seen that the project site and study area falls in the Zone – II and is described as least active zone.

Figure 3.4: Seismic Zone Map of India



C. Climate and Rainfall Data:

The climate of Ariyalur district is sub-tropical. The average rainfall wheli the district receives daring Northeast monsoon is 485 mm and during southwest monsoon is 357mm respectively . The normal onset of Southwest monsoon is first week of June whereas for Northeast monsoon is second week or October, The annual rainfall normal (1970.-2000) of Ariyilar district is 949 mm.5Projections; of rainfall over Ariyabin- for die periods 2010-2040 (2020s), 2040-2070 (2050s) and 2070-2100 (2080s) with reference to the baseline (1970-2000) indicate a decrease of 2.0%. 3.0% and 3.1.)% respectively is given in **Table No.3.8.** Rainfall histograms are presented in **Figure No - 3.5 & 3.6**.

Table 3.8: Average Annual Rainfall Data (2012-2021)

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Rainfall
2012	10.26	11.1	44.64	215.27	73.81	215.05	219.15	281.78	142.85	200.84	106.61	16.04	1537.4
2013	0.5	15.84	17.46	1.95	23.69	30.12	25.14	194.66	118.83	102.85	233.9	118.4	883.34
2014	0.85	5.16	0	0	179.76	21.94	91.06	135.01	35.37	306.85	209.59	144.91	1130.5
2015	14.11	0	1.59	79.09	92.45	64.4	75.23	89.55	39.72	115.89	548.65	285.57	1406.25
2016	0.04	0	0.01	0	119.86	57.61	49.59	179.49	50.16	65.93	55.41	41.1	619.2
2017	60.91	0.01	6.88	0	3.06	45.02	12	66.04	99.16	66.82	254.12	88.92	702.94
2018	30.73	0.01	1.38	0.93	5.5	55.19	32.41	87.1	16.54	223.15	279.22	33.53	765.69
2019	0.73	0.87	0.01	0	1.56	5.38	59.77	130.1	277.01	189.97	293.44	248.8	1207.64
2020	18.26	0.63	0.08	8.85	27.65	27.86	127.82	77.81	104.89	110.97	236.52	481.36	1222.7
2021	348.76	27.96	4.73	16.73	77.21	56.97	54.09	132.28	129.35	302.09	658.23	89.6	1898
Cumulative	485.15	61.58	76.78	322.82	604.55	579.54	746.26	1373.82	1013.88	1685.36	2875.69	1548.23	11373.66

Source – IMD GRID – Ariyalur report

Figure 3.5: Total Rainfall

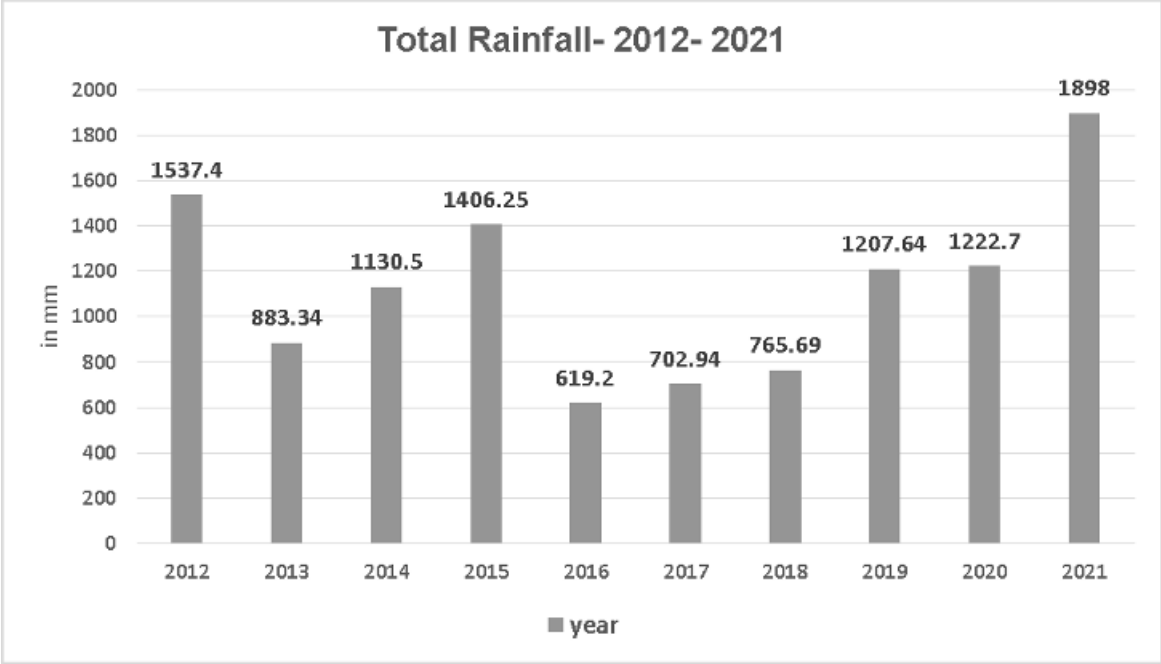
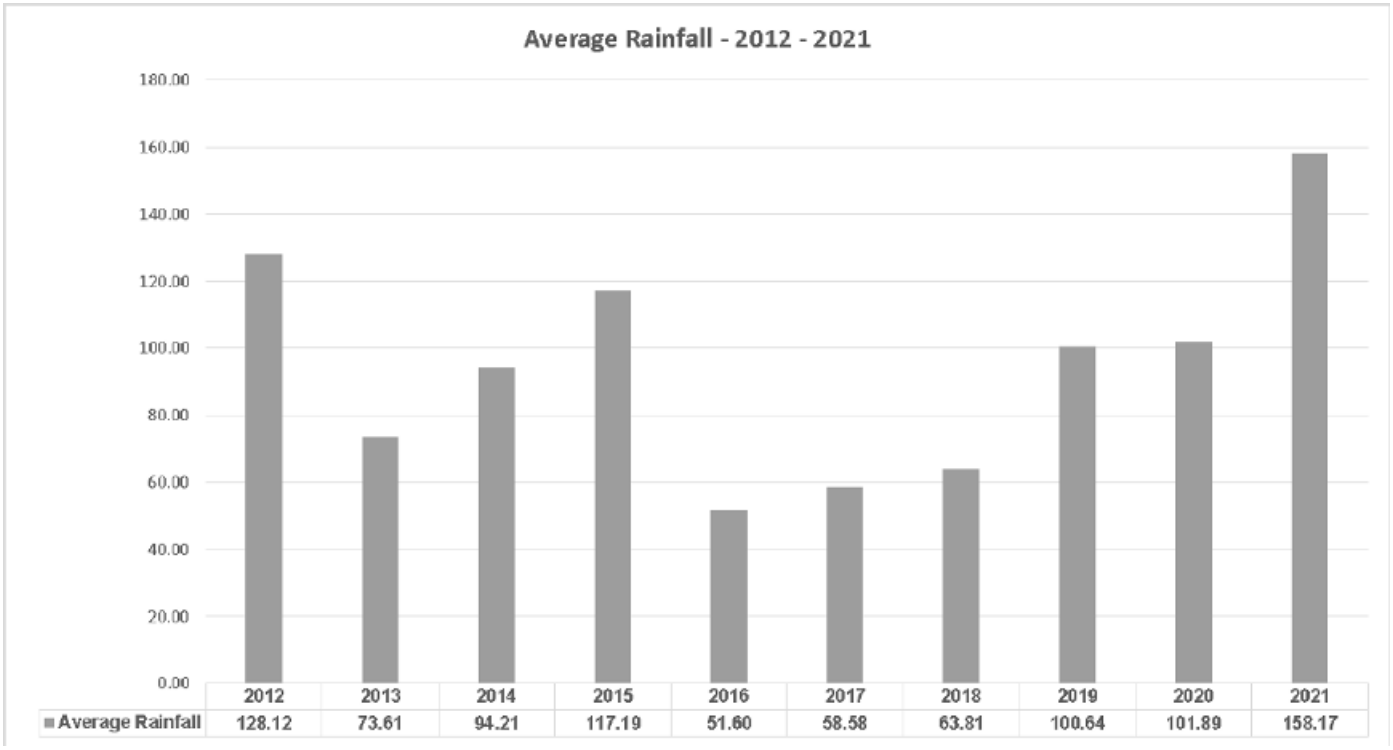


Figure 3.6: Average Annual Rainfall



3.3.1.3 SITE SPECIFIC METEOROLOGICAL DATA:

Micrometeorology and microclimatic parameters of wind velocity, wind direction, ambient temperature, relative humidity, were collected throughout the monitoring period.

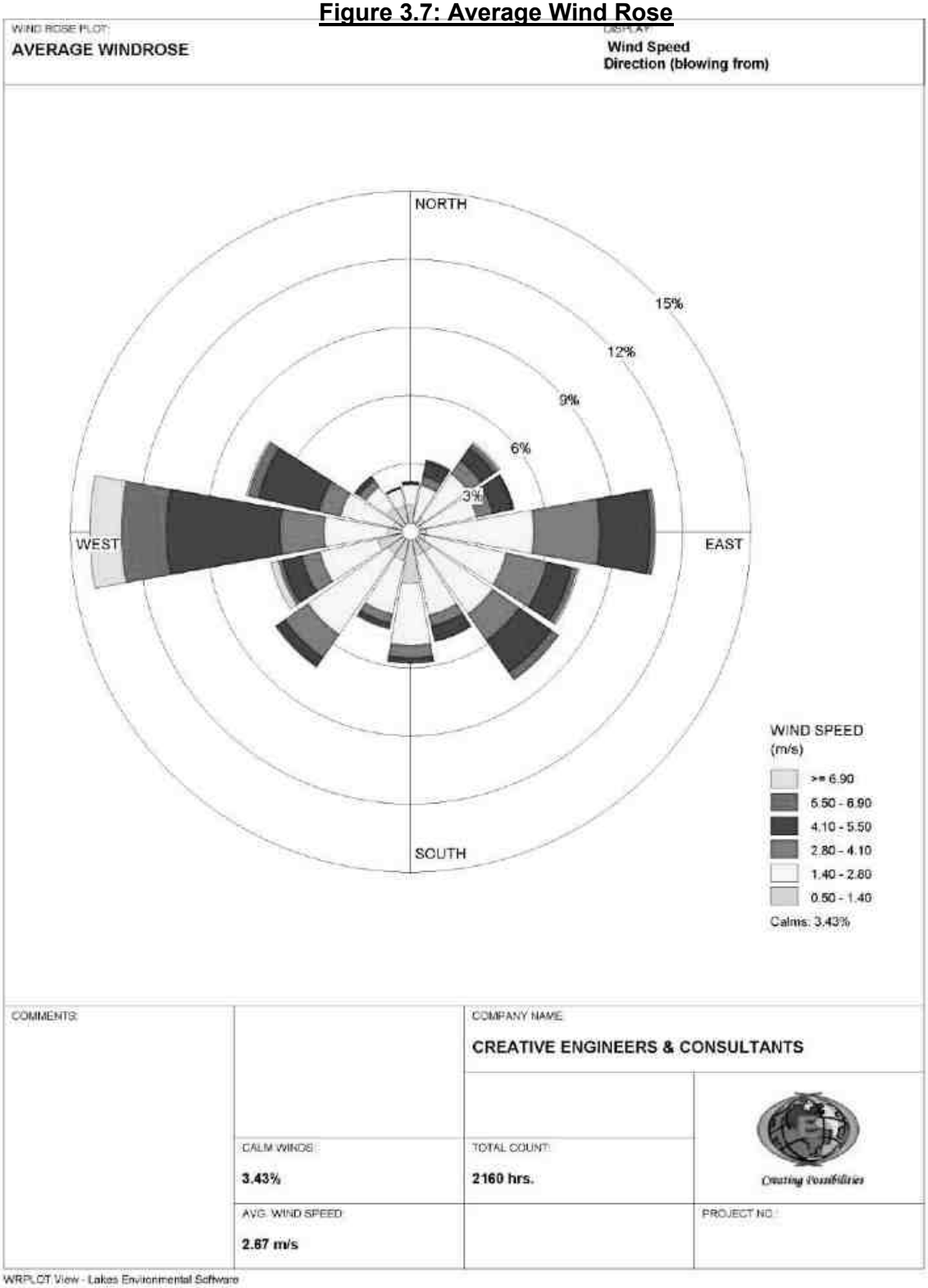
DATA ANALYSIS:

The temperature in the area during the study period ranged from 23.0ºC to 41.0ºC while the relative humidity varied between 21.0 – 99.0%. The wind speed during the study period ranged from <1.8 to 38.9 Km/hr. The predominant wind direction is from W . The meteorological data are presented in **Table no – 3.9.** The average wind rose is depicted in **Figure No - 3.7.**

Table 3.9: Meteorological Data

Season: Summer Season (March – May 2025)			
S.NO	**PARAMETERS**	**MIN**	**MAX**
1	Temperature In ^{0}c	23.0	41.0
2	Humidity in %	21.0%	99.0%
3	Wind speed in km/hr	<1.8	38.9
4	Predominant wind direction from	W	

Figure 3.7: Average Wind Rose



3.3.2 AMBIENT AIR QUALITY (AAQ):

Ambient Air quality has been assessed through a network of 5 ambient air quality stations. The following methodology has been considered for design of ambient air quality monitoring network in the area:

- Topography / terrain of study area.
- Populated areas within study area.
- Residential /sensitive areas within study area.
- Magnitude of surrounding industries.
- Representation of regional background levels.
- Representation of cross sectional distribution in down wind direction.
- Predominant wind direction and wind pattern.

Table 3.10: Air Quality Monitoring

1.	**Monitoring Period**	Summer Season (Mar 2025 – May 2025)
2.	**Monitoring Location**	The location map showing Ambient Air Quality study stations are shown in **Figure No- 3.8.**
3.	**Methodology**	
	Parameter	**Protocol**
	a. Particulate Matter (PM10)	Gravimetric (IS 5182: Part 23:2017)
	b. Particulate Matter PM2.5	Gravimetric (IS 5182: Part 24:2019)
	c. Sulphur Dioxide	Colorimetric (West & Gaeke Method) (IS 5182: Part 02: 2017)
	d. Nitrogen Dioxide	Colorimetric(Modified Jacob & Hocheiser Method) (IS 5182: Part 06:2017)
	e. Carbon Monoxide	CO Monitor
	f. Silica	Colorimetric (Molybdate Method) NIOSH 7601 -2003
4.	**Monitoring Frequency**	2 days in a week, 4 weeks in a month for 3 months in a season.

Table 3.11: Air Quality Monitoring Locations

S.NO	LOCATION CODE	LOCATION	DISTANCE FROM CORE ZONE (Km)	DIRECTION
1	A1	Near Mine Lease Area	-	-
2	A2	Nallampalayam Village	850m	NE
3	A3	Elangaicherry Village	550m	NW
4	A4	Adhikudikadu Village	1.2km	SW
5	A5	Unjini Village	1.1km	SE

Figure 3.8: Ambient Air Quality Study Stations

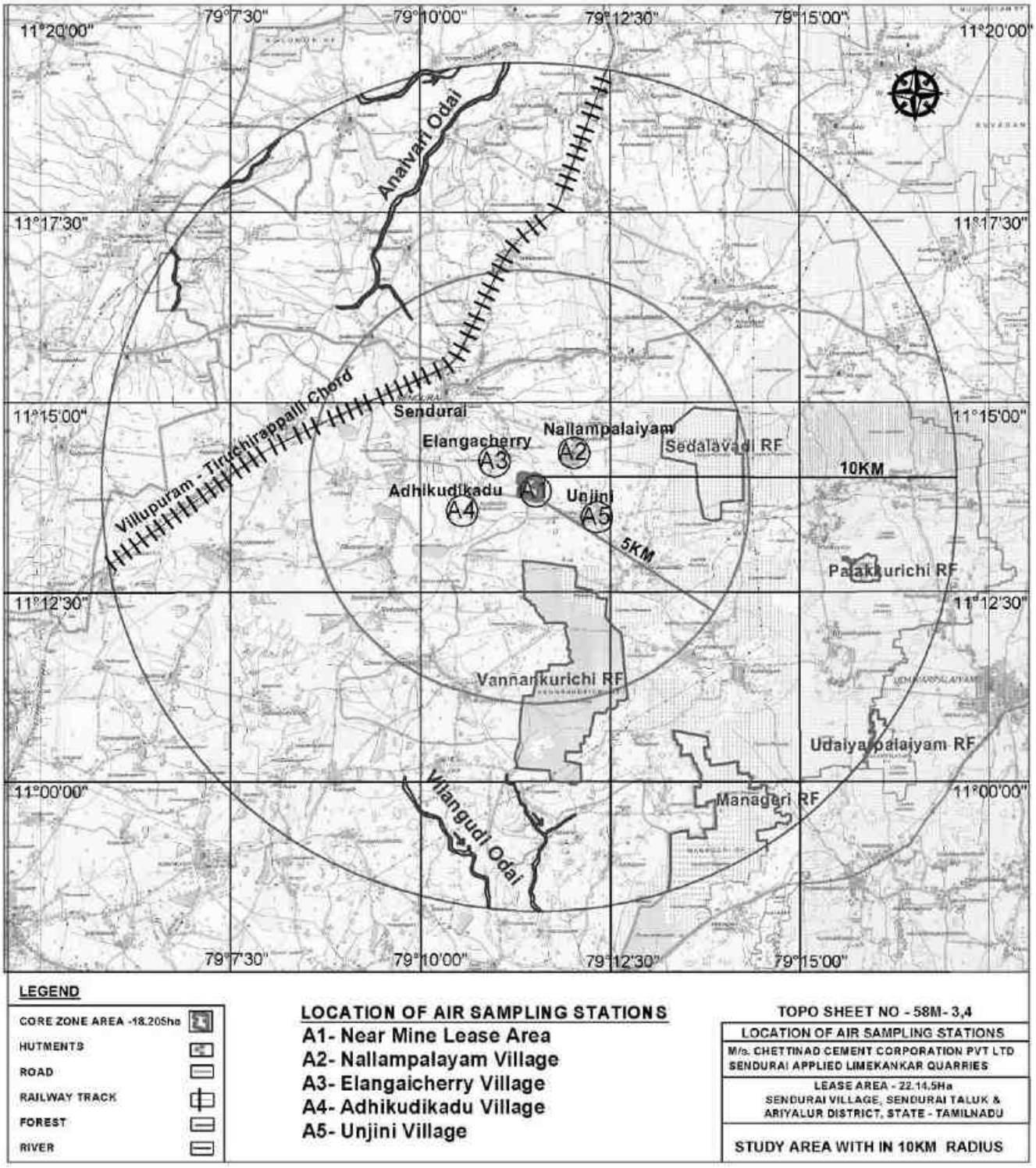


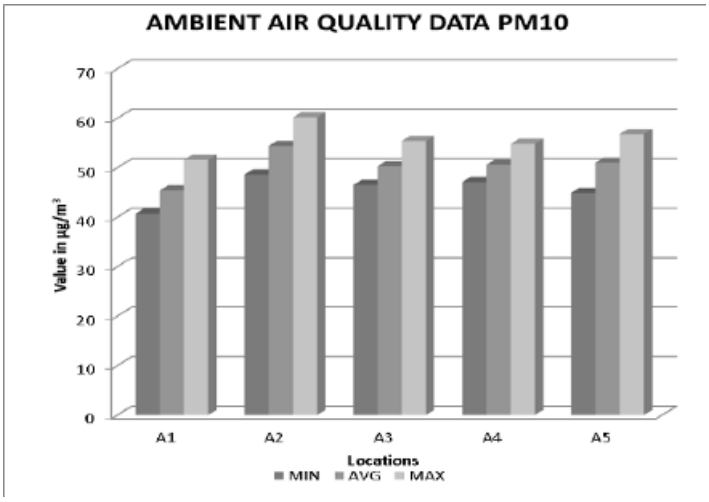
Table 3.12: Ambient Air Quality Data

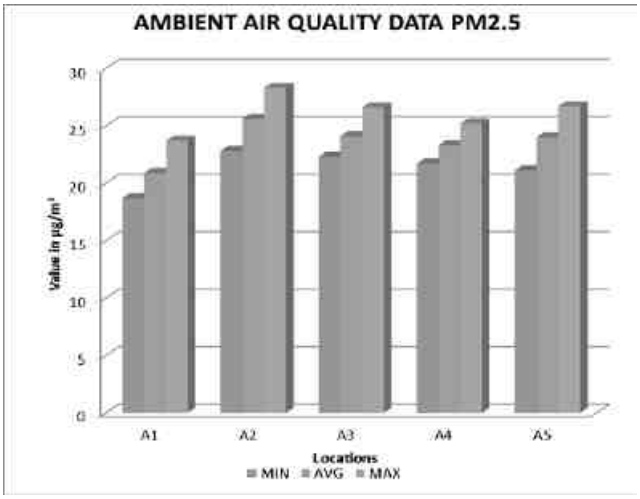
All Value in µg/m³

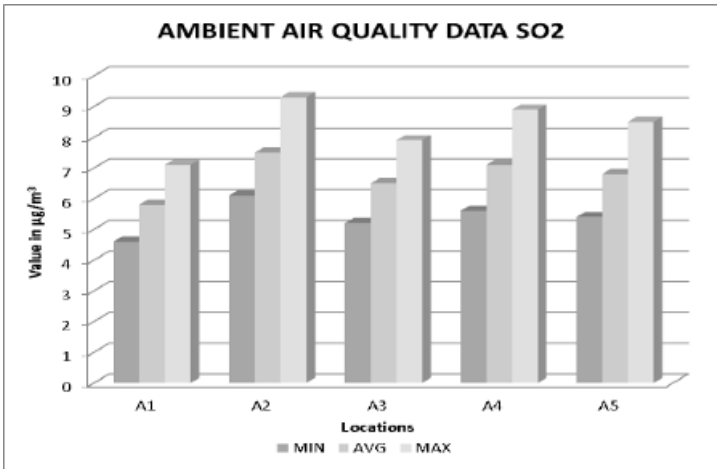
PARAMETERS	Cat.*	PM_{10}			$PM_{2.5}$			SO_2			NO_2		
LOCATIONS		MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX	MIN	AVG	MAX
A1-Near Mine Lease Area	I	40.7	45.4	51.6	18.7	20.9	23.7	4.6	5.8	7.1	8.1	9.3	10.4
A2-Nallampalayam Village	R	48.6	54.4	60.2	22.8	25.6	28.3	6.1	7.5	9.3	8.7	10.3	12.8
A3-Elangaicherry Village	R	46.5	50.3	55.4	22.3	24.1	26.6	5.2	6.5	7.9	8.4	9.7	11.4
A4-Adhikudikadu Village	R	47.1	50.6	54.8	21.7	23.3	25.2	5.6	7.1	8.9	8.5	9.8	11.9
A5-Unjini Village	R	44.9	51	56.8	21.1	24	26.7	5.4	6.8	8.5	8.8	10.3	12.1
NAAQ Limits		PM_{10}			$PM_{2.5}$			SO_2			NO_2		
	*	100			60			80			80		
	**	100			60			80			80		

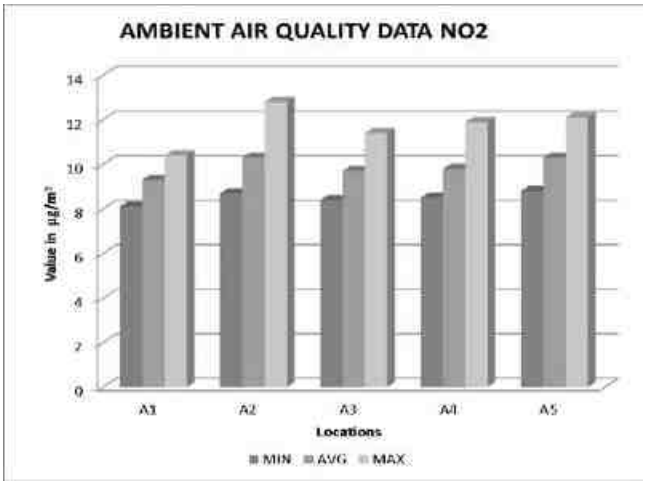
***Note:** Category: * - Industrial, Residential, Rural and other area, ** – Ecologically Sensitive Area (notified by Central Government)*

Figure 3.9: Ambient Air Quality Data









3.3.2.1 Results and Discussion:

The AAQ monitored data for all locations for above parameters are shown in **Table No - 3.12 and** in **Figure No - 3.9.** Ambient Air Quality data during the study period is given in **Annexure – 9.** From the table it is seen that, in the ambient air, the PM_{10} values were in the range of 40.7-60.2 µg/m3. PM2.5 values were in the range of 18.7-28.3 µg/m3. SO2 levels were ranging from 4.6– 9.3 µg/m3. NO2 levels were ranging from 8.1-12.8µg/m3.

The existing Ambient Air Quality levels for PM_{10}, $PM_{2.5}$, SO_2 and NO_2, are within the NAAQ standards prescribed CPCB limits of 100 µg/m^3, 60 µg/m^3, 80 µg/m^3 & 80 µg/m^3. The CO values in all the locations were found to be below detectable limit. Silica values in the study area are found to be below detectable limit. (Detection limit – 0.05 mg/m^3)

3.3.3 WATER ENVIRONMENT:

Assessment of baseline data on water environment includes Identification of water resources, Collection of water samples and Analyzing water samples collected for physico-chemical parameters as per standards. The water sampling was carried out for 5 locations. Details of the same has been provided below:

Table 3.13: Water Quality Monitoring

1.	**Monitoring Period**		Summer Season (Mar 2025 – May 2025)		
2.	**Monitoring Location**		The location map showing water sampling locations are given in **Figure No.3.10.**		
	Code	**Location**	**Sample Type**	**Distance**	**Direction**
	W1	Near Mine Lease Area	Bore well	-	-
	W2	Nallampalayam Village	Bore well	850m	NE
	W3	Elangaicherry Village	Bore well	550m	NW
	W4	Adhikudikadu Village	Bore well	1.2km	SW
	W5	Unjini Village	Bore well	1.1km	SE
3.	**Methodology**		Sampling - IS 3025 Part - I		
			Analysis – IS 3025 relevant parts / APHA 23rd Edition		

Figure 3.10: Location of Water Sampling Stations

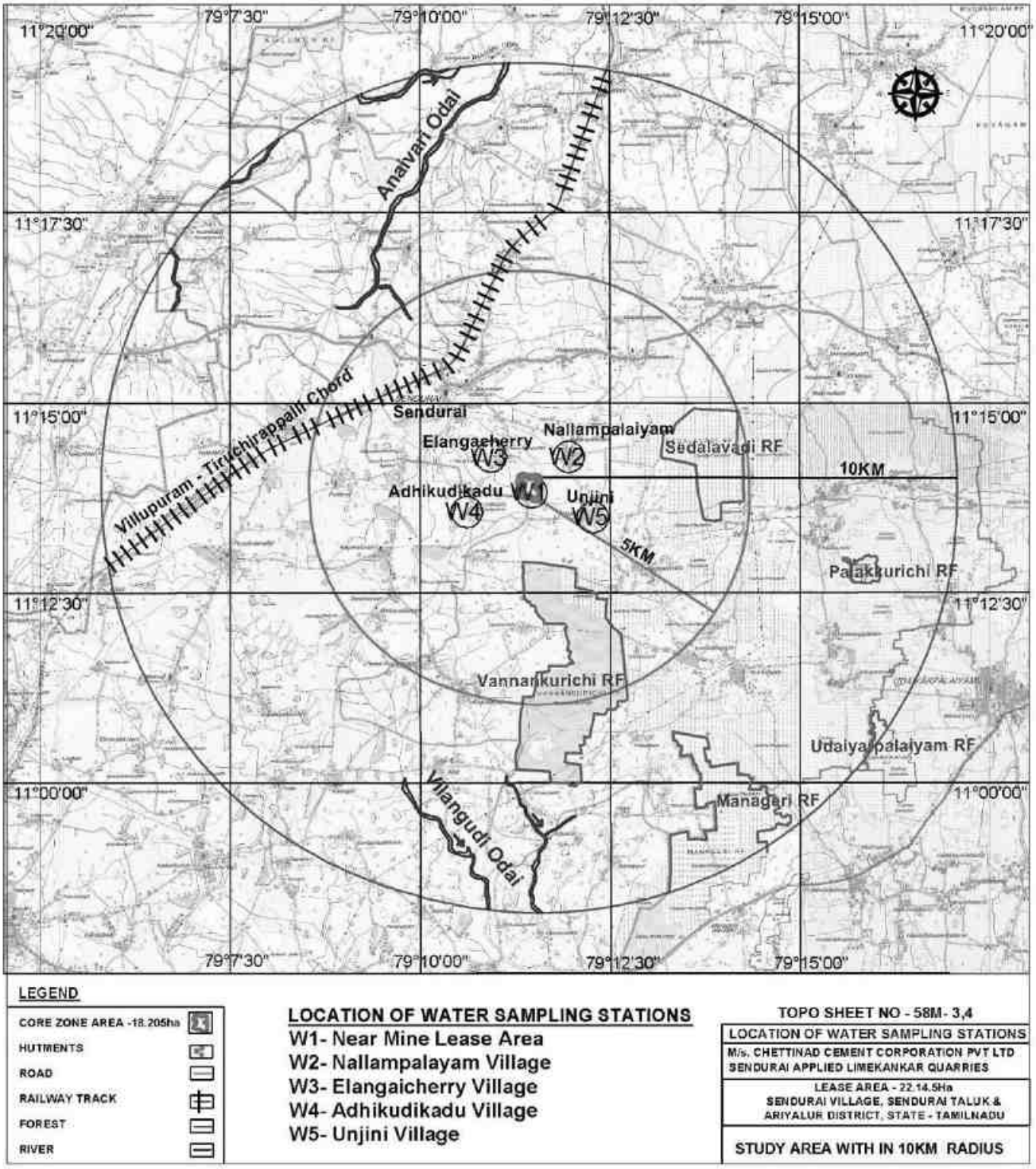


Table 3.14: Summary of Water Quality Data

Season	Summer Season (Mar 2025 – May 2025)	
Monitoring Locations	5 locations	
Parameters	**Range of values**	**Limits***
pH at 25 ˚C	6.89 – 7.54	**6.5-8.5**
Total Dissolved Solids, mg/L	450 – 770	**2000**
Chloride as Cl-, mg/L	114 – 446	**1000**
Total Hardness (as CaCO3), mg/L	302 – 390	**600**
Total Alkalinity (as CaCO3), mg/L	232– 344	**600**
Sulphates as SO42-, mg/L	72.6 – 222	**400**
Iron as Fe, mg/L	0.04 – 0.09	**0.3**
Nitrate as NO3, mg/L	1.56 – 3.28	**45**
Fluoride as F, mg/L	0.36 – 0.45	**1.5**

3.3.3.1 Results and Discussion:

The results of the 5 bore well water sample analysis are shown in **Table No - 3.14.** The pH values of bore well water were ranging in between 6.89 – 7.54 TDS values were in the range of 450 – 770 mg/L. Chloride values were ranging from 114 – 446 mg/L. Iron content was found to be in the range 0.04 – 0.09 mg/L. The water quality of ground water is found to be within the prescribed Permissible limits of IS: 10500 Norms in the absence of an alternative source as per Drinking Water Specifications. The water quality data is provided in **Annexure-10.**

3.3.4 NOISE ENVIRONMENT:

Opearional phase of this project may lead to increase noise levels from the existing levels at least in and around the project area. As noise level beyond permissible limits will cause adverse impacts on the environment, it has become imperative to assess the noise levels in and around the mine area. Noise level measurements were taken at the 5 locations during the monitoring period. Details of the same are provided below:

Table 3.15: Noise Level Monitoring

1.	**Monitoring Period**	Summer Season (Mar 2025 – May 2025)		
2.	**Monitoring Location**	The location map showing noise monitoring locations are given in **Figure No.3.11.**		
	Code	**Location**	**Distance**	**Direction**
	N1	Near Mine Lease Area	-	-
	N2	Nallampalayam Village	850m	NE
	N3	Elangaicherry Village	550m	NW
	N4	Adhikudikadu Village	1.2km	SW
	N5	Unjini Village	1.1km	SE
3.	**Methodology**	Noise levels were measured using sound level meter manufactured by (Model No - SL- 4001, Make - Lutron). Sound Pressure Level (SPL) measurements were measured at all locations where ambient air quality monitored; one reading for every hour was taken for 24 hours.		
4.	**Monitoring Frequency**	Once during monitoring period		

Figure 3.11: Location of Noise Sampling Stations

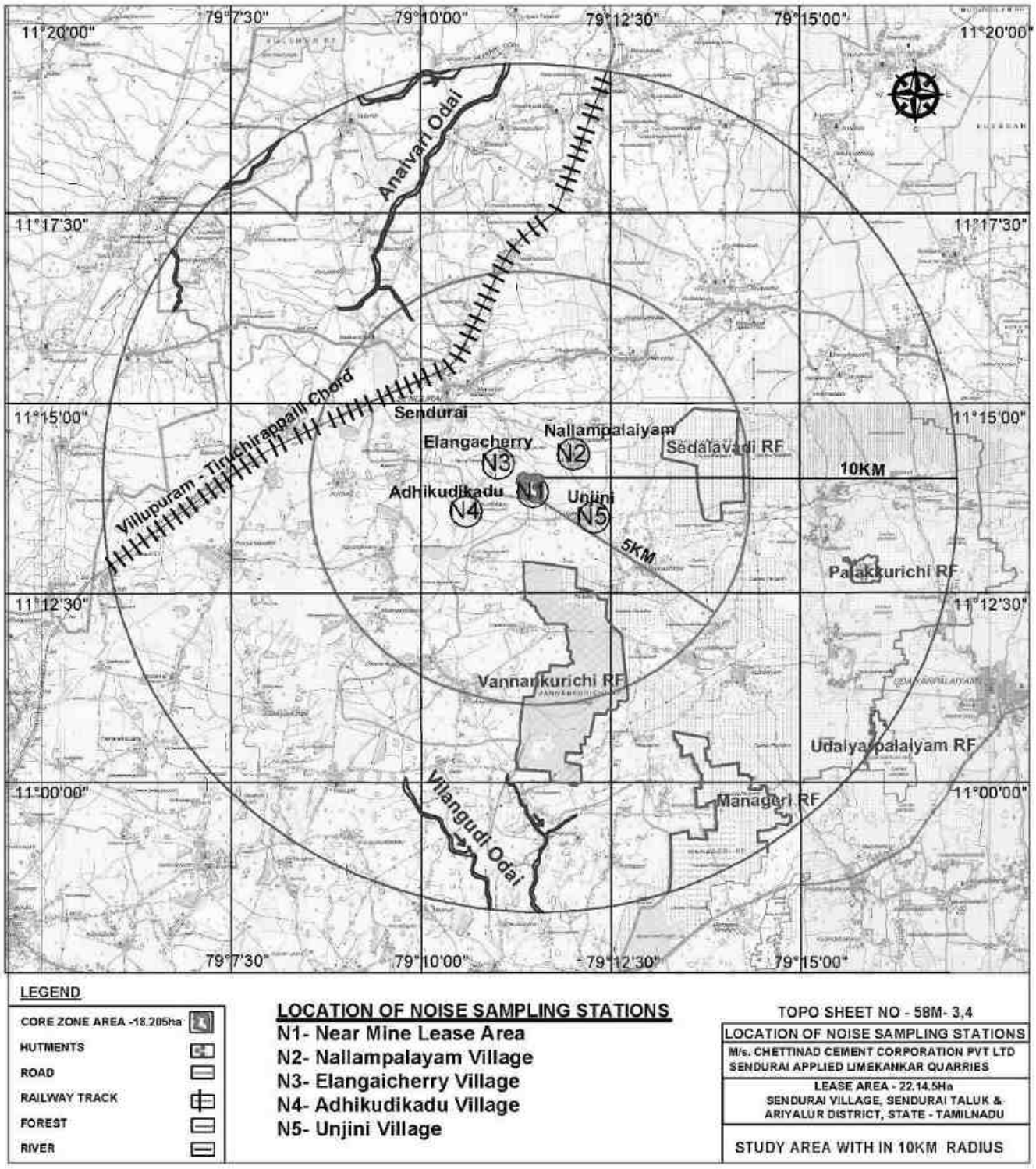
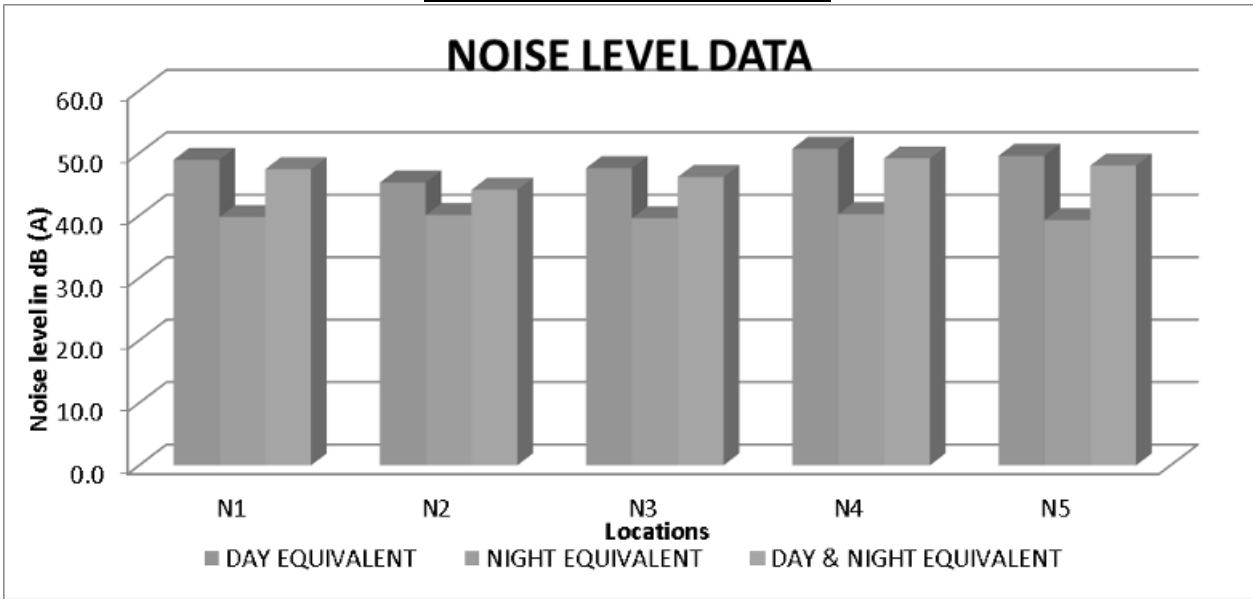


Table 3.16: Ambient Noise Level in dB (A)

Date and time of monitoring	N1	N2	N3	N4	N5
Day Equivalent	48.9	45.3	47.6	50.7	49.6
Night Equivalent	39.8	40.1	39.6	40.2	39.3
Day & Night Equivalent	47.4	44.1	46.2	49.2	48.0
Limits: As per CPCB: Work zone Exposure in 8 hr - 90 dB(A) As per MoEF&CC: Residential: Day equivalent - 55 dB(A); Night equivalent - 45 dB(A)					

Figure 3.12: Noise Level Data



3.3.4.1 Results and Discussion:

The results of noise levels for all locations are given in **Table No-3.16**.The noise values for all above locations are shown in a comparative chart given in **Figure No - 3.12.** In the buffer zone, day Equivalent Noise (Leq-d) noise levels were ranging from 45.3 dB(A) to 50.7 dB(A) and night Equivalent Noise (Leq-d) levels ranged between 39.3 dB(A) to 40.2 dB(A).While comparing with the MOEF&CC Norm of 55 dB(A) for day time and 45 dB(A) for night time, the monitored ambient noise levels were within the limit values for Residential areas.

3.3.5 SOIL CHARACTERISTICS:

Soil samples were collected in 5 locations in the core and buffer zone to analyse the physiochemical characteristics of the soil in the area. Elaborate details of the same has been provided below.

Table 3.17: Soil Quality Monitoring

1.	**Monitoring Period**	Summer Season (Mar 2025 – May 2025)		
2.	**Monitoring Location**	The location map showing soil sampling locations are given in **Figure No.3.13.**		
	Code	**Location**	**Distance**	**Direction**
	S1	Near Mine Lease Area	-	-
	S2	Nallampalayam Village	850m	NE
	S3	Elangaicherry Village	550m	NW
	S4	Adhikudikadu Village	1.2km	SW
	S5	Unjini Village	1.1km	SE
3.	**Methodology**	Composite soil samples using sampling augers and field capacity apparatus.		
4.	**Monitoring Frequency**	Once during monitoring period		

Figure 3.13: Location of Soil Sampling Stations

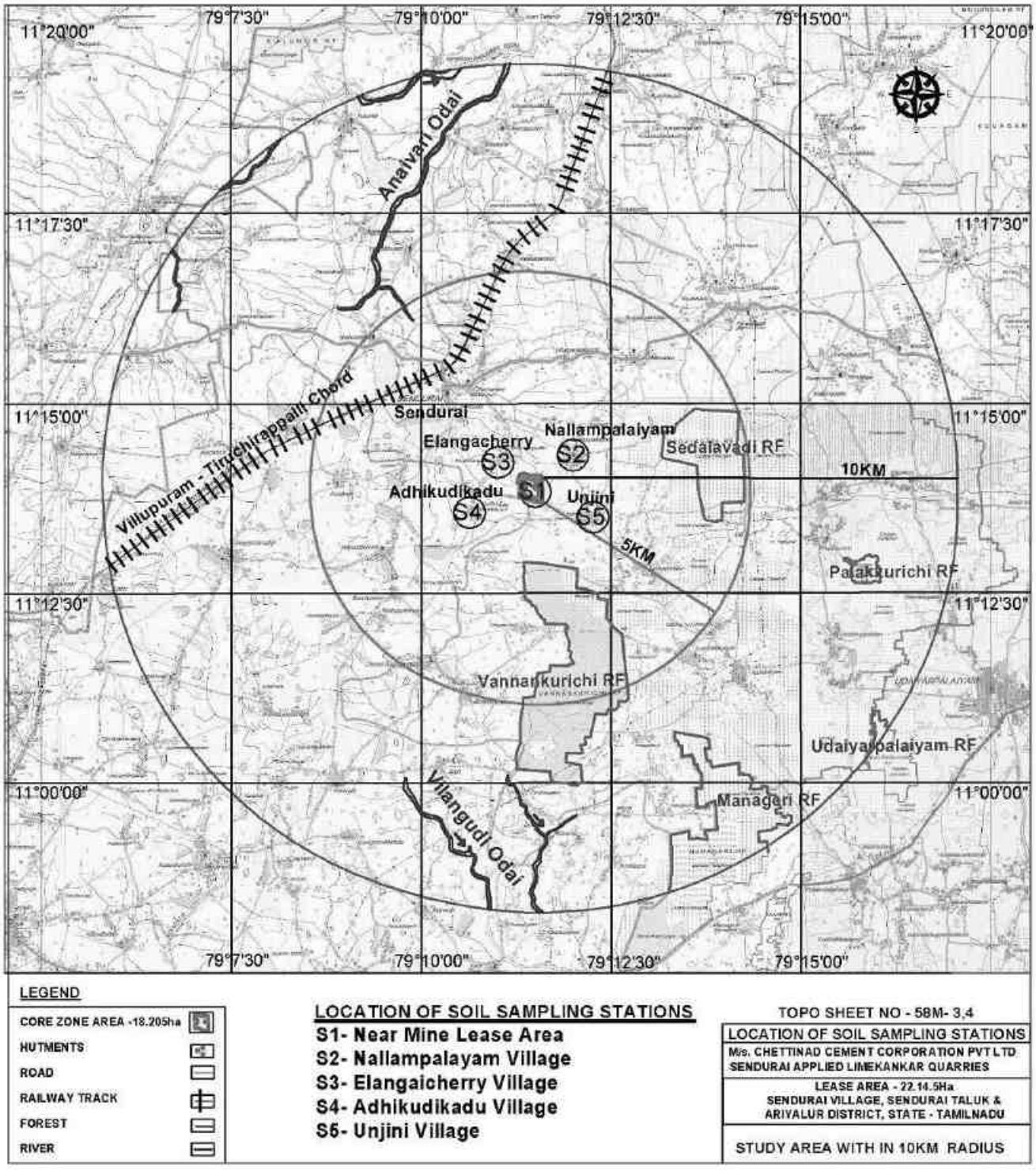


Table 3.18: Soil Quality Data

S.No	Parameters	Unit	S1	S2	S3	S4	S5
1	pH at 25°C	-	7.49	6.94	7.25	7.45	6.97
2	Electrical Conductivity	(µmhos/cm)	58.74	60.34	98.47	52.11	90.34
3	Dry matter content	%	94.52	97.45	96.54	97.65	95.22
4	Water Content	%	5.48	2.55	3.46	2.35	4.78
5	Organic Matter	%	0.76	0.92	0.74	1.12	0.76
6	Soil texture	-	Silty Clay	Silty Clay	Clay	Silty Clay	Silty Clay
7	Grain Size Distribution i. Sand	%	6.89	3.35	5.48	9.33	6.56
8	ii. Silt	%	35.78	58.21	37.82	40.99	44.35
9	iii. Clay	%	57.33	38.44	56.70	49.68	49.09
10	Phosphorous	µg/g	0.62	0.79	0.84	1.41	1.22
11	Sodium	mg/kg	712	725	845	690	934
12	Potassium	mg/kg	326	312	412	268	367
13	Total Nitrogen	mg/kg	242	275	289	312	205
14	Total Sulphur	%	BDL(D.L.0.02)	BDL(D.L.0.02)	BDL(D.L.0.02)	BDL(D.L.0.02)	BDL(D.L.0.02)
15	Porosity	%	19.9	17.6	19.1	16.7	18.5
16	Water Holding Cabacity	Inches/foot	40	35	36	40	38

3.3.5.1 Results and Discussion:

Results of the soil samples show that the pH values were ranging between 6.94 to 7.49 and Electrical Conductivity values were ranging between 52.11 – 98.47 µmhos/cm. Soils are generally Silty Clay type. Organic matter values were ranging between 0.74 – 1.12 %. Phosphorus values were ranging between 0.62 – 1.41 µg/g. Potassium values were ranging between 268 -412 mg/kg. Sodium values were ranging between 690- 934 mg/kg. Total Sulphur values were observed to be BDL. The soil quality data for the 2 samples collected and analyzed are provided in **Table No – 3.18.**

3.4 LAND ENVIRONMENT - LANDUSE & LAND COVER

For preparing an impact statement, aspects of the land conditions are covered under land use. An industrial project / mine can cause changes in land use, soil process in different intensities depending upon the size of the project and distance involved between the industries and the area. Here, land use status for a radius of 10 km has been studied.

3.4.1 DATA USED AND METHODOLOGY

For the present study on land use pattern of buffer area around the proposed stone and gravel quarry, an archived historical data of Landsat 8 data shas been used as base data acquired on April 2025 has been used to generate the require landuse map showing their spatial pattern within the buffer area. The table showing data used for generation of information on landuse and subsequent GIS analysis is given below

Table 3.19: RS satellite image used for the present study

S.No	Type of Data	Date	Generated Map
1.	Sentinel 2	April 2025	Landuse (LU) Map showing 10 Km buffer zone

Interpretation of satellite image requires understanding of relationship between image elements and their respective terrain elements. Since, in the present study, the landuse information is obtained using visual interpretation, an interpretation key is generated. The image elements such as color, tone, texture, size, shape and associated elements have been used to delineate various landuse categories. The landuse categorization and nomenclature used in the present study is based on the national level landuse classification system, which is adopted for the entire country as recommended by NationaL Remote Sensing Centre (NRSC), Department of Space, Government of India.

Figure 3.14 : Landsat 8 Satellite Data of the Study Area

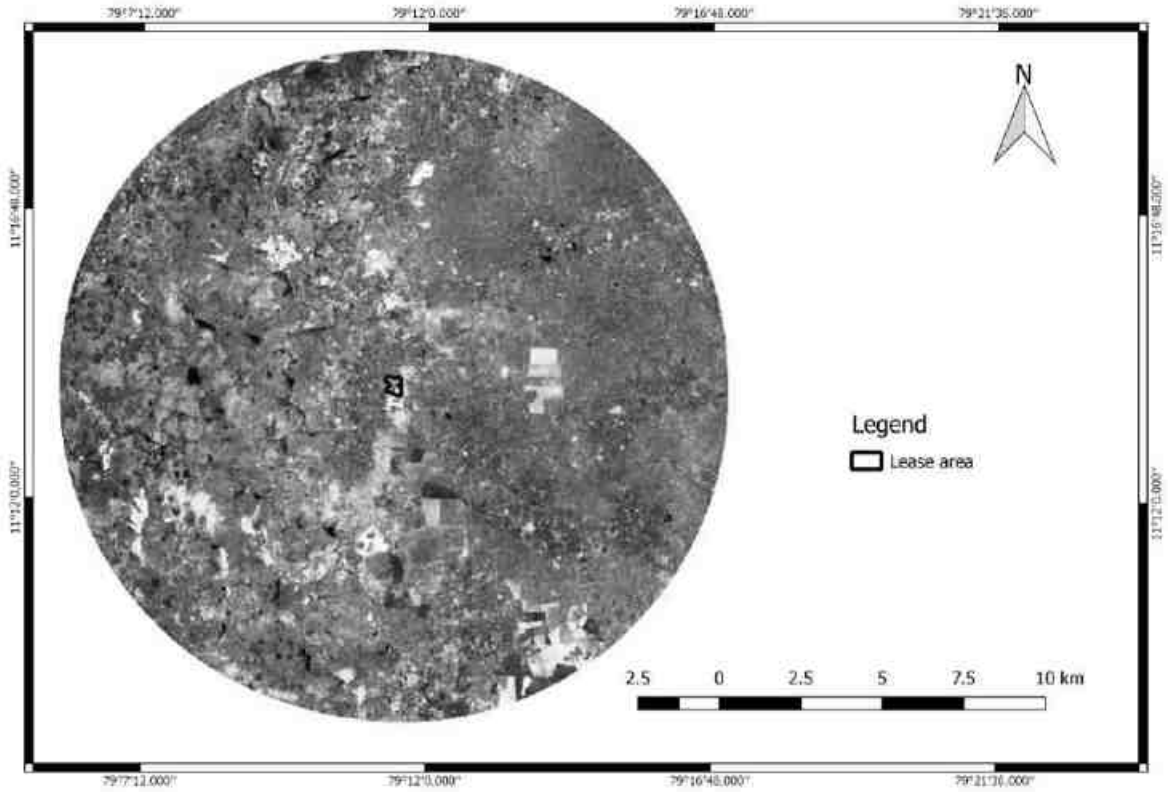


Table 3.20: Major Landuse Units of the Study Area

S.No	Major Category	Landuse unit
1	Built-Up Land	Village, Town, Industrial / Vacant Area
2	Agricultural Land	Crop Land Fallow Land Plantation Farm Land
3	Forest Land	Open Scrub Forest
4	Waste Land Mining Area	Land With Scrub/ Land Without Scrub Barren Rocky/ Stony Waste Quarries / Abandoned Quarries
5	Waterbodies	Tanks/ Rivers / Streams

Such LandUse and Land cover (LULC) categories have been verified using field check and identified sample sites within the buffer area, verified on field and transferred into gis geo-coordinates using observation coordinates received from hand held GPS (global positioning system) instrument. Thus, an interpreted final landuse map has been generated using above such elaborate procedure and transformed into GIS environment for its spatial distribution and area estimation. Spatial nature and extent of various landuse categories within the buffer area is discussed is given below:

Figure 3.15: Map Showing Land Use Categories around 10km Buffer

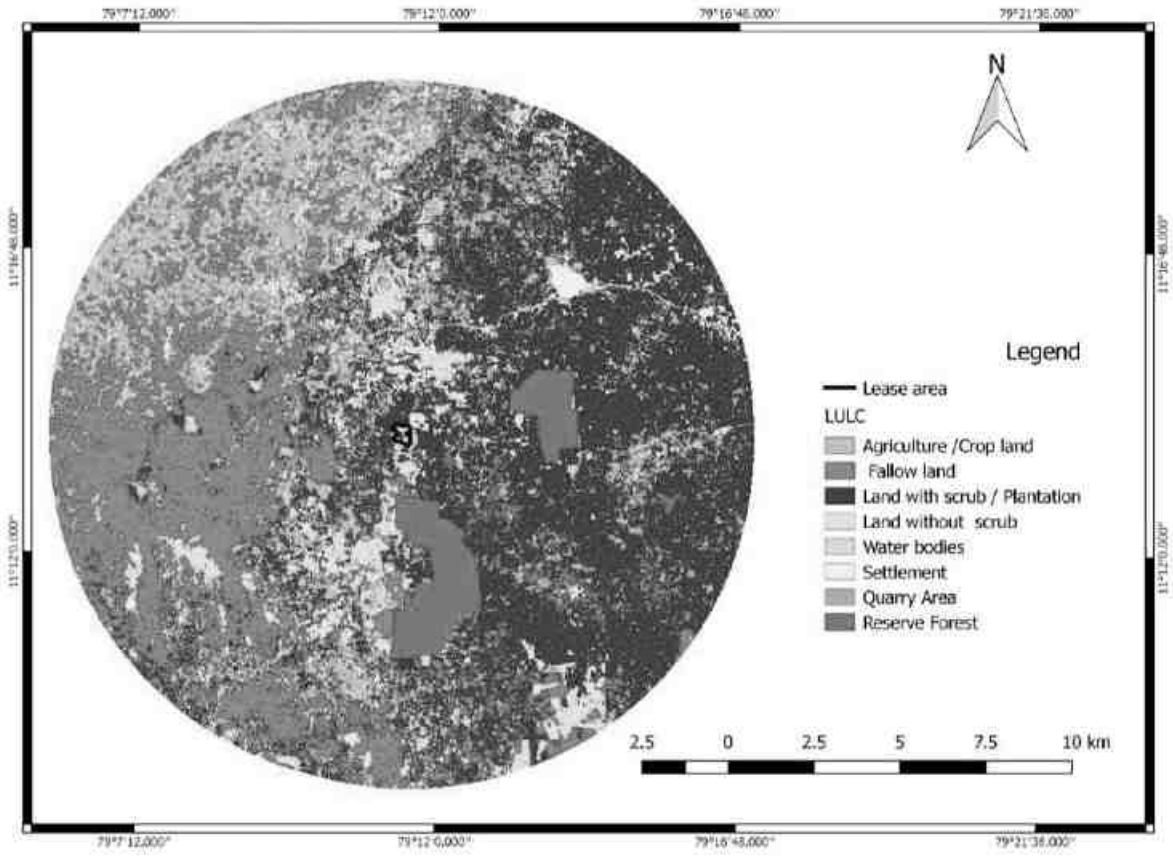


Table 3.21: Area Estimation of Landuse Categories in Buffer Zone

S.No	Landuse Feature	Area (Sq.Km)	Percentage
1	Agriculture/Crop	79.28	23.60
2	Fallow Land	84.58	25.18
3	Land With Scrub/ Plantation	109.68	32.66
4	Land Without Scrub	36.44	10.85
5	Reserve Forest	10.96	3.26
6	Water bodies	4.80	1.43
7	Settlement	8.61	2.56
8	Mining	1.51	0.45
	Total	334.86	100

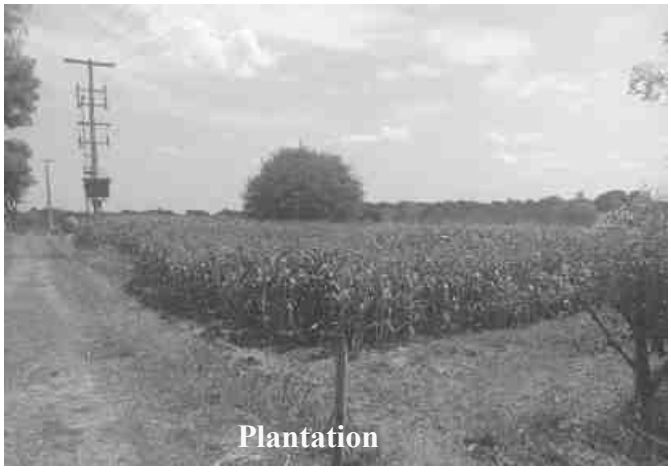
From the above table it is seen that 23.60% of the buffer area is classified under the Agriculture/ Plantation followed by 25.18 % of fallow land, 32.66 % constitutes land with scrub, 10.85 % constitutes land without scrub and the balance falls under other land use categories.

Photograph shows landuse Photographs in Buffer zone

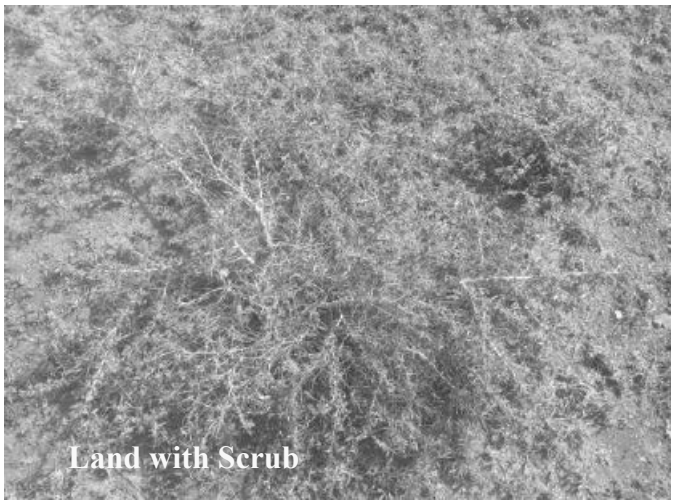

Crop Land


Reserve Forest


Water Bodies


Plantation


Land withour Scrub


Land with Scrub

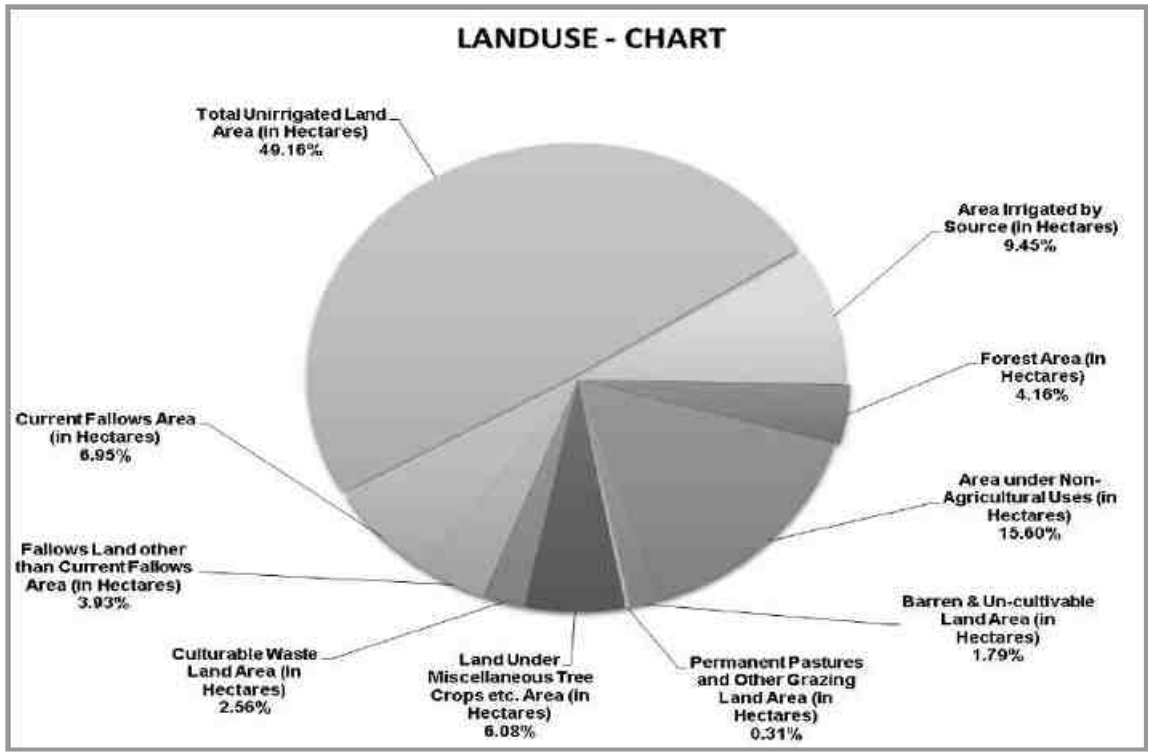
3.4.2 LAND USED BASED ON REVENUE RECORDS:

The lease area and the study area for the land use pattern (10 km radius) has been divided into four zones viz. Zone-I (0-2 km), Zone-II (2-5 km), Zone-III (5-10 km) and Zone-IV (0-10 km) respectively. The land use pattern of the study area falling within 10 km radius around the proposed project area is presented in Table no - 3.22. Village wise land use pattern is provided in **Annexure-11.**

Table 3.22: Land Use Pattern of the Study Area Falling Within 10 Km Area in (Ha)

VILLAGE NAME	Total Geographical Area	Forest Area	Area under Non-Agricultural Uses	Barren & Un-cultivable Land Area	Permanent Pastures and Other Grazing Land Area	Land Under Miscellaneous Tree Crops etc. Area	Culturable Waste Land Area	Fallows Land other than Current Fallows Area	Current Fallows Area	Total Un irrigated Land Area	Area Irrigated by Source
0- 2 KM	2185.82	0	524.03	0	0	74.55	74.3	63.78	284.47	1095.4	69.29
2 - 5 KM	11499.63	0	1893.06	156.03	38.39	871.2	263.9	59.64	499.82	7074.35	643.24
5-10 KM	36501.57	2090.01	5413.91	742.84	117.38	2104.33	946.18	1849.86	2701.56	16504.06	4031.44
0-10 KM	**50187.02**	**2090.01**	**7831**	**898.87**	**155.77**	**3050.08**	**1284.38**	**1973.28**	**3485.85**	**24673.81**	**4743.97**

Figure 3.16: Landuse within the Buffer Zone Area



3.5 BIOLOGICAL ENVIRONMENT:

Study of the biological environment of any area comprises of well-planned ecological survey for the floristic and faunal composition of the areas through various scientifically planned techniques.

3.5.1 FLORA:

An ecological survey of the study area was conducted with reference to listing of species and assessment of the existing baseline ecological conditions. The objective of the survey is as follows:

- ❖ Generate existing data from field observations of various terrestrial floristic occurrences.
- ❖ Collect secondary data from Government records as well as through discussion with Forest officials, knowledgeable public etc.,
- ❖ Compare the data with authentic past records to identify changes, if any.
- ❖ Identify the impact of project operations on the biological aspects.

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius was conducted. The locations were identified for phyto-sociological aspects to assess the current status.

3.5.1.1 Sampling Methodology:

In order to provide representative ecological status for the study area, the 10-km radius buffer area has been divided into four quartiles for biodiversity sampling, i.e., NE (Q-1), NW (Q-2) SW (Q-3) and SE (Q-4). Each of the quartiles have been examined for representative flora on randomly sampled quadrats for trees (10x10 m), shrubs (5x5 m) and herbs (1x1 m) depending upon prevailing geographical conditions and bio-diversity aspects of study area.

Phyto-sociological Survey: Phyto-sociological parameters, viz., Abundance (i.e., density), average and minimum stems were measured to determine the distribution and ecological aspects of the species. Abundance is a measure of the density of distribution of an individual species within a given area. It is calculated by summed individuals of a species. Average species number is calculated for all quadrates; similarly, minimum number of individuals

represented is recorded at quadrats level. A total of 5 quadrats were laid down in core area and a total of 20 quadrats were laid out in four quartiles (5 each) of buffer area.

Quadrats method for flora : A total of 100 x 100 m Grid was laid for buffer zone of 300m from Core Zone. In that grid 10 × 10m sub-quadrat were laid down randomly within core, PIZ and 10kms buffer area; each quadrat was laid to assess the trees (>5 cm GBH) and 5 × 5 m sub-quadrat nested within the quadrat for shrubs and two plot 1 × 1 m for herbs. The quadrats were laid apart to maximize the sampling efforts and minimize the species homogeneity, such as small stream area, Mining area, Woking pit, Old quarries, agricultural areas, tank bunds, farm forestry plantations, natural forest area, avenue plantations, house backyards, etc. In each sample quadrate, individuals belonging to tree, shrub and herb species were recorded separately, and have been identified on the field. The prevailing land use and habitat quality has been noted down for each location on the field.

Vegetation Analysis using index: Species diversity will be calculated by using Shannon and Wiener (1963) formula as follows:

$$H' = -\sum_{i=1}^{R} p_i \ln p_i$$

Whereas,

H´ is Shannon index of general diversity,

p_i is often the proportion of individuals belonging to the ith species in the dataset of interest.

Evenness index was calculated as: E = H´/Hmax,

Whereas Hmax = log2 (number of species in the plot)

A.CORE ZONE:

The lease area is a non forest, private land. The lease area is dominated with Prosopis juliflora. There are 3 trees species from 2 families followed by 3 shurbs from 3 families and 2 herbs from 2 family were recorded in the core zone. The detailed list of plants found in the core zone are given in Table no – 3.23


11°13'47.02789"N 79°11'28.8816"E
Sendurai
Tamil Nadu


May 12, 2025 11:31:44 AM
11°13'59.28957"N 79°11'30.25544"E ±3.79m
Unnamed Road
Elangaicherry
Tamil Nadu


May 12, 2025 11:31:38 AM
11°13'59.90029"N 79°11'30.27768"E ±3.79m
Unnamed Road
Elangaicherry
Tamil Nadu


11°13'47.13654"N 79°11'28.9644"E
Sendurai
Tamil Nadu

Table 3.23: List of Floristic Species in the Core Zone

Sl.No	Species Name	Common Name	Family
Trees			
1	*Acacia nilotica*	Karuvelan	Fabaceae
2	*Morinda tinctoria*	Nuna	Rubiaceae
3	*Prosopis juliflora*	Cimaikkaruvel	Fabaceae
Shrubs			
1	*Lantana camara*	Unni chedi	Verbenaceae
2	*Cassia auriculata*	Fabaceae	Aavarampoo
3	*Jatropha glandulifera*	Vellaikattukottai	Euphorbiaceae
4	*Calotropis gigantea*	Yerukku	Apocynaceae
Herbs			
1	*Acalypha indica*	*Kupaimeni keeri*	Amaranthaceae
2	*Anisomeles indica*	marutti	Lamiaceae

In the lease area is dominated with thorny bushes and local Nuna and Avaram. There are no rare, endangered, threatened (RET) species were recorded and therer is no much diversity. Due to less species diversity in the lease area and tree species are common in the periphery of the lease area, no impact on the species diversity is envisaged.

C.BUFFER ZONE:

The Dominated species in the buffer zone are Albizia lebbeck, Acacia auriculiformis, Sygygium cumuni, Borassus flabellifer, Azadirachta indica, Prosopis juliflora, etc. The detailed list of plants found in the Buffer zone is given in Table no – 3.24.

Table 3.24: List of Floristic Species in the Buffer Zone

The buffer zone comprises of agriculture, fallow land and plantation. Agriculture activity mainly depends on monsoon season only. Vannankurichi RF:- 1.6km- (S), Sedalavadi RF-3.0km- (NE), Manageri RF- 6.4km- (SE), Palakkurichi RF- 7.4km- (E), Udaiyarpalaiyam RF-9.5km- (SE) are present in the study area. The forest department is converting the low yielding species to high yielding species in the forest area like Munthiri & Dalbergia Sp. Agriculture is seen mainly on the northern, North western side of the study area in proximity to odai, due to presence of rainfed irrigation facility and the favourable soil condition. Since the lithology of the eastern side of the study area, is predominantly motteled sandstone type Munthiri (Annacordium occidentalae) prdominantly present in this area. The Dominated species in the buffer zone are Annacordium occidentalae, Mangifera indica, Albizia lebbeck, Acacia auriculiformis, Sygygium cumuni,

Borassus flabellifer, Azadirachta indica, Prosopis juliflora, etc. The detailed list of plants found in the Buffer zone is given in Table no – 3.24.

.Sl.No	Species Name	Family	Local Name
Trees			
1	*Terminalia arjuna*	Combretaceae	Marudha Maram
2	*Mangifera indica*	Anacardiaceae	Maamaram
3	*Annacordium occidentalae*	Anacordiaceae	Munthiri
4	*Delonix regia*	Fabaceae	Gulmohar
5	*Annona squamosa*	Annonaceae	Siththa
6	*Tamarindus indica*	Fabaceae	Puli
7	*Musa paradisiaca*	Musaceae	Valzhlai
8	*Terminalia catappa*	Combretaceae	Badam Tree
9	*Murraya koenigii*	Rutaceae	Curry leaf
10	*Cassia fistula*	Fabaceae	Konrai
11	*Tectona grandis*	Verbenaceae	Tekku
12	*Acacia leucophloea*	Fabaceae	Valvelam
13	*Azadirachta indica*	Meliaceae	Vembu
14	*Borassus flabelliformis*	Arecaceae	Panna-maram
15	*Moringa oleifera*	Moringaceae	Murungai
16	*Leucaena leucocephala*	Fabaceae	Subabul
17	*Psidium guava*	Myrtaceae	Koyya
18	*Peltophorum pterocarpum*	Fabaceae	Kilukiluppai
19	*Madhuca longifolia*	Sapotaceae	Iluppai
20	*Casuarina equisetifolia*	Casuarinaceae	Savukku
21	*Prosopis juliflora*	Fabaceae	Seemai karuvel
22	*Cocus nucifera*	Arecaceae	Tennai
23	*Pithecellobium dulce*	Fabaceae	Kodukkapuli
24	*Albizia amara*	Fabaceae	Vagai
25	*Manilkara zapota*	Sapotaceae	Sappota
26	*Carica papaya*	Caricaceae	Pappali
27	*Citrus limon*	Rutaceae	Lemon
28	*Caesalpinia pulcherrima*	Fabaceae	Mayilkondrai
29	*Aegle marmelos*	Rutaceae	Vilvamaran
30	*Sygygium cumuni*	Myrtaceae	Naval
31	*Mimusops elengi*	Sapotaceae	Magizhamboo
32	*Acacia nilotica*	Fabaceae	Karuvelan
33	*Acacia auriculiformis*	Fabaceae	Pencile tree
34	*Ficus religiosa*	Moraceae	Poarasamaram
35	*Morinda tinctoria*	Rubiaceae	Nuna
36	*Ficus hispida*	Moraceae	Aarasu
37	*Polyalthia longifolia*	Annonaceae	Nietilingam
38	*Thespesia populnea*	Malvaceae	Puvarasu
39	*Phyllanthus emblica*	Euphorbiaceae	Nelli
40	*Samanea saman*	Fabaceae	Amaivagai
41	*Delonix elata*	Fabaceae	Perungondrai
42	*Ficus benghalensis*	Moraceae	Aalamaram

.Sl.No	Species Name	Family	Local Name
43	*Pongamia pinnata*	Fabaceae	Pungai
44	*Dalbergia Sp*	Fabaceae	Indian Rose wood
Shrubs			
1	*Nerium indicum*	Apocynaceae	Arali
2	*Ixora casei*	Rubiaceae	Idlipoo
3	*Tecoma stans*	Bignoniaceae	*Yellow trumpetbush*
4	*Lawsonia inermis*	Lythraceae	Maruthani
5	*Ricinus communis*	Euphorbiaceae	*Amanakku*
6	*Hibiscus rosa-sinensis*	Malvaceae	Semparuthi
7	*Lantana camara*	Verbenaceae	nuni
8	*Justicia adhatoda*	Acanthaceae	Adathoda
9	*Jatropha glandulifera*	Euphorbiaceae	Vellaikattukottai
10	*Ziziphus jujuba*	Rhamnaceae	*Elanthai*
11	*Calotropis gigantea*	Apocynaceae	Earukku
12	*Boerhaavia diffusa*	Nyctaginaceae	Kagithapoo
13	*Vitex negundo*	Verbinaceae	Vanili
14	*Cassia auriculata*	Fabaceae	Aavarampoo
15	*Datura metel*	Solanaceae	Umatai
16	*Aloe vera*	Asphodelaceae	Chotthu kathalai
17	*Sida cordifolia*	Malvaceae	*Sida plant*
Herbs			
1	*Sida acuta*	Malvaceae	Palambasi
2	*Achyranthes aspera*	Amaranthaceae	*Nayuruvi*
3	*Croton sparsiflorus*	Euphorbiaceae	*Poodu sedi*
4	*Andrographis paniculata*	Acanthaceae	*Kirayt*
5	*Boerhavia erecta*	Nyctaginaceae	*Erect spiderling*
6	*Acalypha indica*	Amaranthaceae	*Kupaimeni keeri*
7	*Ocimum tenuiflorum*	Lamiaceae	Thulasi
8	*Parthenium hysterophorus*	Asteraceae	*Parthenium*
9	*Argemone mexicana*	Papaveraceae	*Mexican poppy*
10	*Anisomeles malabarica*	Lamiaceae	Peyimarutti
11	*Solanum incanum*	Solanaceae	Karimulli
12	*Anisomeles indica*	Lamiaceae	marutti
13	*Solanum nigrum*	Solanaceae	*Manatthakalli*
14	*Leucas aspera*	Lamiaceae	*Thumbai*
15	*Tridax procumbens*	Asteraceae	Vettukai poondu
16	*Tephrosia purpurea*	Fabaceae	Vayal poondu
17	*Phyllanthus niruri*	Phyllanthaceae	*Keelzhaneeli*
18	*Cleome viscosa*	Cleomaceae	*Naai velai*
19	*Vinca rosea*	Apocynaceae	Nithiyakalyani
20	*Tragia involucrata*	Euphorbiaceae	Kanchori
21	Solanum xanthocarpum	Solanaceae	Kandangkattari
22	*Sida rhombifolia*	Malvaceae	*Kurundotti*
23	*Amaranthus viridis*	Amaranthaceae	*Creen amaranth*
Climbers			
1	Asparagus racemosus	Asparagaceae	Tannir-vittan
2	Jasminum angustifolium	Oleaceae	Uccimalligai

.Sl.No	Species Name	Family	Local Name
3	Abrus precatorius	Fabaceae	Kundumani
4	Capparis rotundifolia	Capparaceae	Thoratti
5	Coccinia indica	Cucubitaceae	Kovai
6	Cissus quadrangularis	Vitaceae	Pirandai
Crops			
1	*Musa paradisiaca*	Musaceae	Valzhai
2	*Sorghum vulgare*	Poaceae	Solam
3	*Sesbania grandiflora*	Fabaceae	Agati
4	*Gossypium hirsutum*	Malvaceae	Paruththi
5	*Capsicum annuum*	Solanaceae	Red chilli
Grasses			
1	*Kyllinga nemoralis*	Cyperaceae	Velutta nirbasi
2	*Cyperus rotundus*	Cyperaceae	korai pullu
3	*Chloris barbata*	Poaceae	Kodai pullu
4	*Cynodon dactylon*	Poaceae	Arugampillu

PHOTOGRAPH SHOWING RESRVE FOREST

3.5.2 FAUNA:

Methodology: Both direct and indirect observation methods were used to survey the fauna. Point Survey Method was used to study the Bird diversity. Besides, discussion with local villagers Collection secondary data from Government records, published reports as well as through discussion with Forest officials, knowledgeable public were used for the study.

Observation: Domesticated animals like Cows, Buffalos, Dogs, Cats etc., are commonly found. The lease and 10 Km buffer zone does not fall in the Western Ghats ESA boundary. No wild mammalian species was directly sighted during the field survey. The list of fauna within the study area is given in Table No – 3.25.

Table 3.25: List of Fauna in the Buffer Zone

S.No	Common Name	Scientific name	IWPA, Schedule
Mammals			
1	Common Indian Hare	Lepus ruficaudatus	IV
2	Indian Grey Mongoose	Herpestes edwardsii	II
3	Indian Palm squirrel	Funambuus palmarum	IV
4	Bonnet macaque	Macaca radiata	II
Birds			
1	Purple-rumped Sunbird	Nectarinia zeylonica	IV
2	Cattle Egret	Bubulcus ibis	IV
3	Indian Cuckoo	Cuculus micropterus	IV
4	Little Egret	Egretta garzetta	IV
5	Common Crow	Corvus splendens	V
6	Spotted Dove	Streptopelia chinensis	IV
7	Rose-ringed Parakeet	Psittacula krameri	IV
8	Common Kingfisher	Alcedo atthis	IV
9	Common Quail	Coturnix coturnix	IV
10	Common Myna	Acridotheres tristis	IV
11	House Sparrow	Passer domesticus	IV
12	Black Drongo	Dicrurus macrocercus	IV
13	Common Babbler	Turdoides caudatus	IV
14	Little Cormorant	Phalacrocorax niger	IV
15	Red-vented Bulbul	Pycnonotus cafer	IV
Reptiles			
1	Common Indian krait	Bungarus caeruleus	II
2	Rat Snake	Ptyas mucosa	II
3	Garden Lizard	Calotes versicolar	IV
Amphibians			
1	Common Indian toad	Bufo melanostictus	IV
Butterfly			
1	Lemon pansy	Junonia lemonias	IV
2	Small grass yellow	Eurema brigitta	IV
3	Lime butterfly	Papilio demoleus	IV
4	Common crow	Euploea core	IV
5	Stripped or common tiger	Danaus genutia	IV

3.6 HYDROGEOLOGICAL STUDY:

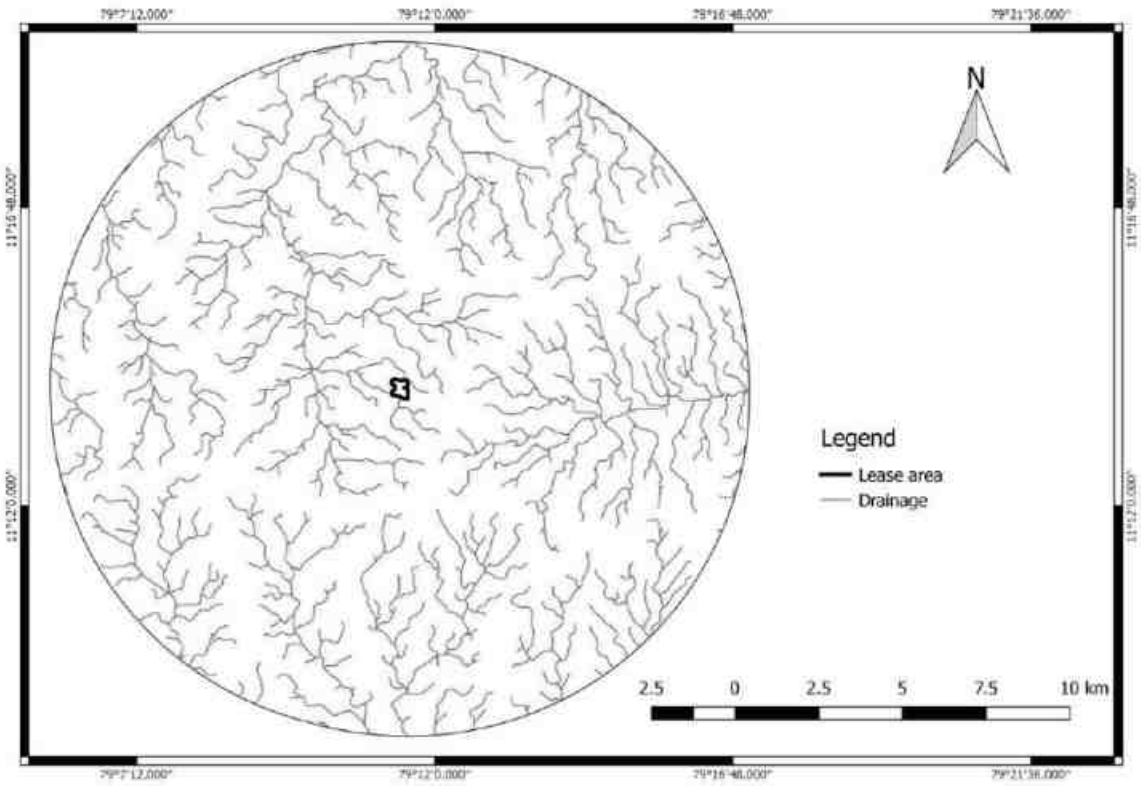
This section delves into the study of the hydrogeological scenario of the study area to evaluate the impact of mining activities on the nearby areas. The study area is considered to understand the nature of the general hydrogeological conditions of the area. The geology of the area and subsurface conditions have been interpreted based on the exploratory data collected from different agencies, like Geological Survey of India, Central Ground Water Board, Govt. of India, PWD department , etc. Intensive well inventory of the area have been undertaken to establish the groundwater flow regimes. The hydrogeological properties of the aquifer existing in the study area have been evaluated through conducting aquifer performance test on representative wells. The test data has been analysed using standard computer aided techniques. The water table elevation map and aquifer parameters evaluated through pump test have been used to establish groundwater flow regime. The ground water resources potential and its utilization have been calculated as per GEC norms

3.6.1 PHYSIOGRAPHY AND DRAINAGE:

Physiography: The area applied for quarry lease exhibits almost plain topography covered by top soil and lime kankar formation. The limekankar formation is noticed below top soil of 0.30m will be side casted and the limekankar of 1.10m). The general elevation of the QL area is 96 to 100 m aMSL.

Drainage: The area is almost flat and plain terrain with a gentle slope towards east. There are no perineal water courses in the lease areas. South of the lease area, vari course situated in S.F.No.39/2, 40/2 & 41 of Unjani village, S.F.No.288 of Rayampuram village and a drainage channel originating from S.F.No.590/14 in the North eastern side. Safety distance of 50m has been left based on precise area conditions.. There are no Perennial Rivers in the vicinity.

Figure 3.17: Drainage Map



3.6.2 HYDROGEOLOGY:

Regional Hydrogeology:

Ariyalur district is underlain by the geological formations ranging in age from Archaean to Recent excluding Tertiary. The important aquifer systems in the district are constituted by weathered and fractured crystalline rocks. Groundwater 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 zone in the district is in the range of 2 to 15 m.

The porous formations in the district include shales, sandstones and clays of Jurassic age (Upper Gondwana), marine sediment of Cretaceous age, sandstones of Tertiary age and Recent alluvial formations. As the Gondwana formations are well compacted and poorly jointed, the movement of groundwater in these formations is mostly restricted. Groundwater occurs under phreatic to semi confined conditions in the inter-granular pore

spaces in sands and sandstones and the bedding planes and thin fractures in shales. In the area underlain by Cretaceous sediments, ground water development is rather poor due to the rugged nature of the terrain and the poor quality of the formation water. Quaternary formations comprising mainly sand, clay and gravels are confined to semi confined in the major drainage courses in the district. The maximum thickness of alluvium is 30 m whereas the average thickness is about 15 m. Groundwater in these formations is being developed by means of dug wells

The major aquifer systems in the district are constituted by (1) Basal crystalline rocks consisting mainly of Charnockites, Granites and Gneisses of Archaean age and (2) Sedimentary formations range in age from Cretaceous to Recent.

Alluvial Formations:

In the river alluvium ground water occurs under water table condition. The maximum thickness is 37 m and the average thickness of the aquifer is approximately 12 to 15 m. These formations are porous and permeable, which have good water bearing zones.

Tertiary formation:

Tertiary formations are mainly Cuddalore Sand stone, mottled ferruginous clays and pebbles. The ground water occurs in semi-confined conditions and confined conditions with good ground water potentials in these aquifers. The Specific Capacity in the Tertiary formations ranges from 40 to 1627 lpm/m/dd.

Cretaceous formations:

Cretaceous formations comprises white Sandy Limestones and Sandstones with fossils, Calcareous mottled Sand stones with fossils, Shell Lime stones, Clays, Sand stones with fossils, Basal Lime stone, Clays and Sandy beds with fossils. Ground water in the sandy clay lenses and fine sands underlain by white and black clay beds constitutes phreatic aquifers in the depth range 10.0 to 15.0 m below ground level. Phreatic aquifers in the limestone are more potential. The Specific Capacity in the cretaceous formation ranges from 18.77 to 90.66 lpm/m/dd.

Hard Rock formations:

Hard rock formations include Charnockites, Granites and Gneisses traversed by Quartz and Pegmatite veins. Ground water occurs under water table conditions in weathered mantle and semi-confined conditions in fractured zones depend on the joints, fracture and its development.

Figure 3.18: Geology Map

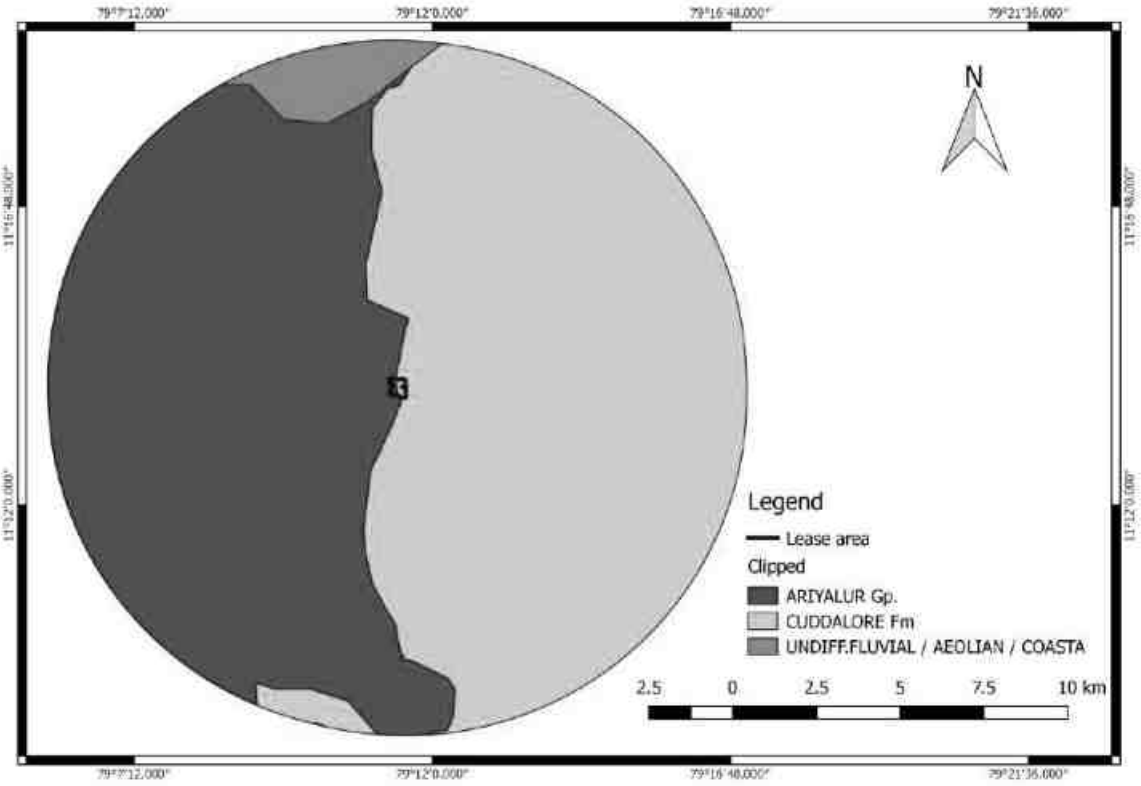
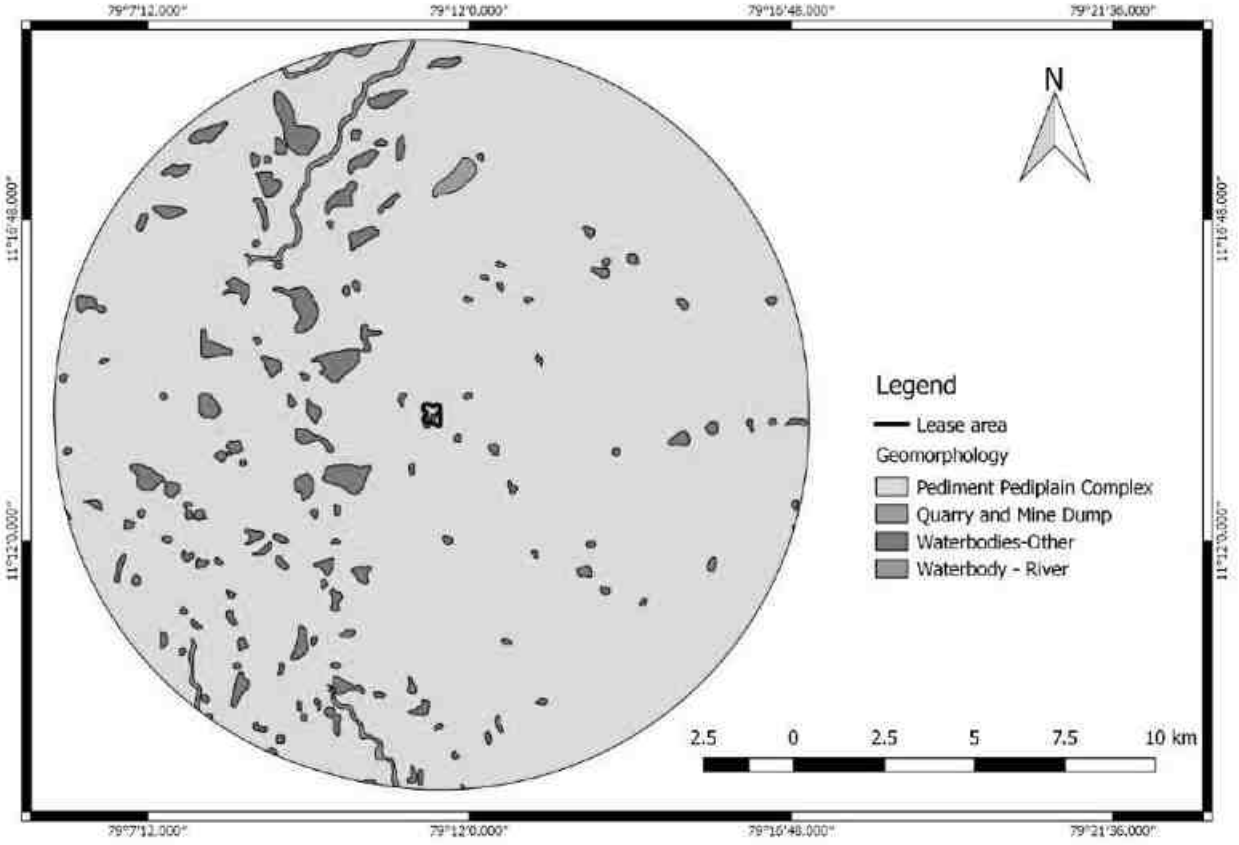
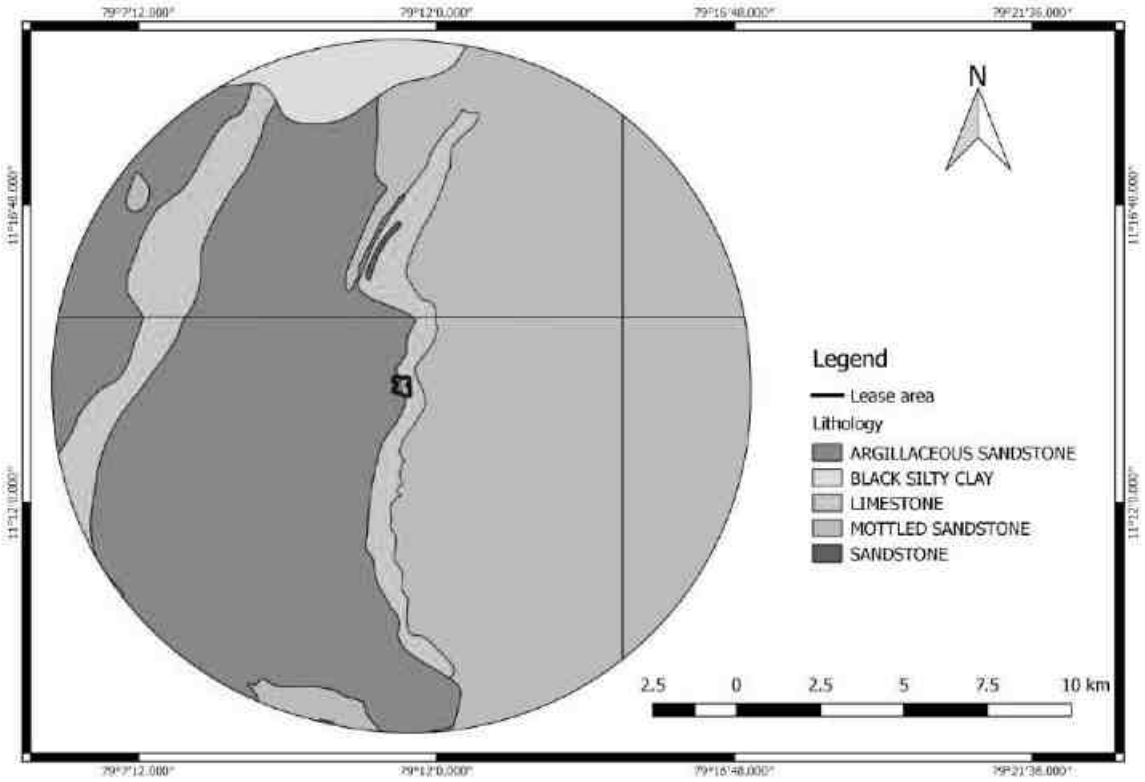


Figure 3.19: Geomorphology Map



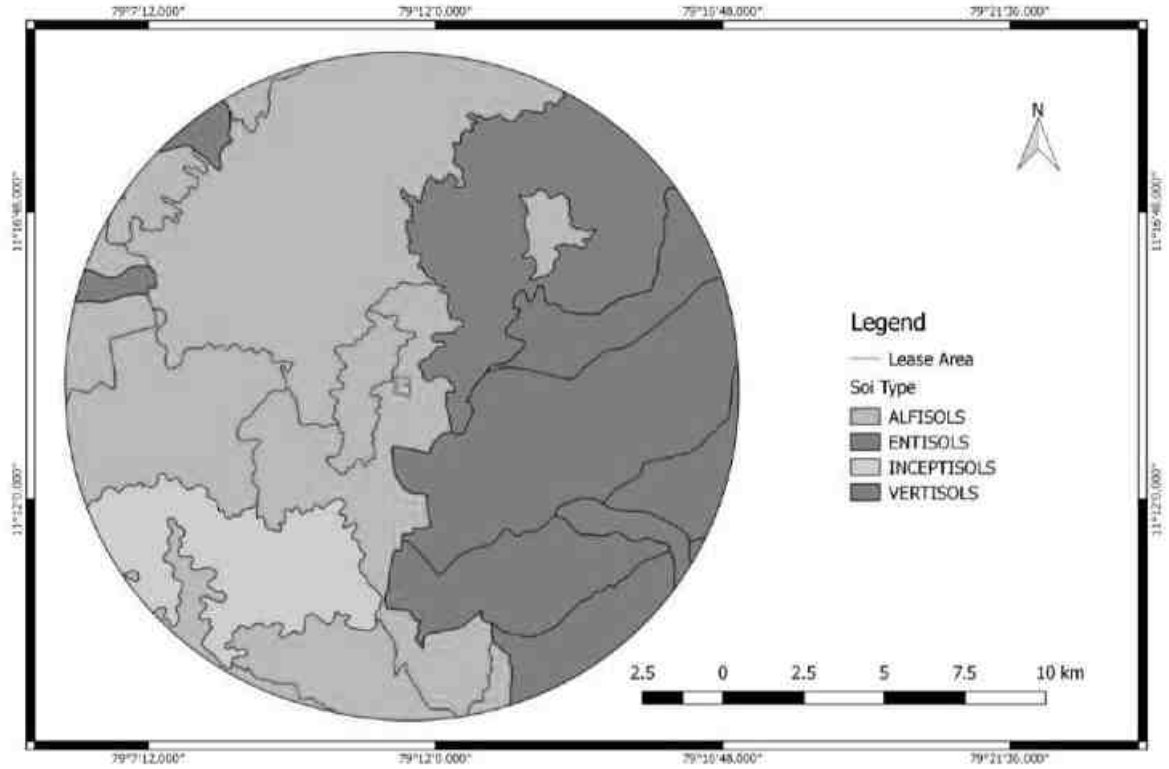
Lithology: The lithological map of the buffer zone has been provided. From this, it is seen that the study area is mainly dominated by Molted Sandstone. The lease area falls under lime stonewith regards to lithology.

Figure 3.20: Lithology Map



Soil: The study area is characterized by Utisols, Inceptisol, Alfisols.The lease are falls under the category of Alfisols. The soil map is provided in Figure No.3.21.

Figure 3.21: Soil Map



3.6.3 WATER TABLE OF THE AREA:

The Groundwater levels from the 27 number of observation wells of TWAD in Ariyalur have been analyzed for Post-Monsoon and Pre-Monsoon. 5 years average Ground water level in m Below Ground Level for pre and post monsoon is as follows:

Table 3.26: Groundwater Level Pre Monsoon and Post Monsoon

	January	May
2017	28.8	31.7
2018	25.0	31.3
2019	26.9	30.0
2020	26.1	29.1
2021	24.6	27.9
Average	26.3	30.0

Ground water Condition in and around study area:

The Hydrological setting of this area is characterized generally by two aquifer system, comprising a water table aquifer in the over burden and limekankar and a semi-confined one in the sandstone occur below the limekankar formation.

The water table aquifer is normally developed for domestic water supply and small irrigation needs, through dug wells, constructed in the past. However, most of the dug wells inventoried during the field study are observed in dry condition The semi- confined aquifer is mostly developed through bore wells for agricultural purposes tapping this zone at depths of 60 to 80m. The over burden and limestone together could be grouped under one water table zone for hydrological purposes. These wells are recharged through The occurrence of groundwater mainly in the porous soil are weathered layers, very negligible amount of groundwater percolated through the poorly fractured layer, after that there is no existence of groundwater.

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CHAPTER - IV

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

CHAPTER 4
ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 GENERAL

In this project Semi – Mechanized Open Cast mining without drilling & blasting will be carried out to quarry out Lime Kankar. Negligible environmental impact is envisaged from this project due to the following reasons:

- Low quantum of production
- No Drilling and Blasting
- Less number of equipments of optimum capacity proposed to be used in this project.
- Shallow depth of mining
- Less no of operating years

Due to the above-mentioned reasons, there will no adverse impact envisaged on the environment. However, an assessment of anticipated impacts on components like air, water, noise, land, transport etc. has been carried out and the details of the same are elaborated in this chapter.

4.2 AIR ENVIRONMENT:

4.2.1 IMPACTS DUE TO PROJECT OPERATION:

The existing ambient air quality in the area has been described in Chapter-III. The proposed mining and allied operations may cause deterioration of air quality due to pollution arising from the project operation if prompt care is not taken. The principal sources of air pollution in general due to mining and allied activities will be:

- Excavation of material.
- Movement of HEMM such as Excavators, tippers etc.
- Loading and unloading operation
- Transportation

Besides, Gas emission will occur as a result of operation of diesel driven mining equipment, compressors, transporting vehicles, etc.

Particulate matter smaller than 10 microns, referred to as PM_{10}, can settle in the bronchi and lungs and cause health problems like Bronchitis, Emphysema, Bronchial Asthma, Irritation of mucus membranes of eyes, etc. Particles smaller than 2.5 micrometers ($PM_{2.5}$), tend to penetrate into the lungs and very small particles (<100 nanometers) may pass through the lungs to affect other organs.

Besides the above-mentioned fugitive dust emissions, atmospheric pollution can occur as a result of emission of SO_2, NO_x, CO etc., from diesel driven mining equipment, generator sets, etc. Larger suspended particles are generally filtered in the nose and throat and do not cause problems. Higher concentration of SO2, NOx, CO may cause some health effect on the human beings exposed to it. The following measures will be adopted to control impact on the air quality due to mining operations:

Table 4.1: Impact and Mitigation Measures – Air Environment

S.No	Activity	Consequence	Mitigation Measures
1	Excavation and Loading	Dust emanation, Gaseous Emission	HEMM will be operated as per the manufacturer's guidelines
			Enclosures for operator cabin.
			Imparting sufficient training to operators on safety and environmental parameters.
			Proper maintenance of hauling equipments.
			Avoiding overloading of dumpers.
2	Transportation	Dust emanation, Gaseous Emission	Regular wetting of transport road using mobile water tanker.
			Proper maintenance of haul road and other roads
			Setting up of tyre wash facility in the transport road.
			Avoiding overloading of tippers
			Covering of loaded tippers with tarpaulins during transportation
			Vehicular emissions will be controlled through regular and proper preventive maintenance schedules and emissions tests are done with diesel smoke meter equipment to ensure emission values.
3	Others	Dust emanation, Gaseous Emission	Development of greenbelt / barriers around mine in the safety zone and carrying out plantation within the lease area.
			Green netting will be carried out around the lease periphery on all sides.

Due to adoption of all these measures, no major impact on air quality is envisaged due to this proposed opencast mining operation.

The impact on air quality due to the proposed project is estimated using AERMOD View Gaussian Plume Air Dispersion Model developed by Lakes Environmental Software which is based on steady state Gaussian plume dispersion. Details of the modeling study / estimation including the modeling technique and post project air quality values are elaborated in the following paras.

4.2.2 AIR QUALITY IMPACT PREDICTION:

The model simulations are done for the air pollutant arising from the mining operations, namely, PM_{10}, $PM_{2.5}$. **Ground Level Concentration** (GLC) have been computed using hourly meteorological data.

Table 4.2: Emission Sources

ACTIVITY	SOURCE TYPE
A. Mining operations	Open pit
B. Transportation	Line

4.2.2.1 Emission Factors

Quantification of particulate emissions has been carried out by the emission factor technique. Emission factor is a statistical average of the rate at which a pollutant is released during an activity. This factor when multiplied by the level of that activity in a given situation will give the overall effect. Fugitive emissions have been predicted by using standard equations given and suggested by AP-42, USEPA(1998), Coal S&T Project and for mining & allied activities and other factors. The modeling is done for the peak production to know the worst scenario. The details of the emission factors used for the same is provided below:

Table 4.3: Emission Factors

S.No	Activity	PM10	PM2.5	Unit
1	Ore Loading	1.5×10^{-3}	2.1×10^{-4}	Kg/T
2	Topsoil Removal	0.0052	0.00058	Kg/T
3	Hauling inside lease area	0.19	0.019	g/VKT

4.2.2.2 Emission Rates:

Based on the emission factors, after adopting necessary control measures like dust suppression, Proper maintenance of HEMM, using better quality diesel, using latest equipment, proper maintenance of roads, etc. the expected emission rate due to various operations in this project is calculated and is given below:

Table 4.4: Emission Rate

ACTIVITIES/POLLUTANTS	Lease area	
	PM_{10} (g/sec)	$PM_{2.5}$(g/sec)
Ore Loading	0.017	0.002
Hauling inside lease area	0.076	0.011
Total	**0.094**	**0.013**

A. ***Emission Source Coordinates:*** The center of mine was assumed (0, 0) in the mathematical modeling.

B. ***Meteorological Conditions Used In Predictions:*** The hourly meteorological data has been generated for **Summer Season (March to May 2025)** and the same has been used in the predictions.

4.2.2.3 Results and Discussions

The results of the Peak GLC's for various environmental parameters with control measures are given below:

Table 4.5: Peak Incremental Concentration

S.No	Parameters	Peak incremental concentration µg/m^3
1	PM_{10}	1.71
2	$PM_{2.5}$	0.45

It is observed that the peak incremental concentration for PM_{10}, $PM_{2.5}$ occurring very near the source. At away from the source the values are getting reduced due to dispersion effects. The Isopleths of PM_{10}, $PM_{2.5}$ concentrations for with control measures scenario have also been drawn and these are given in **Figure No.4.1 and 4.2.** The incremental and predicted concentrations at the locations of ambient air quality have been discussed in the following section.

Figure 4.1: Isopleth of GLC Prediction for PM_{10}

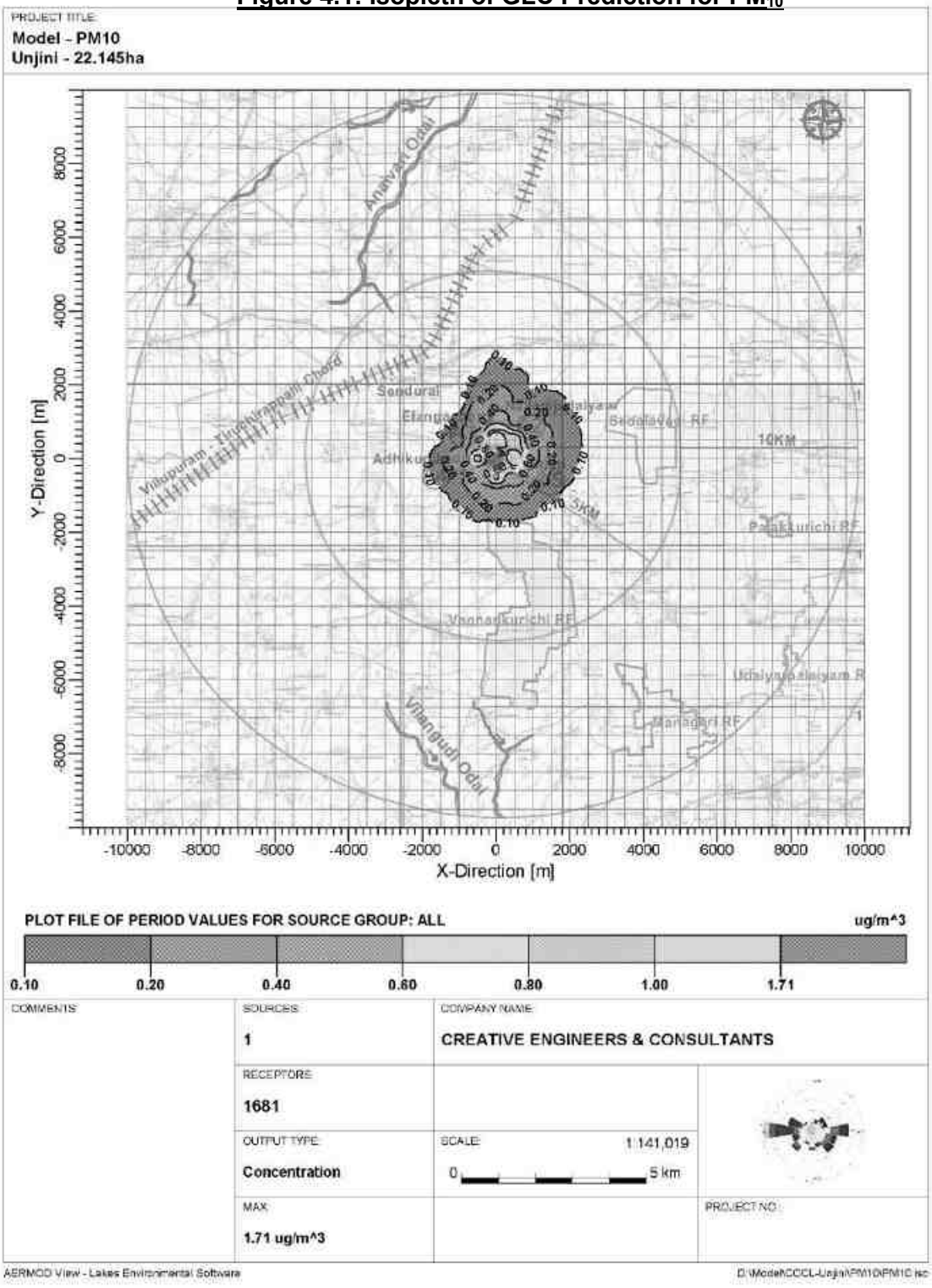
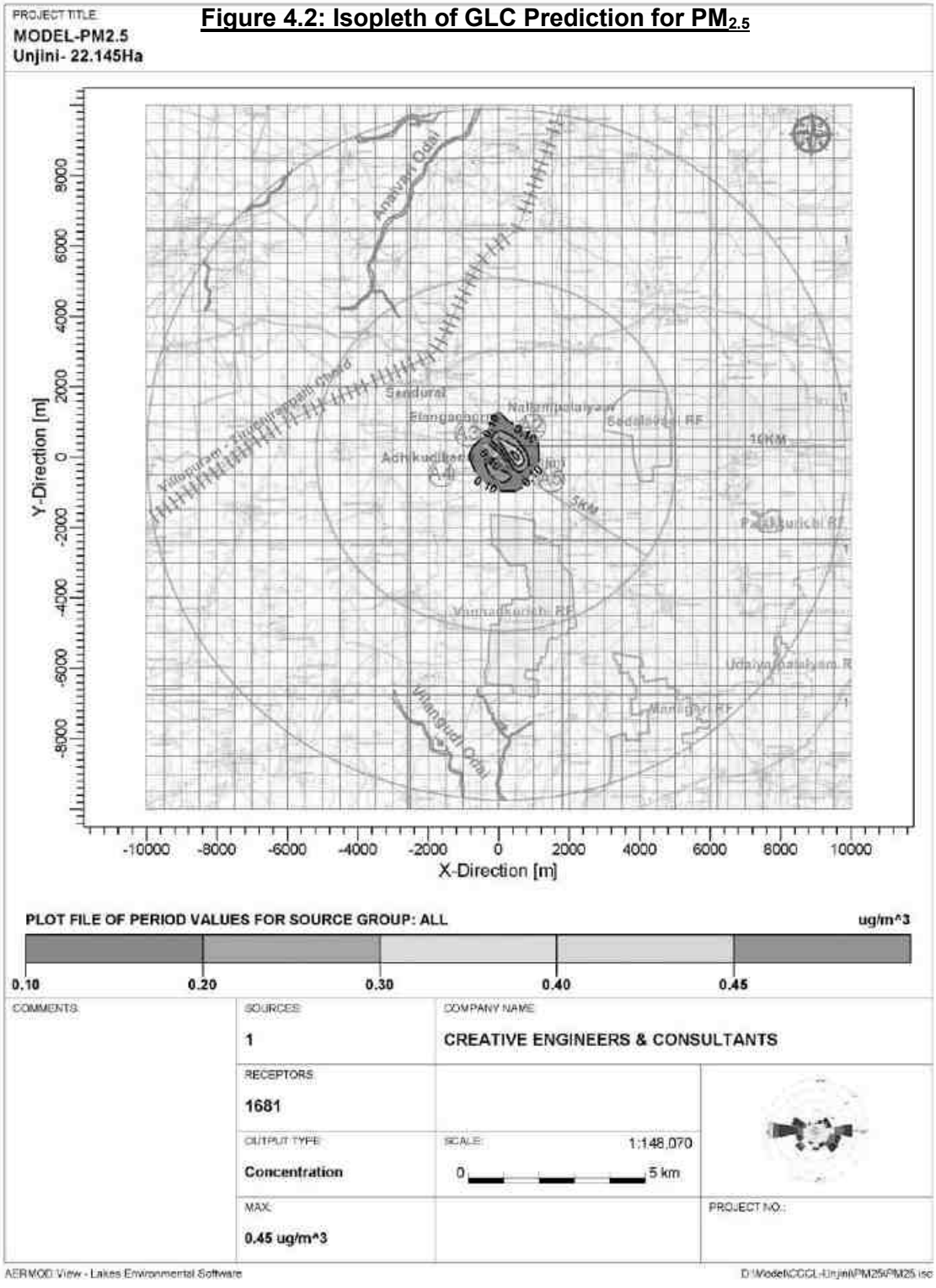


Figure 4.2: Isopleth of GLC Prediction for $PM_{2.5}$



4.2.2.4 Predicted Ambient Air Quality:

The post project Concentrations of PM10, PM2.5, (GLC) (base line + incremental) after adopting necessary control measures is given in Table No - 4.6 to 4.7.

Table 4.6: Concentrations Of PM_{10} after Project Implementation

Values in μg/m³

S. No	Location	Background Concentration	Incremental Conc	Post Project Conc	Statutory Limits
1	A1-Near Mine Lease Area	51.6	1.7	53.3	
2	A2-Nallampalayam Village	60.2	<1.0	61.2	100
3	A3-Elangaicherry Village	55.4	<1.0	56.4	
4	A4-Adhikudikadu Village	54.8	<1.0	55.8	
5	A5-Unjini Village	56.8	<1.0	57.8	

Table 4.7: Concentrations Of $PM_{2.5}$ after Project Implementation

Values in μg/m³

S. No	Location	Background Concentration	Incremental Conc	Post Project Conc	Statutory Limits
1	A1-Near Mine Lease Area	23.7	<1.0	23.7	-
2	A2-Nallampalayam Village	28.3	<1.0	29.3	60
3	A3-Elangaicherry Village	26.6	<1.0	27.6	
4	A4-Adhikudikadu Village	25.2	<1.0	26.2	
5	A5-Unjini Village	26.7	<1.0	27.7	

It can be seen that the resultant added concentrations with baseline figures that the values of ambient air quality with respect to PM_{10} are in the range of 53.3 μg/m3 to 61.2 μg/m3 and with respect to PM2.5 are in the range of 23.7 μg/m3 to 29.3 μg/m3 which are within the statutory limits.

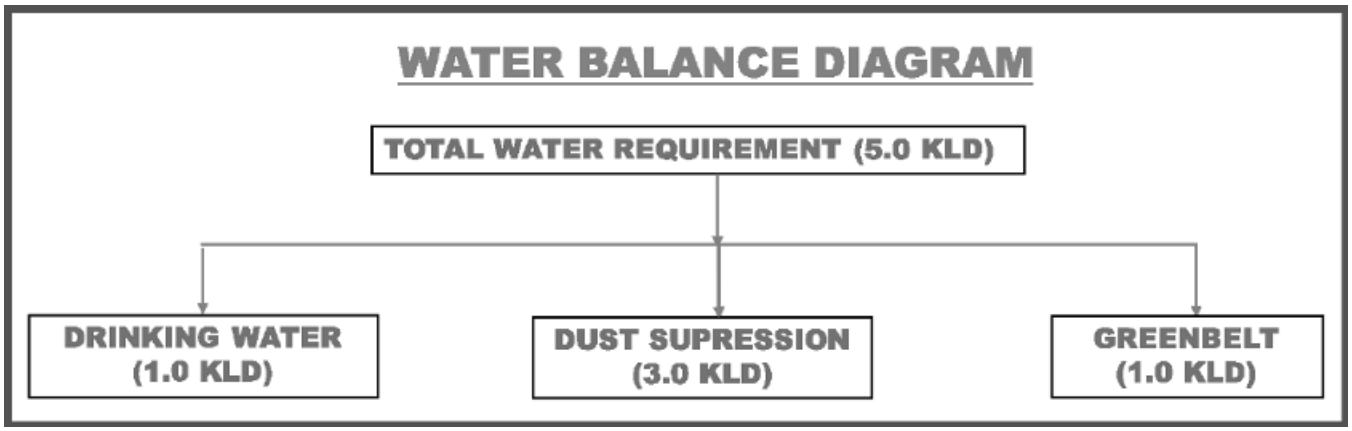
4.3 WATER ENVIRONMENT:

4.3.1 WATER REQUIREMENT:

Total water requirement for this project will be 5.0 KLD comprising 1.0 KLD for drinking water and domestic use, 3.0 KLD for dust suppression and 1.0 KLD for greenbelt. The water will be

sourced from outside agencies. The water balance diagram for the same is shown in **Figure No 4.3.**

Figure 4.3: Water Balance Diagram



4.3.2 SOURCES OF WATER POLLUTION:

The existing water environment showing water quality at different sampling stations in the area has been described in Chapter-III.

Direct impact on human beings due to poor water quality consequent to mining operation can lead to various water borne diseases like diarrhea, jaundice, dysentery, typhoid, etc. Besides, the polluted water may not be useful for animal or human consumption, vegetation and may affect aquatic life, if effluents are not properly treated to remove the harmful pollutants.

The major sources of water pollution normally associated due to mining and allied operations are:

a. Domestic effluent.
b. Washouts from stockpile if any.
c. Disturbance to drainage course in the project area
d. Generation of mine pit water pumped out from deeper workings if any.

4.3.3 TREATMENT SCHEME:

A. Generation of domestic effluent:

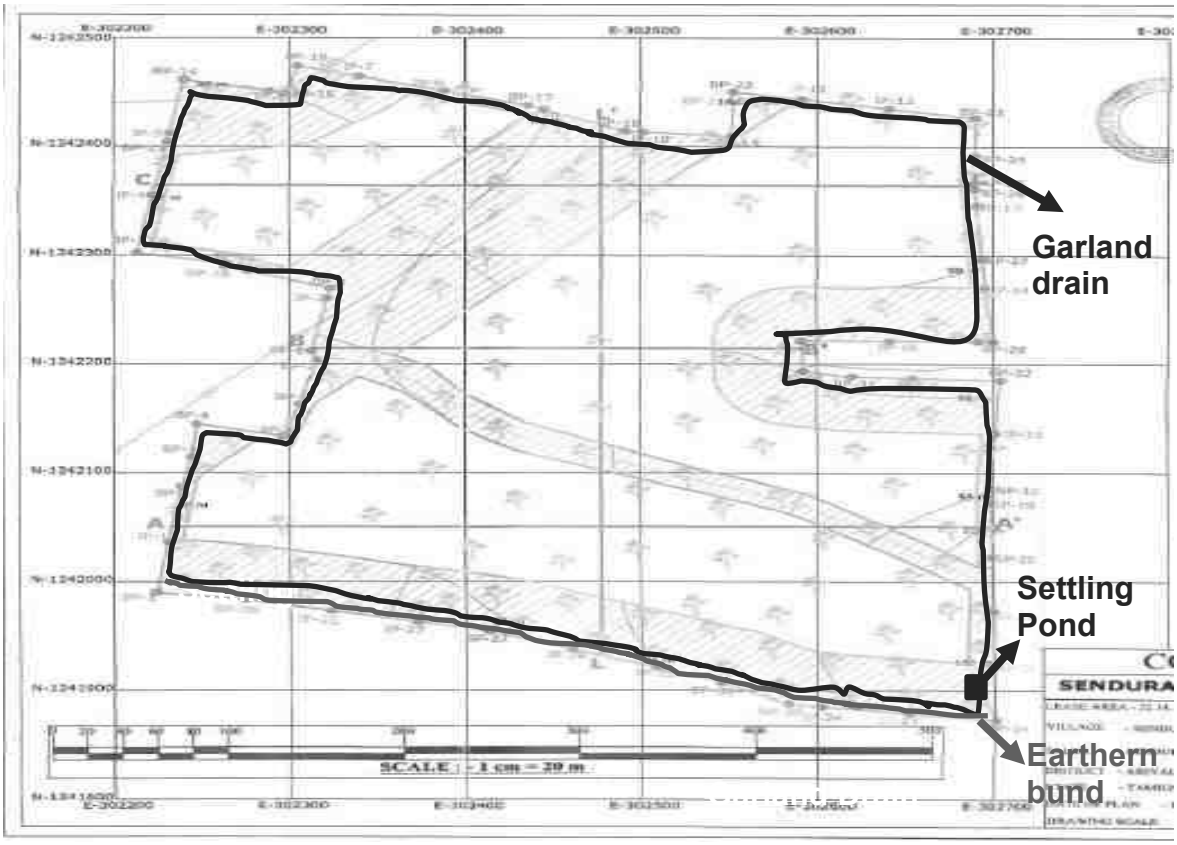
The domestic sewage to be generated from the project will be collected in septic tank with soak pits.

B. Washouts from overburden, ore stockpile, etc.

Since the entire kankar material from the quarry face will be directly dispatched to the consumers, there will not be any stockpiles. Available Top soil will be stacked temporarily and used for plantation & other purposes. There are no waste dumps in this quarry. As such there will not be any wash out due to stock pile or waste dumps.

Ultimately mined out pit will act as a rainwater harvesting pond for augmenting the ground water potential. Towards surface runoff management, garland drain of length 2400m will be constructed around the quarry and will be connected to a settling pond with silt traps. The supernatant clear water from the settling pond will be flow to the downstream users. The surface runoff management structures diagram is given in **Figure No 4.4.**

Figure 4.4: Surface Runoff Management Structures



C. Disturbance to drainage courses

There are no perineal water courses in the lease areas. South of the lease area, vari course situated in S.F.No.39/2, 40/2 & 41 of Unjani village, S.F.No.288 of Rayampuram village and a drainage channel originating from S.F.No.590/14 in the North eastern side.

Safety distance of 50m has been left based on precise area conditions. As a protective measures, an Earthen bund of 3 ft height will be constructed in the safety zone and it will be developed with plantation.

These streams/ water bodies act more of the drainage arrangement and it remains dry for most the year. There is no proposal to discharge any effluent into this water body. No major impact is envisaged on the nearby water bodies due to project operations.

D. Generation of mine pit water pumped out from deeper workings if any.

Mining operations are proposed to be quarried upto a depth of 1.40m only. The groundwater table in this area is much below this level. As such no groundwater intersection envisaged.

4.3.3.1 STAGE OF GROUNDWATER DEVELOPMENT

Details of hydrological scenario of the study area were given in para 3.6, Chapter – III. The groundwater resource data of Ariyalur district was obtained from the data provided in the technical report of the National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD&GR – Notes on Ariyalur District.

Table 4.8: Ground Water Resources Estimation– Ariyalur Taluk (Ha.m)

Net Groundwater Availability	Existing Gross Draft for Irrigation	Existing Gross Draft for Domestic and industrial water supply	Existing Gross Draft for all uses	Stage of Ground water Development (%)	Category of Block
2877.84	1125.57	451.46	1577.03	55	Safe

From the table it is seen that the stage of groundwater development of Ariyalur where the study area falls is 55%. In view of this, this area can be categorized as 'Safe' from ground water development point of view. Thus there is scope for further ground water development.

4.3.4 REDUCING WATER CONSUMPTION OVER THE YEARS:

4.3.4.1 GENERAL METHODS:

Use of water will be monitored and used to the minimum required. Awareness will be spread to the employees about the importance of water conservation. Tap and showers will be turned off immediately after use and any leaks will be monitored and immediately controlled. Water requirement for greenbelt and dust suppression can be reduced by choosing the native plants/trees species with low water requirement and which can sustain in such conditions for greenbelt/ plantation and also optimum usage to the required minimum. While the dust suppression itself is an important method of pollution control for air pollution due to dust, the water consumption will be monitored strictly. The water tanker will be examined for any sources of leaks and if found will be immediately sealed so that water can be utilized for dust suppression effectively without loss.

4.3.4.2 RAINWATER HARVESTING PLAN

Since the lease proximate areas are with less water potential and the rainwater is the major source for replenishment of ground water, effective rainwater harvesting and other water augmentation measures are proposed in this project.

4.4 NOISE AND VIBRATION:

4.4.1 NOISE ENVIRONMENT:

The ambient noise levels in the study area have been discussed in Chapter - III. The data shows that the existing noise levels are within statutory tolerable limits. The impact prediction and control measure for noise environment due to mining and allied activities is described below:

4.4.1.1 IMPACT PREDICTION DUE TO NOISE:

Noise is one of the inevitable causes of pollution in mining operations, largely due to the extensive mechanization adopted. Besides, other operations such as movement of vehicles, etc., also produce noise of considerable magnitude in mining operations. The main sources of noise and expected levels are given below in **Table no – 4.9.**

Table 4.9: Main Sources of Noise

Sl. No.	Source	Inside Cabin	Noise level at dB(A) 10 m. from source
1	Shovel	84-91	59-68
2.	Dumpers/Tippers	87-96	75-85
3.	Drill	88- 95	75-83

Prolonged exposure to a high noise level is harmful to the human auditory system and can create mental fatigue, rebellious attitude, annoyance and carelessness, which may lead to neglect of work and also result in accidents. The impact of noise level as per World Health Organization's 1986 notification is given below in Table No - 4.10.

Table 4.10: Impact of Noise Levels

NOISE LEVELS	ADVERSE EFFECTS
90-115 dB	Partial deafness and nervous irritability
> 115 dB	Permanent deafness
Impulsive noise (>90dB)	Frightens livestock grazing in the nearby areas

OSHA (Occupational Safety and Health Administration), USA and other similar organisations stipulate that noise level up to 90 dB(A) is acceptable for eight hours exposure Leq (Equivalent sound level) (8hrs) per day. The Directorate General of Mines Safety, in circular No. DG (Tech)/18 of 1975, has prescribed the noise level in mining occupations (TLV) for workers, in an 8 hour shift period with unprotected ear as 90 dB(A) or less.

No drilling and blasting involved in this project. There will be hardly operation of 1 loader and 2 tippers in the lease area. Hence the effects of noise from the mining operation will be insignificant.

Noise Levels due to mining operations at the periphery of the mine lease itself will be less even without considering any attenuation factor. However, practically there will be attenuation due to vegetation etc., and as such there will not be any adverse noise propagation outside the lease boundary.

4.4.1.2 CONTROL MEASURES FOR NOISE ENVIRONMENT:

Hence, by following mitigative measures for noise control, the impact on noise levels will be insignificant:

- Planting rows of native trees along roads, around mine area and other noise generating centers to act as acoustic barriers.
- Sound proof operator's cabin for equipments like shovel, tippers, etc.
- Proper and regular maintenance of equipments may lead to less noise generation.
- Providing in-built mechanism for reducing sound emissions.
- Providing earplugs to workers exposed to higher noise level.
- Conducting regular health check-up of workers including Audiometry test for the workers engaged in noise prone area.

4.5 LAND ENVIRONMENT:

The land use pattern at present and at the end of the quarrying period has been provided below.

Table 4.11: Land Use

S.No	Land Use	Present Area (Ha)	Area in use – End of 5 years period (Ha)
1	Mining \Excavation	-	13.60.5
2	Infrastructure	-	-
3	Greenbelt and Plantation	-	8.54
4	Unutilized Area	22.14.5	-
5	Roads	-	-
	Total	**22.14.5**	**22.14.5**

Plantation will be carried out in the safety zone area during the plan period. Mined out area of 13.605 Ha will be backfilled with available material and restored to premising condition. Balance area will be used for rainwater water harvesting pit

4.5.1 LAND RECLAMATION:

No waste generation anticipated in the quarry operation since the entire excavated kankar will be used in the cement plant. Available top soil will be temporarily stacked and used for plantation and protective bund with plantation formation in the safety zone. Hence, there is no external

overburden dump involved. Ultimately the mined out area will be used as rainwater harvesting pit.

Table 4.12: Land Use During Post Operational Period

S.No	Description	Land use (Ha.)			
		Plantation	Water body	Others	Total
1	Quarrying Pit	-	-	13.60.5	13.60.5
2	Infrastructure	-	-	-	-
3	Green Belt & safety zone	8.54	-	-	8.54
4	Roads	-	-	-	-
	TOTAL	**8.54**	**-**	**13.60.5**	**22.14.5**

Plantation will be carried out over 8.54Ha of safety zone area during the plan period. Mined out area of 13.605 Ha will be backfilled with available material and restored to premining condition. Balance area will be used for rainwater water harvesting pit .

4.6 BIOLOGICAL ENVIRONMENT:

4.6.1 EXISTING FLORA AND FAUNA:

Details of flora/fauna pattern in core and buffer zones have been described in chapter - III.

4.6.2 IMPACT OF MINING ON BIOLOGICAL ENVIRONMENT:

The significance of impact on biological environment due to mining and allied activities on various fronts is described below:

Table 4.13: Impact on Biological Environment

S.No	ISSUES	OBSERVATIONS
1	Clearance of vegetation due to mining and allied activities	Since the lease areas contain only thorny bushes & shrubs, clearance of major vegetation is not involved.
2	Retardation of tree growth, tip burning, etc, due to deposition of dust and the Particulate matter generated from the mining operation.	Necessary mitigative measures like dust suppression, proper maintenance of equipment's, roads will be carried out to prevent dust generation.
3	Proximity to national park/ wildlife sanctuary/reserve forest/mangroves/Coastline/estuary/sea	The mining lease area and the 10 km buffer zone from the periphery of the core zone is devoid of declared ecologically sensitive features like national parks, biospheres, sanctuaries, etc.
4	Release of effluents into water body that also supplies water to wildlife	There is no proposal to discharge any effluent into nearby water bodies.
5	Proposed project could increase siltation that would affect nearby biodiversity area	Surface runoff management structures like garland drain, settling pond etc. as explained above will be constructed and

		as such there will not be any appreciable impact on surface water quality which in turn can affect the bio diversity of the area.
6	Activities of the project affects the breeding/nesting sites of birds and animals	In the present ML area, there is no wetland. A migratory bird needs sufficient wetlands with sufficient food, shelter, roosting places and nesting places which is not possible here.
7	Located near an area populated by rare or endangered species	There are no Schedule I animals
8	Risk of fall/slip or cause death to wild animals due to project activities	In the post mining stage, barbed wire fencing is proposed all around the mined-out void to prevent falling of animals in the mine pits.
9	Project affects the forest-based livelihood/any specific forest product on which local livelihood depends	Not applicable
10	Project likely to affect migration routes	No migration routes are in the area.
11	Project likely to affect flora of an area, which have medicinal value	No such significantly important medicinal value species within the ML area and its nearby region.
12	The project likely to affect wetlands, fish breeding grounds, marine ecology	There are no any wetlands, fish breeding grounds, marine ecology nearby the ML area which will be affected due to this project.
13	Project affects the Agriculture, Forestry and Traditional Practices	Due to poor soil condition and non-availability of perineal water source, no major agricultural activity is carried out in and around the lease area. Only patches of plantation are observed in few places in the monsoon season based on water availability.
14	Impact on soil health and biodiversity	The lease area is covered with shrubs and thorny bushes only (Photograph of the site attached in Chapter-II). Besides, there is no waste generation, disposal or stacking involved in this project. As such no loss of soil health and Bio-diversity is expected.

There are no migratory corridors, migratory avian-fauna, rare endemic and endangered species. Therefore there shall be no impacts due to mining activity on them. Even though there are no adverse impact on bio diversity and flora/fauna status due to project operations, positive impacts will arise due to well-planned reclamation measures for restoration of land status in the area ultimately to productive land category with elaborately planned green belt development activities.

4.6.3 CONTROL MEASURES FOR BIOLOGICAL ASPECTS:

To reduce the adverse effects on flora/fauna status of the area due to deposition of dust generated from mining operations, mobile water tanker systems will be ensured in all dust prone

areas to arrest dust generation. Methodical and well-planned plantation scheme will be carried out depending upon the immediate need, priority and availability of land. The plantation will be done along the lease boundary in a phased manner.

4.6.4 GREEN BELT & PLANTATION:

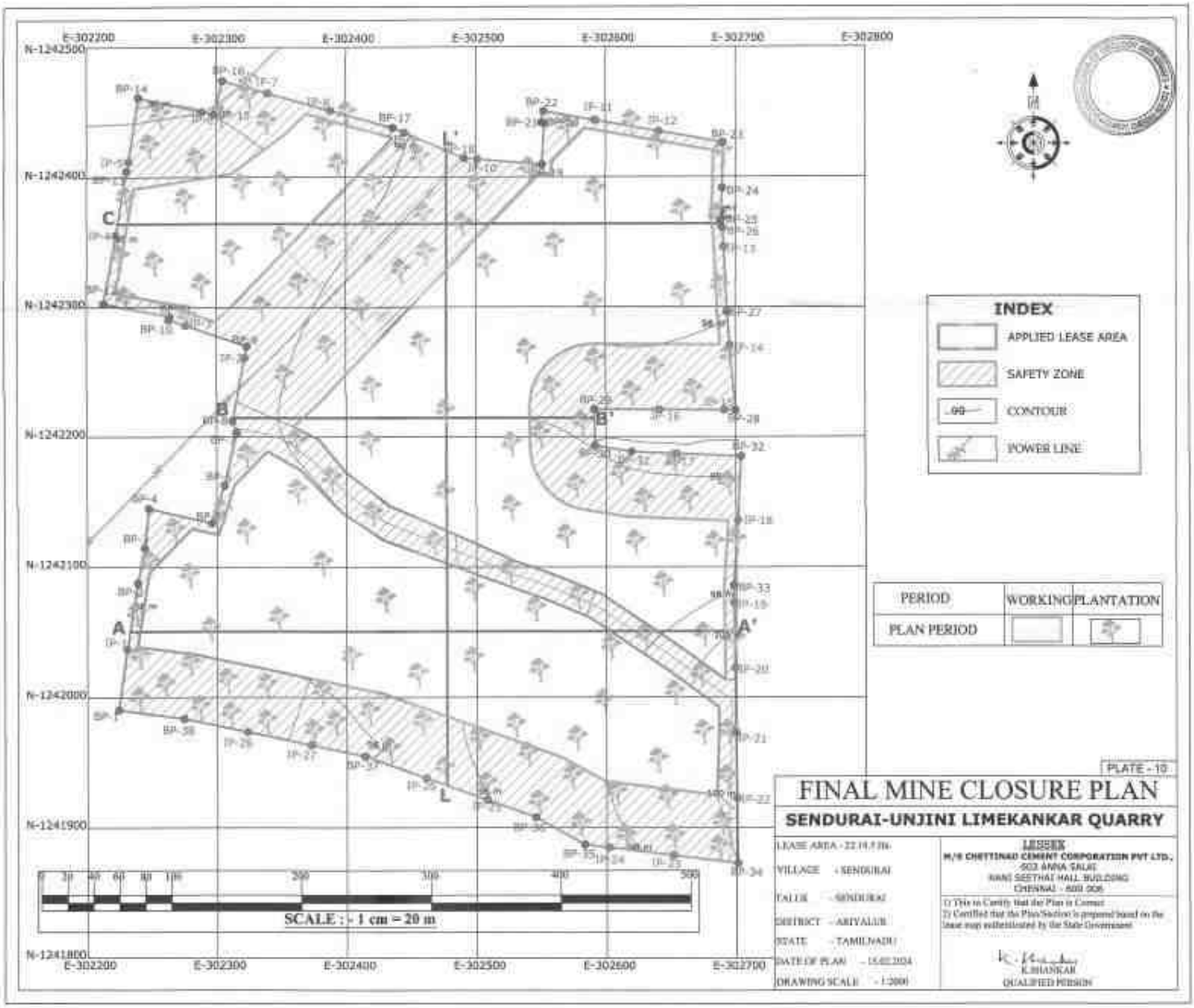
Greenbelt / Plantation will be done in the lease periphery, safety zone and also outside the lease area to enhance the vegetative growth and aesthetic in the safety zone area. Its details are as follows:

Table 4.14: Proposed Plantation

Year	No. of tress proposed to be planted	Name of the species
	22.145	
I	500	Pungai, Vagai, Vembu, Manjal konrai, Naval, Puvarasu, etc.,
II	500	
III	500	
IV	500	
V	-	
Total	**2000**	

The post mining land use plan showing afforestation and water body is shown in **Figure No-4.5.**

Figure 4.5: Mine Closure Plan



4.7 SOCIO ECONOMIC ENVIRONMENT:

The entire lease area is in the proponent's possession. Hence, there are no habitations or hutments in the core zone area and no rehabilitation or resettlement problems will arise here. As already mentioned, the waterbodies/ vari in proximity to the lease area are not be disturbed by the proponent and sufficient safety barrier and protective measures has also been considered.

The mining operations in this lease will employ about 10 persons directly and about 50 persons on indirect basis through allied opportunities in logistics, trading, repairing works etc. good employment potential will arise in this area, which will provide raising income levels and standards of living in the area through various service related activities connected with the project operations as shown under.

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

Besides, there will be improvement in the following aspects due to project operation:

- ❖ Improvement in infrastructural facilities, providing education aids etc. in nearby schools
- ❖ Betterment of drinking water facilities.
- ❖ Benefit to the State and the Central governments through financial revenues by way of royalty, tax, duties, etc from this project directly and also indirectly.

4.8 OCCUPATIONAL HEALTH AND SAFETY:

Primary data collection through field survey conducted in the study area reveals that there is no reported incident of any occupational diseases in the area. Since simple shallow depth mining operations for a less production with less number of equipments to be carried out in this lease, with planned & safe mining practices and ensuring all precautionary measures as prescribed in

Metalliferrous Mines Regulations of 1961 & in the EMP report , the impact on this front is expected to be insignificant.

4.8.1 MITIGATIVE MEASURES FOR SAFETY ASPECTS:

The following safety gadgets will be provided to the staff and workers based on their area of operation and work & requirement:

Sl No	Safety Equipments
1.	Helmets
2.	Shoes
3.	Goggles
4.	Dust Mask
5.	Hand Gloves
6.	Reflective Jackets

4.9 LOGISTICAL SYSTEM:

The limekankar mined out from these leases will be transported to the cement plant of the proponent. The expected peak transport will be as follows:

Table 4.15: Details of Transportation

Sl.no	Particulars of activity	Lease area
A	Maximum Material Transported (T/year)	99720
B	No of days in a year	300
C	Transport hours per day	8
D	Truck capacity in T	20
	Trips per hour	2 Trips/hr

From the above table it is seen that there will be hardly about 2 trips per hour.The transport route can easily absorb this negligible traffic due to this project. Besides, the material production is more of a substitute for the dwindled production from the other leases of the company. As such no additional logistical impact is expected.

The following mitigative measures are suggested for mitigation of adverse impacts on the logistical aspect of the project:

- Water sprinkling on material in the transport vehicles before transporting, so that no dust nuisance during transport will arise.

- Plantation on either side of the transport road in consultation with the concerned department.
- Proper maintenance of transport roads
- Proper maintenance of transport vehicles.
- Avoiding overloading of material
- Covering of loaded vehicles with tarpaulins sheet.
- Limiting of speed
- Provision of tyre washing facility at the mine outlet

4.10 WASTE MANAGEMENT:

Solid Waste: Since the entire mined out material will be used there will not be any solid waste generation from this project.

Liquid waste: There is no process effluent generation from this mine. Hence no liquid waste is generated.

Hazardous waste management: In this project the following management practices will be followed:

- Ensuring availability of different colour bins for collection of different types of waste.
- Storing of Hazardous waste material in a separate storage area with impervious containers for waste oil, oil contaminated clothes, used lead acid batteries, scraps, tyre storage etc.
- Ensure that there are no leakages/spillages of hazardous wastes.
- Ensuring that the fire extinguisher system is available at hazardous material storage area.

The hazardous waste if any will be disposed through authorized recyclers or re-processors periodically. The hazardous wastes will be transported in accordance with the provisions of rules. By effective implementation of above said mitigation measures no major impact due to Hazardous waste is expected.

Plastic waste: Single use plastics/ use and throwaway plastics will be banned in the site as directed by the Tamil Nadu Government vide GO(Ms)No.84 regarding ban on use of plastic products. The employees will be encouraged to use compostable material or reusable material.

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CHAPTER - V

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

CHAPTER 5

ANALYSIS OF ALTERNATIVES

5.1 ALTERNATE TECHNOLOGY:

In this proposed quarry Semi – Mechanized Open Cast mining without drilling and blasting will be carried out. As this method is techno economically proven, consideration of an alternate technology is not warranted.

5.2 ALTERNATE SITE:

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

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CHAPTER - VI

ENVIRONMENTAL MONITORING PROGRAMME

CHAPTER 6

ENVIRONMENTAL MONITORING PROGRAMME

6.1 GENERAL

In this project, appropriate environmental monitoring programme are framed. Regular, systematic and sustained programme schedules for implementation and monitoring of various control measures are devised with clear cut guidelines of various concerned plans for keeping a continuous surveillance on the various environmental quality parameters in the area.

The monitoring schedules are planned to aim at regular and systematic study of various pollution levels with respect to air and water quality, noise levels etc., to ensure that they conform to the standards laid down by the Environment Protection Act, 1986 and various Central and State Pollution Control Board Limits.

The various methodologies and frequency of studies of all environmental quality parameters will be as per prescribed norms laid down by MOEF&CC and State Pollution Control Board. This being a small quarry operation, the Mines in-charge will take care of all the day to dat environmental related works also.

Environmental control measures include components like air, water and soil quality, noise levels, afforestation measures, etc. For monitoring of environment over the life of the mine, a set of stations for study of quality parameters are fixed as per the actual requirements and prevailing conditions of environmental factors, as dictated from time to time, depending on the prevailing pollution levels.

6.2 MONITORING SCHEDULES FOR VARIOUS PARAMETERS

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 statutory Limits. However, based on the need and priority it may be suitably modified / improved in consultation with local authorities. The monitoring schedules are given below.

Table 6.1: Environmental Monitoring Schedule

S.No	Environmental Parameters	Parameters to be monitored	Monitoring area coverage /locations	Frequency of monitoring
1	Air Quality	Sulphur dioxide (SO_2), Oxides of Nitrogen (NO_2), Respirable Particulate Matter ($PM_{2.5}$ and PM_{10}).	2 locations in the buffer zone and 1 work zone location in lease.	Yearly Once
2	Water Quality	General, Physical, and chemical parameters	Ground Water samples 2 nearby locations (around the project area)	Pre and Post Monsoon
3	Noise	Leq. Lmax Lmin, Leq Day & Leq Night dB(A)	2 locations in the buffer zone and 1 work zone location in lease	Yearly Once
4	Socio Economic Environment	Socio Economic Survey, Review of implementation of CER activities proposed	Buffer Zone	Yearly basis
5	Occupational Health	Occupational health survey to detect early incidence of diseases, Audiometry Test for workers in noise prone area and review of safety matters.	Staff and Workers involved in the project	Once in a year
6	Greenbelt	Maintenance	Within the lease area	Regularly

6.3 LEGISLATIVE AND REGULATORY FRAME WORK:

Chettinad Cement Corporation is having its own Environment Health & Safety policy declaring its responsibility and commitment to protect the environment and to ensure public safety. The existing policy will be available with all concerned officials of the plant. The following environmental standards as per methodologies prescribed, by MOEF/CPCB/TNPCB will be enforced in the project:

Table 6.2: Environmental Standards

Standards	Issued By	Reference
National Ambient Air Quality Standards	Central Pollution Control Board	Table No. 6.3
Water quality standards per IS 10500:2012	Bureau of Indian Standards	Table No.6.4
Noise Standards	CPCB / MoEF&CC	Table No.6.5
Permissible Peak Particle Velocity	DGMS, Dhanbad	Table No.6.6

Table 6.3: National Ambient Air Quality Standards

[भाग III—खण्ड 4] भारत का राजपत्र : असाधारण 3

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION
New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-I.—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), µg/m³	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), µg/m³	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} µg/m³	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ µg/m³	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) µg/m³	8 hours**	100	100	- UV photometric - Chemiluminescence
		1 hour**	180	180	- Chemical Method
6	Lead (Pb) µg/m³	Annual*	0.50	0.50	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m³	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) µg/m³	Annual*	100	100	-Chemiluminescence -Indophenol blue method
		24 hours**	400	400	

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m^3	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

Table 6.4: IS – 10500 :2012 Standards

Table 1 Organoleptic and Physical Parameters
(*Foreword* and *Clause* 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to Part of IS 3025	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Colour, Hazen units, *Max*	5	15	Part 4	Extended to 15 only, if toxic substances are not suspected in absence of alternate sources
ii)	Odour	Agreeable	Agreeable	Part 5	a) Test cold and when heated b) Test at several dilutions
iii)	*p*H value	6.5-8.5	No relaxation	Part 11	—
iv)	Taste	Agreeable	Agreeable	Parts 7 and 8	Test to be conducted only after safety has been established
v)	Turbidity, NTU, *Max*	1	5	Part 10	—
vi)	Total dissolved solids, mg/l, *Max*	500	2 000	Part 16	—

NOTE — It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 2 General Parameters Concerning Substances Undesirable in Excessive Amounts
(*Foreword* and *Clause* 4)

Sl No.	Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternate Source	Method of Test, Ref to	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i)	Aluminium (as Al), mg/l, *Max*	0.03	0.2	IS 3025 (Part 55)	—
ii)	Ammonia (as total ammonia-N), mg/l, *Max*	0.5	No relaxation	IS 3025 (Part 34)	—
iii)	Anionic detergents (as MRAS) mg/l, *Max*	0.2	1.0	Annex K of IS 13428	—
iv)	Barium (as Ba), mg/l, *Max*	0.7	No relaxation	Annex F of IS 13428* or IS 15302	—
v)	Boron (as B), mg/l, *Max*	0.5	1.0	IS 3025 (Part 57)	—
vi)	Calcium (as Ca), mg/l, *Max*	75	200	IS 3025 (Part 40)	—
vii)	Chloramines (as Cl_2), mg/l, *Max*	4.0	No relaxation	IS 3025 (Part 26)* or APHA 4500-Cl G	—
viii)	Chloride (as Cl), mg/l, *Max*	250	1 000	IS 3025 (Part 32)	—
ix)	Copper (as Cu), mg/l, *Max*	0.05	1.5	IS 3025 (Part 42)	—
x)	Fluoride (as F) mg/l, *Max*	1.0	1.5	IS 3025 (Part 60)	—
xi)	Free residual chlorine, mg/l, *Min*	0.2	1	IS 3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
xii)	Iron (as Fe), mg/l, *Max*	0.3	No relaxation	IS 3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiii)	Magnesium (as Mg), mg/l, *Max*	30	100	IS 3025 (Part 46)	—
xiv)	Manganese (as Mn), mg/l, *Max*	0.1	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xv)	Mineral oil, mg/l, *Max*	0.5	No relaxation	Clause **6** of IS 3025 (Part 39) Infrared partition method	—
xvi)	Nitrate (as NO_3), mg/l, *Max*	45	No relaxation	IS 3025 (Part 34)	—
xvii)	Phenolic compounds (as C_6H_5OH), mg/l, *Max*	0.001	0.002	IS 3025 (Part 43)	—
xviii)	Selenium (as Se), mg/l, *Max*	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	—
xix)	Silver (as Ag), mg/l, *Max*	0.1	No relaxation	Annex J of IS 13428	—
xx)	Sulphate (as SO_4) mg/l, *Max*	200	400	IS 3025 (Part 24)	May be extended to 400 provided that Magnesium does not exceed 30
xxi)	Sulphide (as H_2S), mg/l, *Max*	0.05	No relaxation	IS 3025 (Part 29)	—
xxii)	Total alkalinity as calcium carbonate, mg/l, *Max*	200	600	IS 3025 (Part 23)	—
xxiii)	Total hardness (as $CaCO_3$), mg/l, *Max*	200	600	IS 3025 (Part 21)	—
xxiv)	Zinc (as Zn), mg/l, *Max*	5	15	IS 3025 (Part 49)	—

NOTES

1 In case of dispute, the method indicated by '*' shall be the referee method.

2 It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under 'acceptable' render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under 'permissible limit in the absence of alternate source' in col 4, above which the sources will have to be rejected.

Table 6.5: Noise Level Standards

Area Code	Category of Area	Limits in dB(A) Leq

		Day Time	Night Time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

Note :

1. Day time shall mean from 6 a.m. and 10.0 p.m.
2. Night time shall mean from 10.0 p.m. and 6 a.m.
3. 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.
4. 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.

Table 6.6: Permissible Noise For Industrial Workers As Laid Down By CPCB

Exposure time (in hr. per day)	Limit in dB(A)
8	**90**
4	**93**
2	**96**
1	**99**
½	**102**
¼	**105**
1/8	**108**
1/16	**111**
1/32	**114**

6.4 ENVIRONMENTAL MONITORING COST:

For environmental monitoring budgetary allocation is also made. Further details of the capital and recurring cost of environmental management has been provided in in Table No. 10.2, Chapter-X.

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CHAPTER - VII

ADDITIONAL STUDIES

CHAPTER 7
ADDITIONAL STUDIES

7.1 GENERAL:

The additional studies covered for this EIA / EMP report are:

1. Public consultation of the project as per MoEF&CC mandates.
2. Cumulative Impact Study
3. Risk Assessment
4. R&R Plan
5. Mine closure planning

7.2 PUBLIC CONSULTATION:

This draft EIA/EMP report will be exposed to public consultation as per mandatory procedures through the District Collector and State Pollution Control Board officials after giving 30 days advance notice in two local newspapers about the scheduled date and time for conduct of the public hearing procedures. The opinions, concerns and objections of stakeholders will be recorded during the public hearing. All the public queries and the replies to the query by the project proponent and officials concerned will be recorded and incorporated in the EIA/EMP report for approval by SEIAA, Tamil Nadu.

7.3 RISK ASSESSMENT:

In this project no major risk is envisaged as it is a very simple operation of small magnitude with less period of working. However, a risk analysis is carried out and given below:

S.No	Factors	Causes of risks	Control measures
1.	Removal of material	a) Bench may slide due to its unconsolidated nature. b) Vibration due to movement of vehicles in the benches.	a) There is no bench proposed in this project since the depth of mining is shallow. b) Only one hydraulic excavator/JCB is proposed. No impact envisaged.

S.No	Factors	Causes of risks	Control measures
2.	Drilling	a) Due to high pressure of compressed air hoses may burst. b) Down the hole drill rod may break due to improper maintenance of rod.	• No drilling is involved in this project.
3.	Blasting	a)Fly rock, ground vibration, noise etc. b) Improper charging of explosives	• No blasting is involved in this project.
4.	Excavation of Ore	a)Hauling and loading equipment are in such proximity while excavation b)Swinging of bucket over the body of tipper c) Driving of unauthorized person	• Operator shall not operate the machine when person & vehicles are in such proximity. • Shall not swing the bucket over the cab and operator leaves the machine after ensuring the bucket is on ground. • Shall not allow any unauthorized person to operate the machine by effective supervision.
5.	Transportation	a)Operating the vehicle “nose to tail” b) Overloading of material c) While reversal & overtaking of vehicle d) Operator of truck leaving his cabin when it is loaded	• It will be ensured that all these causes will be nullified by giving training to the operators. • No over loading will be done. • Proper training will be given.
6.	Fire due to electricity and Oil	a)Due to the short circuit of cables & other electrical parts b) Due to the leakage of inflammable liquid like diesel, oil etc.	• Electrical parts shall be cleaned frequently with the help of dry air blower • All fastening parts and places will be tightening. Suitable fire suppression equipment shall be provided.
7.	Natural calamities	Unexpected happenings	The mine management is capable to deal with the situation.

This being a small-scale project that too working in a safe area, no major disaster is expected. The management and the EMC will be able to deal with the situations efficiently keeping in view of the likely sources of dangers in the mine.

7.4 REHABILITATION AND RESETTLEMENT (R & R) PLAN:

Mining activities will be carried out within the mine lease area only. The entire mine lease area is a Patta land. There is no population within the ML area. Hence, the question of R& R does not arise.

7.5 MINE CLOSURE PLAN:

In the mine closure stage all necessary measures will be taken as per Act & Rules, There is no proposal for back filling, reclamation and rehabilitation. The quarried pits after the end of life of mine will be properly fenced all around to prevent inherent entry of public and cattle and all the statutory requirements will be fulfilled. The mine closure plan is provided in **Figure 4.5.**

7.6 CUMULATIVE IMPACT STUDY:

As mentioned earlier, these are Limekankar quarries located in Kallankurichi village, Ariyalur Taluk & District, Tamil Nadu. The details of the other quarries (existing + proposed) located within the 500m radius of the project considered for cumulative impact study now **(Annexure-3)** has been provided below in Table No.7.1 and Figure No.7.1 below:

Figure 7.1: Vicinity Map

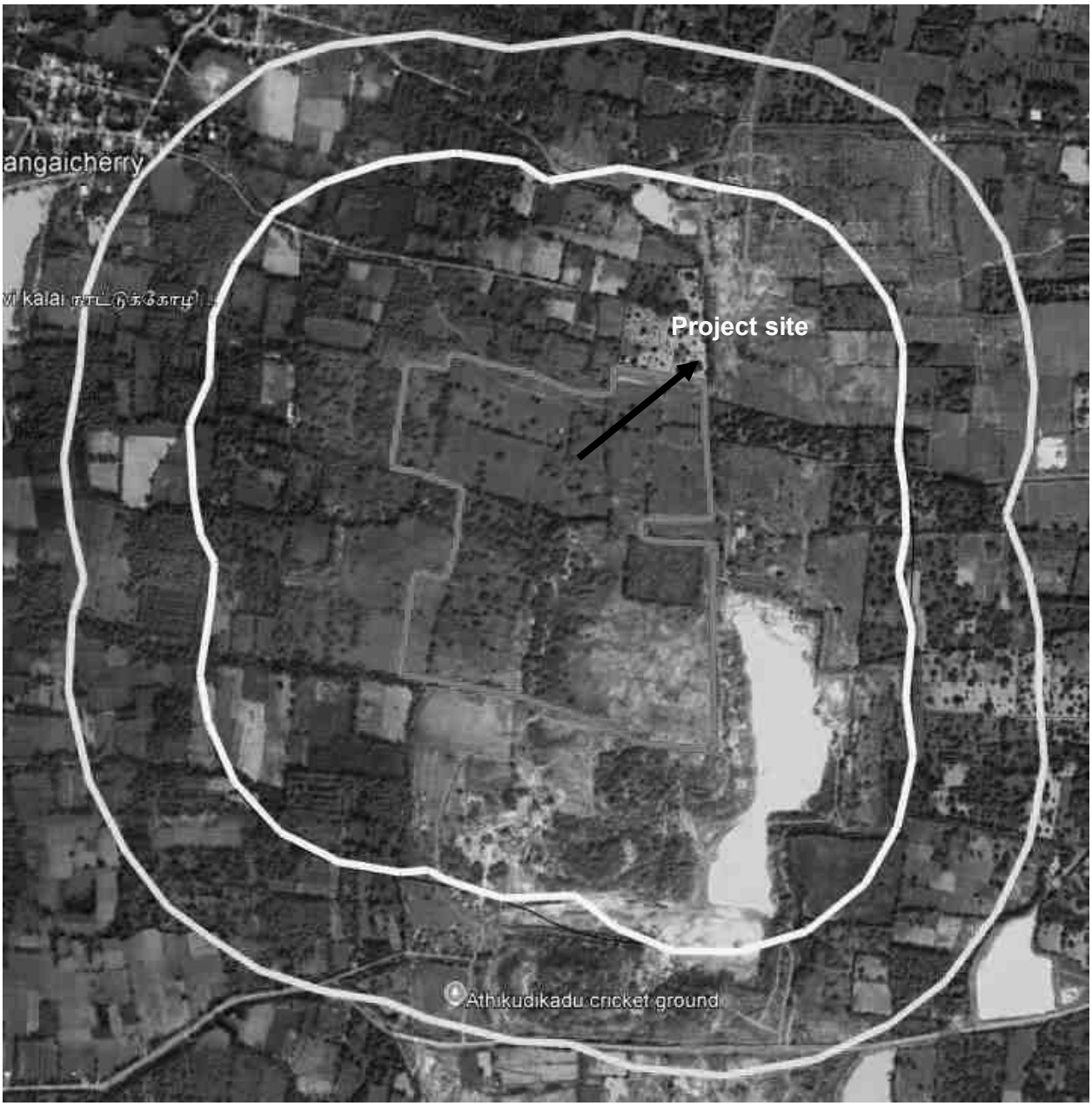

Table 7.1: Details of quarries within 500m radius

Sl.No	Name of the Quarry Owner	Taluk & Village	S.F.No.	Hectares	Name of the Mineral	Lease Period
Existing Quarries						
1.	Chettinad Cement Corporation Private Ltd.	Unjini Village, Sendurai Taluk	37 & 38 etc.,	20.96.5	Limestone	20.09.2005 To 19.09.2035
Proposed Mines						
1	Chettinad Cement Corporation Private Ltd.	Sendurai Village, Sendurai Taluk	575/2B, 3, 582/8A, 8B etc	22.145	Limekankar	-
Expired and Abandoned Mines						
--Nil--						
Total				**43.11.00**		

Since the lease area of this quarry itself is more than >5 Ha this proposal is considered under B-1 category. The baseline monitoring carried out for this project reflects the cumulative impact of the existing scenario.

Since the production from this lease is very low involving simple mining operation with no Drilling and Blasting for a shallow depth only no significant impact on cumulative basis is also expected.

* * * * * * * *

CHAPTER - VIII

PROJECT BENEFITS

CHAPTER 8
PROJECT BENEFITS

The proposed quarry will improve physical and social infrastructures in the area like:

- Direct employment to 10 people.
- Indirect employment to 50 people.
- Financial gains for the governments, through collection of various taxes like royalty, GST, etc.,
- Increase in General Awareness of the People.
- Continual improvements of the local amenities for the local society
- Improvement of the General Living Standard of the People in the Vicinity
- Overall Improvement in HDI (Human Development Index)
- Growth of Allied Industries in the Area.
- Improvement in Per Capita Income.
- Providing certain facilties for the local schools and panchyats

In short, the proposed quarry will benefit this region in the fields of employment opportunities, improved per capita income for local people, improved social welfare facilities in respect of education, medical systems, infrastructural build-up, etc in its own way.

By means of carrying out the socio-economic development activities, local community development is expected. Towards the same, the proponent has allocated Rs.2 Lakhs for CER activities for the project. The activities will be implemented once the mining operations commence. From the CER activities allocated for various social welfare activities, the villages near the lease area will be benefited.

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CHAPTER - IX

ENVIRONMENTAL COST BENEFIT ANALYSIS

CHAPTER 9
ENVIRONMENTAL COST BENEFIT ANALYSIS

Appendix-III of the MoEF notification S.O. 1533 dated 14.09.2006, which describes the generic structure of Environmental Impact Assessment document, states that the chapter 'Environmental cost benefit analysis' is applicable if it is recommended during scoping stage.

In the ToR received for the project from SEIAA, Tamil Nadu ,Environmental cost benefit analysis is not prescribed. Hence, it is not applicable for this project.

* * * * * * * *

CHAPTER - X

ENVIRONMENTAL MANAGEMENT PLAN

CHAPTER 10

ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION:

This chapter describes the implementation strategies of the environmental management measures described through the course of this EIA/EMP report for the purpose of mitigating significant impacts due to the proposed mining operations.

10.2 COMPONENTS OF THE ENVIRONMENTAL MANAGEMENT PLAN:

The environmental management plan comprises identification of the major impacts due to project operations and their suitable mitigative measures. (Provided in an elaborate manner in Chapter-IV) Based on the environmental policy of the company, the environmental management cell will oversee the implementation of these mitigative measures. The details of the proponent's environmental policy, environmental management cell and also the budgetary allocation towards various environmental management measures has been elaborated in this chapter.

10.2.1 ENVIRONMENTAL POLICY:

The proponent has frame a well-planned Environment, Health and Safety Policy. The policy is provided below in Figure No.10.1. Additionally, the Environmental management cell as described below in Table No. 10.1 below will also ensure the following in line with their policy:

- Ensuring risk-free and safe mining operations by following all rules and conditions prescribed in the Indian mines Act, metalliferrous mining regulation, mineral conservation and development rules, etc,
- Ensuring environmental preservation by adoption of remedial measures for control of air, water quality, noise status, biological improvements, green belt creation, etc,.
- Extending CER activities to cater to the needs of local community for various benefits like improvement of physical and social infrastructures for the welfare of local community.

- Ensuring that all mining operations are strictly conducted keeping with regulatory standards & maintaining safe working environment in the area.
- Providing periodical training on safety, Health, & Environment to all employers.
- Any infringement / violation of any rule or unsafe mining operations should be reported mines manager, who will take immediate corrective measures for avoiding major disasters. The report will ultimately reach the owner through upwardly hierarchical communicative channels from the lowest level to superior levels in a quick time bound duration.
- Remedial measures for such violations and deviations should be taken care 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 observed by Mines manager of the mine.

Figure 10.1: Environment, Health and Safety Policy

Chettinad cement

Environment, Health and Safety Policy

Our Environment, Health and Safety responsibilities are focused by an objective to protect people we work with, Environment and society at large. It is integral to the way we do our business activities.

1. We will work to protect people and environment with a basic belief that all injuries, emission and discharge can be prevented.
2. We are committed to prevent work place accidents and pollution, promote employee health and well-being and reduce the environmental impact in our business activities.
3. We will continue to identify, evaluate and control our safety & Occupational health hazard/risk and environmental impact and report progress.
4. We are committed to improve and skill among Employees and Partners through training to demonstrate their involvement and accountability to achieve robust safety, Occupational health and Environmental practices across our areas of operation.
5. We are committed to regularly set and review objectives and targets for continual improvement in the work environment and health & safety performance and go beyond compliance.

We are responsible and accountable for deployment of this policy and believe that Environment, Occupational Health & Safety is a core value of our company and integral part of all our business activities.

N. B...

COO

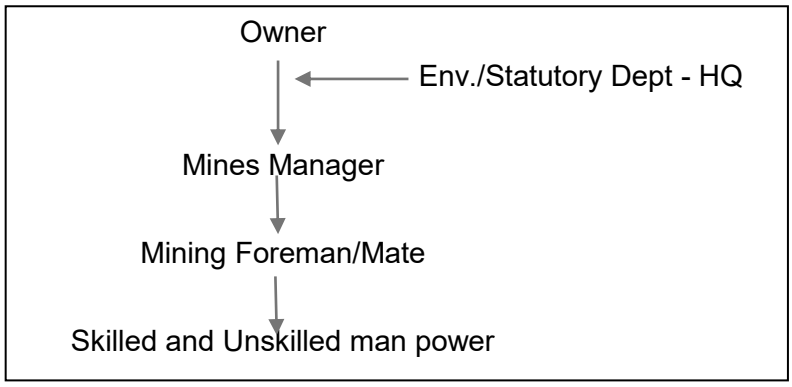
Cement Business

Date: 01.12.20

10.2.2 ENVIRONMENTAL MANAGEMENT CELL:

The Mines Manager/Mine Incharge will undertake effective monitoring and implementation of various environmental control measures promptly and effectively and to oversee various environmental management schemes for air quality control, water quality status, noise level control, plantation programme, social development schemes, etc in the mine. The organizational chart for the same has been provided below:

Figure 10.2: Organization Chart



The Mines Manager/Mines Incharge in the mine project site will be directly responsible for various environmental activities in the mine. The owner through Environment Department at the HQ & concerned Plant head will correlate and oversee the environmental activities and their effective implementation in consonance with the guidelines in the EMP. The Mines Manager/Mines Incharge will oversee the environmental administration at the mine and he will directly supervise all activities of environmental administration on environmental issues. Necessary assistance from sub ordinates, external consultants and laboratories shall be taken.

Environmental control measures will span various factors like land degradation, air, water and soil quality, noise levels, effective land reclamation for excavated areas, afforestation measures, etc. The administrative functions are given below.

- To observe the implementation of environmental control measures.
- To study the effects of project activities on the environment.

- To ensure implementation of Plantation Programme. Regular monitoring of survival rate of plants is carried out to achieve the desired result.
- To keep records of monitoring etc., in a systematic way, so as to facilitate easy access, when needed by statutory agencies, etc. Also send prescribed returns to statutory authorities.
- To ensure that adequate fencing and plantation is carried out in the safety zones.
- Conducting environmental studies and reporting to SPCB.
- To interact and liaise with Government Departments.
- To evaluate the performance of existing pollution control equipment and systems periodically and take timely action to keep the equipment at its optimum performance condition.
- To take immediate preventive action in case of some unforeseen environmental pollution attributable to the project.
- Conducting safety audits and programmes to create safety awareness in workers/ staff.
- Conducting annual health audits to detect any health problems promptly in the workers/staff. This will reduce occupational health problems.
- Imparting training on safety and conduct safety drills to educate employees. Firefighting equipment and system has to be kept in 'ready-to-fight' condition.
- Carrying out socio economic study in the surrounding areas to find out the benefits derived by the society due to the project and also to fulfill the deficiency, if any, immediately.
- Ensuring proper mine closure arrangements

10.2.3 ENVIRONMENTAL MANAGEMENT PLAN:

10.2.1.1 General:

Systematic monitoring systems and well-conceived and efficient Environment Management Plan will ensure that during the project operations, the various environmental parameters, are well within the statutorily sustainable limits. The environmental control measures proposed to keep various environmental parameters of the project in terms of air, water, noise, land, biological environment, etc. has been described below.

10.2.2.2 Air Quality:

With regards to air quality, to mitigate the fugitive and gaseous emission resulting from mining and allied activities, the following control measures are proposed to be undertaken:

- Regular water sprinkling in the transport roads using mobile tankers for dust suppression.
- Provision of dust filters / mask to workers working at highly dust prone and affected areas.
- Proper maintenance of haul roads, HEMM and dumpers.
- Covering of loaded tippers with tarpaulins during transportation
- Vehicular emissions will be controlled through regular and proper preventive maintenance schedules and emissions tests are done with diesel smoke meter equipment to ensure emission values.
- Besides, there will be good green belt cover will be developed around mine periphery and in safety zone.
- Setting up of tyre washing facility in the transport road.
- Fencing with Green netting will be carried out on all sides of the lease area.

10.2.2.3 Water Environment:

There will be no process effluent generated from this project. The domestic sewage to be generated will be collected in septic tank with soak pit arrangements. Besides, there will be no

waste dumps or stockpiles within the lease area as the entire material will be directly dispatched to the consumers. Since, the maximum depth of working is limited, there will not be much impact on water environment.

Surface runoff management structures such as garland drain connected to a settling pond will be constructed around the quarry to collect the rain water. The supernatant clear water from the settling pond will be provided to nearby downstream users.

For the surface water bodies like Eri/ vari near the lease area, safety distance of 50m has been left based on precise area conditions. Protective Earthen bund will be constructed in the entire safety zone and it will be developed with plantation. These streams/ water bodies act more of the drainage arrangement and it remains dry for most the year. There is no proposal to discharge any effluent into this water body. No major impact is envisaged on the nearby water bodies due to project operations.

10.2.2.4 Noise Environment:

During the project operations, various control measures as listed below will be carried out to mitigate adverse impact due to the noise generated due to mining and allied activities:

- Good plantation will be carried out in the safety zone areas
- Sound proof operator's cabin for equipments like shovel, tippers, etc.
- Proper and regular maintenance of equipments
- Providing earplugs to workers exposed to higher noise level.
- Providing in-built mechanism for reducing sound emissions.

10.2.2.6 Biological Environment:

The mining lease area and 10km buffer zone are devoid of declared ecologically sensitive features such as national parks, sanctuaries etc. Besides, no Schedule-I animals are observed in the core and buffer zone. There will be no major clearance of vegetation involved in this project. However, good greenbelt and plantation programmes are planned within the lease area.

In the lease area, safety barrier 7.5m & 50m is left around the periphery. Greenbelt / Plantation will be carried out to enhance the vegetative growth and aesthetic in the safety zone area. This will boost the biological, visual and aesthetic outlook of the area. Elaborate details regarding the same is provided under section 4.6.4, Chapter-IV.

10.2.2.7 Socio-Economic Environment:

The proposed project operations will provide positive impacts in the region on the employment area as well as on physical and social infrastructural status. Many other tangible benefits will be gained by the local people in the surrounding areas due to ancillary units, trading operations, contractual needs, casual labor, green belt development, etc. Towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs.2 Lakh for this project under Corporate Environmental Responsibility. The activities identified under CER will be implemented in a phased manner.

10.3 ENVIRONMENTAL POLLUTION CONTROL COST:

In this proposed quarry Implementation of environmental control measures as stated above involves capital as well as recurring expenses. The probable capital and recurring environmental control cost are calculated and given below **Table No – 10.1**

Table 10.1: Environmental Control Cost

Sl. No	Mitigation Measure	Provision for Implementation	Capital cost in Lakhs	Recurring Cost /Annum in lakhs
Air Environment				
1	Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	0.00	2.21
2	Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and / New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring		1.00
3	Air Quality will be regularly monitored as per norms within ML area & Ambient Area	Yearly Compliance as per CPCB norms		0.50
4	Muffle blasting – To control fly rocks during blasting	Blasting face will be covered with sand bags / steel mesh / old tyres / used conveyor belts		0.00
5	Wet drilling procedure / latest eco-friendly drill machine with separate	Dust extractor @ Rs. 25,000/- per unit deployed as capital & @ Rs. 2500 per unit	0.00	0.00

Sl. No	Mitigation Measure	Provision for Implementation	Capital cost in Lakhs	Recurring Cost /Annum in lakhs
	dust extractor unit	recurring cost for maintenance		
6	No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard		0.05
7	Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin		0.10
8	Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governers @ Rs. 5000/- per Tipper/Dumper deployed	0.10	0.00
9	Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour		0.05
10	Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Lumsum		1.00
11	Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	0.50	0.20
Sub-Total (A)			**0.60**	**5.11**
Noise Environment				
12	Source of noise will be during operation of transportation vehicles, HEMM- For this proper maintenance will be done at regular intervals.	Will be part of Operating Cost	-	-
13	Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Will be part of Operating Cost	-	-
14	Adequate silencers will be provided in all the diesel engines of vehicles.	Will be part of Operating Cost	-	-
15	It will be ensured that all transportation vehicles carry a fitness certificate.	Will be part of Operating Cost	-	-
16	Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	-	-
17	Line Drilling all along the boundary to reduce the PPV from blasting activity and implementing controlled blasting.	Will be part of Operating Cost	-	-
18	Proper warning system before blasting will be adopted and clearance of the area before blasting will be ensured.	Blowing Whistle by Mining Mate / Blaster / Compentent Person	-	-
19	Provision for Portable blaster shed	Installation of Portable blasting shelter	0.00	0.00
20	NONEL Blasting will be practiced to control Ground vibration and fly rocks	Rs. 30/- per 6 Tonnes of Blasted Material	0.00	0.00
Sub-Total (B)			**0.00**	**0.00**
Water Environment				
21	Water management	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	0.32	0.05
Sub-Total (C)			**0.32**	**0.05**
Implementation of EC, Mining Plan & DGMS Condition				

Sl. No	Mitigation Measure	Provision for Implementation	Capital cost in Lakhs	Recurring Cost /Annum in lakhs
22	Waste management (Spent Oil, Grease etc.,)	Provision for waste collection and disposal through authorized agency	0.25	0.20
23		Installation of dust bins	0.05	0.02
24	Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	0.10	0.01
25	Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee)	0.20	0.10
26	Health check up for workers will be provisioned	IME & PME Health check up @ Rs. 1000/- per employee	0.00	0.10
27	First aid facility will be provided	Lumsum	0.00	0.20
28	Mine will have safety precaution signages, boards.	Provision for signages and boards made	0.10	0.02
29	Barbed Wire Fencing to quarry area will be provisioned.	fencing Cost	5.00	0.10
30	No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Lumsum	0.00	0.00
31	Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	0.30	0.05
32	Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1st Class / 2nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0.00	7.80
Sub-Total (D)			**6.00**	**8.60**
Green Belt Development				
34	Green belt development - 2000 trees (500 Inside Lease Area & 1500 Outside Lease Area)	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @ 100 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring)	0.50	0.15
35		Avenue Plantation @ 150 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	2.25	0.45
Sub-Total (E)			**2.75**	**0.60**
Grand Total			**9.67**	**14.36**

Towards EMP measures, Rs.9.67 lakhs is allocated under capital cost. Besides, Rs.14.36 lakhs per annum will be spent under recurring cost. All the recurring cost of maintenance of pollution control measures, environmental monitoring etc., will be met from revenue.

10.4 CONCLUSION:

The magnitude of mining operation is less due to Simple shall depth mining operation for less production, with less equipments and with adoption of mitigative measures as described in this report it is expected that the project activity will not have any major impact on environmental equilibrium in the study area..

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CHAPTER-XI

SUMMARY AND CONCLUSION

CHAPTER 11

SUMMARY & CONCLUSION

11.1 INTRODUCTION:

Chettinad Cement Corporation Pvt. Ltd. propose to operate Lime Kankar Quarry Lease over an area of 22.145 Ha in Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu and has initiated action towards obtaining environmental clearance.

This project involves the production of 3,36,724 Tonnes of Lime Kankar and 61,223 Tonnes of Topsoil upto a depth of 1.40 m bgl (Top soil of 0.30m + limekankar of 1.10m)for the period of 5 years. It will meet the part requirement of the Kilapaluvur Cement Plant of the proponent.

Since the lease area is >5 Ha., this proposal is considered under Category – B1 and as per MoEF & CC notification necessitates preparation of EIA/EMP report and public hearing. The details of the quarries located within the 500m radius of the project is given vide **Annexure-3.** A cumulative impact study has been carried out and furnished in **Para 7.3, Chapter-VII.**

This EIA/EMP report is prepared based on standard and additional Terms of Reference issued by SEIAA, Tamil Nadu in conformance of the generic structure prescribed by MOEF&CC in their notification of September 2006 and the approved mining plan

11.1.1 STATUTORY APPROVALS:

S.No	Statutory Approval	Authority	Letter Number and Date	Reference
1.	**Precise Area Communication Letter**	Industries (MMC2) Department	Lr.No.6152/MMC.2/2023-2 dated 03.01.2024	**Annexure-1**
2.	**Mining Plan Approval**	Department of Geology & Mining,	Rc.No.8884/MM7/2018 dated 05.04.2024	**Annexure-2**
3.	**Details of other quarries within 500m radius**	Department of Geology & Mining,	Rc.No.72/G&M/2017 dated 21.02.2019	**Annexure-3**

11.1.2 ENVIRONMENTAL CLEARANCE APPLICATION:

Particulars	Details
Terms of Reference	Received from SEIAA, Tamil Nadu vide their TO25B0108TN5896547N. Dated: 05/03/2025
Baseline Data Collection	Carried out by Creative Engineers & Consultants , Chennai for Summer Season (March – May 2025)

11.2 SALIENT FEATURES OF THE PROJECT:

Table 11.1: Site Details

Location	Sendurai Village, Sendurai Taluk, Ariyalur District, Tamil Nadu
Survey No.	**Survey Number:** 575/2B, 3, 582/8A, 8B, 8C, 8D, 8E, 585/22, 23, 24, 586/6A, 6B, 8, 587/1, 3A, 3B, 3C, 3D, 3E, 3F, 4, 5, 6, 7A, 7B, 7C, 588/1, 2A, 2B, 3A, 3B, 4, 5, 6, 7A, 7B, 8A, 8B, 8C, 8D, 9, 10, 11, 12, 590/1, 2, 3A, 3B, 4, 5, 6A, 6B, 7, 8, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B1, 12B2, 12B3, 13A1, 13A2, 13A3, 13B, 591/1, 2A, 2B, 3, 592/1A, 592/1B1, 1B2, 2 and 3
Coordinates	**Latitude:** 11°13' 43.3021"Nto 11°14' 2.803"N **Longitude:** 79°11' 18.0165"Eto 79°11' 34.2221"E
Nearest Village	Periya Elangaicheri – 530m (NW)
Nearest Town	Unjini – 1Km (SE)
Nearest Highway	SH-217 - 2.5Km (NW)
Nearest Railway Station	Sendurai Railway Station – 3.2Km (NW)
Nearest Airport	Trichy Airport-74Km (SW)
Accessibility	Lease area is approachable through existing approach road on the southern side of the lease area which joins Rayampuram-Unjini Road at a distance of 1.5Km (S) and 15km form Ariyalur.
Topography	Plain terrain, dry lands with thorny bushes.
Drainage	First order streams/ vari courses control the drainage near the lease area

Table 11.2: Environment Setting of The Study Area

S.No	Particulars	Details	22.14.5Ha	
			Distance	Direction
I	**Connectivity**			
1.	Highway	SH-217	2.7Km	NE
2.	Railway Station	Sendurai Railway Station	3.3Km	NW
3.	Airport	Trichy Airport	75Km	SW
4.	Village	Nallampalayam	850m	NE
		Elangaicherry	550m	NW
		Adhikudikadu	1.2km	SW
		Unjini	1.1km	SE
5.	Town/City	Sendurai	2.6Km	NW
II	**Environmental Features**			
6.	Water Bodies	Anaivari Odai	5.7Km	NW
		Vilangudi Odai	7.5Km	S
7.	Reserve Forests	Vannankurichi RF	1.6km	(S)
		Manageri RF	6.4km	(SE)
		Udaiyarpalaiyam RF	9.5km	(SE)
		Palakkurichi RF	7.4km	(E)
		Sedalavadi RF	3.0km	(NE)
III	**Sensitive Areas**			
8.	Notified Archaeologically important places, Monuments	Nil within 10km radius	--	--
9.	Local Places of Historical and Tourism Interest	Nil within 10km radius	--	--
10.	Environmental sensitive areas, Protected areas as per Wildlife Protection Act, 1972*	Nil within 10km radius	--	--
11.	Defense Installations	Nil within 10km radius	--	--

Table 11.3: Technical Description

<table>
<tr><th>PARTICULARS</th><th>DETAILS</th></tr>
<tr><td>Geological reserve</td><td>5,48,089 T of Kankar</td></tr>
<tr><td>Mineable reserve</td><td>3,36,724 T of Kankar</td></tr>
<tr><td>Method of Mining</td><td>Opencast method without drilling and blasting will be carried out.</td></tr>
<tr><td>Production</td><td>
<table>
<tr><th>Year</th><th>Lime Kankar ROM (Tonnes)</th><th>Top Soil (Tonnes)</th><th>Ore: OB Ratio</th></tr>
<tr><td>I</td><td>99510</td><td>18093</td><td>1 : 0.18</td></tr>
<tr><td>II</td><td>99720</td><td>18131</td><td>1 : 0.18</td></tr>
<tr><td>III</td><td>96961</td><td>17629</td><td>1 : 0.18</td></tr>
<tr><td>IV</td><td>40533</td><td>7370</td><td>1 : 0.19</td></tr>
<tr><td>V</td><td>--</td><td>--</td><td>--</td></tr>
<tr><td>Total</td><td>336724</td><td>61223</td><td>1 : 0.18</td></tr>
</table>
</td></tr>
<tr><td>Waste Generation and Management</td><td>There is no generation of mineral rejects in the applied area. The topsoil that would be generated during the present plan period is proposed to be utilized for afforestation.</td></tr>
<tr><td>Ultimate Depth</td><td>1.40m</td></tr>
<tr><td>Man power</td><td>10 People directly and more than 50 people indirectly</td></tr>
<tr><td>Mode of transport</td><td>By Road</td></tr>
<tr><td>Water requirement</td><td>5 KLD</td></tr>
<tr><td>Source of water</td><td>The required water will be procured from outside agencies.</td></tr>
<tr><td>Power requirement</td><td>All the equipment will be diesel operated. No electricity is needed for mining operation. The minimum power requirement for office, etc will be met from state grid.</td></tr>
<tr><td>Lease period</td><td>5 Years</td></tr>
<tr><td>Project cost</td><td>Rs.252.0 Lakhs</td></tr>
</table>

11.3 EXISTING ENVIRONMENTAL SCENARIO:

11.3.1 GENERAL:

The studies and data collection have been carried out systematically and meticulously as per relevant IS codes, CPCB and MoEF&CC guidelines and as per approved ToR during **Summer Season (March 2025 to May 2025)** For the purpose of this study, the area has been divided into

two zones, namely, core and buffer zones. Core zone is considered as the total lease area, while buffer zone encompasses an area of 10 km radius distance from the periphery of core zone.

11.3.2 SOCIO-ECONOMIC STATUS:

The proposed lease is located in Sendurai Village, Ariyalur Taluk, & District. Based on 2011 census data, in the 10km radius there are 42 Rural villages from Ariyalur Taluk, & District

Table 11.4: Social, Economic And Demographic Profile of the Study Area

Details	Population	Percentage
A. Gender-wise distribution		
Male Population	86953	49.73
Female Population	87904	50.27
Total	**174857**	**100**
B. Caste-wise population distribution		
Scheduled Caste	47291	27.05
Scheduled Tribes	1130	0.65
Other	126436	72.31
Total	**174857**	**100**
C. Literate and Illiterate population		
Literate Males	61811	35.35
Literate Females	44929	25.69
Total Literate Population	**106740**	**61.04**
Other Males	25142	14.38
Other Females	42975	24.58
Others Population	**68117**	**38.96**
Total	**174857**	**100**
D. Occupational structure		
Main workers	68186	39.00
Marginal workers	25884	14.80
Total Workers	**94070**	**53.80**
Total Non-workers	93475	5
Total	**174857**	**100**

11.3.2.1 SAMPLE SURVEY:

Nearby villages were visited for conducting sample Village survey on all socio-economic aspects and requirements of the people. The existing socio-economic scenario is studied and CER activities are also suggested to the proponent. The study details are given in **Para 3.2.4, Chapter – III**.

11.3.3 EXISTING ENVIRONMENTAL QUALITY:

Baseline monitoring was carried out during Summer Season (March 2025 to May 2025). The details of the same are provided below:

Table 11.5: Baseline Data

A) METEOROLOGICAL DATA	**Monitoring Location -** Near Mine Lease Area		
PARAMETERS	**MINIMUM**	**MAXIMUM**	
Temperature in °C	23.0	41.0	
Humidity in %	21.0%	99.0%	
Wind speed Km/Hr	<1.8	38.9	
Predominant wind direction (From)	W		
B) AMBIENT AIR QUALITY	**Monitoring Location –** 5 locations		
PARAMETER	**RESULT (µg/m3)**		***LIMIT (µg/m3)**
Location	**Core Zone**	**Buffer Zone**	
Particulate Matter (Size <10 µm)	40.7 – 51.6	44.9 – 60.2	100
Particulate Matter (Size <2.5 µm)	18.7 – 23.7	21.1 – 28.3	60
Sulphur Dioxide (as SO_2)	4.6 – 7.1	5.2 – 9.3	80
Nitrogen Dioxide (as NO_2)	8.1 – 10.4	8.4 – 12.8	80
Conclusion: The existing Ambient Air Quality levels for PM10, PM2.5, SO2 and NO2, are within the NAAQ standards prescribed CPCB limits of 100 µg/m3, 60 µg/m3, 80 µg/m3 & 80 µg/m3. The CO values in all the locations were found to be below detectable limit. Silica values in the study area are found to be below detectable limit. (Detection limit – 0.05 mg/m3)			
C) WATER QUALITY	**Monitoring Location –** 5 locations		
PARAMETER	**Result**	***LIMIT (µg/m3)**	
pH at 25 ˚C	6.89 – 7.54	**6.5-8.5**	
Total Dissolved Solids, mg/L	450 – 770	**2000**	
Chloride as Cl-, mg/L	114 – 446	**1000**	
Total Hardness (as CaCO3), mg/L	302 – 390	**600**	
Total Alkalinity (as CaCO3), mg/L	232– 344	**600**	
Sulphates as SO42-, mg/L	72.6 – 222	**400**	
Iron as Fe, mg/L	0.04 – 0.09	**0.3**	
Nitrate as NO3, mg/L	1.56 – 3.28	**45**	
Fluoride as F, mg/L	0.36 – 0.45	**1.5**	

Conclusion: The water quality of ground water is found to be within the prescribed Permissible limits of IS: 10500 Norms in the absence of an alternative source as per Drinking Water Specifications.			
D) NOISE LEVELS		**Monitoring Location –** 5 locations	
PARAMETER	**RESULT dB(A)**		***LIMIT (µg/m3)**
	Day Equivalent	**Night Equivalent**	
Core Zone	48.9	39.8	**90**
Buffer Zone	45.3– 50.7	39.3 – 40.2	**Day Equivalent - 55dB(A), Night Equivalent - 45dB(A)**
*Permissible noise for industrial workers as laid down by CPCB (at 8 hrs Exposure Time). While comparing with the MoEF&CC Norms, the monitored ambient noise levels are generally within the limit values.			
E) SOIL QUALITY		**Monitoring Location –** 5 locations	
PARAMETER		**Range of values**	
pH		6.94 to 7.45	
Electrical Conductivity (µmho/cm)		52.11 – 98.47	
Organic matter (%)		0.76 – 1.12	
Total Nitrogen (mg/kg)		205 – 312	
Phosphorus (mg/kg)		0.62 – 1.41	
Sodium (mg/kg)		690- 934	
Potassium (mg/kg)		268 -412	
Soil is of Loam Type			

F) LAND EVIRONMENT:

For the present study on land use pattern in the study area, remote sensing satellite data have been used. The area estimated of land use categories around the 10km buffer zone is provided below:

Table 11.6: Land Use in 10Km Buffer Zone

S.No	Landuse Feature	Area (Sq.Km)	Percentage
1	Agriculture/Crop	79.28	23.60
2	Fallow Land	84.58	25.18
3	Land With Scrub/ Plantation	109.68	32.66
4	Land Without Scrub	36.44	10.85
5	Reserve Forest	10.96	3.26
6	Water bodies	4.80	1.43
7	Settlement	8.61	2.56
8	Mining	1.51	0.45
	Total	334.86	100

From the above table it is seen that 23.60% of the buffer area is classified under the Agriculture/ Plantation followed by 25.18 % of fallow land, 32.66 % constitutes land with scrub, 10.85 % constitutes land without scrub and the balance falls under other land use categories. Details are given in Table 3.21, Chapter – III.

G) BIOLOGICAL ENVIRONMENT:

Flora: The lease area is a non forest, private land. The lease area is dominated with Prosopis juliflora. There are 3 trees species from 2 families followed by 3 shurbs from 3 families and 2 herbs from 2 family were recorded in the core zone. The detailed list of plants found in the core zone are given in Table no – 3.23. Agriculture is seen mainly on the northern, North western side of the study area in proximity to odai, due to presence of rainfed irrigation facility and the favourable soil condition. Since the lithology of the eastern side of the study area, is predominantly motteled sandstone type Munthiri (Annacordium occidentalae) prdominantly present in this area. The Dominated species in the buffer zone are Annacordium occidentalae, Mangifera indica, Albizia lebbeck, Acacia auriculiformis, Sygygium cumuni, Borassus flabellifer, Azadirachta indica, Prosopis juliflora, etc. The detailed list of plants found in the Buffer zone is given in Table no – 3.24..

Fauna: There is no Wild Life Sanctuary or National Park within the study area of 10 km. Domesticated animals like Cows, Buffalos, Dogs, Cats etc., are commonly found. The lease and 10 Km buffer zone does not fall in the Western Ghats ESA boundary. No wild mammalian species was directly sighted during the field survey. There is no Schedule I species in the core & buffer zone. The list of fauna within the study area is given in Table No – 3.25.

H) HYDROLOGICAL STUDY:

The area applied for quarry lease exhibits almost plain topography covered by top soil and lime kankar formation. There are no perineal water courses in the lease areas. South of the lease area, vari course situated in S.F.No.39/2, 40/2 & 41 of Unjani village, S.F.No.288 of Rayampuram village and a drainage channel originating from S.F.No.590/14 in the North eastern side. Safety distance of 50m has been left based on precise area conditions... Further elaborate details of the same has been provided under section 4.3.3C, Chapter-IV. The drainage map prepared from the survey of India topographic maps shows the presence of few streams running in a dendritic pattern.

The Groundwater levels from the observation wells of TWAD in Ariyalur have been analyzed for Post-Monsoon and Pre-Monsoon. The occurrence of groundwater mainly in the porous soil are weathered layers, very negligible amount of groundwater percolated through the poorly fractured layer.

In the study area, the shallow aquifer is developed through dug wells and deeper aquifer through tube wells. The study has revealed that potential fractures are encountered at deeper levels. The water in the wells are available mainly after post monsoon and it reduces during summer necessitating only dry crops cultivation. The water table aquifer is normally developed for domestic water supply and small irrigation needs, through dug wells, constructed in the past. The semi- confined aquifer is mostly developed through bore wells for agricultural purposes tapping this zone at depths of 60 to 80m. The ultimate mining depth is also 1.40m only. Hence, no adverse impact on groundwater table is envisaged.

11.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES:

11.4.1 GENERAL:

This is a proposed project and Semi – Mechanized Open Cast mining will be carried out to quarry out Lime Kankar. Negligible environmental impact is envisaged from this project owing to the following reasons:

- Low quantum of production
- No Drilling and Blasting
- Less number of equipments of optimum capacity - Only 1 excavator and 2 tippers are proposed to be used in this project.
- Ultimate depth of mining is only 1.40m

Due to the above-mentioned reasons, there is no adverse impact envisaged on the environment. The identified impacts due to this mine during mining and associated activities have been studied in relation to various environmental components like Air, water, noise, vibration, land, transport etc.

11.4.2 AIR ENVIRONMENT:

The principal sources of air pollution in the area due to mining and allied activities are dust generation in the mine due to various activities such as excavation of material, movement of

HEMM, loading, unloading and transportation operations.. Besides, Gas emission also occur as a result of emission of SO2, NOx, CO etc., from diesel driven mining equipment, compressors, generator sets, etc. The following measures will be adopted to control impact on the air quality due to mining operations in the lease area:

Table 11.7: Mitigation Measures – Air Environment

S.No	Activity	Mitigation Measures
1	Excavation and Loading	Proper maintenance of HEMM
		Enclosures for operator cabin.
		Imparting sufficient training to operators on safety and environmental parameters.
		Proper maintenance of hauling equipments.
		Avoiding overloading of dumpers.
2	Transportation	Regular wetting of transport road using mobile water tanker.
		Proper maintenance of haul road and other roads
		Setting up of tyre wash facility in the transport road.
		Avoiding overloading of tippers
		Covering of loaded tippers with tarpaulins during transportation
		Vehicular emissions will be controlled through regular and proper preventive maintenance schedules and emissions tests are done with diesel smoke meter equipment to ensure emission values.
3	Others	Development of greenbelt / barriers around mine in the safety zone and carrying out plantation within the lease area.
		Green netting will be carried out around the lease periphery on all sides.

Due to adoption of all these measures, no major impact on air quality is envisaged due to this proposed opencast mining operation.

The impact on air quality due to the proposed project is estimated using AERMOD View Gaussian Plume Air Dispersion Model developed by Lakes Environmental Software which is based on steady state Gaussian plume dispersion. Ground Level Concentration (GLC) have been computed using hourly meteorological data for particulate matter PM10 and PM2.5.

The resultant added concentrations with baseline figures even at worst scenario, show that the values of ambient air quality with respect to PM_{10} are in the range of 53.3 μg/m3 to 61.2 μg/m3 and with respect to PM2.5 are in the range of 23.7 μg/m3 to 29.3 μg/m3 which are within the statutory limits in each case.

For preservation of environment in this mine strict enforcement of management schemes will be undertaken for taking corrective actions, as needed. By adopting the effective implementation of all the mitigative measures, no adverse impact on Air quality due to the mining operation in this lease area is expected.

11.4.3 WATER ENVIRONMENT:

Water Requirement: The total water requirement for this project will be 5.0 KLD comprising 1.0 KLD for drinking water and domestic use, 3.0 KLD for dust suppression and 1.0 KLD for greenbelt. The water will be sourced from outside agencies.

The activity / source of pollution, its impact / consequence, proposed control measures are explained below:

Table 11.8: Mitigation Measures – Water Pollution

S.No	Source	Consequence	Mitigation Measures
A	Domestic use	Generation of waste water	The domestic sewage to be generated from the project will be collected in septic tank with soak pits.
B	Rainfall	Runoff from waste dump and stack	Towards surface runoff management, a garland drain of length 2400m will be constructed around the quarry and will be connected to a settling pond with silt traps. The supernatant clear water from the settling pond will be flow to the downstream users.
		Rainwater Harvesting	The rain water falling in the quarry will be harvested in the sump at the lowest level of the quarry. This sump will act as a settling pond to prevent solids escaping along with discharge, before outlet. etc.
C	Drainage Course	Disturbance to drainage course	There are no perineal water courses in the lease area. South of the lease area, vari course situated in S.F.No.39/2, 40/2 & 41 of Unjani village, S.F.No.288 of Rayampuram village and a drainage channel originating from S.F.No.590/14 in the North eastern side. Safety distance of 50m has been left based on precise area conditions. As a protective measures, an Earthen bund of 3 ft height will be constructed in the safety zone and it will be developed with plantation. These streams/ water bodies act more of the drainage arrangement and it remains dry for most the year. There is no proposal to discharge any effluent into this water body. No major impact is envisaged on the nearby water bodies due to project operations

- **Stage of Groundwater Development:** The groundwater resource data of Ariyalur district was obtained from the data provided in the technical report of the National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD&GR – Notes on Ariyalur

District. Based on the report it is seen that this area can be categorized as 'Safe' from ground water development point of view.

- **Generation of mine pit water:** Mining operations are proposed to be quarried upto a depth of 1.40m only. The groundwater table in this area is much below this level. There is no groundwater intersection envisaged

11.4.4 NOISE ENVIRONMENT:

In this project, there is no drilling and blasting involved. There will be hardly operation of 1 loader and 2 tippers in the lease area. Hence the effects of noise from the mining operation will be insignificant. Noise Levels due to mining operations at the periphery of the mine lease itself will be less even without considering any attenuation factor. However, practically there will be attenuation due to vegetation etc., and as such there will not be any adverse noise propagation outside the lease boundary. Since the habitations are also away the effect of noise due to mining operations will not be felt at all in the surrounding village. Hence, by implementing the following mitigative measures for noise control, the impact on noise levels will continue to be insignificant:

- Planting rows of native trees along roads, around mine area and other noise generating centres to act as acoustic barriers.
- Sound proof operator's cabin for equipments like shovel, tippers, etc.
- Proper and regular maintenance of equipments may lead to less noise generation.
- Providing in-built mechanism for reducing sound emissions.
- Providing earplugs to workers exposed to higher noise level.
- Conducting regular health check-up of workers including Audiometry test for the workers engaged in noise prone area.
- Provision of green net in lease periphery

Further green belt and afforestation will be planned and executed to abate noise and dust propagation in the area.

11.4.6 IMPACT ON LAND ENVIRONMENT:

The lease area of 22.145 Ha is a patta land in the name of the applicant Chettinad Cement Corporation Pvt Ltd.. There is no waste generation anticipated in this quarry operation since the entire excavated material will be utilized. Hence, there is no external overburden dump involved. Ultimately Mined out area of 13.605 Ha will be backfilled with available material and restored to premining condition. Balance area will be used for rainwater water harvesting pit.. Entire mined out area will be properly fenced to prevent inadvertent entry of men and animals. Plantation will be carried out in the safety zone area.

11.4.7 BIOLOGICAL ENVIRONMENT:

Since the lease areas contain only thorny bushes & shrubs, clearance of major vegetation is not involved.Necessary mitigative measures like dust suppression, proper maintenance of equipment's, greenbelt and plantation etc., will be carried out to prevent dust generation & any further impact on the vegetation. Greenbelt / Plantation will be done in the lease periphery, safety zone and also outside the lease area to enhance the vegetative growth. About 2000 trees will be planted in and around the lease area.

11.4.8 SOCIO ECONOMIC ENVIRONMENT:

The entire lease area is a private patta land. Hence, there are no habitations or hutments in the core zone area and no rehabilitation or resettlement problems will arise here. The vari in proximity to the lease area not be disturbed by the proponent and sufficient safety barrier has also been left. Towards the same, it is proposed to construct a bund along with fencing.

The mining operations in the proposed quarry will employ about 10 people. Besides through allied opportunities in logistics, trading, repairing works etc. good employment potential will arise in this area, which will provide raising income levels and standards of living in the area through various service related activities connected with the project operations.

Towards the socio economic development of the surrounding area, the proponent has earmarked an amount of Rs.2.0 Lakhs under Corporate Environmental Responsibility. The activities identified under CER will be implemented in a phased manner.In consultation with the locals based on the need & priority it will be implemented.

11.4.9 OCCUPATIONAL HEALTH AND SAFETY ASPECTS:

In order to ensure minimisation of occupational health and safety problems in the project operation, the following preventive remedial measures will be effectively exercised in the project operations, so as to comply with applicable standards.

- Medical examination of workers at pre-entry level stage of workers, etc., by qualified doctors, with periodical examination of all workers/staff at least once a year, as per DGMS circulars.
- Regular awareness campaigns amongst staff and workers
- Staff will be provided with PPE to guard against excess noise levels, Dust generation and inhalation, etc., as per standards prescribed by DGMS.

11.4.10 IMPACT ON LOCAL LOGISTICAL SYSTEM DUE TO PROJECT:

There will be hardly about 2 trips per hour of mineral transporation. The transport route can easily absorb this negligible traffic due to this project. The following mitigative measures are suggested for mitigation of adverse impacts on the logistical aspect of the project:

- ❖ Water sprinkling on Rough stone in the transport vehicles before transporting, so that no dust nuisance during transport will arise.
- ❖ Proper maintenance of transport roads
- ❖ Proper maintenance of transport vehicles.
- ❖ Avoiding overloading of material
- ❖ Covering of loaded vehicles with tarpaulins sheet if warranted.

11.4.11 WASTE MANAGEMENT:

Since the entire mined out material will be used there will not be any solid waste generation from this project. There is no process effluent generation from this mine. Hence no liquid waste is generated.

The hazardous waste generated in this mine will be stored in a separate storage area with impervious containers for waste oil, oil contaminated clothes, used lead acid batteries, scraps, tyre storage etc. It will be disposed through authorized recyclers or re-processors periodically. The hazardous wastes will be transported in accordance with the provisions of rules. By effective implementation of above said mitigation measures no major impact due to Hazardous waste is expected.

Single use plastics/ use and throwaway plastics will be banned in the site as directed by the Tamil Nadu Government vide GO(Ms)No.84 regarding ban on use of plastic products. The employees will be encouraged to use compostable material or reusable material.

11.5 ENVIRONMENTAL MONITORING PROGRAMME:

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 statutory Limits.

Monitoring location and the frequency of monitoring shall be suitably modified in consultation with the nodal agency as per the actual requirements and prevailing conditions of the mine and environmental factors, as dictated from time to time, depending on the prevailing pollution levels, if required.

Towards EMP measures, Rs.9.67 lakhs is allocated under capital cost. Besides, Rs.14.36 lakhs per annum will be spent under recurring cost. All the recurring cost of maintenance of pollution control measures, environmental monitoring etc., will be met from revenue. Further details of the capital and recurring cost of environmental management has been provided in in Table No. 10.2, Chapter-X.

11.6 ADDITIONAL STUDIES:

The additional studies covered for this EIA / EMP report are:

1. Public consultation of the project as per MoEF&CC mandates.
2. Risk Assessment
3. R&R Plan
4. Mine closure plan

This draft EIA/EMP report will be exposed to public consultation as per mandatory procedures through the District Collector and State Pollution Control Board officials after giving 30 days advance notice in two local newspapers about the scheduled date and time for conduct of the public hearing procedures. The opinions, concerns and objections of stakeholders will be recorded during the public hearing. All the public queries and the replies to the query by the project proponent and officials concerned will be recorded and incorporated in the EIA/EMP report for approval by SEIAA, Tamil Nadu.

Elaborate description in respect of Risk Assessment and Mine closure plan are given in **Chapter - VII**.

As the lease area of this quarry itself is more than >5 Ha this proposal is considered under B-1 category. The baseline monitoring carried out for this project reflects the cumulative impact of the existing scenario.

Since the production from this lease is very low involving simple mining operation with no Drilling and Blasting for a shallow depth only no significant impact on cumulative basis is also expected.

11.7 CONCLUSION:

By systematic and scientific mining adhering to all the statutory norms and enforcing and strictly implementing the above said mitigation measures mentioned in this report, no adverse impact is envisaged. The proposed mining activity will be carried out without drilling and blasting, with low quantum of production, less number of equipments and also a meagre depth of only 1.40m. Hence, no adverse impact on the environment due to mining operations is envisaged. Besides, this project will also provide employment, social welfare facilities by way of CER activities and also meet the raw material requirement of their plant.

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CHAPTER - XII

DISCLOSURE OF CONSULTANTS ENGAGED

CHAPTER 12

DISCLOSURE OF CONSULTANTS ENGAGED

Creative Engineers & Consultants, Chennai is an **NABL** accredited testing laboratory and **NABET** accredited EIA consultancy. Established over 25 years ago, this company has steadily made good strides in the environmental impact assessment fields, and is also one of the first companies to get accredited by NABET as an Accredited Consultant Organization as early as 2011. Creative Engineers & Consultants has to its credit, successful completion of numerous EIA/EMP reports, grant of environmental clearances and periodic environmental monitoring works. Presently, the company has been accredited by NABET as a 'Category-A' organization for the sectors of Mining of Minerals (opencast only), Thermal Power Plants, Mineral Beneficiation and Cement Plants with the accreditation valid upto 23.12.2026. The team of experienced professionals that are a part of this organization has been detailed below.

Table 12.1: List of People Involved

EXPERT NAME	QUALIFICATION	POSITION	EXPERIENCE
Mr. P. Giri	AMIE (Mining)	EIA Coordinator & Functional area Expert (AP,NV,HW),	Over 30 years of experience in EIA/EMP report, mine plan preparation, including modeling
Mr. K. Shankar	M.Sc (Geology). PGMEMG	Functional area Expert (GEO, HG, SHW, RH) & IBM approved RQP.	Over 25 years of experience in EIA/EMP report, Mine plan, hydrological report preparation
Mr.S.S.Rajendran	M.Sc. (Pharmaceutical Chemistry)	Lab head	More than 15 years of experience in Environmental laboratory.
Mr. R. Babu raj	M.A (Sociology), B.Com(Y.L&Cost), ITI, Advance Diploma in Computer application	Functional Area Expert (Socio Economy)	Over 18 years of experience in dispersion modeling, computer applications. Specialized in CAD and computer software,

EXPERT NAME	QUALIFICATION	POSITION	EXPERIENCE
			applications. 7years experience in the field of socio economy and its allied report preparation.
Mr. B. Govindaraman	B.Sc.	Field technician	Over 20 years of field monitoring & data collection experience
Dr.B.Swamynathan	M.Sc (Ecology & Environmental Sciences), M.Phill (Botany), Ph.D (Ecology & Environmental Sciences)	EIA Coordinator and Functional Area Expert (EB,SC,LU and AP)	More than 12 years of experience in Environment and allied fields.
Ms. G. Sandhya	B. Tech Chemical Engineering M.Tech Environmental Engineering	Functional Area Expert (AQ, WP)	Over 6 years experience in preparation of EIA/EMP reports

* * * * * * * *

ANNEXURES

Annexure - 2

Natural Resources (MMC.2) Department,
Secretariat, Chennai-600 009.

Letter No.6152/MMC.1/2023-2, Dated: 03.01.2024

From
Thiru. K. Phanindra Reddy, I.A.S.,
Additional Chief Secretary to Government (FAC).

To
Tvl. Chettinad Cement Corporation Private Limited,
4th Floor, Rani Seethai Hall Building, No.603,
Anna salai, Chennai - 600 006.

Sir,

Sub: Natural Resources Department - Mines and Minerals - Minor Mineral – Quarry Lease Application of Tvl.Chettinad Cement Corporation Private Limited for quarrying Limekankar over an extent of 22.14.5 hectares of patta lands in S.F.Nos.575/2B, 3, 582/8A, 8B etc., in Sendurai Village, Sendurai Taluk, Ariyalur District – Precise Area communicated – Approved Mining Plan and Environmental Clearance Certificate - Requested – Regarding.

Ref: 1. Your Quarry Lease application dated 15.03.2018.

2. From the District Collector, Ariyalur District, Lr.Rc.No.72/G&M/2018, dated 13.11.2018.

3. From the Commissioner of Geology and Mining, e-File Rc.No.8884/MM7/2018, dated 10.02.2023.

*****

I am directed to invite your attention to the references second and third cited wherein the District Collector, Ariyalur and the Commissioner of Geology and Mining have recommended your quarry lease application for quarrying Limekankar over an extent of 22.14.5 hectares of patta lands in S.F.Nos.575/2B, 3, 582/8A, 8B etc., in Sendurai Village, Sendurai Taluk, Ariyalur District for a period of 5 years under Rule 43(3) of the Tamil Nadu Minor Mineral Concession Rules, 1959.

2. In this connection, I am directed to inform that the above said area for quarrying Limekankar is approved as precise area by Government, as annexed, subject to the following conditions:-

i. Quarrying operations shall be carried out upto the depth of Limekankar limits only under Rule 43(3) of the Tamil Nadu Minor Mineral Concession Rules, 1959.

ii. The applicant company shall provide and maintain a safety distance of 10 meters to the cart track situated in S.F.Nos.582/1, 587/2.

iii. The applicant company shall provide and maintain a safety distance of 50 meters to the vari course in S.F.No.590/14 in Sendurai village.

iv. The applicant company shall provide and maintain a safety distance of 50 meters to the vari course in S.F.No.39/2, 40/2 and 41 of Unjini village and S.F.No.288 of Rayampuram village.

v. The applicant company shall provide and maintain a safety distance of 50 meters to the low tension power line passing from North East to South west through S.F.No.575/2A1, 2A2, 589/11, 12B, 588/3A, 3B, 4, 5, 9, 10, 587/1, 585/12, 14, 18, 19, 20, 21, 586/2, 3A, 3B, 4, 5A, 5B, 588/1, 582/8A and North to South in S.F.Nos.582/1, 7A, 7B, 7C.

vi. The applicant company shall provide and maintain a safety distance of 10 meters to the foot path situated in S.F.Nos.591/3, 592/2, 3.

vii. The applicant company shall provide and maintain a safety distance of 7.5 meters to the adjoining patta lands.

viii. The applicant company shall provide and maintain a safety distance of 10 meters to the adjoining Government poromboke lands.

ix. The applicant company should not mine the limestone below the limekankar deposit.

x. The applicant company shall obtain Environmental clearance from the State Environment Impact Assessment Authority (SEIAA)-Chennai.

xi. The applicant company shall obtain consent from the Tamil Nadu Pollution Control Board.

xii. If any violation is found during quarrying operations, the penal provisions of the Tamil Nadu Minor Mineral Concession Rules, 1959 and other Act and Rules in force will attract.

xiii. The applicant company should fence the lease granted area with barbed wire fencing before the execution of lease deed as follows:-

a) The pillar post shall be firmly grounded with concrete foundation of height not less than 2 meters with a distance between two pillars shall not be more than 3 meters.

b) The applicant company shall incorporate the Differential Global Positioning System (DGPS) readings for the entire boundary Pillars of the area and the same should be clearly shown in the mining plan.

c) A soft copy of the digitalized map with Differential Global Positioning System (DGPS) readings should be submitted in the Compact Disc (CD) form to the Deputy Director (Geology & Mining), Ariyalur.

xiv. The applicant company should ensure that all the quarry workers working under its control are registered in the Labour Welfare Board and also enrolled in the ongoing insurance scheme and to submit compliance report to the District Collector, Ariyalur District before execution of the lease deed.

3. Therefore, I am to request you to furnish an approved mining plan for the above said precise area to the Government through the Commissioner of Geology and Mining within a period of 3 months for grant of quarry lease for quarrying Limekankar as per rule 43 of the Tamil Nadu Minor Mineral Concession Rules, 1959.

4. I am also directed to request you to obtain and produce Environmental Clearance Certificate from the appropriate authority as per rule 42 of the Tamil Nadu Minor Mineral Concession Rules, 1959 for grant of quarry lease.

Yours faithfully,

Rajavelu
5.1.2024

for Additional Chief Secretary to Government (FAC)

Copy to:
The Commissioner of Geology and Mining,
Guindy, Chennai – 600 032.

The District Collector,
Ariyalur District.

COMMISSIONERATE OF GEOLOGY AND MINING

From
Thiru T.Muruganandam, M.Sc.,
Additional Director,
Commissionerate of Geology and Mining,
Guindy, Chennai – 600 032.

To
M/s.Chettinad Cement Corporation
Private Limited,
Ariyalur Works,
Trichy Road, Keelpaluvur,
Ariyalur District - 621 707.

Rc.No.8884/MM7/2018, dated 05.04.2024

Sir,

Sub: Mines and Quarries – 31 Minor Minerals – Limekanakr – Ariyalur District - Sendurai Taluk – Sendurai Village – S.F.Nos.575/2B, 582/8A, 8B etc., - over an extent of 22.14.5 Ha. - Patta lands - Quarry lease application preferred by Tvl.Chettinad Cement Corporation Private Limited – Recommended and forwarded by the Assistant Director, Geology and Mining, Ariyalur – Precise area communicated by the Government - Mining Plan submitted for approval - accorded – Regarding.

Ref:
1) Quarry lease application of Tvl.Chettinad Cement Corporation Private Limited, Ariyalur dated 15.03.2018.
2) District Collector, Ariyalur letter Rc.No.72/G&M/2018, dated 13.11.2018.
3) This Office File Rc.No.8884/MM7/2018, dated 10.02.2023 forwarded to the Government.
4) Government letter No.6152/MMC.2/2023-2, dated 03.01.2024.
5) G.O.(D) No.18, Natural Resources (E.1) Department, dated 01.03.2024.
6) Mining Plan Submitted by Tvl.Chettinad Cement Corporation Private Limited dated 04.03.2024.
7) The Assistant Director, Geology and Mining, Ariyalur District letter Rc.No.72/G&M/2018, dated 13.03.2024.

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Kind attention is invited to the references cited above.

2) In the reference 4th cited, Precise Area Communicated by the Government with a direction to the Applicant Company to submit an approved mining plan within a period of 3 months in respect of the area applied for grant of quarry lease for quarrying

Limekanakr over an extent of 22.14.5 Ha. of patta lands in S.F.Nos. 575/2B (0.31.0), 575/3 (0.20.0), 582/8A (0.13.5), 582/8B (0.21.0), 582/8C (0.03.0), 582/8D (0.24.0), 582/8E (0.32.0), 585/22 (0.14.5), 585/23 (0.05.5), 585/24 (0.07.0), 586/6A (0.18.0), 586/6B (0.10.0), 586/8 (0.18.5), 587/1 (0.91.0), 587/3A (0.75.5), 587/3B (0.36.0), 587/3C (0.67.0), 587/3D (0.12.5), 587/3E (0.12.5), 587/3F (0.18.5), 587/4 (0.10.5), 587/5 (0.04.5), 587/6 (0.13.0), 587/7A (0.02.0), 587/7B (0.34.0), 587/7C (0.07.0), 588/1 (0.39.5), 588/2A (0.25.5), 588/2B (0.03.0), 588/3A (0.20.0), 588/3B (0.07.0), 588/4 (0.27.0), 588/5 (0.46.5), 588/6 (0.19.0), 588/7A (0.07.5), 588/7B (0.10.0), 588/8A (0.12.0), 588/8B (0.11.0), 588/8C (0.09.0), 588/8D (0.09.5), 588/9 (0.22.5), 588/10 (0.51.0), 588/11 (0.28.5), 588/12 (0.30.5), 590/1 (0.05.0), 590/2 (0.03.5), 590/3A (0.10.5), 590/3B (0.10.5), 590/4 (0.08.5), 590/5 (0.07.0), 590/6A (0.15.5), 590/6B (0.15.5), 590/7 (0.19.5), 590/8 (0.19.5), 590/9A (0.06.0), 590/9B (0.45.5), 590/10A (0.20.0), 590/10B (0.00.5), 590/11A (0.13.0), 590/11B (0.58.5), 590/12A (0.24.0), 590/12B1 (0.37.0), 590/12B2 (0.14.5), 590/12B3 (0.00.5), 590/13A1 (0.02.0), 590/13A2 (0.19.0), 590/13A3 (0.36.5), 590/13B (0.19.0), 591/1 (1.23.0), 591/2A (0.32.5), 591/2B (0.16.0), 591/3 (3.03.0), 592/1A (0.26.0), 592/1B1 (0.29.0), 592/1B2 (0.29.0), 592/2 (1.31.5) and 592/3 (1.32.5) in Sendurai Village, Sendurai Taluk and Ariyalur District for a period of **5** years under Rule 43(3) of Tamil Nadu Minor Mineral Concession Rules, 1959 by incorporating the conditions stipulated in the Government letter dated 03.01.2024.

3) In response to the Precise Area Communicated by the Government, the applicant company has submitted **6** copies of draft mining plan duly prepared by the Recognized Qualified Person for approval vide reference 6th cited.

4) In the reference 7th cited, the Assistant Director, Geology and Mining, Ariyalur has recommended and forwarded the copies of draft mining plan and reported that contents of the draft mining

plan have been verified with reference to the field conditions. The details such as Geological Reserves, Mineable Reserves, year wise production and Development programme and the Special conditions imposed in the precise area communication letter No.6152/MMC.2/2023-2, dated 03.01.2024 were duly incorporated in the draft mining plan. The area is covered by an average thickness of 0.3 m. Top Soil and followed by Limekankar up to a depth of 1.4m. (0.3m Top soil + 1.10m. Limekankar) below from the ground level. The applicant company has proposed to quarry total reserves of 3,36,724 Tonnes of Limekankar @ the rate of 100% recovery within **four years** of mining operation and has planned afforestation on 5th year.

5) In the mining plan, it has been observed that the applicant company has proposed to carry out quarrying operation up to a depth of 1.40 m. Total Geological Resources of Kankar is estimated as 5,48,089 Ts and mineable reserves as 3,36,724 Ts. Top soil generated will be side casted and will be backfilled after removal of Kankar and afforested, no other waste generation is envisaged as the Kankar will be completely utilized for the production of cement @ the rate of 100% recovery.

6) The Government have authorized the Additional Director of Geology and Mining, Head Quarters to approve the mining plan, modified mining plans and scheme of mining in respect of 31 minor minerals vide G.O.(D) No.18, Natural Resources (E.1) Department, dated 01.03.2024.

7) In exercise of the powers conferred under Rule 43 (8) of Tamil Nadu Minor Mineral Concession Rules, 1959, read with G.O.(D) No.18, Natural Resources (E.1) Department, dated 01.03.2024 the mining plan submitted by the applicant company in respect of the precise area communicated for quarrying Limekankar over an extent of 22.14.5 Ha. of patta lands in S.F.Nos. 575/2B (0.31.0), 575/3 (0.20.0), 582/8A (0.13.5), 582/8B (0.21.0), 582/8C (0.03.0), 582/8D (0.24.0), 582/8E

(0.32.0), 585/22 (0.14.5), 585/23 (0.05.5), 585/24 (0.07.0), 586/6A (0.18.0), 586/6B (0.10.0), 586/8 (0.18.5), 587/1 (0.91.0), 587/3A (0.75.5), 587/3B (0.36.0), 587/3C (0.67.0), 587/3D (0.12.5), 587/3E (0.12.5), 587/3F (0.18.5), 587/4 (0.10.5), 587/5 (0.04.5), 587/6 (0.13.0), 587/7A (0.02.0), 587/7B (0.34.0), 587/7C (0.07.0), 588/1 (0.39.5), 588/2A (0.25.5), 588/2B (0.03.0), 588/3A (0.20.0), 588/3B (0.07.0), 588/4 (0.27.0), 588/5 (0.46.5), 588/6 (0.19.0), 588/7A (0.07.5), 588/7B (0.10.0), 588/8A (0.12.0), 588/8B (0.11.0), 588/8C (0.09.0), 588/8D (0.09.5), 588/9 (0.22.5), 588/10 (0.51.0), 588/11 (0.28.5), 588/12 (0.30.5), 590/1 (0.05.0), 590/2 (0.03.5), 590/3A (0.10.5), 590/3B (0.10.5), 590/4 (0.08.5), 590/5 (0.07.0), 590/6A (0.15.5), 590/6B (0.15.5), 590/7 (0.19.5), 590/8 (0.19.5), 590/9A (0.06.0), 590/9B (0.45.5), 590/10A (0.20.0), 590/10B (0.00.5), 590/11A (0.13.0), 590/11B (0.58.5), 590/12A (0.24.0), 590/12B1 (0.37.0), 590/12B2 (0.14.5), 590/12B3 (0.00.5), 590/13A1 (0.02.0), 590/13A2 (0.19.0), 590/13A3 (0.36.5), 590/13B (0.19.0), 591/1 (1.23.0), 591/2A (0.32.5), 591/2B (0.16.0), 591/3 (3.03.0), 592/1A (0.26.0), 592/1B1 (0.29.0), 592/1B2 (0.29.0), 592/2 (1.31.5) and 592/3 (1.32.5) in Sendurai Village, Sendurai Taluk and Ariyalur District is hereby approved subject to the following conditions:-

i) The mining plan is approved without prejudice to any other law applicable to the quarry lease from time to time whether such laws are made by the Central Government, State Government or any other authority.

ii) The approval of the mining plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development and Regulation) Act 1957, or any other connected laws including Forest (Conservation) Act, 1980, Forest Conservation Rules, 1981, Environment Protection Act, 1980, Indian Explosives Act, 1884 (Central Act IV of 1884) and the rules made there under and the Tamil Nadu Minor Mineral Concession Rules, 1959.

iii) The Mining plan is approved without prejudice to any other order or direction from any court of competent Jurisdiction.

iv) Quarrying operations shall be carried out upto the depth of Limekankar limits only under Rule 43(3) of the Tamil Nadu Minor Mineral Concession Rule, 1959.

v) The applicant company shall provide and maintain a safety distance of 10 meters to the cart track situated in S.F.Nos.582/1, 587/2.

vi) The applicant company shall provide and maintain a safety distance of 50 meters to the vari course in S.F.No.590/14 in Sendurai Village.

vii) The applicant company shall provide and maintain a safety distance of 50 meters to the vari course in S.F.Nos.39/2, 40/2 and 41 of Unjini Village and S.F.No.288 of Rayampuram Village.

viii) The applicant company shall provide and maintain a safety distance of 50 meters to the low tension power line passing from North East to South West through S.F.Nos. 575/2A1, 2A2, 589/11, 12B, 588/3A, 3B, 4, 5, 9, 10, 587/1, 585/12, 14, 18, 19, 20, 21, 586/2, 3A, 3B, 4, 5A, 5B, 588/1, 582/8A and North to South in S.F.Nos. 582/1, 7A, 7B, 7C.

ix) The applicant company shall provide and maintain a safety distance of 10 meters to the foot path situated in S.F.Nos.591/3, 592/2, 3.

x) The applicant company shall provide and maintain a safety distance of 7.5 meters to the adjoining patta lands.

xi) The applicant company shall provide and maintain a safety distance of 10 meters to the adjoining Government poromboke lands.

xii) The applicant company should not mine the limestone below the limekankar deposit.

xiii) The applicant company shall obtain Environmental Clearance from the State Environment Impact Assessment Authority (SEIAA) Chennai.

xiv) The applicant company should fence the lease granted area with barbed wire fencing before the execution of lease deed as follows:-

a. The pillar post shall be firmly grounded with concrete foundation of height not less than 2 mts

with a distance between two pillars shall not be more than 3 mts.

b. A soft copy of the digitalized map with Differential Global Positioning System (DGPS) readings should be submitted in the Compact Disc (CD) form to the Assistant Director/ Deputy Director (Geology & Mining), Ariyalur.

xv) The applicant company should ensure that all the quarry workers working under its control are registered in the Labour Welfare Board and also enrolled in the ongoing insurance scheme and to submit compliance report to the District Collector, Ariyalur District before execution of the lease deed.

xvi) The lessee company shall quarry limekankar only. If any other mineral other than limekankar is found during quarrying operations, the lessee shall report to the District Collector immediately.

xvii) The Assistant Director (Geology and Mining), Ariyalur shall inspect the subject quarry lease before issuing permits and to ascertain whether the lessee is quarrying only limekankar.

xviii) If any quarrying of limestone or any other mineral other than limekankar is found, issuance of permits shall be stopped immediately and penal action shall be initiated against the lessee as per Act and Rules.

xix) Quarrying operations should be carried out without any hindrance to the adjoining pattadars lands and to the public.

xx) Quarrying should be restricted within the lease granted area.

xxi) Quarrying should be carried out in scientific and systematic manner.

xxii) If any mineral, other than Limekankar is discovered while quarrying, the applicant company shall not mine or dispose of such mineral and it should be intimated to the Government within 30 days from the date of discovery of such new mineral(s) as required under sub-rule (3) of

Rule 36 of Tamil Nadu Minor Mineral Concession Rules, 1959.

xxiii) Difference in seigniorage fee for the actual quantum of Limekankar transported (as per weighment slips) should be reconciled before 15th April of every year.

xxiv) A green belt should be constructed by planting trees along the boundary of the area to control air and noise pollution.

xxv) As per the Hon'ble Supreme Court order dated 08.01.2020 in W.P.(C) No.114/2014 and subsequent instructions received from Ministry of Mines order dated 14.01.2020 and State Government letter No.1666/ MMD.1/2020-1, dated 03.03.2020 the mining lease holders shall undertake re-grassing the mining area and any other area which may have been disturbed due to their mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna, etc.,

xxvi) The applicant company should obtain and produce Environment Clearance Certificate from the competent authority as per the guidelines issued by the Ministry of Environmental, Forest and Climate Change, Government of India and as per Rule 42 of Tamil Nadu Minor Mineral Concession Rules, 1959 before grant of quarry lease.

xxvii) The applicant company shall strictly adhere to the statutory and safety requirements.

xxviii) If any violation is found during quarrying operation, the penal provisions of Tamil Nadu Minor Mineral Concession Rules, 1959 and the Tamil Nadu prevention of illegal mining, transportation and storage of Minerals and Mineral Dealers Rules, 2011 and other Rules and Act in force will attract.

xxix) Before execution of lease deed, the applicant company shall produce latest mining due clearance certificate obtained from the authorities concerned.

xxx) No quarrying operations and dumping of the mineral and waste shall be carried out in safety distances provided to the lease applied area.

xxxi) The child labour should not be engaged in the quarry works.

Encl: Approved Mining Plan.

Additional Director of Geology and Mining

Copy Submitted to:
The Additional Chief Secretary to Government (FAC),
Natural Resources Department,
Secretariat,
Chennai-9. (with AMP)

05/04/24

Copy to:

1) The District Collector,
Ariyalur.

2) The Director General of Mines Safety,
Lapis Lagoon, AA Block, Shanthi Colony,
Anna Nagar, Chennai. 600 040. (with AMP)

3) The Assistant Director,
Geology and Mining,
Ariyalur District. (with AMP)

4) Stock file.

From
Thiru.P.Saravanan, M.Sc.,
Deputy Director,
Geology & Mining,
Ariyalur.

To
The Director,
Department of Geology & Mining,
Industrial Estate,
Guindy,
Chennai – 600 032.

Rc.No.71/G & M/2017, Date: .02.2019.

Sir,

Sub : Mines & Minerals-Major Minerals - Limekankar – Sendurai Taluk & District- Sendurai Village S.F.No. 63/1,2,3A,3B etc.., Over an extent of 18.20.5 Hects of Patta Lands Mining Lease Granted to Tvl. chettinad Cement Corporation (Private) Limited, for Mining limekankar - Details of quarries situated within 500m Radial distance –requested –details furnished –Reg.

Ref:
1. 1.Quarry lease application of Tvl.chettinad Cement Corporation (Private) Limited, Ariyalur works, Trichy Road, Keelapalur, Ariyalur District, Dated:15.03.2018 (received by this office on 21.03.2018)
2. 2.District Collector, Ariyalur letter Rc.No.71/G&M/2018 Dated:26.03.2018

I invite your kind attention to the references cited.

2) In the reference 1st cited, Tvl. chettinad Cement Corporation (Private) Limited has applied for grant of quarrying lease for quarrying limekankar over an extent of 18.20.5 Hectares of patta lands in S.F.Nos.63/1, 2, 3A, 3B etc., in Sendurai Village, Sendurai Taluk, Ariyalur District for a period of 10 years.

3) The above said quarry lease application has been forwarded to the Government through the Director of Geology & Mining, Chennai – 32 vide this office letter in the reference 2nd cited.

4) In this connection, I submit the details of existing quarrying lease situated within 500 mts radial distance from the applied area are furnished as follows:

(i) **Details of existing mine:**

Sl. No	Name of the lessee / applicant	Taluk & Village	S.F.Nos	Extent (in Hect)	Mineral	Lease Period
1	Tvl.chettinad Cement Corporation (Private) Limited,4th Floor, Rani Seethai Hall Building,No.603, Anna Salai, Chennai-600 006	Sendurai Village, Sendurai Taluk	382/1A, 1B etc..,	4.99.5	Limestone	20 years 29.04.2013 to 28.04.2033

(ii) **Details of Lease period expired/abandoned mine:**

Sl. No	Name of the lessee / applicant	Taluk & Village	S.F. Nos	Extent (in Hect)	Minera l	Lease period applied/ Granted
	---------- Nil ----------					

(iii) **Details of proposed mine:**

Sl. No	Name of the lessee / applicant	Taluk & Village	S.F. Nos	Extent (in Hect)	Minera l	Lease period applied/ Granted
	---------- Nil ----------					

Deputy Director,
Geology and Mining,
Ariyalur.

POPULATION BREAKUP & LITERACY LEVEL IN THE BUFFER ZONE

Annexure- 4

Sl.No	No. of Villages	Name of village	Rural / urban	HOUSE HOLDS	POPULATION			POPULATION BELOW 6 AGE GROUP			SCHEDULE CASTE			SCHEDULE TRIBE			LITRERATES			ILLITRERATES		
					TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F. MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE
0-2 km,Sendurai Sub-District, Ariyalur District																						
1	1	Unjini	**Rural**	1294	5021	2545	2476	540	309	231	1067	535	532	42	18	24	2910	1796	1114	2111	749	1362
2	2	Sendurai	**Rural**	2406	9643	4817	4826	1055	558	497	2727	1435	1292	211	110	101	6460	3568	2892	3183	1249	1934
		total (A)		**3700**	**14664**	**7362**	**7302**	**1595**	**867**	**728**	**3794**	**1970**	**1824**	**253**	**128**	**125**	**9370**	**5364**	**4006**	**5294**	**1998**	**3296**
2-5 km,SenduraiSub-District, Ariyalur District																						
3	1	Nakkampadi	**Rural**	796	3082	1517	1565	325	178	147	1131	569	562	0	0	0	1914	1096	818	1168	421	747
4	2	Maruvathur	**Rural**	797	2828	1326	1502	308	169	139	558	236	322	37	17	20	1890	989	901	938	337	601
5	3	Ponparappi	**Rural**	1167	4754	2370	2384	454	229	225	824	421	403	26	15	11	3417	1939	1478	1337	431	906
6	4	Pilakurichi	**Rural**	1079	3942	1938	2004	433	252	181	669	332	337	4	2	2	2363	1321	1042	1579	617	962
7	5	Sirukadambur	**Rural**	886	3255	1586	1669	379	209	170	626	304	322	13	6	7	1925	1117	808	1330	469	861
8	6	Irumbilikurichi	**Rural**	972	3668	1850	1818	357	207	150	501	253	248	16	7	9	2301	1354	947	1367	496	871
9	7	Anandavadi	**Rural**	1087	4262	2108	2154	492	273	219	1436	731	705	132	61	71	2461	1437	1024	1801	671	1130
Ariyalur Sub-District, Ariyalur District																						
10	1	Pottaveli	**Rural**	1048	4261	2171	2090	517	270	247	2142	1126	1016	0	0	0	2550	1524	1026	1711	647	1064
11	2	Rayampuram	**Rural**	947	3718	1846	1872	379	191	188	1456	726	730	0	0	0	2095	1229	866	1623	617	1006
12	3	Sennivanam	**Rural**	474	1870	932	938	195	109	86	1179	586	593	0	0	0	1257	711	546	613	221	392
		total (B)		**9253**	**35640**	**17644**	**17996**	**3839**	**2087**	**1752**	**10522**	**5284**	**5238**	**228**	**108**	**120**	**22173**	**12717**	**9456**	**13467**	**4927**	**8540**
5-10 km,Sendurai Sub-District, Ariyalur District																						
13	1	Kulumur	**Rural**	1234	5052	2524	2528	567	291	276	2604	1335	1269	5	4	1	3081	1756	1325	1971	768	1203
14	2	Manapathur	**Rural**	1483	5443	2646	2797	621	307	314	2147	1065	1082	24	15	9	3013	1746	1267	2430	900	1530
15	3	Asaveerankudikkadu	**Rural**	1008	3981	1988	1993	426	222	204	916	485	431	141	65	76	2428	1415	1013	1553	573	980
16	4	Tular	**Rural**	644	2503	1224	1279	279	141	138	619	293	326	0	0	0	1710	959	751	793	265	528
17	5	Sirkalathur	**Rural**	951	3720	1821	1899	373	194	179	826	400	426	92	39	53	2411	1378	1033	1309	443	866
18	6	Periyakurichi	**Rural**	940	3533	1749	1784	340	177	163	1330	683	647	35	17	18	2309	1333	976	1224	416	808
19	7	Vanjinapuram	**Rural**	797	2907	1433	1474	336	171	165	1282	639	643	0	0	0	1440	846	594	1467	587	880
20	8	Namangunam	**Rural**	948	3897	1979	1918	428	215	213	1960	1001	959	0	0	0	2084	1260	824	1813	719	1094
21	9	Keezhamaligai	**Rural**	866	3078	1457	1621	289	155	134	446	225	221	2	0	2	2004	1086	918	1074	371	703
22	10	Nagalkuzhi	**Rural**	989	3723	1834	1889	433	232	201	560	280	280	0	0	0	2245	1297	948	1478	537	941
23	11	Paranam	**Rural**	1312	4844	2337	2507	519	295	224	439	203	236	0	0	0	3013	1692	1321	1831	645	1186
24	12	Kilimangalam	**Rural**	818	2926	1481	1445	309	169	140	640	326	314	0	0	0	1777	1077	700	1149	404	745
Udayarpalayam Sub-District, Ariyalur District																						
25	1	Kodukkur	**Rural**	728	2914	1467	1447	317	187	130	566	292	274	201	99	102	1822	1062	760	1092	405	687
26	2	Marudur	**Rural**	1487	5765	2848	2917	559	317	242	348	172	176	1	1	0	3798	2122	1676	1967	726	1241
27	3	Variyankaval	**Rural**	1057	4150	2067	2083	353	192	161	483	252	231	0	0	0	3018	1667	1351	1132	400	732
28	4	Elaiyur (West)	**Rural**	1738	6393	3052	3341	650	349	301	741	370	371	0	0	0	3885	2160	1725	2508	892	1616
29	5	Thathanur(West)	**Rural**	1416	5050	2424	2626	537	288	249	644	332	312	56	27	29	2854	1597	1257	2196	827	1369
30	6	Managethi	**Rural**	1042	3916	1998	1918	438	239	199	1209	604	605	74	37	37	2423	1427	996	1493	571	922
Ariyalur Sub-District, Ariyalur District																						

Sl.No	No. of Villages	Name of village	Rural / urban	HOUSE HOLDS	POPULATION			POPULATION BELOW 6 AGE GROUP			SCHEDULE CASTE			SCHEDULE TRIBE			LITRERATES			ILLITRERATES		
					TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F. MALE	TOTAL	MALE	F.MALE	TOTAL	MALE	F.MALE
31	1	Illuppaiyur	**Rural**	983	4142	2158	1984	481	283	198	1985	1043	942	0	0	0	2433	1505	928	1709	653	1056
32	2	Ottakoil	**Rural**	1210	4703	2344	2359	535	275	260	1769	899	870	0	0	0	2748	1640	1108	1955	704	1251
33	3	Govindapuram	**Rural**	1242	4996	2502	2494	591	314	277	1347	674	673	0	0	0	3260	1871	1389	1736	631	1105
34	4	Kallankurichi	**Rural**	1380	5385	2663	2722	607	304	303	1383	699	684	1	1	0	3392	1957	1435	1993	706	1287
35	5	Kadugur	**Rural**	866	3217	1627	1590	363	199	164	493	253	240	1	1	0	1893	1172	721	1324	455	869
36	6	Ayanathur	**Rural**	654	2445	1263	1182	207	115	92	362	184	178	0	0	0	1484	915	569	961	348	613
37	7	Kavanur	**Rural**	841	3242	1634	1608	400	197	203	594	307	287	11	7	4	1790	1092	698	1452	542	910
38	8	Thelur	**Rural**	1094	4215	2136	2079	480	270	210	794	400	394	4	3	1	2407	1423	984	1808	713	1095
39	9	Periyanagalur	**Rural**	1041	3538	1762	1776	330	191	139	692	347	345	0	0	0	1975	1175	800	1563	587	976
40	10	Ammenabath	**Rural**	170	654	315	339	95	42	53	122	59	63	0	0	0	349	218	131	305	97	208
Kunnam Sub-District, Perambalur District																						
41	1	Thungapuram (North)	**Rural**	1151	4536	2334	2202	480	244	236	1692	885	807	0	0	0	2780	1675	1105	1756	659	1097
42	2	Thungapuram (South)	**Rural**	589	2290	1116	1174	263	134	129	2	1	1	1	0	1	1442	807	635	848	309	539
43	3	Kadur (North)	**Rural**	711	3132	1623	1509	376	196	180	1974	1053	921	0	0	0	1656	1021	635	1476	602	874
44	4	Kadur (South)	**Rural**	655	2794	1404	1390	346	173	173	1449	754	695	0	0	0	1490	903	587	1304	501	803
45	5	Periavenmani (East)	**Rural**	351	1469	737	732	186	97	89	557	285	272	0	0	0	783	476	307	686	261	425
Udayarpalayam Sub-District, Ariyalur District																						
46	1	Udayarpalayam (TP)	**Urban**	3155	12688	6292	6396	1363	702	661	3132	1539	1593	70	30	40	8922	4893	4029	3766	1399	2367
		total (C)		**32396**	**124553**	**61947**	**62606**	**13514**	**7175**	**6339**	**32975**	**16800**	**16175**	**649**	**316**	**333**	**75197**	**43730**	**31467**	**49356**	**18217**	**31139**
		Grand Total (A+B+C)		**45349**	**174857**	**86953**	**87904**	**18948**	**10129**	**8819**	**47291**	**24054**	**23237**	**1130**	**552**	**578**	**106740**	**61811**	**44929**	**68117**	**25142**	**42975**

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

OCCUPATIONAL STRUCTURE IN THE BUFFER ZONE

Sl.No	No. of Villages	Name of village	Rural / urban	MAIN WORKERS		CULTIVATORS		AGRI LABOURS		HOUSE HOLD		OTHERS		MARGINAL WORKERS		NON WORKERS	
				MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE
0-2 km,Sendurai Sub-District, Ariyalur District																	
1	1	Unjini	**Rural**	1356	1160	415	325	387	497	481	302	73	36	19	37	1170	1279
2	2	Sendurai	**Rural**	2050	1000	532	222	591	482	81	41	846	255	479	407	2288	3419
		total (A)		**3406**	**2160**	**947**	**547**	**978**	**979**	**562**	**343**	**919**	**291**	**498**	**444**	**3458**	**4698**
2-5 km,SenduraiSub-District, Ariyalur District																	
3	1	Nakkampadi	**Rural**	535	565	333	408	114	122	5	5	83	30	356	358	626	642
4	2	Maruvathur	**Rural**	576	281	414	216	60	33	10	2	92	30	140	397	610	824
5	3	Ponparappi	**Rural**	917	498	452	266	41	47	134	101	290	84	318	184	1135	1702
6	4	Pilakurichi	**Rural**	737	291	481	184	129	76	10	4	117	27	187	627	1014	1086
7	5	Sirukadambur	**Rural**	816	767	486	377	270	367	3	5	57	18	55	128	715	774
8	6	Irumbilikurichi	**Rural**	963	797	479	51	282	687	31	10	171	49	30	54	857	967
9	7	Anandavadi	**Rural**	984	608	441	271	372	276	13	18	158	43	146	193	978	1353
Ariyalur Sub-District, Ariyalur District																	
10	1	Pottaveli	**Rural**	1033	685	351	294	419	349	28	4	235	38	232	157	906	1248
11	2	Rayampuram	**Rural**	752	432	412	266	138	122	32	4	170	40	321	464	773	976
12	3	Sennivanam	**Rural**	389	316	177	48	93	243	6	3	113	22	201	238	342	384
		total (B)		**7702**	**5240**	**4026**	**2381**	**1918**	**2322**	**272**	**156**	**1486**	**381**	**1986**	**2800**	**7956**	**9956**
5-10 km,Sendurai Sub-District, Ariyalur District																	
13	1	Kulumur	**Rural**	1282	850	659	284	393	483	26	15	204	68	41	91	1201	1587
14	2	Manapathur	**Rural**	1463	1371	1004	1057	319	247	11	10	129	57	113	160	1070	1266
15	3	Asaveerankudikkadu	**Rural**	1077	883	388	320	496	450	20	27	173	86	35	54	876	1056
16	4	Tular	**Rural**	736	519	559	321	116	167	0	3	61	28	30	236	458	524
17	5	Sirkalathur	**Rural**	933	413	302	35	335	320	200	37	96	21	24	12	864	1474
18	6	Periyakurichi	**Rural**	766	616	513	424	163	167	11	3	79	22	204	402	779	766
19	7	Vanjinapuram	**Rural**	691	305	215	103	416	183	8	5	52	14	170	436	572	733
20	8	Namangunam	**Rural**	566	335	256	102	110	210	5	8	195	15	550	689	863	894
21	9	Keezhamaligai	**Rural**	614	336	423	186	131	131	7	3	53	16	168	32	675	1253
22	10	Nagalkuzhi	**Rural**	722	290	220	69	334	166	7	3	161	52	258	512	854	1087
23	11	Paranam	**Rural**	1132	796	737	503	184	208	23	12	188	73	255	469	950	1242
24	12	Kilimangalam	**Rural**	843	580	185	66	564	477	3	4	91	33	7	21	631	844
Udayarpalayam Sub-District, Ariyalur District																	
25	1	Kodukkur	**Rural**	624	35	269	6	210	6	26	3	119	20	111	391	732	1021
26	2	Marudur	**Rural**	1353	659	701	305	204	184	140	105	308	65	257	677	1238	1581
27	3	Variyankaval	**Rural**	1106	880	277	282	321	295	174	195	334	108	110	275	851	928
28	4	Elaiyur (West)	**Rural**	1362	649	587	156	351	310	148	105	276	78	378	1013	1312	1679
29	5	Thathanur(West)	**Rural**	1019	717	335	162	446	451	54	43	184	61	379	609	1026	1300
30	6	Managethi	**Rural**	912	616	328	201	452	382	12	0	120	33	384	313	702	989
Ariyalur Sub-District, Ariyalur District																	

Sl.No	No. of Villages	Name of village	Rural / urban	MAIN WORKERS		CULTIVATORS		AGRI LABOURS		HOUSE HOLD		OTHERS		MARGINAL WORKERS		NON WORKERS	
				MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE	MALE	F.MALE
31	1	Illuppaiyur	**Rural**	1101	488	566	267	355	176	12	19	168	26	171	388	886	1108
32	2	Ottakoil	**Rural**	1120	590	393	311	355	186	18	22	354	71	276	557	948	1212
33	3	Govindapuram	**Rural**	1401	782	380	220	452	391	12	16	557	155	85	131	1016	1581
34	4	Kallankurichi	**Rural**	1228	705	396	253	264	236	17	54	551	162	252	150	1183	1867
35	5	Kadugur	**Rural**	832	712	557	305	201	369	18	15	56	23	186	247	609	631
36	6	Ayanathur	**Rural**	748	461	528	302	125	132	6	6	89	21	15	40	500	681
37	7	Kavanur	**Rural**	814	711	568	512	140	159	1	12	105	28	156	127	664	770
38	8	Thelur	**Rural**	1118	632	461	275	297	289	37	11	323	57	160	167	858	1280
39	9	Periyanagalur	**Rural**	936	644	452	304	123	208	33	29	328	103	85	140	741	992
40	10	Ammenabath	**Rural**	45	6	31	1	0	0	0	0	14	5	122	70	148	263
Kunnam Sub-District, Perambalur District																	
41	1	Thungapuram (North)	**Rural**	662	521	460	336	107	149	14	1	81	35	863	889	809	792
42	2	Thungapuram (South)	**Rural**	442	366	306	305	28	20	33	17	75	24	216	371	458	437
43	3	Kadur (North)	**Rural**	50	31	14	3	11	16	1	1	24	11	945	861	628	617
44	4	Kadur (South)	**Rural**	343	188	126	38	104	122	4	5	109	23	464	351	597	851
45	5	Periavenmani (East)	**Rural**	420	179	140	13	176	158	5	2	99	6	17	259	300	294
Udayarpalayam Sub-District, Ariyalur District																	
46	1	Udayarpalayam (TP)	**Urban**	2604	747	188	34	561	150	334	215	1521	348	736	793	2952	4856
		total (C)		**31065**	**18613**	**13524**	**8061**	**8844**	**7598**	**1420**	**1006**	**7277**	**1948**	**8223**	**11933**	**28951**	**38456**
		Grand Total (A+B+C)		**42173**	**26013**	**18497**	**10989**	**11740**	**10899**	**2254**	**1505**	**9682**	**2620**	**10707**	**15177**	**40365**	**53110**

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

EDUCATIONAL FACILITIES IN THE STUDY AREA

Annexure- 6

Sl.No	No. of Villages	Name of village	Educational Facilities (A(1)/ NA(2))	Govt Pre - Primary School (Nursery/LKG/UKG) (Numbers)	Govt Primary School (Numbers)	Govt Middle School (Numbers)	Govt Secondary School (Numbers)	Govt Senior Secondary School (Numbers)	Govt Arts and Science Degree College (Numbers)	Govt Engineering College (Numbers)	Govt Medicine College (Numbers)	Govt Management Institute (Numbers)	Govt Polytechnic (Numbers)	Govt Vocational Training School/ITI (Numbers)	Government Non Formal Training Centre (Numbers)	Government School For Disabled (Numbers)
0-2 km,Sendurai Sub-District, Ariyalur District																
1	1	Unjini	**1**	5	2	2	2	0	0	0	0	0	0	0	4	0
2	2	Sendurai	**1**	9	5	2	2	2	0	0	0	0	0	0	7	0
		total (A)		**14**	**7**	**4**	**4**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**
2-5 km,SenduraiSub-District, Ariyalur District																
3	1	Nakkampadi	**1**	3	2	1	0	0	0	0	0	0	0	0	2	0
4	2	Maruvathur	**1**	4	3	1	0	0	0	0	0	0	0	0	3	0
5	3	Ponparappi	**1**	5	3	2	1	1	0	0	0	0	0	0	4	0
6	4	Pilakurichi	**1**	5	1	0	0	0	0	0	0	0	0	0	2	0
7	5	Sirukadambur	**1**	4	3	1	1	0	0	0	0	0	0	0	4	0
8	6	Irumbilikurichi	**1**	5	1	1	1	1	0	0	0	0	0	0	3	0
9	7	Anandavadi	**1**	5	4	1	1	1	0	0	0	0	0	0	4	0
Ariyalur Sub-District, Ariyalur District																
10	1	Pottaveli	**1**	3	2	1	0	0	0	0	0	0	0	0	1	0
11	2	Rayampuram	**1**	3	2	2	1	0	0	0	0	0	0	0	3	0
12	3	Sennivanam	**1**	1	2	1	0	0	0	0	0	0	0	0	2	0
		total (B)		**38**	**23**	**11**	**5**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**28**	**0**
5-10 km,Sendurai Sub-District, Ariyalur District																
13	1	Kulumur	**1**	4	1	1	1	1	0	0	0	0	0	0	3	0
14	2	Manapathur	**1**	9	5	1	1	0	0	0	0	0	0	0	6	0
15	3	Asaveerankudikkadu	**1**	4	5	3	1	1	0	0	0	0	0	0	6	0
16	4	Tular	**1**	4	3	0	0	0	0	0	0	0	0	0	3	0
17	5	Sirkalathur	**1**	3	1	1	0	0	0	0	0	0	0	0	1	0
18	6	Periyakurichi	**1**	6	3	1	1	0	0	0	0	0	0	0	4	0
19	7	Vanjinapuram	**1**	3	3	1	0	0	0	0	0	0	0	0	3	0
20	8	Namangunam	**1**	5	3	2	0	0	0	0	0	0	0	0	3	0
21	9	Keezhamaligai	**1**	3	2	1	0	0	0	0	0	0	0	0	2	0
22	10	Nagalkuzhi	**1**	3	3	1	0	0	0	0	0	0	0	0	3	0
23	11	Paranam	**1**	5	2	1	1	0	0	0	0	0	0	0	3	0
24	12	Kilimangalam	**1**	4	3	1	0	0	0	0	0	0	0	0	1	0
Udayarpalayam Sub-District, Ariyalur District																
25	1	Kodukkur	**1**	1	2	1	1	0	0	0	0	0	0	0	3	0
26	2	Marudur	**1**	1	4	3	1	1	0	0	0	0	0	0	6	0
27	3	Variyankaval	**1**	4	1	0	0	0	0	0	0	0	0	0	1	0
28	4	Elaiyur (West)	**1**	6	3	1	1	1	0	0	0	0	0	0	3	0
29	5	Thathanur(West)	**1**	4	3	2	1	1	0	0	0	0	0	0	2	0
30	6	Managethi	**1**	2	3	0	0	0	0	0	0	0	0	0	3	0
Ariyalur Sub-District, Ariyalur District																
31	1	Illuppaiyur	**1**	3	2	2	1	1	0	0	0	0	0	0	2	0

Sl.No	No. of Villages	Name of village	Educational Facilities (A(1)/ NA(2))	Govt Pre - Primary School (Nursery/LKG/UKG) (Numbers)	Govt Primary School (Numbers)	Govt Middle School (Numbers)	Govt Secondary School (Numbers)	Govt Senior Secondary School (Numbers)	Govt Arts and Science Degree College (Numbers)	Govt Engineering College (Numbers)	Govt Medicine College (Numbers)	Govt Management Institute (Numbers)	Govt Polytechnic (Numbers)	Govt Vocational Training School/ITI (Numbers)	Government Non Formal Training Centre (Numbers)	Government School For Disabled (Numbers)
32	2	Ottakoil	**1**	4	3	3	1	0	0	0	0	0	0	0	1	0
33	3	Govindapuram	**1**	5	5	3	1	0	0	0	0	0	0	0	6	0
34	4	Kallankurichi	**1**	4	5	2	2	0	0	0	0	0	0	0	5	0
35	5	Kadugur	**1**	2	2	0	0	0	0	0	0	0	0	0	3	0
36	6	Ayanathur	**1**	2	2	1	1	0	0	0	0	0	0	0	3	0
37	7	Kavanur	**1**	4	4	1	1	0	0	1	0	0	0	0	4	0
38	8	Thelur	**1**	3	3	2	0	0	0	0	0	0	0	0	1	0
39	9	Periyanagalur	**1**	3	3	1	1	0	0	0	0	0	0	0	4	1
40	10	Ammenabath	**1**	1	1	0	0	0	0	0	0	0	0	0	1	0
Kunnam Sub-District, Perambalur District																
41	1	Thungapuram (North)	**1**	1	1	0	0	0	0	0	0	0	0	0	1	0
42	2	Thungapuram (South)	**1**	2	1	1	1	1	0	0	0	0	0	0	1	0
43	3	Kadur (North)	**1**	1	1	1	0	0	0	0	0	0	0	0	1	0
44	4	Kadur (South)	**1**	1	0	0	0	0	0	0	0	0	0	0	0	0
45	5	Periavenmani (East)	**1**	2	2	0	0	0	0	0	0	0	0	0	1	0
		total (C)		**109**	**85**	**38**	**18**	**7**	**0**	**1**	**0**	**0**	**0**	**0**	**90**	**1**
		Grand Total (A+B+C)		**161**	**115**	**53**	**27**	**12**	**0**	**1**	**0**	**0**	**0**	**0**	**129**	**1**

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

MEDICAL FACILITIES WITHIN THE STUDY AREA

Annexure- 7

Sl.No	No. of Villages	Name of village	Medical Facilities (A(1)/NA(2))	Community Health Centre (Numbers)	Primary Health Centre (Numbers)	Primary Heallth Sub Centre (Numbers)	Maternity And Child Welfare Centre (Numbers)	TB Clinic (Numbers)	Hospital Allopathic (Numbers)	Hospiltal Alternative Medicine (Numbers)	Dispensary (Numbers)	Veterinary Hospital (Numbers)	Mobile Health Clinic (Numbers)	Family Welfare Centre (Numbers)
0-2 km,Sendurai Sub-District, Ariyalur District														
1	1	Unjini	**1**	0	0	1	1	0	0	0	0	0	0	0
2	2	Sendurai	**1**	0	0	1	1	1	0	0	0	1	0	0
		total (A)		**0**	**0**	**2**	**2**	**1**	**0**	**0**	**0**	**1**	**0**	**0**
2-5 km,SenduraiSub-District, Ariyalur District														
3	1	Nakkampadi	**1**	0	0	1	0	0	0	0	0	0	0	0
4	2	Maruvathur	**1**	0	0	1	1	0	0	0	0	0	0	0
5	3	Ponparappi	**1**	0	1	1	1	1	0	0	1	1	0	1
6	4	Pilakurichi	**1**	0	0	1	1	0	0	0	0	1	0	0
7	5	Sirukadambur	**1**	0	0	1	1	0	0	0	0	0	0	0
8	6	Irumbilikurichi	**1**	0	1	1	1	1	0	0	1	1	0	1
9	7	Anandavadi	**1**	0	1	1	1	1	0	0	1	0	0	1
Ariyalur Sub-District, Ariyalur District														
10	1	Pottaveli	**1**	0	0	1	0	0	0	0	0	0	0	0
11	2	Rayampuram	**1**	0	0	1	0	0	0	0	0	0	0	0
12	3	Sennivanam	**2**	0	0	0	0	0	0	0	0	0	0	0
		total (B)		**0**	**3**	**9**	**6**	**3**	**0**	**0**	**3**	**3**	**0**	**3**
5-10 km,Sendurai Sub-District, Ariyalur District														
13	1	Kulumur	**1**	0	1	1	1	1	0	0	1	1	0	1
14	2	Manapathur	**1**	0	0	1	1	0	0	0	0	0	0	0
15	3	Asaveerankudikkadu	**1**	0	0	1	1	0	0	0	0	1	0	0
16	4	Tular	**1**	0	0	1	1	0	0	0	0	1	0	0
17	5	Sirkalathur	**1**	0	0	1	1	0	0	0	0	0	0	0
18	6	Periyakurichi	**1**	0	0	1	0	0	0	0	0	0	0	0
19	7	Vanjinapuram	**2**	0	0	0	0	0	0	0	0	0	0	0
20	8	Namangunam	**1**	0	0	1	1	0	0	0	0	0	0	0
21	9	Keezhamaligai	**1**	0	0	1	0	0	0	0	0	0	0	0
22	10	Nagalkuzhi	**1**	0	0	1	0	0	0	0	0	0	0	0
23	11	Paranam	**1**	1	1	1	1	1	0	0	1	1	0	1
24	12	Kilimangalam	**2**	0	0	0	0	0	0	0	0	0	0	0
Udayarpalayam Sub-District, Ariyalur District														
25	1	Kodukkur	**2**	0	0	0	0	0	0	0	0	0	0	0
26	2	Marudur	**1**	0	0	3	0	0	0	0	0	0	0	0
27	3	Variyankaval	**1**	0	1	1	1	1	0	0	1	0	0	1
28	4	Elaiyur (West)	**1**	0	0	3	0	0	0	0	0	0	0	0
29	5	Thathanur(West)	**1**	0	1	1	1	1	0	0	1	0	0	1
30	6	Managethi	**1**	0	0	1	1	0	0	0	0	0	0	0
Ariyalur Sub-District, Ariyalur District														

Sl.No	No. of Villages	Name of village	Medical Facilities (A(1)/NA(2))	Community Health Centre (Numbers)	Primary Health Centre (Numbers)	Primary Heallth Sub Centre (Numbers)	Maternity And Child Welfare Centre (Numbers)	TB Clinic (Numbers)	Hospital Allopathic (Numbers)	Hospiltal Alternative Medicine (Numbers)	Dispensary (Numbers)	Veterinary Hospital (Numbers)	Mobile Health Clinic (Numbers)	Family Welfare Centre (Numbers)
31	1	Illuppaiyur	**1**	0	0	1	0	0	0	0	0	0	0	0
32	2	Ottakoil	**1**	0	0	1	0	0	0	0	0	0	0	0
33	3	Govindapuram	**1**	0	1	1	1	1	0	0	1	0	0	1
34	4	Kallankurichi	**1**	0	0	1	0	0	0	0	0	0	0	0
35	5	Kadugur	**1**	1	1	1	1	1	0	0	1	0	0	1
36	6	Ayanathur	**2**	0	0	0	0	0	0	0	0	0	0	0
37	7	Kavanur	**1**	0	0	1	0	0	0	0	0	0	0	0
38	8	Thelur	**1**	0	0	1	0	0	0	0	0	0	0	0
39	9	Periyanagalur	**1**	0	0	1	1	0	0	0	0	1	0	0
40	10	Ammenabath	**2**	0	0	0	0	0	0	0	0	0	0	0
Kunnam Sub-District, Perambalur District														
41	1	Thungapuram (North)	**1**	0	1	1	1	1	0	0	1	0	0	1
42	2	Thungapuram (South)	**1**	0	1	1	1	1	0	0	1	1	0	1
43	3	Kadur (North)	**1**	0	0	1	1	0	0	0	0	0	0	0
44	4	Kadur (South)	**2**	0	0	0	0	0	0	0	0	0	0	0
45	5	Periavenmani (East)	**2**	0	0	0	0	0	0	0	0	0	0	0
		total (C)		**2**	**8**	**30**	**16**	**8**	**0**	**0**	**8**	**6**	**0**	**8**
		Grand Total (A+B+C)		**2**	**11**	**41**	**24**	**12**	**0**	**0**	**11**	**10**	**0**	**11**

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

Note : A: Available, NA- Not Available

INFRASTRUCTURAL FACILITIES IN THE STUDY AREA

Annexure- 8

Sl. No	No. of Villages	Name of village	Tap Water-Treated (Status A(1)/NA (2))	Covered Well (Status A(1)/NA (2))	Hand Pump (Status A(1)/NA (2))	Tube Wells/Borehole (Status A(1)/NA(2))	Spring (Status A(1)/NA (2))	River/Canal (Status A(1)/NA(2))	Tank/Pond/ Lake (Status A(1)/NA(2))	Post Office (Status A(1)/NA (2))	Sub Post Office (Status A(1)/NA (2))	Post And Telegraph Office (Status A(1)/NA (2))	Telephone (landlines) (Status A(1)/NA (2))	Mobile Phone Coverage (Status A(1)/NA (2))	Public Bus Service (Status A(1)/NA (2))	Railway Station (Status A(1)/NA (2))	Commercial Bank (Status A(1)/NA(2))	Cooperative Bank (Status A(1)/NA(2))	Agricultural Credit Societies (Status A(1)/NA(2))
0-2 km,Sendurai Sub-District, Ariyalur District																			
1	1	Unjini	2	1	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
2	2	Sendurai	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1
2-5 km,SenduraiSub-District, Ariyalur District																			
3	1	Nakkampadi	1	1	1	1	1	2	2	2	1	2	1	1	1	2	2	2	2
4	2	Maruvathur	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
5	3	Ponparappi	1	2	2	1	2	2	2	1	1	1	1	1	1	2	1	2	1
6	4	Pilakurichi	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
7	5	Sirukadambur	2	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
8	6	Irumbilikurichi	1	2	2	1	2	2	2	2	1	2	1	1	1	2	1	2	2
9	7	Anandavadi	1	2	1	1	2	2	2	2	1	2	1	1	1	2	1	2	1
Ariyalur Sub-District, Ariyalur District																			
10	1	Pottaveli	1	2	1	1	2	2	1	2	1	2	1	1	1	1	2	2	2
11	2	Rayampuram	1	2	1	1	2	2	1	1	1	1	1	1	1	2	2	2	1
12	3	Sennivanam	1	2	2	2	2	2	1	2	1	2	1	1	1	2	2	2	2
5-10 km,Sendurai Sub-District, Ariyalur District																			
13	1	Kulumur	1	1	1	1	1	2	2	2	1	2	1	1	1	2	2	2	1
14	2	Manapathur	1	1	2	1	1	2	2	2	1	2	1	1	1	2	1	2	1
15	3	Asaveerankudikadu	1	2	1	1	1	2	2	1	2	1	1	1	1	1	1	1	2
16	4	Tular	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
17	5	Sirkalathur	1	1	2	2	2	2	2	2	1	2	1	1	1	2	2	2	2
18	6	Periyakurichi	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
19	7	Vanjinapuram	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	1
20	8	Namangunam	1	1	2	1	1	2	2	2	1	2	1	1	1	2	2	1	1
21	9	Keezhamaligai	1	2	2	2	2	2	2	2	1	2	1	1	1	2	2	2	2
22	10	Nagalkuzhi	1	1	2	1	2	2	1	2	1	2	1	1	1	2	2	2	2
23	11	Paranam	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	1
24	12	Kilimangalam	1	1	2	1	1	2	1	2	1	2	1	1	1	2	2	2	2
Udayarpalayam Sub-District, Ariyalur District																			
25	1	Kodukkur	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	1
26	2	Marudur	1	1	2	1	2	2	2	2	1	2	1	1	1	2	2	2	1
27	3	Variyankaval	1	2	2	1	2	2	2	1	1	1	1	1	1	2	2	2	2
28	4	Elaiyur (West)	1	1	2	1	2	2	2	2	2	2	1	1	1	2	1	2	1
29	5	Thathanur(West)	1	1	2	1	2	2	2	2	2	2	1	1	1	2	1	1	2
30	6	Managethi	1	2	1	1	2	2	2	2	1	2	1	1	1	2	2	2	2

Sl. No	No. of Villages	Name of village	Tap Water-Treated (Status A(1)/NA (2))	Covered Well (Status A(1)/NA (2))	Hand Pump (Status A(1)/NA (2))	Tube Wells/Borehole (Status A(1)/NA(2))	Spring (Status A(1)/NA (2))	River/Canal (Status A(1)/NA(2))	Tank/Pond/ Lake (Status A(1)/NA(2))	Post Office (Status A(1)/NA (2))	Sub Post Office (Status A(1)/NA (2))	Post And Telegraph Office (Status A(1)/NA (2))	Telephone (landlines) (Status A(1)/NA (2))	Mobile Phone Coverage (Status A(1)/NA (2))	Public Bus Service (Status A(1)/NA (2))	Railway Station (Status A(1)/NA (2))	Commercial Bank (Status A(1)/NA(2))	Cooperative Bank (Status A(1)/NA(2))	Agricultural Credit Societies (Status A(1)/NA(2))
Ariyalur Sub-District, Ariyalur District																			
31	1	Illuppaiyur	1	1	1	1	1	2	2	2	1	2	1	1	1	2	2	2	1
32	2	Ottakoil	1	1	1	1	2	2	2	2	1	2	1	1	1	1	2	2	2
33	3	Govindapuram	1	1	2	1	1	2	2	2	1	2	1	1	1	2	2	2	1
34	4	Kallankurichi	2	2	1	1	1	2	2	1	1	1	1	1	1	2	2	2	2
35	5	Kadugur	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
36	6	Ayanathur	1	1	1	1	1	2	1	2	1	2	1	1	1	2	2	1	1
37	7	Kavanur	1	1	1	1	1	2	1	2	1	2	1	1	1	2	2	2	2
38	8	Thelur	1	2	1	1	1	1	2	2	1	2	1	1	1	2	2	2	2
39	9	Periyanagalur	1	1	1	1	2	2	1	2	1	2	1	1	1	2	2	2	1
40	10	Ammenabath	1	2	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
Kunnam Sub-District, Perambalur District																			
41	1	Thungapuram (North)	1	1	2	1	2	2	2	2	1	2	1	1	1	2	2	2	1
42	2	Thungapuram (South)	1	1	2	1	2	2	2	2	2	2	1	1	1	2	1	1	1
43	3	Kadur (North)	1	2	2	1	2	2	2	2	1	2	1	1	2	2	2	2	1
44	4	Kadur (South)	1	1	2	1	2	2	2	2	1	2	1	1	1	2	2	2	2
45	5	Periavenmani (East)	1	1	2	1	2	2	2	2	2	2	2	1	1	2	2	2	2

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

Note : A: Available, NA- Not Available

Status: A(1)/NA(2)

CREATIVE ENGINEERS & CONSULTANTS

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DEPARTMENT OF INDUSTRIES AND COMMERCE REGISTERED COMPANY

AMBIENT AIR QUALITY

Project	:	**Limekankar Quarry Lease Of Chettinad Cement Corporation Pvt. Ltd. 22.145 HA In Sendurai Village, Sendurai Taluk, Ariyalur District,**
Name of the Location	:	**Near Mine Lease Area**
Station Code	:	**A1**

SL.NO	DATE	PM10	PM2.5	SO2	NO2
1	3/4/2025	42.7	19.6	5.1	8.6
2	3/5/2025	44.3	20.4	5.5	9.1
3	3/15/2025	43.1	19.8	5.2	8.7
4	3/16/2025	45.5	20.9	5.8	9.3
5	3/18/2025	47.6	21.9	6.3	9.8
6	3/19/2025	48.7	22.4	6.6	10.1
7	3/29/2025	51.6	23.7	7.1	10.4
8	3/30/2025	48.3	22.2	6.5	10.1
9	4/1/2025	43.5	20.1	5.3	8.8
10	4/2/2025	40.7	18.7	4.6	8.1
11	4/12/2025	42.3	19.5	5.0	8.5
12	4/13/2025	46.5	21.4	6.0	9.5
13	4/15/2025	41.9	19.3	4.9	8.4
14	4/16/2025	45.1	20.7	5.7	9.2
15	4/26/2025	46.7	21.5	6.1	9.6
16	4/27/2025	43.9	20.2	5.4	8.9
17	4/29/2025	41.1	18.9	4.7	8.2
18	4/30/2025	44.7	20.6	5.6	9.1
19	5/10/2025	47.1	21.7	6.2	9.7
20	5/11/2025	49.2	22.6	6.7	10.2
21	5/13/2025	41.5	19.1	4.8	8.3
22	5/14/2025	45.9	21.1	5.9	9.4
23	5/24/2025	47.7	22.0	6.4	9.9
24	5/25/2025	49.9	23.1	6.9	10.3
	MIN	**40.7**	**18.7**	**4.6**	**8.1**
	AVE	**45.4**	**20.9**	**5.8**	**9.3**
	MAX	**51.6**	**23.7**	**7.1**	**10.4**

Note: BDL – Below Detectable Limit, DL: Detectable Limit.

Prepared by

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CREATIVE ENGINEERS & CONSULTANTS

(NABET ACCREDITED, NABL ACCREDITED TESTING LABORATORY,
DEPARTMENT OF INDUSTRIES AND COMMERCE REGISTERED COMPANY

AMBIENT AIR QUALITY

Project	:	**Limekankar Quarry Lease Of Chettinad Cement Corporation Pvt. Ltd. 22.145 HA In Sendurai Village, Sendurai Taluk, Ariyalur District,**
Name of the Location	:	**Nallampalayam Village**
Station Code	:	**A2**

SL.NO	DATE	PM10	PM2.5	SO2	NO2
1	3/4/2025	52.6	24.7	6.9	9.6
2	3/5/2025	55.1	25.9	7.5	10.3
3	3/15/2025	50.2	23.6	6.4	9.1
4	3/16/2025	53.3	25.1	7.1	9.7
5	3/18/2025	49.5	23.3	6.3	8.9
6	3/19/2025	52.1	24.5	6.8	9.5
7	3/29/2025	57.3	26.9	8.1	11.1
8	3/30/2025	59.2	27.8	8.9	11.9
9	4/1/2025	51.6	24.3	6.7	9.4
10	4/2/2025	54.7	25.7	7.4	10.1
11	4/12/2025	60.2	28.3	9.3	12.8
12	4/13/2025	57.6	27.1	8.3	11.3
13	4/15/2025	55.6	26.1	7.6	10.5
14	4/16/2025	53.5	25.1	7.2	9.8
15	4/26/2025	54.2	25.5	7.3	9.9
16	4/27/2025	56.6	26.6	7.9	10.9
17	4/29/2025	58.2	27.4	8.5	11.5
18	4/30/2025	51.3	24.1	6.6	9.3
19	5/10/2025	58.6	27.5	8.7	11.7
20	5/11/2025	59.6	28.0	9.1	12.5
21	5/13/2025	56.4	26.5	7.7	10.7
22	5/14/2025	49.1	23.1	6.2	8.8
23	5/24/2025	48.6	22.8	6.1	8.7
24	5/25/2025	50.7	23.8	6.5	9.2
	MIN	**48.6**	**22.8**	**6.1**	**8.7**
	AVE	**54.4**	**25.6**	**7.5**	**10.3**
	MAX	**60.2**	**28.3**	**9.3**	**12.8**

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DEPARTMENT OF INDUSTRIES AND COMMERCE REGISTERED COMPANY

AMBIENT AIR QUALITY

Project	:	**Limekankar Quarry Lease Of Chettinad Cement Corporation Pvt. Ltd. 22.145 HA In Sendurai Village, Sendurai Taluk, Ariyalur District,**
Name of the Location	:	**Elangaicherry Village**
Station Code	:	**A3**

SL.NO	DATE	PM10	PM2.5	SO2	NO2
1	3/6/2025	51.6	24.8	6.9	10.2
2	3/7/2025	54.6	26.2	7.7	11.1
3	3/13/2025	47.4	22.8	5.5	8.7
4	3/14/2025	49.5	23.8	6.3	9.5
5	3/20/2025	53.1	25.5	7.4	10.6
6	3/21/2025	50.1	24.0	6.5	9.7
7	3/27/2025	46.8	22.5	5.3	8.5
8	3/28/2025	48.6	23.3	5.9	9.2
9	4/3/2025	55.4	26.6	7.9	11.4
10	4/4/2025	50.7	24.3	6.7	9.9
11	4/10/2025	46.5	22.3	5.2	8.4
12	4/11/2025	48.9	23.5	6.1	9.3
13	4/17/2025	47.7	22.9	5.6	8.8
14	4/18/2025	51.9	24.9	7.1	10.3
15	4/24/2025	48.1	23.1	5.7	8.9
16	4/25/2025	50.4	24.2	6.6	9.8
17	5/1/2025	47.1	22.6	5.4	8.6
18	5/2/2025	49.2	23.6	6.2	9.4
19	5/8/2025	53.5	25.7	7.5	10.7
20	5/9/2025	51.3	24.6	6.8	10.1
21	5/15/2025	48.3	23.2	5.8	9.1
22	5/16/2025	52.5	25.2	7.2	10.4
23	5/22/2025	49.9	24.0	6.4	9.6
24	5/23/2025	52.9	25.4	7.3	10.5
	MIN	**46.5**	**22.3**	**5.2**	**8.4**
	AVE	**50.3**	**24.1**	**6.5**	**9.7**
	MAX	**55.4**	**26.6**	**7.9**	**11.4**

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AMBIENT AIR QUALITY

Project	:	**Limekankar Quarry Lease Of Chettinad Cement Corporation Pvt. Ltd. 22.145 HA In Sendurai Village, Sendurai Taluk, Ariyalur District,**
Name of the Location	:	**Adhikudikadu Village**
Station Code	:	**A4**

SL.NO	DATE	PM10	PM2.5	SO2	NO2
1	3/6/2025	48.6	22.4	6.2	9.1
2	3/7/2025	50.4	23.2	6.8	9.7
3	3/13/2025	47.1	21.7	5.6	8.5
4	3/14/2025	49.8	22.9	6.6	9.5
5	3/20/2025	51.6	23.7	7.5	10.2
6	3/21/2025	53.1	24.4	8.5	10.7
7	3/27/2025	47.7	21.9	5.8	8.7
8	3/28/2025	52.2	24.0	7.9	10.4
9	4/3/2025	48.9	22.5	6.3	9.2
10	4/4/2025	50.7	23.3	6.9	9.8
11	4/10/2025	47.4	21.8	5.8	8.6
12	4/11/2025	50.1	23.0	6.7	9.6
13	4/17/2025	53.7	24.7	8.8	11.5
14	4/18/2025	48.3	22.2	6.1	8.9
15	4/24/2025	51.9	23.9	7.7	10.3
16	4/25/2025	53.4	24.6	8.7	10.8
17	5/1/2025	49.2	22.6	6.4	9.3
18	5/2/2025	51.1	23.5	7.1	9.9
19	5/8/2025	48.1	22.1	5.9	8.9
20	5/9/2025	52.8	24.3	8.3	10.6
21	5/15/2025	54.8	25.2	8.9	11.9
22	5/16/2025	52.5	24.2	8.1	10.5
23	5/22/2025	49.5	22.8	6.5	9.4
24	5/23/2025	51.3	23.6	7.3	10.1
	MIN	**47.1**	**21.7**	**5.6**	**8.5**
	AVE	**50.6**	**23.3**	**7.1**	**9.8**
	MAX	**54.8**	**25.2**	**8.9**	**11.9**

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AMBIENT AIR QUALITY

Project	:	**Limekankar Quarry Lease Of Chettinad Cement Corporation Pvt. Ltd. 22.145 HA In Sendurai Village, Sendurai Taluk, Ariyalur District,**
Name of the Location	:	**Unjini Village**
Station Code	:	**A5**

SL.NO	DATE	PM10	PM2.5	SO2	NO2
1	3/8/2025	45.4	21.3	5.5	8.9
2	3/9/2025	49.6	23.3	6.6	9.9
3	3/11/2025	52.4	24.6	7.3	10.5
4	3/12/2025	55.5	26.1	7.7	11.6
5	3/22/2025	53.6	25.2	7.4	11.1
6	3/23/2025	45.9	21.6	5.6	9.1
7	3/25/2025	48.9	23.0	6.4	9.7
8	3/26/2025	46.6	21.9	5.7	9.3
9	4/5/2025	51.7	24.3	7.1	10.3
10	4/6/2025	55.8	26.2	7.8	11.7
11	4/8/2025	47.5	22.3	6.1	9.6
12	4/9/2025	50.4	23.7	6.7	10.3
13	4/19/2025	49.5	23.3	6.5	9.8
14	4/20/2025	52.9	24.9	7.2	10.7
15	4/22/2025	46.8	22.0	5.8	9.4
16	4/23/2025	53.4	25.1	7.3	10.9
17	5/3/2025	56.8	26.7	8.5	12.1
18	5/4/2025	54.4	25.6	7.5	11.3
19	5/6/2025	50.9	23.9	6.8	10.1
20	5/7/2025	56.4	26.5	7.9	11.8
21	5/17/2025	44.9	21.1	5.4	8.8
22	5/18/2025	48.4	22.7	6.3	9.6
23	5/20/2025	54.9	25.8	7.6	11.5
24	5/21/2025	51.4	24.2	6.9	10.2
	MIN	**44.9**	**21.1**	**5.4**	**8.8**
	AVE	**51.0**	**24.0**	**6.8**	**10.3**
	MAX	**56.8**	**26.7**	**8.5**	**12.1**

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WATER QUALITY DATA

Project Name	:	**Limekankar Quarry Lease Of Chettinad Cement Corporation Pvt. Ltd.**
Location Name	:	

Location Code	Location Name
W1	Near Mine Lease Area
W2	Nallampalayam Village
W3	Elangaicherry Village
W4	Adhikudikadu Village
W5	Unjini Village

S. No.	Parameter	Unit	W1	W 2	W 3	W 4	W 5	*Permissible Limits
1	pH	-	**7.12**	**7.54**	**6.89**	**7.21**	**7.32**	**6.5-8.5**
2	Electrical Conductivity	µmhos/cm	**1052**	**1284**	**1102**	**742.5**	**1220**	**-**
3	Odor	-	**AGREEABLE**	**AGREEABLE**	**AGREEABLE**	**AGREEABLE**	**AGREEABLE**	**AGREEABLE**
4	Turbidity	NTU	**<1**	**<1**	**<1**	**<1**	**<1**	**5.0**
5	Total Hardness as $CaCO_3$	mg/L	**318**	**390**	**336**	**302**	**385**	**600**
6	Calcium Hardness $CaCO_3$	mg/L	**267**	**345**	**242**	**201**	**340**	**-**
7	Magnesium Hardness $CaCO_3$	mg/L	**51.0**	**45.0**	**94.0**	**101.0**	**45.0**	**-**

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S. No.	Parameter	Unit	W1	W 2	W 3	W 4	W 5	*Permissible Limits
8	Calcium Ca	mg/L	107	138	96.8	80.4	136	200
9	Magnesium Mg	mg/L	12.4	10.9	22.8	24.5	10.9	100
10	Alkalinity $CaCO_3$	mg/L	305	322	340	232	344	600
11	Chloride Cl^-	mg/L	446	205	136	114	206	1000
12	Sulphate SO_4^2	mg/L	164	210	222	72.6	206	400
13	Iron Fe	mg/L	0.05	BDL(D.L - 0.01)	0.04	0.09	BDL(D.L - 0.01)	0.3
14	Nitrate NO_3	mg/L	2.45	1.56	3.28	2.97	2.54	45
15	Fluoride F	mg/L	0.36	0.39	0.45	0.36	0.45	1.5
16	Total Dissolved Solids	mg/L	632	770	664	450	736	2000
17	Free Residual Chlorine Cl^-	mg/L	BDL (D.L-0.2)	BDL (D.L-0.2)	BDL (D.L-0.2)	BDL(D.L-0.2)	BDL(D.L-0.2)	1.0
18	Manganese Mn	mg/L	BDL (D.L-0.05)	BDL (D.L-0.05)	BDL (D.L-0.05)	BDL (D.L-0.05)	BDL (D.L-0.05)	0.3

Note: * **The water quality of the collected ground water samples were found to be within the prescribed permissible limits of IS: 10500:2012 Norms for Drinking in the absence of an alternative source.**

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Annexure-11

LAND USE PATTERN OF THE STUDY AREA WITHIN 10 KM RADIUS AROUND THE PROPOSED PROJECT AREA

Sl.No	No. of Villages	Name of village	Total Geographical Area (in Hectares)	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Fallows Land other than Current Fallows Area (in Hectares)	Current Fallows Area (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
0-2 km,Sendurai Sub-District, Ariyalur District													
1	1	Unjini	726.8	0	126.93	0	0	18.25	21	0.31	29.12	514.38	16.81
2	2	Sendurai	1459.02	0	397.1	0	0	56.3	53.3	63.47	255.35	581.02	52.48
		total (A)	**2185.82**	**0**	**524.03**	**0**	**0**	**74.55**	**74.3**	**63.78**	**284.47**	**1095.4**	**69.29**
2-5 km,SenduraiSub-District, Ariyalur District													
3	1	Nakkampadi	971.91	0	287.79	0	0.66	53.39	12.78	12.25	20.5	467.19	117.35
4	2	Maruvathur	913.22	0	24.58	69.62	0.45	1.12	0	6.25	14.92	766.74	29.54
5	3	Ponparappi	1097.48	0	101.69	0	0	14.31	0.5	0	0.08	942.76	38.14
6	4	Pilakurichi	1588.75	0	460.29	0	8	52.25	0	0	73.78	978.82	15.61
7	5	Sirukadambur	853.71	0	126.78	0	4	3.43	2.54	0	0.25	658.47	58.24
8	6	Irumbilikurichi	1461.65	0	53.79	70.1	0	372.25	59	32.76	105.25	752.22	16.28
9	7	Anandavadi	1714.25	0	362.22	5.26	0	262.55	45.31	3.14	178.98	772.25	84.54
Ariyalur Sub-District, Ariyalur District													
10	1	Pottaveli	1180.31	0	214.66	0	0	0	103.69	0	0.67	787.47	73.82
11	2	Rayampuram	1160.97	0	148.87	11.05	0.48	96.95	39.03	5.24	105.15	582.97	171.23
12	3	Sennivanam	557.38	0	112.39	0	24.8	14.95	1.05	0	0.24	365.46	38.49
		total (B)	**11499.63**	**0**	**1893.06**	**156.03**	**38.39**	**871.2**	**263.9**	**59.64**	**499.82**	**7074.35**	**643.24**
5-10 km,Sendurai Sub-District, Ariyalur District													
13	1	Kulumur	1627.65	0	359.29	86.89	0	207.25	0	30.72	36.85	490.12	416.53
14	2	Manapathur	1115.42	0	222.71	3.31	13	42.85	0.5	65	112.25	390.74	265.06
15	3	Asaveerankudikkadu	807.99	0	100.11	0	0	37.25	1	47.48	95.25	406.48	120.42
16	4	Tular	1191.93	0	83.1	0	0	69.42	12	6.25	53.52	941.04	26.6
17	5	Sirkalathur	805.43	0	84.59	0	0	3.81	0	0	8.5	683.79	24.74
18	6	Periyakurichi	1052.37	0	122.37	0	0	130.42	0	120.07	15.2	543.89	120.42
19	7	Vanjinapuram	849.4	0	209.24	0	0	49.25	13	9.46	40	396.25	132.2
20	8	Namangunam	997.95	0	163.41	17.21	0	72.25	12	52.73	9.78	362.6	307.97
21	9	Keezhamaligai	993.61	0	140.44	0	12	1.02	1	0	0.13	833.5	5.52
22	10	Nagalkuzhi	1046.18	0	66.86	0	0	48.25	30.12	0	1.22	880.08	19.65
23	11	Paranam	1597.79	0	291.3	0	0.22	2.22	5.65	1	0.38	1277.83	19.19
24	12	Kilimangalam	823.27	0	99.48	0	8.66	11.39	0	13.25	19.72	580.07	90.7
Udayarpalayam Sub-District, Ariyalur District													
25	1	Kodukkur	911.42	0	70.04	18.22	0	49.66	0	0.94	3.03	756.1	13.43
26	2	Marudur	1075.08	0	90.33	9.72	0	0.21	2.71	0	4.09	781.86	186.16
27	3	Variyankaval	661.75	0	56.62	0	0	2.11	3.18	0	36.97	558.99	3.88
28	4	Elaiyur (West)	892.32	0	145.89	0	0	24.68	0	0	14.39	646.28	61.08
29	5	Thathanur(West)	1196.8	0	153.96	0	0	667.12	0	0.06	4.51	263.73	107.42
30	6	Managethi	1885.2	974.01	250.17	0	4.17	194.67	0	0	227.09	0	235.09
31	7	Udayarpalayam R.F	156	156	0	0	0	0	0	0	0	0	0

Sl.No	No. of Villages	Name of village	Total Geographical Area (in Hectares)	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Fallows Land other than Current Fallows Area (in Hectares)	Current Fallows Area (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
32	8	Managethi RF	960	960	0	0	0	0	0	0	0	0	0
Ariyalur Sub-District, Ariyalur District													
33	1	Illuppaiyur	1287.11	0	248.82	0	0	23.6	3.01	0	39.19	884.47	88.02
34	2	Ottakoil	1795.12	0	505.18	122.82	0	100	4.1	0	10	979.36	73.66
35	3	Govindapuram	1374.92	0	90.45	0	0	10.27	1.28	570.91	159.67	486.43	55.91
36	4	Kallankurichi	1323.55	0	197.97	122.77	9.98	172.35	5.6	88.52	290.88	334.22	101.26
37	5	Kadugur	877.98	0	49.1	21.9	44	45.4	75.6	30.6	85.19	415.59	110.6
38	6	Ayanathur	988.7	0	20.7	6.04	15.9	20.5	105.1	110.6	210.1	369.36	130.4
39	7	Kavanur	1190.69	0	25.1	10.1	9.1	9.1	151.3	135.18	806.8	17.21	26.8
40	8	Thelur	1219.57	0	370.13	0	0	35.39	234.97	3.23	144.87	244.65	186.33
41	9	Periyanagalur	1194.7	0	291.08	149.36	0.35	22.2	194.18	277.56	16.8	117.03	126.14
42	10	Ammenabath	559.45	0	93.54	174.5	0	9.92	62.97	56.56	0.45	136.27	25.24
Kunnam Sub-District, Perambalur District													
43	1	Thungapuram (North)	1098.62	0	252.98	0	0	15.53	5.61	95.15	56.59	506.62	166.14
44	2	Thungapuram (South)	729.69	0	217.1	0	0	15.32	7	8.58	60.11	312.74	108.84
45	3	Kadur (North)	727.66	0	127.98	0	0	8.4	0	75.15	61.12	124.06	330.95
46	4	Kadur (South)	656.37	0	126.99	0	0	2.52	14.3	0	6.6	317.97	187.99
47	5	Periavenmani (East)	829.88	0	86.88	0	0	0	0	50.86	70.31	464.73	157.1
		total (C)	**36501.57**	**2090.01**	**5413.91**	**742.84**	**117.38**	**2104.33**	**946.18**	**1849.86**	**2701.56**	**16504.06**	**4031.44**
		Grand Total (A+B+C)	**50187.02**	**2090.01**	**7831**	**898.87**	**155.77**	**3050.08**	**1284.38**	**1973.28**	**3485.85**	**24673.81**	**4743.97**

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*

**Source: District Primary Census Abstract, Ariyalur , Perambalur District of Tamilnadu State-2011*