



The Ramco Cements Limited

**Proposed Kairulabad Lime Kankar Quarry Lease
over an Extent of 15.135 Ha & Production in Plan Period of
3,66,300 Tonnes @ Maximum 1,99,800 TPA**

S.F Nos. 414/8A, 414/8B, 415/5, 415/6, 415/7, 415/8, 415/9, 415/10, 415/11, 415/12, 415/13, 415/14, 416/7, 417/1, 417/2, 417/3, 417/4, 417/5, 417/6, 417/7, 417/8, 417/9, 417/10A, 417/10B, 417/11A, 417/11B, 417/11C, 417/12, 417/13, 417/14A, 417/14B, 417/15, 417/16A, 417/16B, 417/17A, 417/17B, 418/1A, 418/1B, 418/2, 418/3, 418/7, 418/8, 418/10C, 419/1A, 419/1B, 419/2A, 419/2B, 419/3A, 419/3B, 419/4, 419/5A, 419/5B, 419/5C, 419/7, 419/8, 419/9, 419/10, 419/13, 433/2A, 433/2B, 433/3A, 433/3B, 433/4A, 433/4B, 433/5, 433/6A, 433/6B, 433/7, 433/8, 433/9, 433/10, 433/11, 433/12A, 433/12B, 433/12C, 433/12D, 433/12E, 433/13A, 433/13B, 433/13C, 433/13D, 433/15, 433/16, 433/17, 433/18, 433/19, 433/20, 434/1A, 434/1B, 434/2, 434/3, 434/5, 434/6, 434/7, 434/8, 434/9A, 434/9B, 434/9C, 434/10, 434/11, 434/12A, 434/12B, 434/12C, 434/13A, 434/13B, 434/14, 434/15, 434/18 & 434/19 of Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu

Minor Mineral for Captive Consumption (not in Cluster)

Precise Area Communication Letter 2963/MMC.2/2022-1 dated 19.05.2023
Mining Plan Approval by Directorate of Geology & Mining, Chennai vide
Letter Rc. No. 1271/MM7/2021 dated 17.08.2023

Environmental Clearance under EIA Notification 2006

Schedule SI. No. 1(a) & Category 'B' (Minor Mineral)

Draft Environmental Impact Assessment Report

(after TOR for Public Hearing)

TOR Awarded vide Identification No. TO24B0108TN5653629N dated 22.10.2024
Baseline Data Collection : March-May 2025 (Summer Season)

August 2025

EIA Consultant



ABC Techno Labs India Private Limited, Chennai

Accreditation Certificate : NABET/EIA/2225/RA0290 dated 11.06.2023
with Validity till 16.11.2025 (SI. No. 4 of QCI/NABET List)

Lab Accreditation : NABL Certificate No. TC-5770 dated 03.04.2024-valid till 02.04.2026

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Quarry Lease (QL) - Survey Numbers

Kairulabad Lime Kankar Quarry Lease over an extent of 15.135 Ha of own Patta Land in Kairulabad Village, Ariyalur Taluk & District, Tamil, Nadu.

Survey No.	Sub Division	Extent, Ha	Survey No.	Sub Division	Extent, Ha	Survey No.	Sub Division	Extent, Ha
414	8A	0.025	418	3	0.160	433	13B	0.015
414	8B	0.310	418	7	0.145	433	13C	0.015
415	5	0.260	418	8	0.180	433	13D	0.020
415	6	0.045	418	10C	0.150	433	15	0.420
415	7	0.080	419	1A	0.025	433	16	0.035
415	8	0.140	419	1B	0.030	433	17	0.180
415	9	0.085	419	2A	0.030	433	18	0.040
415	10	0.075	419	2B	0.025	433	19	0.040
415	11	0.075	419	3A	0.025	433	20	0.570
415	12	0.255	419	3B	0.025	434	1A	0.110
415	13	0.135	419	4	0.385	434	1B	0.100
415	14	0.105	419	5A	0.020	434	2	0.155
416	7	0.275	419	5B	0.030	434	3	0.090
417	1	0.200	419	5C	0.045	434	5	0.095
417	2	0.060	419	7	0.180	434	6	0.250
417	3	0.135	419	8	0.325	434	7	0.075
417	4	0.135	419	9	0.030	434	8	0.420
417	5	0.160	419	10	0.295	434	9A	0.045
417	6	0.315	419	13	0.310	434	9B	0.025
417	7	0.065	433	2A	0.160	434	9C	0.050
417	8	0.155	433	2B	0.155	434	10	0.220
417	9	0.110	433	3A	0.080	434	11	0.220
417	10A	0.025	433	3B	0.100	434	12A	0.030
417	10B	0.030	433	4A	0.260	434	12B	0.030
417	11A	0.060	433	4B	0.095	434	12C	0.020
417	11B	0.075	433	5	0.030	434	13A	0.105
417	11C	0.090	433	6A	0.105	434	13B	0.105
417	12	0.085	433	6B	0.070	434	14	0.160
417	13	0.095	433	7	0.140	434	15	0.865
417	14A	0.095	433	8	0.450	434	18	0.245
417	14B	0.105	433	9	0.260	434	19	0.330
417	15	0.095	433	10	0.120	-		-
417	16A	0.100	433	11	0.070			
417	16B	0.110	433	12A	0.075	Total Extent		15.135
417	17A	0.180	433	12B	0.060			
417	17B	0.070	433	12C	0.060			
418	1A	0.270	433	12D	0.020			
418	1B	0.265	433	12E	0.055			
418	2	0.180	433	13A	0.145			



Document-I : VAO Certificate**சான்று**

அரியலூர் மாவட்டம், அரியலூர் வட்டம், கயர்லாபாத் கிராம நிர்வாக அலுவலர் அளிக்கும் சான்று.

திருவாளர், து. ராம்கோ சிமெண்ட்ஸ் நிறுவனம், கோவிந்தபுரம் கிராமம், அரியலூர் மாவட்டம் அவர்கள் அரியலூர் மாவட்டம், அரியலூர் வட்டம், கயர்லாபாத் கிராமம், சர்வே எண். 414/8A, 414/8B, 415/5, 415/6 முதலிய பட்டா நிலத்தில், மொத்தப்பரப்பு 15.13.5 ஹெக்டேர் பரப்பளவில் சுண்ணாம்பு கன்கர் க்கல் வெட்டியெடுக்க சுரங்க குத்தகை அனுமதி கோரியுள்ளனர்.

மேற்கண்ட சுரங்க குத்தகை அனுமதி கோரியுள்ள இடத்தைச் சுற்றி சுமார் 300 மீட்டர் சுற்றளவில் கிராம நத்த குடியிருப்பு பகுதிகள், அங்கீகரிக்கப்பட்ட வீட்டு மனைகள், கோயில்கள் புராதன வரலாற்று சின்னங்கள் மற்றும் மின்மயானங்கள் எதுவுமில்லை, சுரங்க அனுமதி கோரி விண்ணப்பித்துள்ள புலத்திற்கு வண்டிகள் சென்றவரும் கிராம சாலைகளுக்கு இடையூறுகள் என்றும் இல்லை, மேலும் பொதுமக்களுக்கோ அருகில் உள்ள அரசுப் புறம்போக்கு மற்றும் பட்டாதாரர்களுக்கோ எந்தவித இடையூறுகள் இல்லை என தெரிவித்துக் கொள்ளுகிறேன்.


கிராம நிர்வாக அலுவலர்,
கிராம நிர்வாக அலுவலர்,
11, கயர்லாபாத் கிராமம்,
அரியலூர் வட்டம் & மாவட்டம்.

Document-II : DFO NOC

Tel. No. 04329-299195

E-Mail dfogovindapuram@gmail.com**TAMIL NADU FOREST DEPARTMENT**

From
Dr.T.Elangovan, M.Com., B.Ed.,
District Forest Officer,
Ariyalur Forest Division,
Ariyalur.

To
Principal Chief Conservator of Forests,
Velachery, Chennai.

(Through Chief Conservator of Forests,
Trichy circle)

C.No.4065/2023/D dated 15.11.2023

Sir,

Sub : Mines and quarries – Confirmation of Forest Land and Other Eco-Sensitive areas like National Parks, Sanctuaries, Biosphere Reserves etc in the proposed project area of 15.13.5 Ha. In SF Nos.414/8A, 414/8B, 415/5, 415/6 etc., of Khairulabad Village, - M/s The Ramco Cements Limited, Govindapuram works, Ariyalur – Regarding.

Ref 1) Ramco Cements Ltd, Ariyalur Letter dated.01.09.2023.
2) Forest Range Officer, Ariyalur Range Ref.No.606-1/2023 dated.07.11.2023.

I submit that in the reference 1st cited M/s Ramco Cement Ltd, Govindapuram Works had requested "No Objection Certificate" for obtaining Environmental Clearance from Ministry of Environment and Climate Change for Khairulabad in the mining lease area of 15.13.5 Ha comprised in SF.No. 414/8A, 414/8B, 415/5, 415/6 etc., Khairulabad Village of Ariyalur Taluk and district.

In this connection the Forest Range Officer, Ariyalur has inspected the mining areas on 04.10.2023 and submitted in his report vide reference 2nd cited above has report as detailed below.

- ❖ The mine area does not comprise any Forest Land.
- ❖ No Reserve Forests is present within the one kilometer radius of the mines.
- ❖ The nearest Reserve Forests is Villangudi Extension Reserved Forests (11.105629^o, 79.196512^o) which is 7.45 kilometers away from the mines.
- ❖ Other Reserved Forests lies within ten Kilometers Radius of the mines are Villangudi Extension RF (7.66 Km), Managethy RF (8.68 Km) and Vinnakurichi RF (7.81 Km)

- ❖ Karaivetti Birds Sanctuary is 16 Kilometers away from the said Mines and no other protected area is present nearby.
- ❖ The mine area is 15.5 Kilometers away from the Eco-Sensitive Zone of Karaivetti Birds Sanctuary
- ❖ And no other National Parks, Sanctuaries, Biosphere Reserve, Wildlife Corridors, Ramsar Site, Tiger/Elephant Reserve lies in the proposed area.
- ❖ The mine area doesn't fall under notified areas of TNPPF Act/TNHP Act.

In this regard I submit that as reported by the Forest Range Officer, Ariyalur, No Reserved Forests or any other Forest land is situated within 1 Km from the Periphery of the above mining lease area.

I have inspected the above mining area on 04.10.2023. The distance between existing lime stone mining area of Ramco Cements Ltd, Govindapuram works, Ariyalur in Khairulabad village over an extent of 15.13.5 Hectares Karaivetti Birds Sanctuary is 16 Kilometers away from the said mines and it also informed that no National park, Sanctuaries, Biosphere Reserves, Wildlife corridors, Ramsar site, Tiger/Elephant Reserves does not lies with in 10 Kms of the existing lime stone mine area. The mine area doesn't fall under notified areas of TNPPF Act/TNHP Act.

Therefore I request that necessary orders may kindly be given for the issue of the "No Objection Certificate" in the above matter. Further I submit that there is no objection from Forestry and Wildlife point of view in according the No Objection Certificate for the operation of mining in the above subject lands.

Yours faithfully,


District Forest Officer,
Ariyalur Forest Division,
Ariyalur.

Copy :

1. submitted to Chief Conservator of Forests, Trichy Circle
2. Copy to General Manager (Mines), Ramco Cements Ltd, Govindapuram, Ariyalur (Dt).

Document-III : Cluster Certificate

From
Miss. R.Priya M.Sc.,
Assistant Director,
Geology and Mining,
Ariyalur,

To
The Director,
Directorate of Geology and Mining,
Industrial Estate,
Guindy,
Chennai - 32

Rc.No. 228/G&M/2020, dated: 27.07.2023

Sir,

Sub: Mines and Quarries - Quarrying Lease - Minor Mineral - Limekankar - Ariyalur District & Taluk - Kairulabad Village - S.F.Nos. 414/8A, 414/8B, 415/5 etc., - over an extent of 15.135 Hectares of patta lands - Quarry lease application of Tvl. The Ramco Cements Ltd., Ariyalur for grant of quarry lease for quarrying Limekankar - Precise area Communicated - Mining Plan submitted for approval - forwarded - reg.

- Ref:
1. Quarry Lease application of Tvl. The Ramco Cements Ltd., Chennai - 4 dated. 17.09.2019 (received by this office 05.10.2020).
 2. The Assistant Director (i/c), Geology and Mining Ariyalur letter Rc. No.228/G&M/2020, dated. 15.02.2021
 3. The Commissioner of Geology and Mining, Chennai File Rc.No. 1271/MM7/2021, dated 25.01.2023
 4. The Government letter No.2963/MMC.2/2022-1 dated 19.05.2023.
 5. Tvl. The Ramco Cements Limited, Ariyalur, Letter No.TRCL/Mines/Kairulabad/2023 dated. 20.07.2023

I invite kind attention to the references cited.

In the reference 1st cited, Tvl. The Ramco Cements Limited, Chennai-04 have applied for grant of quarrying Lease for quarrying Limekankar over an extent of 15.135 Hectares of patta lands in S.F.Nos. 414/8A, 414/8B, 415/5 etc., in Kairulabad Village, Ariyalur Taluk and District for a period of 5 years. The applicant company have submitted the application in the prescribed Appendix Form - VII -B as per sub rule (3) & (5) of Rule-43 of Tamil Nadu Minor Mineral Concession Rules, 1959.

The above said quarry lease application has been forwarded to Government through the Commissioner of Geology and Mining, Chennai - 32 in the reference second cited.

In the reference 4th cited, the Government have furnished precise area over an extent 15.13.5 hec of patta lands in SF.Nos. 414/8A, 414/8B, 415/5 etc., in Kairulabad village, Ariyalur Taluk and District and requested the applicant to furnish the approved Mining Plan and environmental clearance for the above said area. Accordingly, in the reference 5th cited the applicant has submitted five copies of the mining plan for approval.

The Mining Plan has been verified with reference to field conditions. The Mining Plan has been prepared by the qualified person. The details such as Geological Reserves, Mineable Reserves, year wise production and Development programme have been incorporated in the Mining Plan. The Special conditions imposed in the precise area communication are incorporated in the mining plan.

The details of quarries/mine situated within 500meter radial distance from the applied area are furnished

i) Details of existing mines/quarries:

Sl. No	Name of the lessee / applicant	Taluk & Village	S.F. Nos	GO & Extent (in Hect)	Mineral	Lease period
1.	Tvl. Ultratech Cement Limited, Reddipalayam Cement Works, Ariyalur District.	Ariyalur Taluk & Kairulabad Village	343/2, 343/3 etc.,	Commissioner of Geology and Mining Proceeding Rc.No. 7058/MM1/2009 dated 14.12.2016 Extent - 24.63.5 Hect	Limestone	50 years (10.01.2017 to 09.01.2067)
2.	Tvl. TamilNadu Minerals Limited, Chempauk, Chennai	Periyanaagalur	304/2A, 2B etc.,	G.O.(Ms) No.106 INDUSTRIES (MMA.2) DEPARTMENT Dated: 12.05.2015 Extent - 2.80.0 Hect.	Limestone	20 years (31.03.1998 to 30.03.2018) (Under deemed extension)
3.	Tvl. TamilNadu Minerals Limited, Chempauk,	Periyanaagalur	304, 301/1, 301/4, etc.,	G.O.MaNo.1659 INDUSTRIES DEPARTMENT Dated: 05.12.1981	Limestone	20 years (30.06.1986 to 29.06.2036)

(ii) Details of Lease period expired/abandoned quarry:

(iii) Details of Proposed mines/cuarries:

Sl. No	Name of the lessee / applicant	Taluk & Village	S.F. Nos	Extent (in Hect)	Mineral	Lease period
---NIL---						

In view of the above, the mining plan submitted by the applicant Tvl. The Ramco Cements Limited for quarrying Limekankar over an extent of 15.135 Hectares of patta lands in S.F.Nos. 414/8A, 414/8B, 415/5 etc., in Kairulabad Village, Ariyalur Taluk and District is recommended and forwarded for approval.

Encl: Five copies of Mining Plan.


Assistant Director,
Geology and Mining,
Ariyalur.


27/07/2023



THE RAMCO CEMENTS LIMITED

(Formerly Madras Cements Ltd.)

Corporate Office:
Auroa Corporate Centre, V Floor,
95-A, Dr. Radhakrishnan Sota, Mylapore,
Chennai - 600 004, India.
Tel: +91 44 2947 8666 Fax: +91 44 2947 8676
Website: www.ramcocements.in
Corporate Identity Number: L25941TN1957PLC082000

Project Proponent Declaration

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

We, M/s. The Ramco Cements Limited (RCL), have applied to the State Level EIA Authority (SEIAA)-Tamil Nadu for prior Environmental Clearance of 'Proposed Kairulabad Lime Kankar Quarry Lease over an Extent of 15.135 Ha & Production in Plan Period of 3,66,300 Tonnes @ Maximum 1,99,800 TPA at Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu' vide Parivesh Online proposal No. SIA/TN/MIN/495135/2024 on 02.09.2024 and the File has been accepted by SEIAA under File No. 11231/2024 on 06.09.2024. The Proposal was deliberated by the State Expert Appraisal Committee (SEAC)-Tamil Nadu in its 502nd Meeting held on 03.10.2024 and SEIAA-TN in its 765th Meeting held on 18.10.2024. TOR has been awarded vide Identification No. TO24B0108TN5653629N dated 22.10.2024 with Public Hearing.

EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including Sector-1 (Mining Projects) for Category 'A' by the National Accreditation Board for Education & Training (NABET) vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with validity till 16.11.2025 (Sl. No. 4 of List). ABC Laboratory is accredited by the National Accreditation Board for Testing & Calibration Laboratories (NABL) vide Certificate No. TC-5770 dated 03.04.2024 - valid till 02.04.2026.

The Environmental Impact Assessment (EIA) Report and Summary Environmental Impact Assessment Reports have been prepared in compliance with the awarded TORs and as per the generic structure proposed in EIA Notification 2006 and submitted. The data submitted in the EIA Report are factually correct. Also, in compliance with awarded TOR, we swear and submit the followings:

1. There is no mining activity after 15.01.2016 and Proposal is not falling under Violation Category.
2. The Quarrying operation will be carried out with out any Drilling & Blasting.
3. No contractual persons provided by the explosive suppliers will be employed.
4. No highly sensitive structure such as fire-cracker manufacturing units, Gas godown/explosive Magazine, LPG Bottling Units, etc. are located within 300 m radius from the lease boundary.
5. As the Lease not in Cluster, Cluster approach/Cluster Committee, etc. are not applicable to the Project.
6. Proposed EMP Budget is for the entire life of mine and we abide EMP for the entire life of mine.

For The Ramco Cements Limited

Sr. Vice President (ESG-Corp.)
Authorised Signatory

Date : 27.08.2025
Place : Chennai



EIA Consultant Undertaking

[In compliance with MoEF&CC Office Memorandum No. J-11013/41/2005-IA.II.(I) dated 04.08.2009]

M/s. The Ramco Cements Limited (RCL), have applied to the State Level EIA Authority (SEIAA)-Tamil Nadu for prior Environmental Clearance of 'Proposed Kairulabad Lime Kankar Quarry Lease over an Extent of 15.135 Ha & Production in Plan Period of 3,66,300 Tonnes @ Maximum 1,99,600 TPA at Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu' vide Parivesh Online proposal No. SIA/TN/MIN/495135/2024 on 02.09.2024 and the File has been accepted by SEIAA under File No. 11231/2024 on 06.09.2024.

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The Environmental Impact Assessment (EIA) Report and Summary Environmental Impact Assessment Reports have been prepared in compliance with the awarded TORs and as per the generic structure proposed in EIA Notification 2006 and submitted. The data submitted in the EIA Report are factually correct.

For ABC Techno Labs India Pvt. Ltd.


Authorised Signatory

Date : 27.08.2025
Place : Chennai.



ABC TECHNO LABS INDIA PRIVATE LIMITED

(Accredited by NABL, NABL vide TC-5770, Approved by FSSAI, Recognized by MoEF&CC, BS, APDM, ISO/IEC, ISO 9001:2015)
ABC TOWER, #406, 136 Street, SIDCO Industrial Estate-Mark Puzos, Ambattur, Chennai - 600 096, Tamil Nadu, INDIA.
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Email: info@abctechnolabs.com
Website: www.abctechnolabs.com
Hotline: +91 94461 6888 / 95601 87777

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Awarded TORs



File No: 11231
Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Environment Impact Assessment
Authority(SEIAA), TAMIL NADU)



Dated 22/10/2024



To,

Thiru.M Srinivasan
THE RAMCO CEMENTS LIMITED
The Ramco Cements Limited 5th Floor, Auras Corporate Centre No. 98A, Dr.Radhakrishnan Road,
Mylapore, Chennai, Mylapore, CHENNAI, TAMIL NADU, , 600004
ramcoenv@ramcocements.co.in

Subject:

Grant of Terms of Reference with Public Hearing under the provision of the EIA Notification 2006-as amended regarding.

Sir/Madam,

SEIAA, Tamil Nadu – Terms of Reference with Public Hearing (ToR) for Proposed Lime Kankar Quarry kankar lease over an extent of 15.135Ha in S.F.Nos.414/8A, 414/8B, 415/5, 415/6, 415/7, 415/8, 415/9, 415/10, 415/11, 415/12, 415/13, 415/14, 416/7, 417/1, 417/2, 417/3, 417/4, 417/5, 417/6, 417/7, 417/8, 417/9, 417/10A, 417/10B, 417/11A, 417/11B, 417/11C, 417/12, 417/13, 417/14A, 417/14B, 417/15, 417/16A, 417/16B, 417/17A, 417/17B, 418/1A, 418/1B, 418/2, 418/3, 418/7, 418/8, 418/10C, 419/1A, 419/1B, 419/2A, 419/2B, 419/3A, 419/3B, 419/4, 419/5A, 419/5B, 419/5C, 419/7, 419/8, 419/9, 419/10, 419/13, 433/2A, 433/2B, 433/3A, 433/3B, 433/4A, 433/4B, 433/5, 433/6A, 433/6B, 433/7, 433/8, 433/9, 433/10, 433/11, 433/12A, 433/12B, 433/13C, 433/12D, 433/12E, 433/13A, 433/13B, 433/13C, 433/13D, 433/15, 433/16, 433/17, 433/18, 433/19, 433/20, 434/1A, 434/1B, 434/2, 434/3, 434/5, 434/6, 434/7, 434/8, 434/9A, 434/9B, 434/9C, 434/10, 434/11, 434/12A, 434/12B, 434/12C, 434/13A, 434/13B, 434/14, 434/15, 434/18 & 434/19 of Kairulabad Village, Ariyalur Taluk, Ariyalur District, Tamil Nadu by M/s. The Ramco Cements Limited – under project category - "B1" and Schedule S.No.1(a) – ToR issued along with Public Hearing – preparation of EIA report – Regarding.

Ref:

1. Online Proposal No.SIA/TN/MEN/495135/2024, Dated:02.09.2024.
2. Your application submitted for Terms of Reference dated:06.09.2024.
3. Minutes of the 502nd Meeting of SEAC held on 03.10.2024.
4. Minutes of the 765th authority meeting held on 18.10.2024.

2. The particulars of the proposal are as below :

(i) TOR Identification No.

TO24B0108TN5653629N

(ii) File No.

11231

(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals Proposed Kairulabad Lime Kankar Quarry Lease over an Extent of 15.135 Ha & Production in Plan Period - 3,66,300 Tonnes @ Maximum 1,99,800 TPA at SF Nos. 414/8A, 414/8B, 415/5, 415/6, 415/7, etc. of Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu by M/s. The Ramco Cements Limited
(vii) Name of Project	
(viii) Name of Company/Organization	THE RAMCO CEMENTS LIMITED
(ix) Location of Project (District, State)	Ariyalur, TAMIL NADU
(x) Issuing Authority	SEIAA
(xi) Applicability of General Conditions	no
(xii) 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) Appraisal Committee of SEIAA in the meeting held on 15/10/2024. 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 for instant proposal of Thiru. M Srinivasan 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(T)(part) dated 29th August, 2017.

Copy To

1. The Principal Secretary to Government, Environment, Climate Change and Forests Department, Govt. of Tamil Nadu, Fort St. George, Chennai - 9.
2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
3. The Chairperson, Tamil Nadu Pollution Control Board, 76, Mount Saini, Guindy, Chennai - 600 032.
4. The APCCF (C), Regional Office, MoEF & CC (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungambakkam, Chennai - 34.
5. Monitoring Cell, IA Division, Ministry of Environment, Forests & CC, Parivaran Bhavan, CGO Complex, New Delhi

- 110 003.

6. The District Collector, Ariyalur District.

7. Stock File.

Annexure 1

Specific Terms of Reference for (Mining Of Minerals)

1. Seiaa Specific Conditions:

S. No	Terms of Reference
1.1	After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant Terms of Reference with Public Hearing subject to the conditions as recommended by SEAC & normal conditions and conditions in Annexure 'B' of this minutes in addition to the followings shall be incorporated in EIA study. 1. As a part of Ground Water Management, the PP shall carry out the scientific studies to assess the hydrogeological condition and impacts of the quarrying operation on the ground water level present in the core zone, by involving any one of the reputed Institution. A copy of such scientific study report shall be submitted to the SEIAA, MoEF, TNPCB, AD Mines-DGM and DMS, Chennai as a part of Environmental Compliance without any deviation. 2. Traffic Study 3. Socio-Economic Study 4. Impact of Agriculture, Horticulture, Water Table, Climate change, Drainage Pattern. 5. Anticipated Green House Gas emissions and mitigation strategies. 6. Details of Plantation in EMP.

2. Seac Conditions - Site Specific

S. No	Terms of Reference
2.1	1. The structures within the project site & 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. 2. 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. 3. The Proponent shall carry out Bio diversity study as a part of EIA study and the same shall be included in the Report. 4. The PP shall prepare the EMP for the entire project life of mine, i.e. 5 years and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine. 5. The PP shall carry out the comprehensive studies on the cumulative environmental impacts of the existing & proposed quarries which included drilling & blasting, loading & hauling on the surrounding village and structures.

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 Minesable 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/ 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, 13. What was the period of the operation and stoppage of the earlier mines with last work permit

S. No	Terms of Reference
	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 restrictions for mining operations, should also be indicated and where so required,

S. No	Terms of Reference
	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/Horticulturalist 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

S. No	Terms of Reference
	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.

4. Seiaa Standard Conditions:

S. No	Terms of Reference
41	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. 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. Agriculture & Agro-Biodiversity 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, horticultural 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. Forests 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: - Hydrothermal/Geothermal effect due to destruction in the Environment. - Bio-geochemical processes and its foot prints including environmental stress. - 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/unlabeled 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, odel, vari, 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	An EIA-EMP Report shall be prepared for peak capacity (.....MTPA)operation in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modeling for..... MTPA of mineral production based on approved project/Mining Plan for..... MTPA. Baseline data collection can be for any season (three months) except monsoon.
1.3	Proposer KML file with pin drop and coordinate of mine at 500-1000 m interval be provided
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/tullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines and other polluting sources. In case of ecologically sensitive areas such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.

S. No	Terms of Reference																																							
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ riverlet system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need elaboration in form of length, quantity and quality of water to be diverted																																							
1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.																																							
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.																																							
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channeling of the existing rivers/water courses flowing through the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.																																							
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channelling of the water courses, etc., approach roads, major haul roads, etc should be indicated.																																							
1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural land/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights <table><tr><th>S.NML/Project Land use</th><th>Area under Surface Rights(ha)</th><th>Area Under Mining Rights(ha)</th><th>Area under Both (ha)</th></tr><tr><td>1 Agricultural land</td><td></td><td></td><td></td></tr><tr><td>2 Forest Land</td><td></td><td></td><td></td></tr><tr><td>3 Grazing Land</td><td></td><td></td><td></td></tr><tr><td>4 Settlements</td><td></td><td></td><td></td></tr><tr><td>5 Others (specify)</td><td></td><td></td><td></td></tr></table> <table><tr><th>S.N.</th><th>Details</th><th>Area (ha)</th></tr><tr><td>1</td><td>Buildings</td><td></td></tr><tr><td>2</td><td>Infrastructure</td><td></td></tr><tr><td>3</td><td>Roads</td><td></td></tr><tr><td>4</td><td>Others (specify)</td><td></td></tr></table>	S.NML/Project Land use	Area under Surface Rights(ha)	Area Under Mining Rights(ha)	Area under Both (ha)	1 Agricultural land				2 Forest Land				3 Grazing Land				4 Settlements				5 Others (specify)				S.N.	Details	Area (ha)	1	Buildings		2	Infrastructure		3	Roads		4	Others (specify)	
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S. No	Terms of Reference
	Total
1.13	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate budgetary provision should be prepared and submitted with EIA-EMP Report, and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.
1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, NOx and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/ MoEF&CC certification of the respective laboratory and NABET accreditation of the consultant to be provided.
1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air)/downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10 km buffer zone i.e. dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison with the monitoring data to be provided
1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need based survey for CSR activities to be followed.
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that

S.No	Terms of Reference
	area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted.
1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.
1.23	Study on land subsidence including modeling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.
1.24	Detailed water balance should be provided. The break up of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs.
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of mineral. The measures adopted to conserve energy or use of renewable sources shall be explored.
1.27	PP to evaluate the green house emission gases from the mine operation and corresponding carbon absorption plan.
1.28	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.
1.29	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation, handling & storage/stockyard, etc. Impact of blasting, noise and vibrations should be provided.
1.30	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.
1.31	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.

S. No	Terms of Reference
1.32	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.
1.33	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre-mining status should be provided. A Plan for the ecological restoration of the mined out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.
1.34	Adequate greenbelt nearby areas, mineral stock yard and transportation area of mineral shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route.
1.35	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.
1.36	Details of R&R. Detailed project specific R&R Plan with data on the existing socio-economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc and costs along with the schedule of the implementation of the R&R Plan should be given.
1.37	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.
1.38	Corporate Environment Responsibility.
1.39	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.
1.40	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.
1.41	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.
1.42	d) To have proper checks and balances, the company should have a well laid down 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.
1.43	e) Environment Management Cell and its responsibilities to be clearly spelled out in EIA/ EMP report.
1.44	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.
1.45	Status of any litigations/ court cases filed/pending on the project should be provided.

S. No	Terms of Reference												
1.46	PP shall submit clarification from DFO that mine does not falls under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.												
1.47	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval, NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable.												
1.48	Details on the Forest Clearance should be given as per the format given: <table><thead><tr><th>Total ML Total Project Area Forest (ha)</th><th>land (ha)</th><th>Date of FC</th><th>Extent of Forest Land</th><th>Balance area for which FC is yet to be obtained</th><th>Status of appl For be diversion of forest land</th></tr></thead><tbody><tr><td colspan="6">If more than one provide details of each FC</td></tr></tbody></table>	Total ML Total Project Area Forest (ha)	land (ha)	Date of FC	Extent of Forest Land	Balance area for which FC is yet to be obtained	Status of appl For be diversion of forest land	If more than one provide details of each FC					
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1.49	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report												
1.50	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.												
1.51	PP shall carry out survey through drone highlighting the ground reality for atleast 10 minutes												
1.52	Detailed Chronology of the project starting from the first lease deed allotted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc. as per the requisites respectively to be furnished in tabular form.												
1.53	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification)												
1.54	The compliances of ToR must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapters section.												

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-LA.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 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 its acquisition, nearby (in 2-3 km.) water body, population, within 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 institutions/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-11013/77/2004-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 report to the MoEF, Govt. of India.

OM No J-11013/41/2006-IA-II(I)(part) dated 20/10/2024

Digitally Signed by : A R Rahul Nadi IAS
Member Secretary, SEIAA

Date: 23/10/2024

Awarded TORs & their incorporation in EIA Report

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
I	Specific Terms of Reference for Mining of Minerals	
1	SEIAA Specific Conditions	
1.1	After detailed discussions, the Authority accepts the recommendation of SEAC and decided to grant Terms of Reference with Public Hearing subject to the conditions as recommended by SEAC & normal conditions and conditions in Annexure 'B' of this minutes in addition to the followings shall be incorporated in EIA study. 1. As a part of Ground Water Management, the PP shall carry out the scientific studies to assess the hydrogeological condition and impacts of the quarrying operation on the ground water level present in the core zone, by involving any one of the reputed Institution. A copy of such scientific study report shall be submitted to the SEIAA, MoEF, TNPCB, AD/Mines-DGM and DMS, Chennai as a part of Environmental Compliance without any deviation. 2. Traffic Study 3. Socio-Economic Study 4. Impact of Agriculture, Horticulture, Water Table, Climate change, Drainage Pattern. 5. Anticipated Green House Gas emissions and mitigation strategies. 6. Details of Plantation in EMP.	The depth of the quarry will be 2.30 m BGL only. Quarrying activities will not intersect the ground water-table. Hydrogeological conditions at Page Nos. 128-131 163-164 155-162 167-169 169 169
2	SEAC Conditions – Site Specific	
2.1	1. The structures within the project site & 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. 2. 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. 3. The Proponent shall carry out Bio diversity study as a part of EIA study and the same shall be included in the Report. 4. The PP shall prepare the EMP for the entire project life of mine, i.e, 5 years and also furnish the sworn affidavit stating to abide the EMP for the entire life of mine. 5. The PP shall carry out the comprehensive studies on	75 & 78 New Quarry Lease 141-155 16

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	the cumulative environmental impacts of the existing & proposed quarries which included drilling & blasting, loading & hauling on the surrounding village and structures.	163 No Drilling & Blasting proposed.
3	SEAC Standard Conditions	
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.	Not Applicable. New Quarry Lease.
	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.	75 & 78 9
	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.	Nil 75 & 78
	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.	No intersection of ground water-table. Hydrogeological conditions -128-131
	5. The Proponent shall carry out Bio diversity study through reputed Institution and the same shall be included in EIA Report.	141-155
	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.	20-11
	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	Not Applicable. New Quarry Lease.

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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.	Shallow depth quarrying upto 2.3 m BGL. No benches. 89-90
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.	16 90
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. No Drilling & Blasting proposed.
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.	71-74
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,	Not Applicable. New Quarry Lease.
13.	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	Not Applicable. New Quarry Lease.
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.	Not Applicable. New Quarry Lease.
15.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/Topo sheet, topographic sheet, geomorphology, lithology	78, 83 88-89

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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).	138-148
	16. The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,	Complied and to be submitted for EC meeting
	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.	76-77
	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.	81 163-164
	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.	85
	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.	No intersection of ground water-table. Hydrogeological conditions -128-131
	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.	Chapter 3.0 98-162
	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.	Chapter 4.0 163-169 178-179
	23. Rain water harvesting management with recharging details along with water balance (both monsoon &	97

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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.	82-84 138-140 96
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.	96
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. 98
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.	97
28.	Impact on local transport infrastructure due to the Project should be indicated.	163-164
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.	No tree within the Lease. 168-169
30.	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	96
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.	141-185
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.	96 169
33.	Taller/one year old Saplings raised in appropriate	Will be complied.

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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	94 96
	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.	173-176
	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.	172-176
	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.	168-169
	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.	156-157
	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.	155-162
	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.	Nil 67
	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.	177
	41. If any quarrying operations were carried out in the proposed quarrying site for which now the EC is sought, the Project Proponent shall furnish the detailed compliance to EC conditions given in the previous EC with the site photographs which shall duly be certified by MoEF&CC, Regional Office, Chennai (or) the concerned DEE/TNPCB.	Not Applicable. New Quarry Lease.
	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.	16

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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.	Noted and will be complied.
4	SEIAA Standard Conditions	
4.1	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. 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 management plan pertaining to the cluster in a holistic manner especially during natural calamities like intense rain and the mitigation measures considering the inundation of the cluster and evacuation plan. 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.	Not Applicable- Lease not in cluster 16
	Agriculture & Agro-Biodiversity 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 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.	168 168 Nil

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	12.The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem. 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.	163-169 96 168-169
	Forests 15.The project proponent shall detailed study on impact of mining on Reserve forests 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.	168 141-155 Nil 168
	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	No intersection of ground water-table. Hydrogeological conditions -128-131 NA 167-168 154-155 141 154-155

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	impacts.	
	25. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components.	187-188
	26. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	167-168
	27. The EIA shall include the impact of mining activity on the following:	
	a) Hydrothermal/Geothermal effect due to destruction in the Environment.	NA
	b) Bio-geochemical processes and its foot prints including environmental stress.	168
	c) Sediment geochemistry in the surface streams.	167-168
	Energy	
	28. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	178-179
	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.	169
	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.	169
	31. Impact of mining on pollution leading to GHGs emissions and the impact of the same on the local livelihood.	169
	Mine Closure Plan	
	32. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	96
	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.	178-179
	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.	179
	Risk Assessment	
	35. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	172-176
	Disaster Management Plan	
	36. To furnish disaster management plan and disaster	173-176

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/unfavorable 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.	
	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, odis, 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.	9 To be complied after PH 179
	Standard Terms of Reference for Mining of Minerals	
1	Project Details	
1.1	An EIA-EMP Report shall be prepared for peak capacity (.....MTPA)operation in an ML/project area of.....ha based on the generic structure specified in Appendix III of the EIA Notification, 2006.	Complied.
1.2	An EIA-EMP Report would be prepared for peak capacity operation to cover the impacts and environment management plan for the project specific activities on the environment of the region, and the environmental quality encompassing air, water, land, biotic community, etc. through collection of data and information, generation of data on impacts including prediction modelling for..... MTPA of mineral production based on approved project/Mining Plan for.....MTPA. Baseline data collection can be for any season (three months) except monsoon.	Complied. Baseline Data collected during Mar.-May 2025 period – Summer 2025 Season
1.3	Proper KML file with pin drop and coordinate of mine at 500-1000 m interval be provided.	Provided.
1.4	A Study area map of the core zone (project area) and 10 km area of the buffer zone (1: 50,000 scale) clearly delineating the major topographical features such as the land use, surface drainage pattern including rivers/streams/nullahs/canals, locations of human habitations, major constructions including railways, roads, pipelines, major industries, mines and other polluting sources. In case of ecologically sensitive areas	82-85

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	such as Biosphere Reserves/National Parks/WL Sanctuaries/ Elephant Reserves, forests (Reserved/Protected), migratory corridors of fauna, and areas where endangered fauna and plants of medicinal and economic importance found in the 15 km study area should be given. The above details to be furnished in tabular form also.	
1.5	Map showing the core zone delineating the agricultural land (irrigated and un-irrigated, uncultivable land as defined in the revenue records, forest areas (as per records), along with other physical features such as water bodies, etc should be furnished.	78
1.6	A contour map showing the area drainage of the core zone and 25 km of the study area (where the water courses of the core zone ultimately join the major rivers/streams outside the lease/project area) should also be clearly indicated in the separate map.	101
1.7	Catchment area with its drainage map of 25 km area within and outside the mine shall be provided with names, details of rivers/ rivulet system and its respective order. The map should clearly indicate drainage pattern of the catchment area with basin of major rivers. Diversion of drains/ river need elaboration in form of length, quantity and quality of water to be diverted	101
1.8	(Details of mineral reserves, geological status of the study area and the seams to be worked, ultimate working depth and progressive stage-wise working scheme until the end of mine life should be provided on the basis of the approved rated capacity and calendar plans of production from the approved Mining Plan. Geological maps and sections should be included. The Progressive mine development and Conceptual Final Mine Closure Plan should also be shown in figures. Details of mine plan and mine closure plan approval of Competent Authority should be furnished for green field and expansion projects.	87-89 91-94 96
1.9	Details of mining methods, technology, equipment to be used, etc., rationale for selection of specified technology and equipment proposed to be used vis-à-vis the potential impacts should be provided.	90
1.10	Impact of mining on hydrology, modification of natural drainage, diversion and channelling of the existing rivers/water courses flowing through the ML and adjoining the lease/project and the impact on the existing users and impacts of mining operations thereon.	167-168
1.11	A detailed Site plan of the mine showing the proposed break-up of the land for mining operations such as the quarry area, OB dumps, green belt, safety zone, buildings, infrastructure, Stockyard, township/colony (within and adjacent to the ML), undisturbed area -if any, and landscape features such as existing roads, drains/natural water bodies to be left undisturbed along	91 94

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.																																													
	with any natural drainage adjoining the lease /project areas, and modification of thereof in terms of construction of embankments/bunds, proposed diversion/re-channelling of the water courses, etc., approach roads, major haul roads, etc should be indicated.																																														
1.12	Original land use (agricultural land/forestland/grazing land/wasteland/water bodies) of the area should be provided as per the tables given below. Impacts of project, if any on the land use, in particular, agricultural and/forestland/grazing land/water bodies falling within the lease/project and acquired for mining operations should be analyzed. Extent of area under surface rights and under mining rights should be specified. Area under Surface Rights. <table><tr><th>S.No.</th><th>ML/Project Land use</th><th>Area under Surface Rights(ha)</th><th>Area Under Mining Rights(ha)</th><th>Area under Both (ha)</th></tr><tr><td>1</td><td>Agricultural Land</td><td></td><td></td><td></td></tr><tr><td>2</td><td>Forest Land</td><td></td><td></td><td></td></tr><tr><td>3</td><td>Grazing Land</td><td></td><td></td><td></td></tr><tr><td>4</td><td>Settlements</td><td></td><td></td><td></td></tr><tr><td>5</td><td>Others (specify)</td><td></td><td></td><td></td></tr></table> <table><tr><th>S.No.</th><th>Details</th><th>Area (ha)</th></tr><tr><td>1</td><td>Building</td><td></td></tr><tr><td>2</td><td>Infrastructure</td><td></td></tr><tr><td>3</td><td>Roads</td><td></td></tr><tr><td>4</td><td>Others (specify)</td><td></td></tr></table>	S.No.	ML/Project Land use	Area under Surface Rights(ha)	Area Under Mining Rights(ha)	Area under Both (ha)	1	Agricultural Land				2	Forest Land				3	Grazing Land				4	Settlements				5	Others (specify)				S.No.	Details	Area (ha)	1	Building		2	Infrastructure		3	Roads		4	Others (specify)		96
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1.13	Study on the existing flora and fauna in the study area (10km) should be carried out by an institution of relevant discipline. The list of flora and fauna duly authenticated separately for the core and study area and a statement clearly specifying whether the study area forms a part of the migratory corridor of any endangered fauna should be given. If the study area has endangered flora and fauna, or if the area is occasionally visited or used as a habitat by Schedule-I species, or if the project falls within 15 km of an ecologically sensitive area, or used as a migratory corridor then a Comprehensive Conservation Plan along with the appropriate budgetary provision should be prepared and submitted with EIA-EMP Report; and comments/observation from the CWLW of the State Govt. should also be obtained and furnished.	141-155 No Sch. I Fauna																																													
1.14	One-season (other than monsoon) primary baseline data on environmental quality - air (PM10, PM2.5, SOx, Nox and heavy metals such as Hg, Pb, Cr, As, etc), noise, water (surface and groundwater), soil - along with one-season met data coinciding with the same season for AAQ collection period should be provided. The detail of NABL/ MoEF&CC certification of the respective laboratory and NABET accreditation of the consultant to	Baseline Data collected during Mar.-May 2025 period – Summer 2025 Season 98-138 86 197-199																																													

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	be provided.	
1.15	Map (1: 50, 000 scale) of the study area (core and buffer zone) showing the location of various sampling stations superimposed with location of habitats, other industries/mines, polluting sources, should be provided. The number and location of the sampling stations in both core and buffer zones should be selected on the basis of size of lease/project area, the proposed impacts in the downwind (air) / downstream (surface water)/groundwater regime (based on flow). One station should be in the upwind/upstream/non-impact/non-polluting area as a control station. The monitoring should be as per CPCB guidelines and parameters for water testing for both ground water and surface water as per ISI standards and CPCB classification wherever applicable. Observed values should be provided along with the specified standards.	98-99 102 105-108
1.16	For proper baseline air quality assessment, Wind rose pattern in the area should be reviewed and accordingly location of AAMSQ shall be planned by the collection of air quality data by adequate monitoring stations in the downwind areas. Monitoring location for collecting baseline data should cover overall the 10 km buffer zone i.e. dispersed in 10 km buffer area. In case of expansion, the displayed data of CAAQMS and its comparison with the monitoring data to be provided	98 113-114
1.17	A detailed traffic study along with presence of habitation in 100 mts distance from both side of road, the impact on the air quality with its proper measures and plan of action with timeline for widening of road. The project will increase the no. of vehicle along the road which will indirectly contribute to carbon emission so what will be the compensatory action plan should be clearly spell out in EIA/ EMP report.	163-167
1.18	The socio-economic study to conducted with actual survey report and a comparative assessment to be provided from the census data should be provided in EIA/ EMP report also occupational status & economic status of the study area and what economically project will contribute should be clearly mention. The study should also include the status of infrastructural facilities and amenities present in the study area and a comparative assessment with census data to be provided and to link it with the initialization and quantification of need based survey for CSR activities to be followed.	155-162
1.19	The Ecology and biodiversity study should also indicate the likely impact of change in forest area for surface infrastructural development or mining activity in relation to the climate change of that area and what will be the compensatory measure to be adopted by PP to minimize the impact of forest diversion.	141

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
1.20	Baseline data on the health of the population in the impact zone and measures for occupational health and safety of the personnel and manpower for the mine should be submitted.	155-157
1.21	Impact of proposed project/activity on hydrological regime of the area shall be assessed and report be submitted. Hydrological studies as per GEC 2015 guidelines to be prepared and submitted	No intersection of ground water-table. Hydrogeological conditions -128-131
1.22	Impact of mining and water abstraction from the mine on the hydrogeology and groundwater regime within the core zone and 10 km buffer zone including long-term monitoring measures should be provided. Details of rainwater harvesting and measures for recharge of groundwater should be reflected in case there is a declining trend of groundwater availability and/or if the area falls within dark/grey zone.	128-131
1.23	Study on land subsidence including modelling for prediction, mitigation/prevention of subsidence, continuous monitoring measures, and safety issues should be carried out.	Not Applicable 90
1.24	Detailed water balance should be provided. The break-up of water requirement as per different activities in the mining operations, including use of water for sand stowing should be given separately. Source of water for use in mine, sanction of the Competent Authority in the State Govt. and impacts vis-à-vis the competing users should be provided.	97
1.25	PP shall submit design details of all Air Pollution control equipment (APCEs) to be implemented as part of Environment Management Plan vis-à-vis reduction in concentration of emission for each APCEs	Not Applicable
1.26	PP shall propose to use LNG/CNG based mining machineries and trucks for mining operation and transportation of mineral. The measures adopted to conserve energy or use of renewable sources shall be explored	To be explored at the time of operation
1.27	PP to evaluate the green house emission gases from the mine operation and corresponding carbon absorption plan.	169
1.28	Site specific Impact assessment with its mitigation measures, Risk Assessment and Disaster Preparedness and Management Plan should be provided.	172-176
1.29	Impact of choice of mining method, technology, selected use of machinery and impact on air quality, mineral transportation, handling & storage/stockyard, etc, Impact of blasting, noise and vibrations should be provided.	164-165
1.30	Impacts of mineral transportation within the mining area and outside the lease/project along with flow-chart indicating the specific areas generating fugitive emissions should be provided. Impacts of transportation, handling, transfer of mineral and waste on air quality, generation of effluents from workshop etc, management	164-169

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	plan for maintenance of HEMM and other machinery/equipment should be given. Details of various facilities such as rest areas and canteen for workers and effluents/pollution load emanating from these activities should also be provided.	164
1.31	Details of various facilities to be provided to the workers in terms of parking, rest areas and canteen, and effluents/pollution load resulting from these activities should also be given.	164 95-96
1.32	The number and efficiency of mobile/static water jet, Fog cannon sprinkling system along the main mineral transportation road inside the mine, approach roads to the mine/stockyard/siding, and also the frequency of their use in impacting air quality should be provided.	Not Applicable
1.33	Conceptual Final Mine Closure Plan and post mining land use and restoration of land/habitat to the pre-mining status should be provided. A Plan for the ecological restoration of the mined-out area and post mining land use should be prepared with detailed cost provisions. Impact and management of wastes and issues of re-handling (wherever applicable) and backfilling and progressive mine closure and reclamation should be furnished.	96
1.34	Adequate greenbelt nearby areas, mineral stock yard and transportation area of mineral shall be provided with details of species selected and survival rate Greenbelt development should be undertaken particularly around the transport route.	96
1.35	Cost of EMP (capital and recurring) should be included in the project cost and for progressive and final mine closure plan.	179
1.36	Details of R&R. Detailed project specific R&R Plan with data on the existing socio- economic status of the population (including tribals, SC/ST, BPL families) found in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternate livelihood concerns/employment for the displaced people, civic and housing amenities being offered, etc and costs along with the schedule of the implementation of the R&R Plan should be given.	No R&R involved. 67
1.37	CSR Plan along with details of villages and specific budgetary provisions (capital and recurring) for specific activities over the life of the project should be given.	168
1.38	Corporate Environment Responsibility:	179
1.39	a) The Company must have a well laid down Environment Policy approved by the Board of Directors.	Yes. 71
1.40	b) The Environment Policy must prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.	71
1.41	c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for	71

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	ensuring compliance with the environmental clearance conditions must be furnished.													
1.42	d) To have proper checks and balances, the company should have a well laid down 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.	71												
1.43	e) Environment Management Cell and its responsibilities to be clearly spell out in EIA/ EMP report	171												
1.44	f) In built mechanism of self-monitoring of compliance of environmental regulations should be indicated.	171												
1.45	Status of any litigations/ court cases filed/pending on the project should be provided.	Nil 67												
1.46	PP shall submit clarification from DFO that mine does not falls under corridors of any National Park and Wildlife Sanctuary with certified map showing distance of nearest sanctuary.	10-11												
1.47	Copy of clearances/approvals such as Forestry clearances, Mining Plan Approval, mine closer plan approval. NOC from Flood and Irrigation Dept. (if req.), etc. wherever applicable.	Mining Plan approval obtained. 211-217												
1.48	Details on the Forest Clearance should be given as per the format given: <table> <tr> <th>Total ML Project Area (Ha)</th> <th>Total Forest Land (Ha)</th> <th>Date of FC</th> <th>Extent of Forest Land (Ha)</th> <th>Balance area for which FC is yet to be obtained</th> <th>Status of Application for diversion of Forest Land</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> If more than one provide details of each FC.	Total ML Project Area (Ha)	Total Forest Land (Ha)	Date of FC	Extent of Forest Land (Ha)	Balance area for which FC is yet to be obtained	Status of Application for diversion of Forest Land							Not Applicable
Total ML Project Area (Ha)	Total Forest Land (Ha)	Date of FC	Extent of Forest Land (Ha)	Balance area for which FC is yet to be obtained	Status of Application for diversion of Forest Land									
1.49	In case of expansion of the proposal, the status of the work done as per mining plan and approved mine closure plan shall be detailed in EIA/ EMP report	Not Applicable												
1.50	Details on Public Hearing should cover the information relating to notices issued in the newspaper, proceedings/minutes of Public Hearing, the points raised by the general public and commitments made by the proponent and the time bound action proposed with budgets in suitable time frame. These details should be presented in a tabular form. If the Public Hearing is in the regional language, an authenticated English Translation of the same should be provided.	To be complied after PH												
1.51	PP shall carry out survey through drone highlighting the ground reality for atleast 10 minutes.	To be submitted at the time of EC Meeting.												
1.52	Detailed Chronology of the project starting from the first lease deed allotted/Block allotment/ Land acquired to its No. of renewals, CTO /CTE with details of no. renewals, previous EC(s) granted details and its compliance details, NOC details from various Govt bodies like Forest NOC(s), CGWA permissions, Power permissions, etc as per the requisites respectively to be furnished in tabular	204-210												

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	form.	
1.53	The first page of the EIA/ EMP report must mention the peak capacity production, area, detail of PP, Consultant (NABET accreditation) and Laboratory (NABL / MoEF & CC certification)	Complied.
1.54	The compliances of ToR must be properly cited with respective chapter section and page no in tabular form and also mention sequence of the respective ToR complied within the EIA-EMP report in all the chapter's section.	Complied. 41-66
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.	Not Applicable. New Lease.
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	204-210 75
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.	Complied.
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).	78
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.	83
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.	204-210
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	Yes. 71

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	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.	90
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.	99
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.	137-140 96
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	Not Applicable. No outside dump. No R&R.
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.	10-11
13	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of Net Present Value (NPV) and Compensatory Afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable
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.	141-142
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	168

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	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.	82-84
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.	141-155 No Sch.-I Fauna
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.	Nil 98
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).	Nil 98
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,	No R&R 67

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	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.	Summer 2025 Season Data. 98-162 109-113 114 127
23	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of Vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	164-167 113
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.	97
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.	97
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.	167-168
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	The depth of the quarry will be 2.30 m BGL only . Quarrying activities will not intersect the ground water-table.

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	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.	75
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.	82
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.	96
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.	163-164
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	164
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.	96
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	168-169

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	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.	156-157
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.	168
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.	178-179
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.	To be complied after PH
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.	Nil 67
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.	179
42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	173-176
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.	177
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	Chapter 11 Complied Complied Complied Complied Complied – TOR Stage

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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.	16-17 Nil Not Applicable No external dumps 91-94
	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.	Complied 180 & 184 184 NA 185 183 185 182

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	8. Detailed mining closure plan for the proposed project approved by the Geology of Mining department shall be submitted along with EIA report.	187
	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.	184
	10. EIA report should strictly follow the Environmental Impact Assessment Guidance Manual for Mining of Minerals published February 2010.	Complied.
	11. Detail plan on rehabilitation and reclamation carried out for the stabilization and restoration of the mined areas.	No R & R
	12. The EIA study report shall include the surrounding mining activity, if any.	Complied.
	13. Modelling study for Air, Water and noise shall be carried out in this field and incremental increase in the above study shall be substantiated with mitigation measures.	192-194
	14. A study on the geological resources available shall be carried out and reported.	185
	15. A specific study on agriculture & livelihood shall be carried out and reported.	193
	16. Impact of soil erosion, soil physical chemical and biological property changes may be assumed.	193-194
	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)	180
	18. Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population	190
	19. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.	194
	20. Likely impact of the project on air, water, land, flora-fauna and nearby population	192-194
	21. Emergency preparedness plan in case of natural or in plant emergencies	194
	22. Issues raised during public hearing (if applicable) and response given	To be complied after PH
	23. CER plan with proposed expenditure.	194
	24. Occupational Health Measures	193-194
	25. Post project monitoring plan	194
	26. The project proponent shall carry out detailed hydro geological study through intuitions/NABET Accredited	193

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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.	164 195 193 196 196
	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 - 11013/77/2004- 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	Complied Complied Complied 16-17 197-198 Complied.

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	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.	Agreed to comply Noted.

1.0 Introduction

1.1 Purpose of the Report

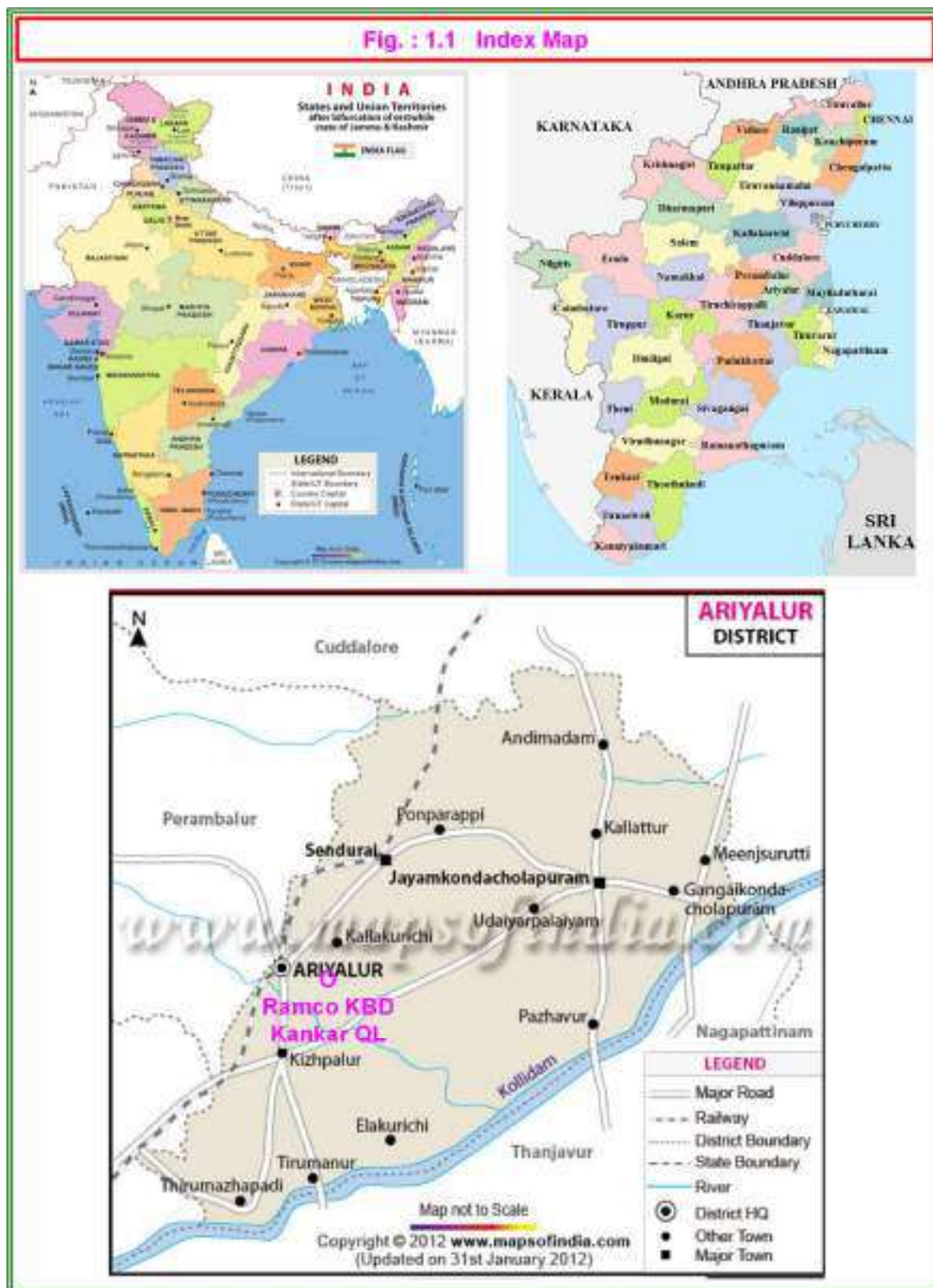
M/s. The Ramco Cement Limited (RCL) is operating its Govindapuram Cement Plant near Ariyalur for 3.62 MTPA Clinker & 5.50 MTPA Cement production. The Plant requires about 6.5-7.0 MTPA of different grade Limestone and Kankar depending on the production. The existing Captive Mines viz. Amalgamated Periyannagalur Mines, Kattupirangium, Reddipalayam, Pudupalayam-North & Usenabad-South Limestone Mines and Illupaiyur, Ottakovil & Ottakovil-II Kankar Quarries in the Ariyalur Region supply the Raw Materials Limestone & Kankar to the Plant.

In addition to the existing Leases in Ariyalur Region, RCL has obtained Precise Area Communication from the State Government for **Kairulabad Kankar Quarry Lease** over an extent of **15.135 Ha of own Patta Land** at Kairulabad Village, Ariyalur Taluk & District, Tamil, Nadu (**Fig. 1.1**). There is **no Government / Forest Land** involved. There is **no Rehabilitation & Resettlement (R&R)** issue. Also, there is **no litigation/pending case** against the Proposal. The Lease is accessible from Ariyalur by the State Highway (SH)-139, Ariyalur-V.Kaikatti Section.

Precise Area Communication (PAC) issued vide Industries Department Letter No. 2963/MMC.2/2022-1 dated 19.05.2023 is given as **Document-I**. The approval for Mining Plan has also been obtained from the Directorate of Geology & Mining, Chennai vide Letter Rc. No. 1271/MM7/2021 dated 17.08.2023 (**Document-II**).

The **effective quarrying area will be 8.140 Ha** after leaving the prescribed safety barriers of 6.995 Ha as per PAC & approved Mining Plan. Mineable Reserves is 3,66,300 Tonnes of Lime Kankar. Mechanized **Non-Conventional Opencast Mining, without Drilling and Blasting**, with deployment of heavy earth moving machineries of low HP will be adopted. The deposit will be quarried by a simple system of simultaneous development & production using Excavators & Dozers-Tippers combination. The average depth of Over Burden (OB) in the form of Top Soil is 0.30 m. Below the Top Soil, Lime Kankar exists up to a depth of 2.0 m BGL. The total depth of the quarry will be to a maximum of 2.30 m BGL only. **No ground water-table intersection** due to the quarrying.

To win the 3.663 Lakh Tonnes of Lime Kankar in the Plan Period (@ maximum 1,99,800 TPA in the First Year), about 0.24 Lakh m³ of OB will be removed and utilized for periphery bund & Green Belt development. Thus, **no Solid Waste Dump** will be there in the Lease. The Ore:OB ratio will be 1:0.066. The ROM Lime Kankar produced from the quarry will be transported by 25 T Tarus Tippers to the Crushers at Govindapuram Cement Plant. The quarrying will be carried out in 2 shifts for 300 days in a year. The entire quantity will be quarried during the **First Plan Period itself with a maximum production of 1,99,800 TPA** in the First Year. Thus, **Life of the Mine is 5 Years only**. Project cost is **Rs.4.65 Crores**.



Quarry Profile :

Mineable Reserves	:	3,66,300 Tonnes
Proposed Lime Kankar Production	:	1,99,800 TPA (maximum)
Ore : OB Ratio	:	1: 0.067
Bench Height & Width	:	- (No benches)
Life of the QL	:	5 years
No. of working days/annum	:	300 (2 shifts)
Ultimate Pit Limit-Conceptual	:	2.3 m (BGL)
Ground Water-table at	:	Pre monsoon - 45 m BGL & Post monsoon - 40 m BGL

Quarrying activities will not intersect the ground water-table.

RCL Kairulabad Lime Kankar Quarry Lease is located in Survey of India Topo Sheet No.58 M/4 and in-between the Coordinates 11°7'20.18"-11°7'44.93" North Latitudes and 79°7'35.70"-79°7'52.95" East Longitudes. There are **no eco sensitive areas like National Parks, Wildlife Sanctuaries, Biosphere Reserves, Elephant Corridor, Mangroves, Historical Monuments, Heritage sites, etc. within 10 km from the Lease boundary.** Parts of **Vannankurichi RF** (7.8 km in NE), **Managethi RF** (8.6 km in east), **Vilangudi Extn. RF** (7.4 km in ESE) and **Vilangudi RF** (7.6 km in SE) fall in the Study Area. Seasonal **River Marudaiyar** drains the region which flows at 4.6 km in the south. Seasonal **Nallah Kallar River** flows at 1.7 km in west-northwest. QL Area is about 0.15 km from nearby **Hastinapuram** village in south and 0.6 km **Kattupirangium** village in the east.

The Lime Kankar to be quarried out from this Lease is **Minor Mineral over an extent of 15.135 Ha** and falls in **Category 'B1'** of Sl. No. 1(a) of EIA Notification 2006, as amended, for prior EC from State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu. Accordingly, TOR Application/Form-1 (Form 1M is Not Applicable) has been submitted by RCL vide Parivesh Online proposal No. **SIA/TN/MIN/495135/2024 on 02.09.2024**. After paying Online Scrutiny Fees, the File has been accepted by SEIAA on 06.09.2024. The Proposal was deliberated in 502nd SEAC Meeting held on 03.10.2024 and in 765th SEIAA Meeting held on 18.10.2024. Terms of Reference (TOR) for carrying out EIA Study has been awarded vide **TOR Identification No. TO24B0108TN5653629N dated 22.10.2024** under **File No. 11231/2024**, with Public Hearing.

EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including **Sector-1 (Mining Projects) for Category 'A'** by the National Accreditation Board for Education & Training (**NABET**) vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with validity till 16.11.2025 (Sl. No. 5 of List). ABC Laboratory is accredited by the National Accreditation Board for Testing & Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2024 - valid till 02.04.2026. Baseline Data (BLD) has been collected during **Mar.-May 2025 (Summer Season)** for Environmental Impact Assessment (EIA) Study. Draft EIA Report has been prepared in compliance with awarded TORs and submitted along with Summary EIA Reports (both in English and Tamil versions) for Public Consultation & Public Hearing.

1.2 Project Proponent

Ramco Group is one of the leading, highly reputed and Second Largest Industrial Group in South India. It is well diversified in the fields of Cement, Ready Mix Concrete, Cement Fiber Products, Cotton and Synthetic Yarn, Software Systems, Wind Farms, Research & Development, Dry Mortar Plants, Cotton Textiles and Surgical. The total employees are about 15,700 and the Turnover of the Group is Rs.8,000 Crores. The main companies of RAMCO Group are:

- ❖ **M/s. The Ramco Cements Limited** (formerly M/s. Madras Cements Limited).
- ❖ M/s. Rajapalayam Mills Limited.
- ❖ M/s. Ramco Industries Limited.
- ❖ M/s. Ramco Systems Limited.

The Ramco Cements Limited (RCL) is one of the reputed Cement Companies in India. The Company is the Second Largest cement producer in South India and sixth largest manufacturer of cement in the Country. The cement production of RCL is about 17.70 million tons per annum (MTPA) from their **Cement Plants** in India.

- ❖ Ramasamy Raja Nagar near Virudhunagar, Tamil Nadu (established in 1961) with 3 Lines - 2.7 MTPA Cement.
- ❖ Kumarasamy Raja Nagar, near Jaggayyapeta, Andhra Pradesh (1986)-3.65 MTPA (3 Lines).
- ❖ Alathiyur near Vriddhachalam, Tamil Nadu (1997): 3.0 MTPA (2 Lines).
- ❖ Mathod near Chithradurga, Karnataka : 0.3 MTPA (2000; not in operation now).
- ❖ Govindapuram near Ariyalur, Tamil Nadu-5.5 MTPA (2009) (2 Lines).
- ❖ Kolimigundla, Andhra Pradesh (Cement 2.0 MTPA).

RCL is operating **Cement Grinding Units** at:

- ❖ Kolaghat (2.0 MTPA) in West Bengal.
- ❖ Kattuputtur (0.75 MTPA) near Chennai, Tamil Nadu.
- ❖ Valapadi (2.0 MTPA) near Salem, Tamil Nadu.
- ❖ Vizag (2.0 MTPA) near Anakapalli, Andhra Pradesh.
- ❖ Haridaspur (0.9 MTPA), Jajpur District, Odisha.

It is also operating a **Packing Plant** at Nagercoil.

RCL is producing Ordinary Portland Cement (**OPC**), Portland Pozzolana Cement (**PPC**), Slag Cement (**PSC**), Composite Cement (**CC**), etc. The cement produced by RCL is marketed in the brand name of 'RAMCO'. The market centers are mainly in Tamil Nadu, Andhra Pradesh, Telangana, Kerala, Karnataka, Odisha and West Bengal States.

RCL which has always been striving for Total Quality, possesses International Certificate **ISO:9001, ISO:14001, ISO:45001 (18001) and ISO:50001**. The company has achieved various awards for '**Best Performance**' in the Cement Industry.

1.3 Environmental Policy

The Ramco Cements Limited is managed by a Board of Directors comprising of eminent personalities as its members. Under the dynamic leadership of **Late Shri.P.R.Ramasubrahmaneya Rajha**, the company has grown into a massive organization. **Shri.P.R.Venketrama Raja** is the **Managing Director (MD)** of the Board. **Shri.A.V.Dharmakrishnan, Chief Executive Officer (CEO)** is heading the Cement Division. Each Unit is headed by a Unit Head in the President Level. RCL has the well laid down Safety, Health and Environmental (SHE) Policy approved by the CMD. The units are having their **Integrated Management System (IMS)** Policy. The Environmental Management Plan (EMP) Cell is functioning under the Unit Head and Corporate Social Responsibility (CSR) Committee is functioning under the Corporate Office. There is a **Hierarchical System** in the company **to deal with the environmental issues and for ensuring compliance** with the environmental clearance conditions. Any non-compliance/violations of environmental norms and corrective actions taken will be reported by the Unit Heads to EDO & CEO and by CEO to the Chairman, the Board and the Shareholders. The **Contact information** of Corporate Office is :

Shri.M.Srinivasan,
Executive Director (Operations),
 The Ramco Cements Limited,
 5th Floor, Auras Corporate Centre,
 No. 98A, Dr.Radhakrishnan Road,
 Mylapore, Chennai-600 004.
 Tel. No. : 044-28478666/28478661/28478656
 Fax No. : 044-28478676
 e-Mail : ramcoenv@ramcocements.co.in

1.4 Identification of the Project

1.4.1 Govindapuram Cement Plant & its Captive Leases

RCL Govindapuram Cement Plant along with its Captive Power Plant (CPP) and Township have been established in an extent of 157.625 Ha in Govindapuram & Aminabad villages, Ariyalur Taluk & District of Tamil Nadu State. The Cement Plant is being operated for **3.62 MTPA Clinker and 5.50 MTPA Cement** production. Captive Power generation is **66 MW**. The statutory approvals for the Plant are listed in **Table 1.1**. The Cement Plant is supported by Captive Limestone Mines and Kankar Quarries in Ariyalur Region (also with proposed Kairulabad Kankar Quarry Lease-KBD QL (**Plate II; Tables 1.2-1.3**)). Centralised Crushers are operated at the Cement Plant. The **Plant and Mines operations are in full compliance with the conditions** stipulated in the Environmental Clearances and Consent Orders issued by TNPCB.

Plate : II Regional Setting



Table : 1.1 RCL Govindapuram Cement Plant & its Statutory Approvals

Production of	Source	Production	MoEF&CC EC References	TNPCB CTOs
Clinker & Cement	Line-I	Clinker 1.55 MTPA & Cement 3.00 MTPA	F. No. J-11011/509/2006 IA.II(I) dt. 24.08.2007	CTO Orders 2307154336340 (Water) & 2307254336340 (Air) dt. 14.11.2023-valid till 31.03.2028
	Line-II	Clinker 1.70 MTPA & Cement 2.50 MTPA	F. No. J-11011/82/2010 IA.II(I) dt. 23.11.2010	
	Lines I & II	Clinker 3.62 MTPA & Cement 5.50 MTPA	NIPL Order T1/TNPCB/F.006053/Ary/Cement/2023 dt. 25.07.2023	
Thermal Power Generation	1x40 MW 1x20 MW 1x6 MW	66 MW	EC dt. 23.11.2010 & F. No. J-13012/20/2014 IA.I(T) dt. 07.08.2015 for 6 MW Turbine Addition	CTO Orders 2305151650241 (W) & 2305251650241 (A) dt. 24.06.2023-valid till 31.03.2028

Table : 1.2 RCL Captive Mines in Ariyalur Region & their Approvals

Sl. No.	Mine	Extent, Ha	ML Ref.	Latest EC Ref.	CTO Orders	Prodn., MTPA
1	Reddipalayam	63.600	GO No. 224 dt. 27.10.2020	SEIAA-TN/F.No.6907/1 (a)/EC.No:5145/2020 dt. 11.07.2022	2307149389486 (W) & 2307249389486 (A) dt. 20.01.2023- valid till 31.03.2027	3.00
2	Kattupiringium	44.580	GO No. 221 dt. 21.10.2020	MoEF Ltr. J-11015/ 557/2007-IA.II(M) dt. 10.10.2007	2308150520129 (W) & 2308250520129 (A) dt. 28.12.2023 - valid till 31.03.2025	0.90
3	Amalgamated Periyanaalur Mines	53.320	GO No. 126 dated 26.02.2021	EC25B0000TN57 97981N dated 29.05.2025	CTE under process	3.00
4	Pudupalayam North	26.075	GO 4(D) No. 1 dt. 02.01.2007	MoEF Ltr. J-11015/ 118/2007-IA.II(M) dt.15.10.2012	2108137877418 (W) & 2108237877418 (A) dt. 28.07.2021 - valid till 31.03.2024	(1.50) Under Closure Stage
5	Usenabad South	25.105	GO No. 152 dt. 23.12.2016	SEIAA/TN/F.461/2012/EC/44/1(a)/Ariyalur dt. 14.11.2016	2308150521228 (W) & 23082505212281 (A) dt. 29.12.2023 valid till 31.03.2026	1.00
Total		212.680	-	-	-	7.90

Table : 1.3 RCL Kankar Quarries in Ariyalur Region & their Approvals

Sl. No.	Mine	Extent , Ha	EC Identification No.	CTO Orders	Prodn., LTPA
1	Ottakovil Lime Kankar Quarry Lease-I	22.815	EC22B001TN175488 dated 30.07.2022 & Amendment dt. 17.02.2023	2304150461619 (Water) & 2304250461619 (Air) dated 11.05.2023 with validity till 28.09.2027	Kankar-1.200
2	Illupaiyur Lime Kankar Quarry	18.030	EC22B001TN161000 dated 30.07.2022 & Amendment dt. 17.02.2023	2304150462226 (Water) & 2304250462226 (Air) dated 11.05.2023 with validity till 05.10.2027	Kankar-0.713 & Clay-0.317
3	Ottakovil Lime Kankar Quarry Lease-II	57.360	EC25B0108TN5935212N dated 29.05.2025	CTE under process	Kankar-6.999

RCL Govindapuram Plant has bagged several Awards/Certificates of Recognition as detailed below :

- ❖ Successfully implemented Five-S Workplace Management System Certificate from Quality Circle Forum of India (QCFI) jointly with Union of Japanese Scientists and Engineers (JUSE) on 30.08.2021.
- ❖ '5 Star Rating' for Commitment in the southern region EHS meet by CII for two consecutive years (2019 & 2020).
- ❖ Economics Times Now 'Best Environmental Sustainability for Water Conservation-8th Edition 2018'.
- ❖ Gold Medal and Overall 3rd Prize in the country for India Green Manufacturing Challenge 2018 & 2019.
- ❖ RCL Pudupalayam Mine received **5-Star Rating** given by Ministry of Mines, Government of India for three consecutive years i.e. 2016-2018.
- ❖ 18th Annual Greentech Occupational Health, Safety Award-2019.
- ❖ 19th Annual Greentech Environment Award for the Year 2019.
- ❖ Best CSR Impact Award in the CSR Summit & Awards – 2019.
- ❖ Won best water management award by CII for the year 2019.
- ❖ Won special award for best green belt development for the community by CII for the year 2020
- ❖ Won Best CSR in Water Management award in the 1st edition of CII SR Industrial Water Management Competitions by CII.
- ❖ Apex India Environment Excellence Award 2019 & 2020.
- ❖ CSR Summit & Awards – 2019 (9th Aug. 2019, New Delhi).
- ❖ World CSR Congress (9th Edition) – Best CSR Award – 2019.
- ❖ 14th Employer Branding Awards (2019-20) - Asia's Best CSR Practices Award.
- ❖ ZEE Business National CSR Leadership – Award.

The contact information of the RCL Govindapuram Unit is as detailed below :

The Sr. Vice President (Mfg.) & Unit Head,
The Ramco Cements Limited,
Govindapuram Cement Plant,
Sendurai Road, Ariyalur District-621 713.
Tel. No. : 04329-226001 to 226004
Fax No. : 04329-226005
e-Mail : madhusudan.k@ramcocements.co.in

1.4.2 Kairulabad Lime Kankar Quarry

In addition to existing Mines & Quarry leases in Ariyalur Region, RCL has obtained the Precise Area Communication for **Kairulabad Lime Kankar Quarry Lease** over an extent of **15.135 Ha** in S.F Nos. 414/8A, 414/8B, 415/5, 415/6, 415/7, 415/8, 415/9, 415/10, 415/11, 415/12, 415/13, 415/14, 416/7, 417/1, 417/2, 417/3, 417/4, 417/5, 417/6, 417/7, 417/8, 417/9, 417/10A, 417/10B, 417/11A, 417/11B, 417/11C, 417/12, 417/13, 417/14A, 417/14B, 417/15, 417/16A, 417/16B, 417/17A, 417/17B, 418/1A, 418/1B, 418/2, 418/3, 418/7, 418/8, 418/10C, 419/1A, 419/1B, 419/2A, 419/2B, 419/3A, 419/3B, 419/4, 419/5A, 419/5B, 419/5C, 419/7, 419/8, 419/9, 419/10, 419/13, 433/2A, 433/2B, 433/3A, 433/3B, 433/4A, 433/4B, 433/5, 433/6A, 433/6B, 433/7, 433/8, 433/9, 433/10, 433/11, 433/12A, 433/12B, 433/12C, 433/12D, 433/12E, 433/13A, 433/13B, 433/13C, 433/13D, 433/15, 433/16, 433/17, 433/18, 433/19, 433/20, 434/1A, 434/1B, 434/2, 434/3, 434/5, 434/6, 434/7, 434/8, 434/9A, 434/9B, 434/9C, 434/10, 434/11, 434/12A, 434/12B, 434/12C, 434/13A, 434/13B, 434/14, 434/15, 434/18 & 434/19 of Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu. Entire Land is own Patta Land of RCL and there is **no Forest/Government Land** involved. There is **no Rehabilitation & Resettlement (R&R)** issue. Also, there is **no litigation/pending case** against the Proposal. Lease is accessible from Ariyalur by the State Highway (SH)-139, Ariyalur-V.Kaikatti Section. Lease Area Photographs are given in **Plates III & IV**.

Water Courses : The Surface run-offs due to the rain in the Lease Area are drained by natural courses i.e. first order streams. There are 3 first order streams in the southern parts of QL Area and a channel in the eastern boundary. As directed in the PAC Order & approved Mining Plan, the **safety barrier of 50 meter from the streams & channel are provided** and its flow will be maintained as such till the Conceptual Stage.

Non-Lease Lands : There are Temple lands, Govt. Poramboke lands and Private pattadhar lands in the QL Area for which **Safety barriers, access / right of way are provided by RCL**. Also, there is an external OB dump of RCL in northwestern parts of the Lease Area.

The existing dumped materials of RCL will not be disturbed for quarrying the Lime Kankar. Also, there will not be any disturbance to nearby settlements / buildings, public facilities like schools, grave yard, etc. due to quarrying. **Plate-V** is showing **50 m, 100 m and upto 1 km** radius areas.

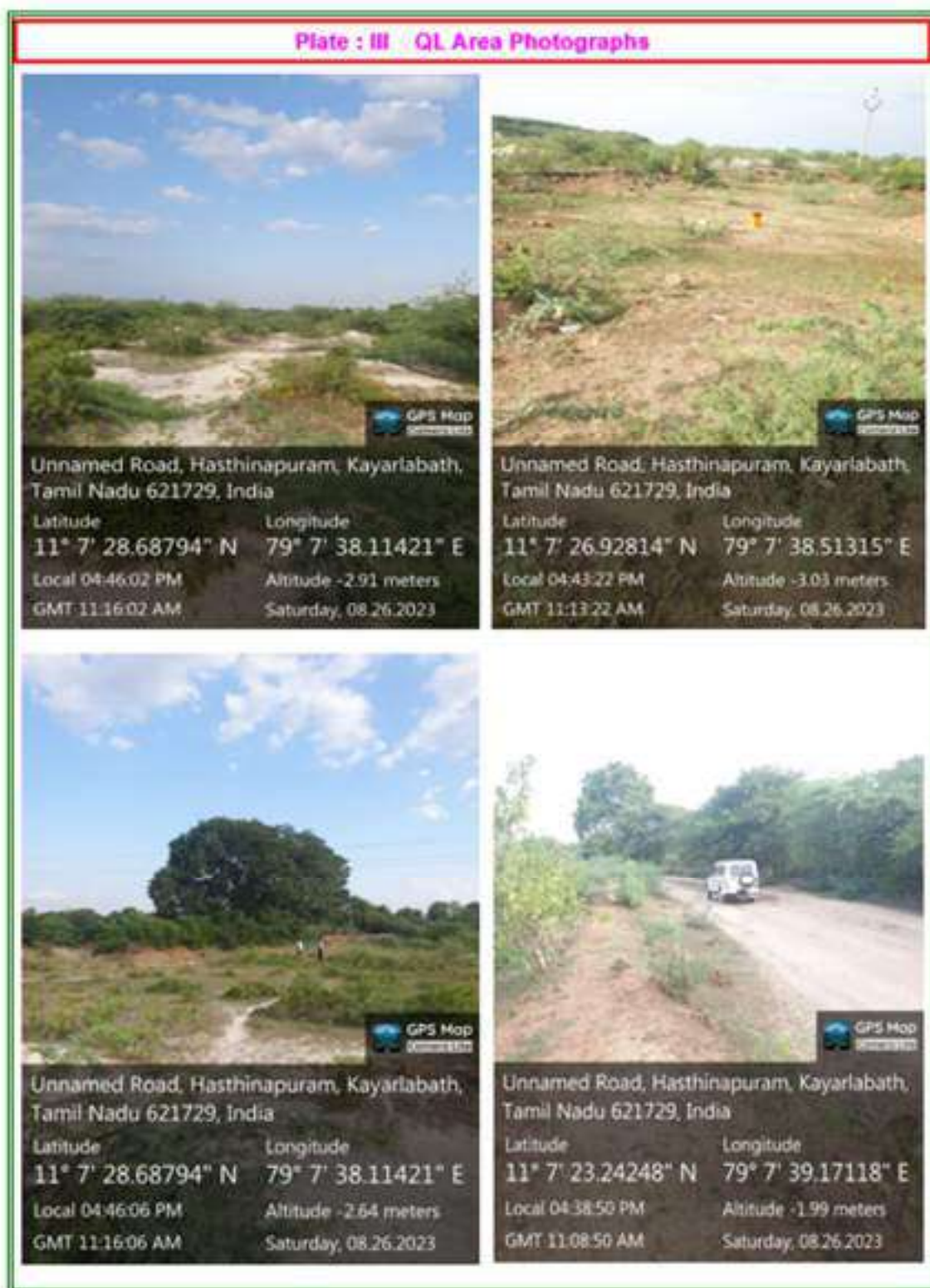
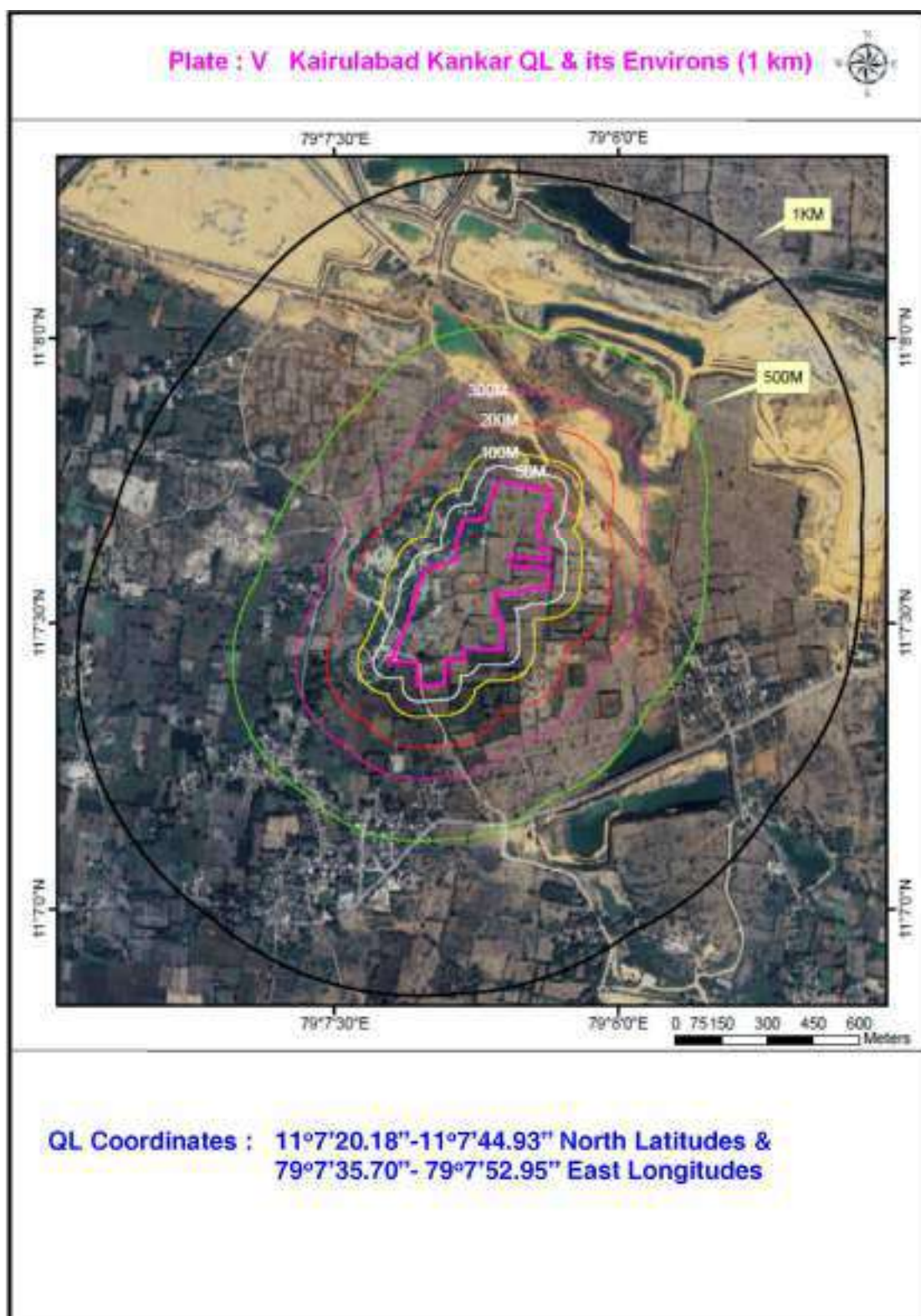


Plate : IV QL Area Photographs





Statutory Approvals : Precise Area Communication (PAC) has been issued vide Industries Department Letter No. 2963/MMC.2/2022-1 dated 19.05.2023. Mining Plan has been approved by the Directorate of Geology & Mining, Chennai vide Letter Rc. No. 1271/MM7/2021 dated 17.08.2023. The **effective quarrying area will be 8.140 Ha** after leaving the prescribed safety barriers of 6.995 Ha as per PAC & approved Mining Plan (**Table 1.4**).

Table : 1.4 Safety Barriers provided in the Quarry Lease

Sl. No.	Safety Barrier for	Provided Yes / No	Remarks
1	The applicant company should provide and maintain a safety distance of 10 meters for the Government poramboke land (Meichal Tharai) situated in SF No.415/15.	Yes	Safety distance of 10 m provided for the Govt. land
2	The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapurann Kasi Viswanathar temple situated in SF Nos. 419/11 & 419/12 in the southern side of the applied area.	Yes	Safety distance of 10 m provided for the Temple land
3	The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapurann Kasi Viswanathar temple situated in SF Nos. 433/14 in the eastern side of the applied area.	Yes	Safety distance of 10 m provided for the Temple land
4	The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapuram Kasi Viswanathar temple situated in SF Nos. 434/16 & 434/17 in the eastern side of the applied area.	Yes	Safety distance of 10 m provided for the Temple land
5	The applicant company should provide and maintain necessary approach road to the patta lands in SF Nos. 419/2 & 434/4 owned by private pattadars situated in the middle of the applied area.	Yes	Approach road provided to the lands owned by private pattadars
6	The applicant company should provide and maintain a safety distance of 10 meters for the Government poramboke land (Vandi Pathai) situated in SF Nos.414/7, 415/4, 416/6, 433/1, 435/6 & 436/10 in the western side of the applied area.	Yes	Safety distance of 10 m provided for the Govt. land
7	The applicant company should provide and maintain a safety distance of 50 meters for the low tension power line passing in SF Nos. 416/7, 417/1, 417/2, 418/1B, 418/3, 419/6, 419/7, 419/8, 428/4B, 428/4C in the east west direction.	Yes	Safety distance of 50 m provided for the low tension power line
8	The applicant company should provide and maintain a safety distance of 50 meters for the low tension power line passing in SF Nos.386, 387 in Valajanagaram village and SF No.420 in Kairulabad village in the southern side of the applied area.	Yes	Safety distance of 50 m provided for the low tension power line
9	The applicant company should provide and maintain a safety distance of 50 meters for the Udaiyar Kuttai situated in SF Nos.419/6 in the southern side of applied area.	Yes	Safety distance of 50 m provided for the water body
10	The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF Nos.418/4, 418/11 in the southern side of the applied area.	Yes	Safety distance of 50 m provided for the vari course
11	The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in	Yes	Safety distance of 50 m provided for the vari course

Sl. No.	Safety Barrier for	Provided Yes / No	Remarks
	SF No.419/14 in the south and southeastern side of the applied area.		
12	The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF No.386/16 in Valajanagaram village in the south western side of the applied area.	Yes	Safety distance of 50 m provided for the vari course
13	The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF No.428/3 in the eastern side of the applied area.	Yes	Safety distance of 50 m provided for the vari course
14	The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF No.427/2 in the south eastern side of the applied area.	Yes	Safety distance of 50 m provided for the vari course
15	The applicant company should provide and maintain a safety distance of 50 meters for the detailed channel demarcated in SF Nos.428/1 & 428/6.	Yes	Safety distance of 50 m provided for the Channel course
16	The applicant company shall provide and maintain a safety distance of 7.5 meters to the adjoining patta lands.	Yes	Safety distance of 7.5 m provided for adjoining patta lands

1.5 Need for the Proposal

The production capacity of existing working Mines is about 6.10 MTPA. Also, two existing Captive Mines in Ariyalur Region are in Conceptual Stage and will be completely exhausted soon. Thus, other Limestone sources are being explored by RCL to meet the Raw Material demand of Govindapuram Cement Plant. The **Lime Kankar is a low grade mineral** in nature which can be blended with other high grade Limestone, being mined from RCL Captive Mines in the Region, for the cement manufacturing. Thus, RCL has proposed the **Kairulabad Lime Kankar Quarry** for establishment and operation.

1.6 The Proposal

Mechanized **Non-Conventional Opencast Mining, without Drilling and Blasting**, with deployment of heavy earth moving machineries of low HP will be adopted. The deposit will be quarried by a simple system of simultaneous development & production using Excavators & Dozers-Tippers combination. The average depth of Over Burden (OB) in the form of Top Soil is 0.30 m. Below the Top Soil, Lime Kankar exists up to a depth of 2.0 m BGL. The total depth of the quarry will be to a maximum of 2.30 m BGL only.

To win the 3.663 Lakh Tonnes of Lime Kankar in the Plan Period (@ maximum 1,99,800 TPA in the First Year), about 0.24 Lakh m³ of OB will be removed and utilized for periphery bund & Green Belt development. The Ore:OB ratio will be 1:0.067. The ROM Lime Kankar produced from the quarry will be transported by 25 T Tarus Tippers to the Crushers at Govindapuram Cement Plant. Quarry particulars are given in **Table 1.5**.

Table : 1.5 Quarry Particulars

Sl. No.	Details on	Particulars
1	Name of the Lease	Kairulabad Lime Kankar Quarry Lease
2	Lease Owner	The Ramco Cements Limited (RCL)
3	Extent of Lease	15.135 Ha
4	Dead Execution	New Lease; to be executed after obtaining EC
5	Lease Validity	5 Years from date of Lease Deed Execution
6	Lease Location	Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu
7	Land Ownership	Own Land of RCL
8	Lithology	Top Soil : 0-0.3 m BGL Lime Kankar : 0.3-2.3 m BGL (max. depth of 2.3 m BGL).
9	Permitted Minerals	Lime Kankar
10	Commencement on	New Lease; commencement will be after obtaining all statutory approvals.
11	Mining Plan / Scheme Approvals	Mining Plan has been approved by the Directorate of Geology & Mining, Chennai vide Letter Rc. No. 1271/MM7/2021 dated 17.08.2023
12	Past Production (since Commencement)	Not Applicable; New Lease
13	Assessed Reserves	Lime Kankar - 6,81,075 Tonnes
14	Mineable Reserves	Lime Kankar - 3,66,300 Tonnes
15	Production so far	Nil
16	Dispatch Quantity	Nil
17	Process Description	Mechanized Non-Conventional Opencast Mining, without Drilling and Blasting , with deployment of Excavators & Dozers-Tippers combination will be adopted. ROM Lime Kankar produced from the quarry will be transported by 25 T Tarus Tippers through SH-139 to Govindapuram Cement Plant for Cement manufacturing.
18	Proposed Production	The entire Reserves of 3,66,300 Tonnes will be quarried during the Plan Period itself with a maximum production of 1,99,800 TPA in the First Year.
19	Ground water table intersection	The total depth of quarrying will be to a maximum of 2.3 m BGL only. As ground water-table fluctuates between 40-45 m BGL in the vicinity, thus, no ground water-table intersection .
20	Project Cost	Rs.4.65 Crores
21	Project Schedule	Life of the Lease is 5 Years.
22	R & R Issue	Nil
23	Litigation/Case Details	Nil
24	CER Budget	Rs.9.30 Lakhs
25	Financial Assurance	Not applicable now
26	Violation, if any	Nil

Quarry Profile :

Mineable Reserves	:	3,66,300 Tonnes
Proposed Lime Kankar Production	:	1,99,800 TPA (maximum)
Ore : OB Ratio	:	1: 0.067
Bench Height & Width	:	- (No benches)
Life of the QL	:	5 years
No. of working days/annum	:	300 (2 shifts)
Ultimate Pit Limit-Conceptual	:	2.3 m (BGL)
Ground Water-table at	:	Pre monsoon - 45 m BGL & Post monsoon - 40 m BGL

Quarrying activities will not intersect the ground water-table.

1.7 Environmental Setting

RCL Kairulabad Lime Kankar Quarry Lease is located in Survey of India Topo Sheet No.58 M/4 and in-between the Coordinates 11°7'20.18"-11°7'44.93" North Latitudes and 79°7'35.70"-79°7'52.95" East Longitudes (**Fig. 1.2**), as extracted from **DGPS Map from approved Mining Plan**. Environmental Setting-15 km Radius is given in **Table 1.6**.

The site is free from seismic effects (Seismic Zone III). The Lease area is having almost a gentle topography sloping from North- South with elevation in the range 88-91 m aMSL.

There are **no eco sensitive areas like National Parks, Wildlife Sanctuaries, Biosphere Reserves, Elephant Corridor, Mangroves, Historical Monuments, Heritage sites, etc. within 10 km from the Lease boundary**. Parts of **Vannankurichi RF** (7.8 km in NE), **Managethi RF** (8.6 km in east), **Vilangudi Extn. RF** (7.4 km in ESE) and **Vilangudi RF** (7.6 km in SE) fall in the Study Area.

None of the followings are located in the Study Area :

- ❖ **Protected areas** notified under the Wild life (Protection) Act, 1972.
- ❖ **Critically polluted area** as notified by CPCB .
- ❖ **Eco -Sensitive areas** as notified.
- ❖ **Interstate boundaries** within 5 km radius from the boundary of the proposed site.
- ❖ **Coastal Regulation Zone (CRZ) Area**.

There is **no Forest Land involved and no Reserved Forest (RF) exists within 1 km** of the Mine (DFO, Ariyalur Letter C.No. 4065/2023/D dated 15.11.2023 - Doc-II).

Seasonal **River Marudaiyar** drains the region which flows at 4.6 km in the south. Seasonal Nallah Kallar River flows at 1.7 km in west-northwest.

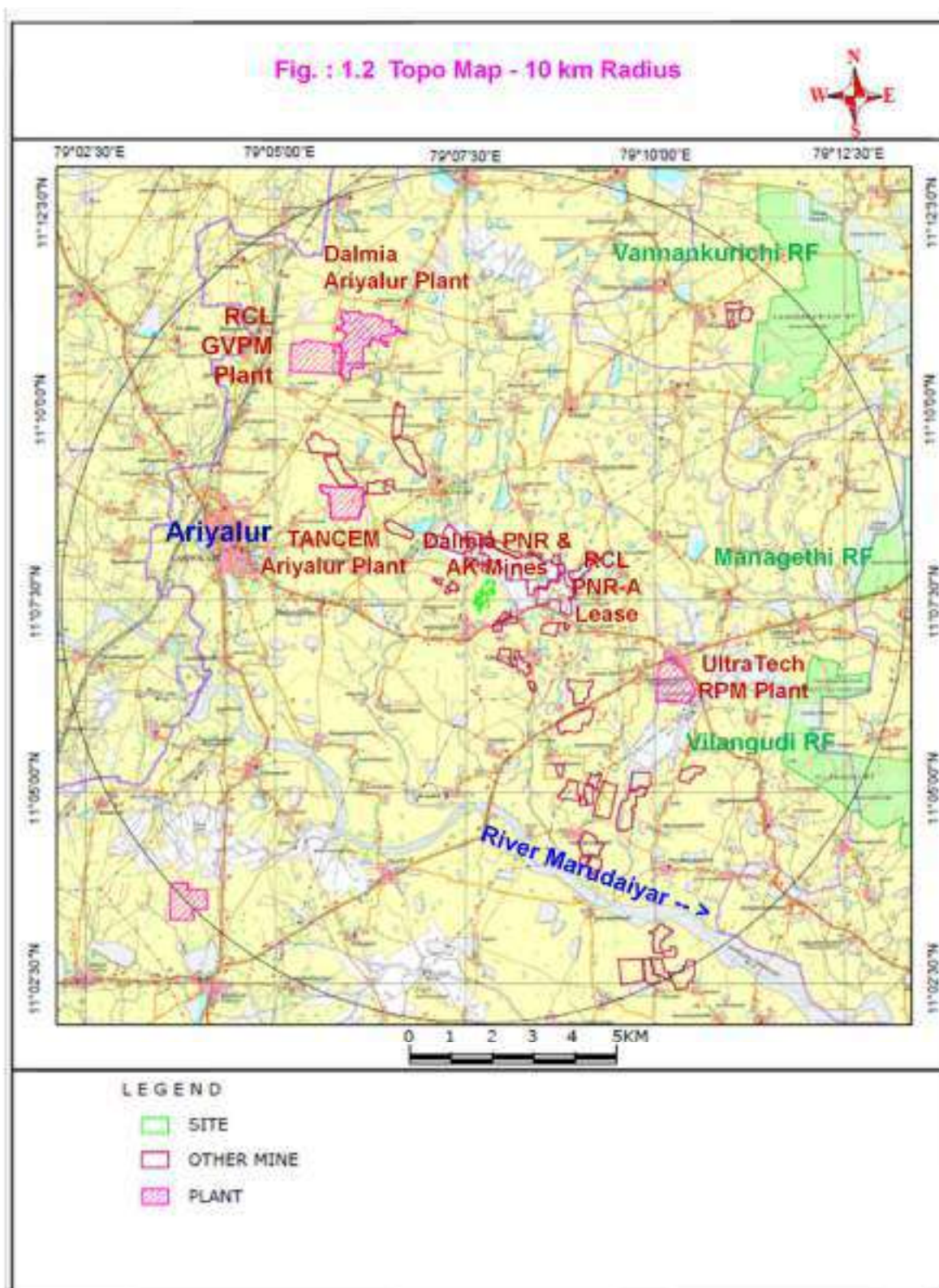


Table : 1.6 Environmental Setting – 15 km Radius

Sl. No.	Areas	Aerial Distance(within 15 km) Proposed Project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	Nil
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Vannankurichi RF - 7.8 km (NE) Managethi RF - 8.6 km (E) Vilangudi Extension RF-7.4 km (ESE) Vilangudi RF - 7.6 km (SE) Kallankuthu RF - 12.5 (E) Vadakadal RF-13.5 (E) Sundaresapuram RF – 11.5 km (ESE) Ulliyakudi RF – 11.0 km (SE) Ambapur RF – 12.5 km (SE) Alvoy RF – 14.0 km (SE) Suttamalli RF-14.0 (ESE)
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	Karaivetti Bird Sanctuary is at 16.0 km (SW)
4	Inland, coastal, marine or underground waters	Marudaiyar River – 4.6 km (S) Kallar River – 1.7 km (WNW) Uppu Odai-4.2 km (ESE) Vilangudi Odai – 5.0 km (ENE) Vanchiyam Odai – 7.5 km (W)
5	State, National boundaries	Nil
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	Kallankurichi Kaliyuga Varadharaja Perumal Temple - 2.4 km in NNW
7	Defence installations	Nil
8	Densely populated or built-up area & Areas occupied by sensitive man-made land uses (<i>hospitals, schools, places of worship, community facilities</i>)	District Headquarters Ariyalur Town – 5.1 km in west
9	Areas containing important, high quality or scarce resources(<i>ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals</i>)	Limestone bearing areas in Ariyalur Region.
10	Areas already subjected to pollution or environmental damage (those where existing legal environmental standards are exceeded)	Nil
12	Areas susceptible to natural hazard which could cause the project to present environmental problems	The region falls in Seismic Zone III. Seasonal Marudaiyar River flows at 4.6 km in south.

State Highway (SH)-139 (Ariyalur-V.Kaikatti-Jayamkondam Section) runs at 0.4 km in south. National Highway (NH)- 81 connecting Trichy-Kilapaluvur-Chidambaram runs at 3.3 km (in SSE), NH-136 connecting Tanjore-Ariyalur-Perambalur runs at 4.9 km (W). Southern Railway BG Line runs through Ariyalur at a distance of 7.0 km in the west-northwest. The nearest Airport Trichy is at 60 km in southwest. The nearest Ports are at Chennai (300 km) and Cuddalore (95 km).

RCL Govindapuram Cement Plant is located at a distance of 6.2 km aerial distance (13 km by road) in northwest. From the Lease, Ultratech Cement Plant-Reddipalayam is at 4.4 km (SE), TANCEM Cement Plant-Kallankurichi at 3.5 km (WNW), Dalmia Ariyalur Plant at 6.5 km (NW) and Chettinad Kilapaluvur Cement Plant at 9.5 km (SW).

The Lease is adjacent to TAMIN-PNR Mine @ 0.5 km (SSE) and Dalmia Cement Periyanaalur-AK Limestone Mines @ 0.5 km (N). From the Lease, UltraTech Periyanaalur Limestone Mine is @ 1.6 km (NE), TANCEM PNR & Kallankurichi Mines @ 0.8-1.3 km (NE) and RCL Mines viz. Usenabad South @ 3.8 km (NW), Kattupirangium @ 1.3 km (SE), Pudupalayam-North @ 2.8 km (SE) & Reddipalayam Mines @ 5.4 km (SE) are existing. UltraTech Vellipirangiyum Mine at 5.1 km (SE), ICL Periyathirukonam Mine @ 6.1 km (SE), Chettinad Periyathirukonam Mine (8.8 km in SE), Dalmia Periyathirukonam Mines @ 9.0 km (SE), etc. are located in the Study area.

The nearest Town & District Headquarters is Ariyalur at a distance of 5.1 km in the west. QL Area is about 0.15 km from nearby Hastinapuram village in south and 0.6 km Kattupirangium village in the east. Valajanagaram is at 2.5 km in the west.

1.8 Project Schedule

Mineable Reserves in the Lease is 3,66,300 Tonnes of Lime Kankar. The entire quantity will be quarried during the **First Plan Period itself with a maximum production of 1,99,800 TPA** in the First Year. Thus, **Life of the Mine is 5 Years only**.

1.9 EIA Study

The Lime Kankar to be quarried out from this Lease is **Minor Mineral over an extent of 15.135 Ha** and falls in **Category 'B1'** of Sl. No. 1(a) of EIA Notification 2006, as amended, for prior EC from State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu. Accordingly, TOR Application/Form-1 (Form 1M is Not Applicable) has been submitted by RCL vide Parivesh Online proposal No. **SIA/TN/MIN/495135/2024 on 02.09.2024**. After paying Online Scrutiny Fees, the File has been accepted by SEIAA on 06.09.2024. The Proposal was deliberated in 502nd SEAC Meeting held on 03.10.2024 and in 765th SEIAA Meeting held on 18.10.2024. Terms of Reference (TOR) for carrying out EIA Study has been awarded vide **TOR Identification No. TO24B0108TN5653629N dated 22.10.2024** under **File No. 11231/2024**, with Public Hearing.

EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including **Sector-1 (Mining Projects) for Category 'A'** by the National Accreditation Board for Education & Training (**NABET**) vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with validity till 16.11.2025 (Sl. No. 5 of List). ABC Laboratory is accredited by the National Accreditation Board for Testing & Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2024 - valid till 02.04.2026.

Baseline Data (BLD) has been collected during **Mar.-May 2025 (Summer Season)** for Environmental Impact Assessment (EIA) Study. EIA Report has been **prepared in compliance with awarded TORs** and submitted as per generic structure proposed in Appendix-III of EIA Notification 2006 with the following Chapters :

- Chapter-1 : Introduction with Need for the Project & Environmental Setting of the Project.
- Chapter-2 : Project Profile - an outline of the Project and allied activities.
- Chapter-3 : Description of Environment (Baseline Status).
- Chapter-4 : Anticipated Impacts along with Prediction of Impacts and Mitigation Measures.
- Chapter-5 : Analysis of Alternatives (Technology & Site).
- Chapter-6 : Environmental Quality Monitoring Programme.
- Chapter-7 : Additional Studies like Risk Assessment, DMP, Hydrogeological Study, etc.
- Chapter-8 : Project Benefits.
- Chapter-9 : Cost-Benefit Analysis, if any.
- Chapter-10 : Environmental Management Plan
- Chapter-11 : Summary EIA.
- Chapter-12 : Disclosure of Consultants engaged.

Draft EIA Report along with Summary EIA Reports (both in English and Tamil versions) are submitted now for Public Consultation & Public Hearing.

2.0 Project Description

2.1 Type of the Project

The Lime Kankar to be quarried out from this Lease is **Minor Mineral over an extent of 15.135 Ha** and falls in **Category 'B1'** of Sl. No. 1(a) of EIA Notification 2006, as amended, for prior EC from State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu.

2.2 Magnitude of Operation

Mineable Reserves in the Lease is 3,66,300 Tonnes of Lime Kankar. Mechanized **Non-Conventional Opencast Mining, without Drilling and Blasting**, with deployment of heavy earth moving machineries of low HP will be adopted. The total depth of the quarry will be to a maximum of **2.30 m BGL only. No ground water-table intersection** due to the quarrying. The entire quantity will be quarried during the **First Plan Period itself with a maximum production of 1,99,800 TPA** in the First Year (Table 2.1). Thus, **Life of the Mine is 5 Years only.**

Table : 2.1 Proposed Development & Production Plan

Year	Area, Ha	Development			Production			Ore:OB Ratio
		RL, m	Depth, m	OB, cu.m	RL, m	Depth, m	Lime Kankar, Tonnes	
I	4.440	89.0-88.7	0.3	13,320	88.7-86.7	2.0	1,99,800	1:0.067
II	2.225	90.0-89.7	0.3	6,675	89.7-87.7	2.0	1,00,125	1:0.067
III	0.555	90.0-89.7	0.3	1,665	89.7-87.7	2.0	24,975	1:0.067
IV	0.555	91.0-90.7	0.3	1665	90.7-88.7	2.0	24,975	1:0.067
V	0.365	91.0-90.7	0.3	1095	90.7-88.7	2.0	16,425	1:0.067
Total	8.140	-	-	24,420	-	-	3,66,300	1:0.067

About 24,420 m³ of OB will be removed and utilized for periphery bund & Green Belt development. Thus, **no Solid Waste Dump** will be there in the Lease. The Ore:OB ratio will be 1:0.067. The ROM Lime Kankar produced from the quarry will be transported by 25 T Tarus Tippers to the Crushers at Govindapuram Cement Plant. There is **no need for Beneficiation.**

2.3 Technology & Project Description

2.3.1 Geology

The Lease area forms a part of Kallankurichi Formations of Middle Ariyalur Stage of Cretaceous beds in South India. In the Cauvery Basin carbonate rock form a sizable part of the stratigraphic column from the Lower Cretaceous to Recent. It can be traced continuously for more than 9 km in the North-South direction starting from Srinivasapuram in the north through Kairulabad, Ameenabad, Periyanaalur, Hasthinapuram, Kattupiringum, Pudupalayam, Nerunchikorai,

Vilipiringium and further south up to Idaiyathankudi on the banks of Marudaiyar river. Deposit of Cretaceous and early Tertiary are also exposed in the three principal outcrop areas viz. Tiruchirappalli, Vriddhachalam, and Pondicherry along the western margin of the basin. The western margin of these sediments have NE-SW trend. The formation in the east trends NE-SW in the north and changes to NW-SE in the Southern part. The dips also changes accordingly.

The stratigraphic succession for the cretaceous basin of Tiruchirappalli is given below:

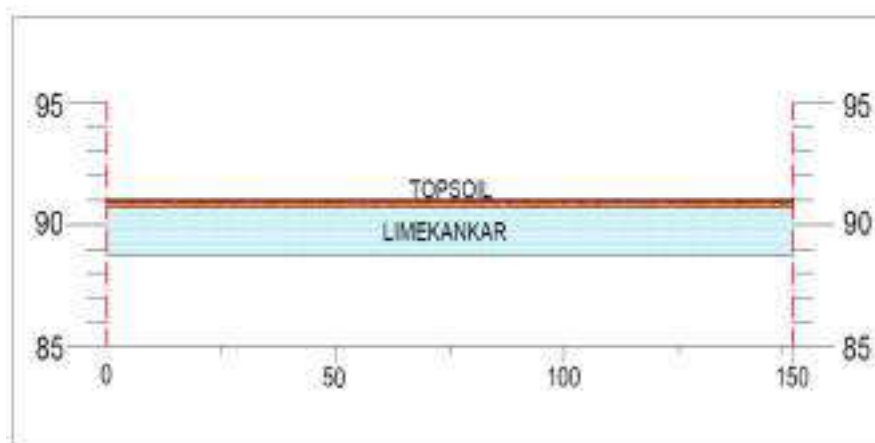
Age	Group	Formation	Litho Stratigraphy
Miopliocene		Cuddalore	Ferruginous sand stone laterite and clay
-----Unconformity-----			
Palaeocene	ARIYALUR	Niniyur	Predominantly limestone with sandstone and marl parting White sandstone and Fossilliferous Limestone calcareous shale marl and sandstone
		Kallamedu	
		Kallankurichi	
Upper Cretaceous		-----Unconformity-----	
		Sillakudi	Upper member-sandstone dominant Lower member - limestone / calc. Sandstone dominant
-----Unconformity-----			
Upper Cretaceous	Tiruchirapalli	Anaipadi	Upper-Sandstone Lower-Shale
		Kulakkantham	
-----Unconformity-----			
Upper Cretaceous	Uttattur	Karai Maruvattur	Coral limestone, Shaly limestone, sandstone & marl
-----Unconformity-----			
Upper Jurassic to Lower Cretaceous	Upper Gondwana	Thappai	Brownish, micaceous & silty ferruginous sandstone
-----Unconformity-----			
Archaean		Crystalline	Charnockite & Gneisses

Local Geology:



Topsoil: The Top soil (as OB) cover is having an average thickness of 0.30 m.

Lime Kankar: The soil contains a large amount of loose, nodules of Kankar widely scattered in it. They are probably derived from the soil and deposited by ground water. The kankar usually contains a large amount of siliceous impurities. A hard layer of lime kankar is seen in patches especially in the eastern portions of the area near Kairulabad. The Lime kankar beds of around 2.0 m thickness.



The existence of mineralization in the area applied for Quarry Lease has been ascertained from the observations in the field (i.e. cross section of nallah and well cuttings) the Lime Kankar deposit is occur as a capping over limestone for a thickness of about 2.0 m. Therefore, the depth of persistence may be assumed as 2.0 m for the purpose of estimation of reserves and the recovery of Lime Kankar may be around 100% of the total material mined.

Since the deposit is flat, simple and shallow in nature, average area method was used for Reserves estimation. Block wise area is estimated then multiplied with average thickness of the ore to get the volume. The volume is multiplied with the bulk density to arrive the insitu Geological reserves then multiplied with Recovery factor to get the Recoverable reserves.

2.3.2 Assessed Reserves

Bulk Density of 2.25 Tonnes/cu.m is considered for Lime Kankar. It is estimated that **3,66,300 Tonnes of Lime Kankar is mineable** from the estimated **Geological Reserves of 6,81,075 Tonnes** from this Quarry (Table 2.2).

Table : 2.2 Estimated Resources

Sl. No.	Particulars	Extent in Ha	Lime Kankar Reserves, Tonnes
1	In-situ Geological Reserves	15.135	6,81,075
2	Mineable Reserves	8.140	3,66,300

2.3.3 Ore Quality

The chemical analysis of Lime Kankar and Top Soil are given in **Table 2.3**.

Table : 2.3 Chemical Composition

Material	SiO ₂ %	Al ₂ O ₃ %	Fe ₂ O ₃ %	CaO %	MgO %	TC	LSF
Lime Kankar	17.78	3.90	1.95	36.95	1.24	65.98	66.30
Top Soil	54.40	4.88	10.35	15.09	0.54	8.45	9.15

The cut of grade is a grade below which ore will not be economical. The cut of grade for Lime Kankar is fixed as **+34% CaO**.

2.4 Quarrying Method

Mechanized **Non-Conventional Opencast Mining, without Drilling and Blasting**, with deployment of heavy earth moving machineries of low HP will be adopted. The deposit will be quarried by a simple system of simultaneous development & production using Excavators & Dozers-Tippers combination. The average depth of Over Burden (OB) in the form of Top Soil is 0.30 m. Below the Top Soil, Lime Kankar exists up to a depth of 2.0 m BGL. The total depth of the quarry will be to a maximum of 2.30 m BGL only.

To win the 3.663 Lakh Tonnes of Lime Kankar in the Plan Period (@ maximum 1,99,800 TPA in the First Year), about 0.24 Lakh m³ of OB will be removed and utilized for periphery bund & Green Belt development. The Ore:OB ratio will be 1:0.067. The ROM Lime Kankar produced from the quarry will be transported by 25 T Tarus Tippers to the Crushers at Govindapuram Cement Plant.

The entire quantity will be quarried during the **First Plan Period itself with a maximum production of 1,99,800 TPA** in the First Year. Thus, **Life of the Mine is 5 Years only**. There is no beneficiation or screening is proposed within Lease area.

Slope Stability: Kankar is medium hard and compact mineral bed and will not slide at the maximum depth of 2.3 m BGL.

2.5 Yearwise Production

The Kankar production will be at the rate of 2.0 Lakhs Tonnes per Annum (LPA) during First year, 1.0 LPA during Second year, 0.25 LPA during Third year & Fourth year and 0.16 LPA during the Fifth year of the Plan period.

Surface Plan, Geological Plan with Sections, First Year Plan & End of Fifth Year/Conceptual Plan from the approved Mining Plan are given as **Figs. 2.1-2.4**.

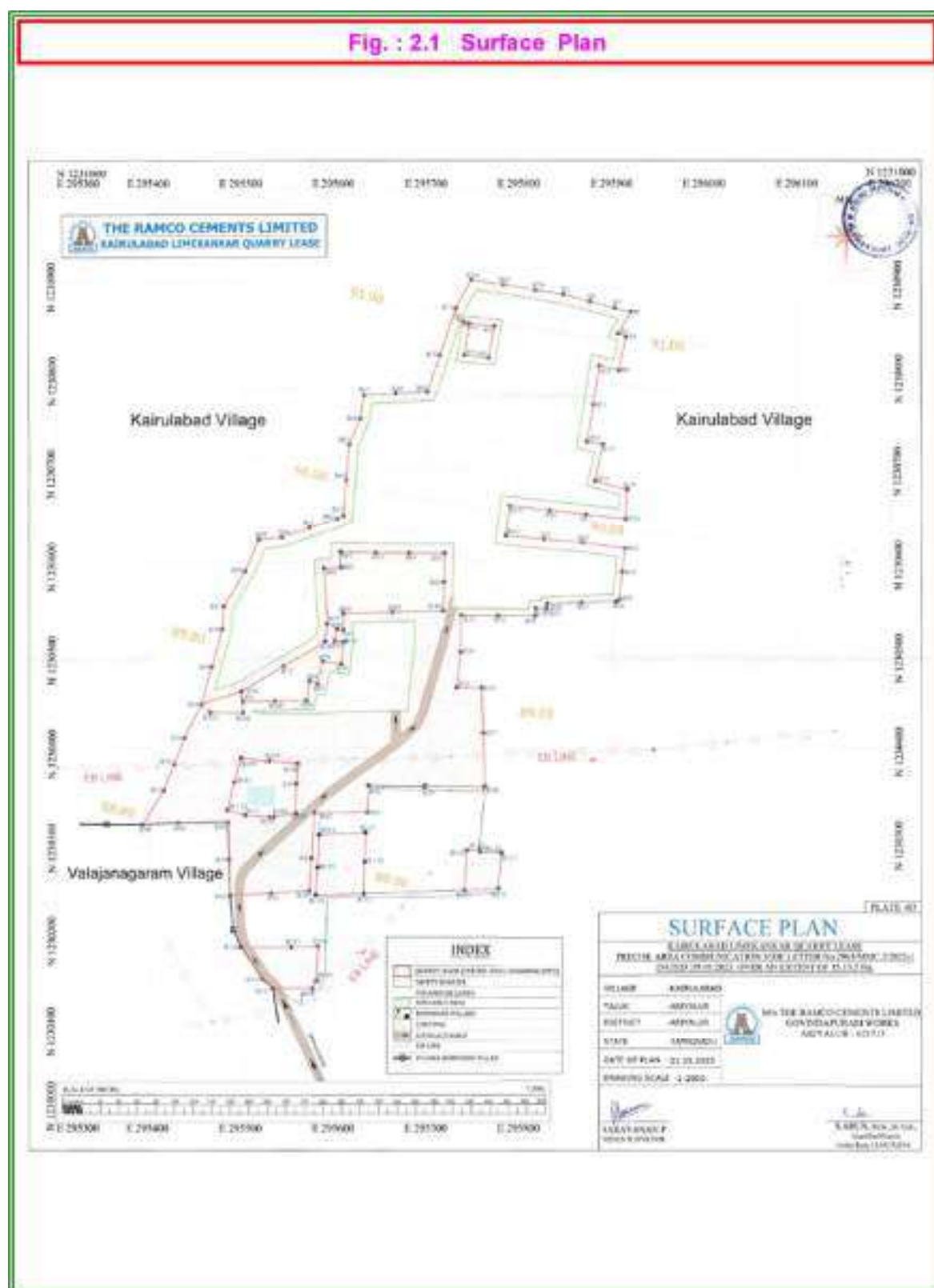


Fig. : 2.2 Geological Plan & Section

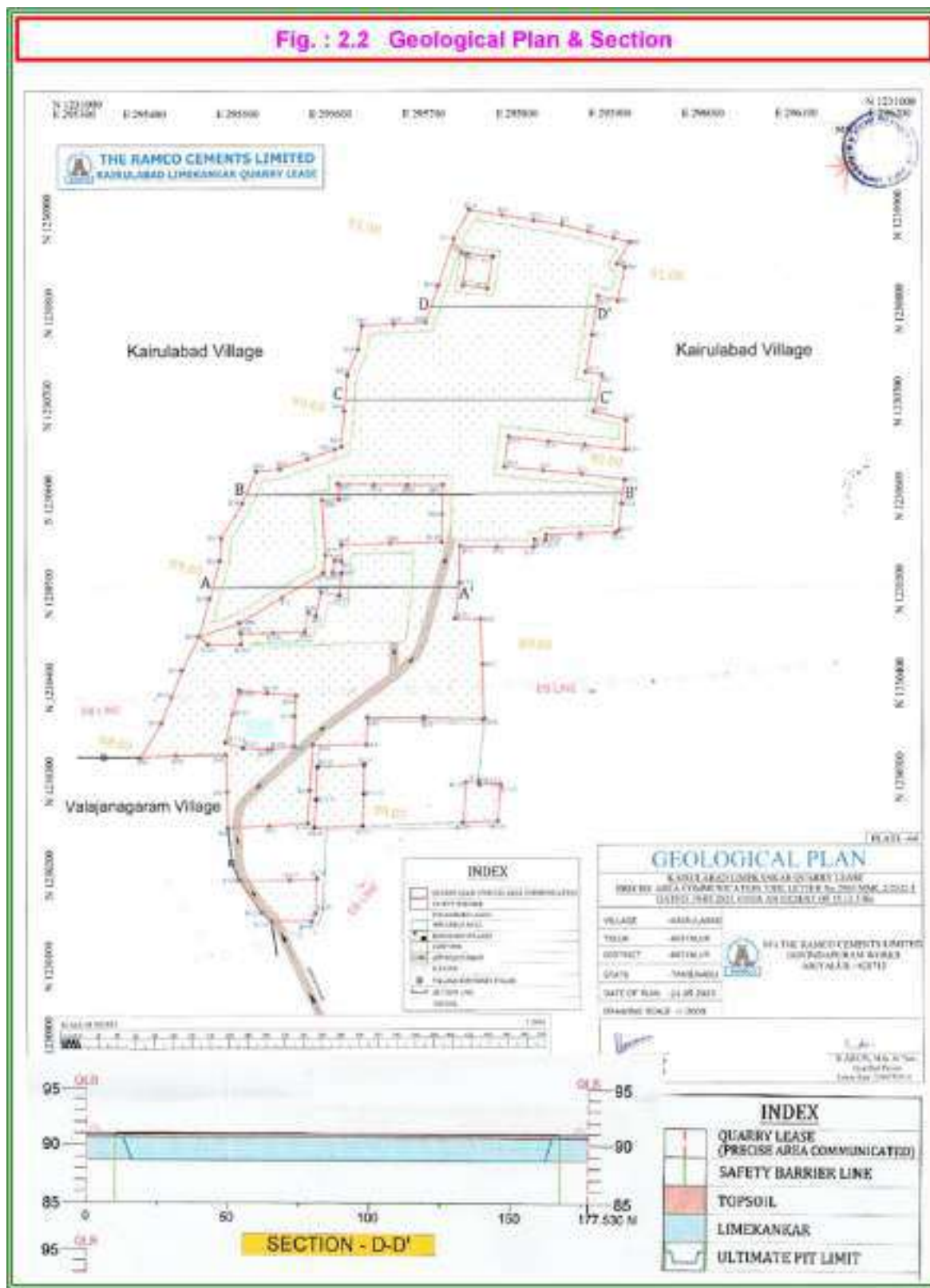
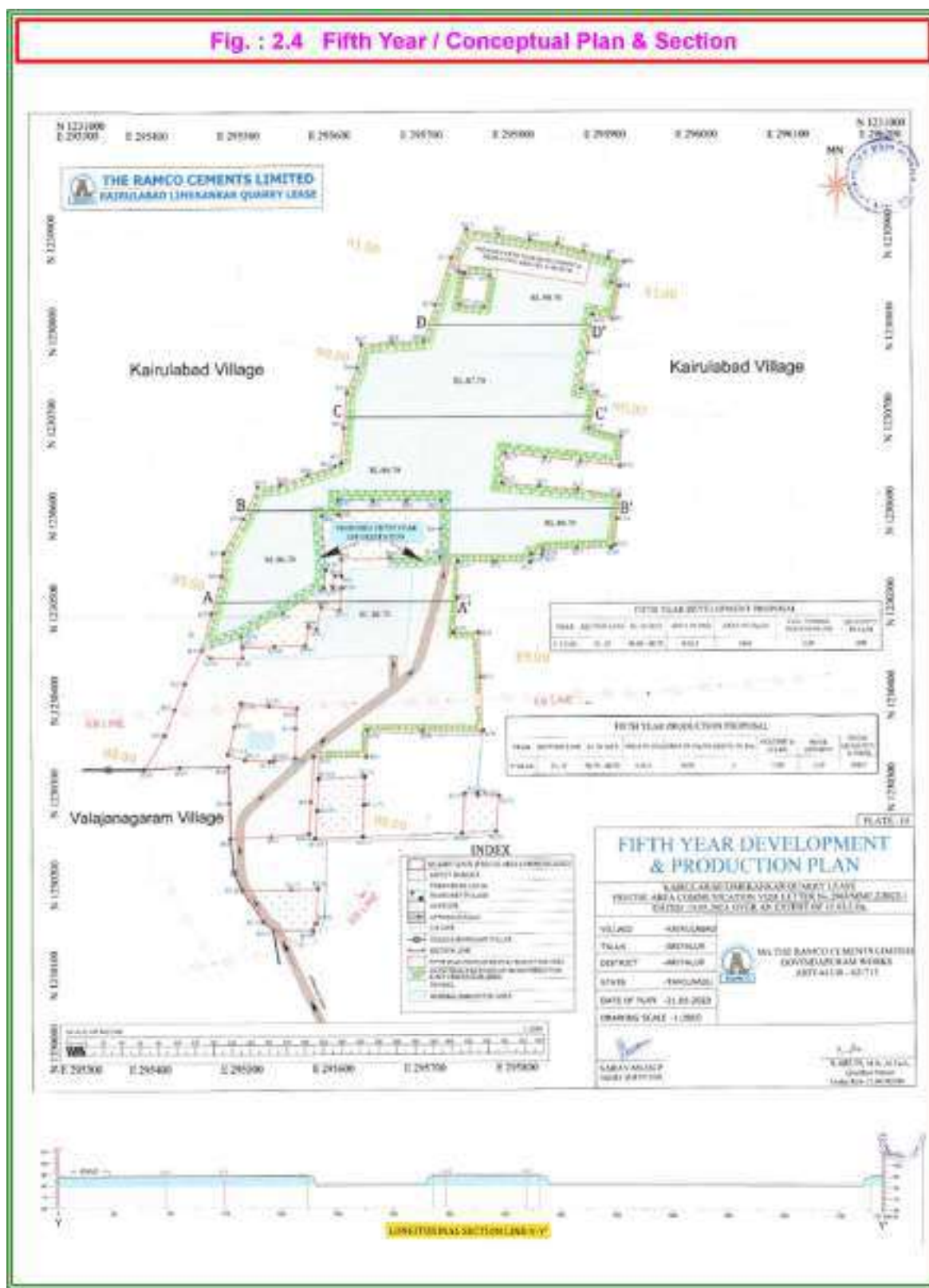




Fig. : 2.4 Fifth Year / Conceptual Plan & Section



2.6 Machineries

The quarrying will be carried out in 2 shifts for 300 days in a year. The List of Machineries proposed are given in **Table 2.4**.

Table : 2.4 Proposed Machineries

Sl. No.	Name of the Machine	Capacity	Nos.
1	TATA Hitachi EX 200	1.20 m ³	1
2	BEML – D50 Dozer	50 HP	1
3	Taurus tippers	25 Tons	5
4	Water Tanker	10 KL	1

The QL will not have permanent installations of machines, but only mobile quarrying equipments. All the machineries will be disposed-off or shifted to other operating Leases on need based.

2.7 Competent Mining Personnel

The Mine will be operated with the required Statutory Officials and Competent Persons mandatorily appointed as per the provisions of Mines Act 1952 and Metalliferous Mines Regulations 1961 (**Table 2.5**).

Table : 2.5 Mining Personnel

Sl. No.	Designation	Qualification	Nos.	Category
1	Mines Manager	I Cass Manager's Certificate Holder	1	Skilled
2	Foreman	Foreman's Certificate Holder	1	Skilled
3	Mining Mates	Mate Certificate	1	Skilled
4	Mechanics	ITI	1	Skilled
5	Time Keeper	Graduate	1	Skilled
6	Mechanical helpers	-	1	Semi-Skilled
7	Operators	Having heavy vehicles license holders	8	Skilled
		Sub Total	14	

2.8 Other Facilities

All the services like site office, First Aid Room, Rest shelters, potable water and other necessary amenities will be provided.

Mine Office: A site office will be provided in the quarry site with drinking water facility.

Workshop: To facilitate the maintenance of all equipments, there is a Central Workshop at Govindapuram Factory for electrical, mechanical and instrumentation repairs.

Stores : A central store is located at centralized location at Factory site to facilitate storage and issue of materials along with lifting, loading and unloading facilities.

Fuel : A licensed fuel storage tanks is established at the Factory and the daily requirement of HSD and other lubricants will be met by a licensed mobile browser.

Fire Fighting: Fire tending arrangement will be provided at the quarry Mine Office. Key persons will be trained in fire fighting.

First Aid: First aid room at the site office, first aid boxes at rest shelter and close to the workings will be provided. All the personnel engaged in the quarrying activity will be trained in first aid. Occupational Health Center is established at the Factory with required Paramedical Staff.

2.9 Proposed Land Use

At the end of life of the quarry, the **entire pit of 8.140 Ha will be converted as a water reservoir** at RL-86.70 on the southern side and 88.70 m on the Northern side (**Table 2.6**). About 2.50 Ha of Safety Zone will be under **Green Belt with a Coverage of 16.51%**. About, 3,750 local tree species like Neem, Pungan, Teak, etc. will be planted @ 1,500 Trees/Ha with a Survival Rate of about 90% (**Table 2.7**).

Table : 2.6 Land Use Pattern

Activities	Existing Land Use, Ha	At the End of Plan Period, Ha	At Conceptual Stage, Ha
Area of excavation	0	8.140 Water Res.	8.140 Water Reservoir
Storage of Top soil	0	0	0
Overburden Dump	0	0	0
Mineral Storage	0	0	0
Infrastructure(Workshop/Building	0	0.010	0.010
Roads	0	0	0
Green belt / Afforestation	0	2.500	2.500
Others (Safety Barrier)	6.995	4.485	4.485
Unused	8.140	0	0
Total	15.135	15.135	15.135

Table : 2.7 Proposed Green Belt

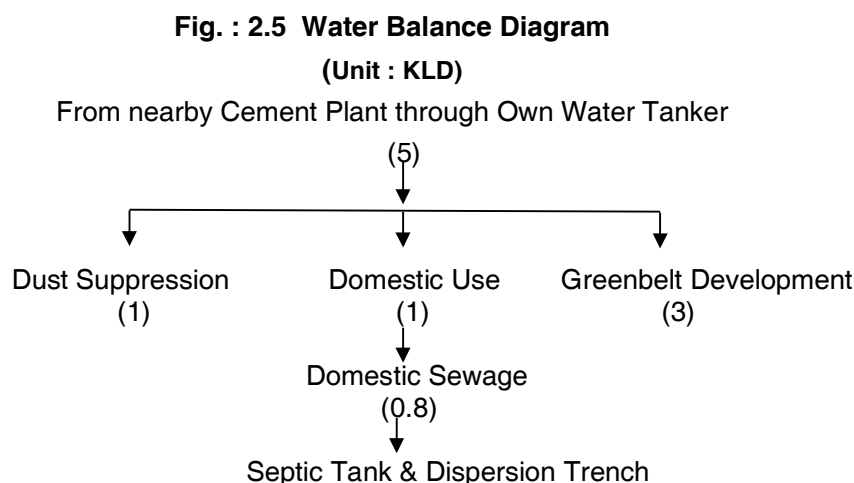
Year	Location	Extent, Ha	No. of Plants
I	Safety Barrier Zone all Along the Quarry Lease Local tree species like Neem, Pungan, Teak, etc. will be planted and maintained with a Survival Rate of about 90%	0.50	750
II		0.50	750
III		0.50	750
IV		0.50	750
V		0.50	750
	Total	2.50	3,750

2.10 Financial Assurance

The available Reserves will last for about 5 years. Activities like Afforestation programme will be continued till end of the Lease Period and hence, the Permanent Closure will arise only thereafter. The abandonment cost will be discussed in the final closure plan and is not applicable now.

2.11 Water Demand & Source

The QL requires about 5 Kilo Liters per Day (KLD) water towards domestic consumption (1 KLD), Dust Control Measures (1 KLD) and Green Belt development (3 KLD) which will be brought by own Tankers from the Cement Plant. There **will not be any water drawl from Surface or Ground Water Sources** in the QL Area. Domestic sewage generation will be about 0.8 KLD which will be biologically treated in a Septic Tank followed by a Dispersion Trench of adequate size. No workshop is proposed and thus, no effluent generation from the QL. The Water Balance Diagram is given as Fig. 2.5.



Mine Pit Drainage : It is a shallow quarrying upto a depth of 2.3 m BGL only. **There will not be any water seepage in the Lease.** At the conceptual stage, entire **quarried area will be converted into a Water Reservoir** to recharge the Ground Water-table in the vicinity.

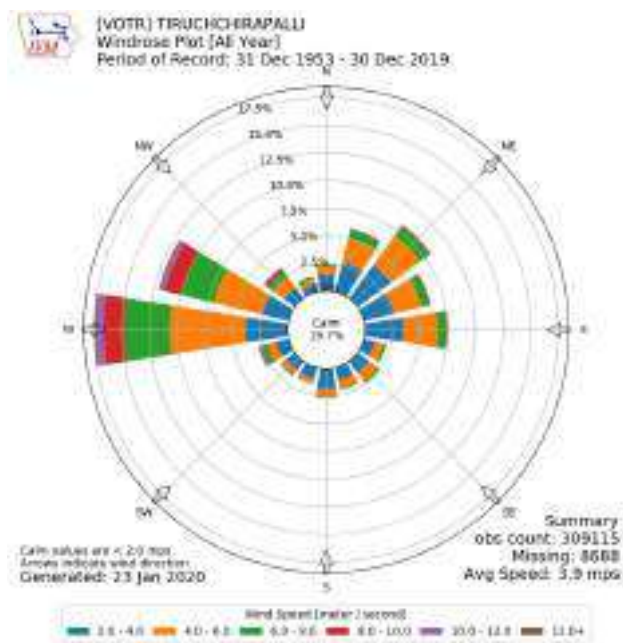
2.12 Power Demand & Source

About 50 KVA industrial supply for lighting is required which will be met from TANGEDCO Grid. For operating the mining equipments, High Speed Diesel (HSD) is required @ 2,500 Liters/day. A licensed fuel storage tanks is established at the Factory and the daily requirement of HSD and other lubricants will be met by a licensed mobile bowser. There will be **no standby DG set**.

3.0 Description of the Environment (Baseline Status)

3.1 Study Area

The study area of **10 km radius (from boundary)** (Fig. 3.1) has been considered for assessing the baseline environmental status. **Project area does not fall in Critically Polluted Industrial Clusters** listed by CPCB. As Bay of Bengal is at 100 km from the Lease, Coastal Regulation Zone (CRZ) **applicability is not there**. The nearest IMD Station is Trichy Airport. The monitoring stations were selected in such a way that the baseline environmental data reflects the **Cumulative Impact of existing Mines and Industries** in the Study area. Annual Wind Rose of Trichy (Source IEM Website) is referred while fixing the Monitoring Stations (appended). Baseline Data (BLD) has been collected during **March-May 2025 (Summer Season)** for the EIA Study.



Physiography : The minimum and maximum elevation of the study area is 18 m and 136 m aMSL respectively (Fig. 3.2). It is almost flat with gentle gradient towards south and southeast. There is no hillocks noticed in the study area.

Drainage Pattern : There is no perennial river in the study area. Seasonal **Marudaiyar River** drains the region and flows at 4.6 km in the south (Fig. 3.3). Seasonal Nallah Kallar River flows at 1.7 km in west-northwest. The overall drainage pattern of the region appears to be dendritic. There are also rainfed irrigation tanks and ponds in the study area.

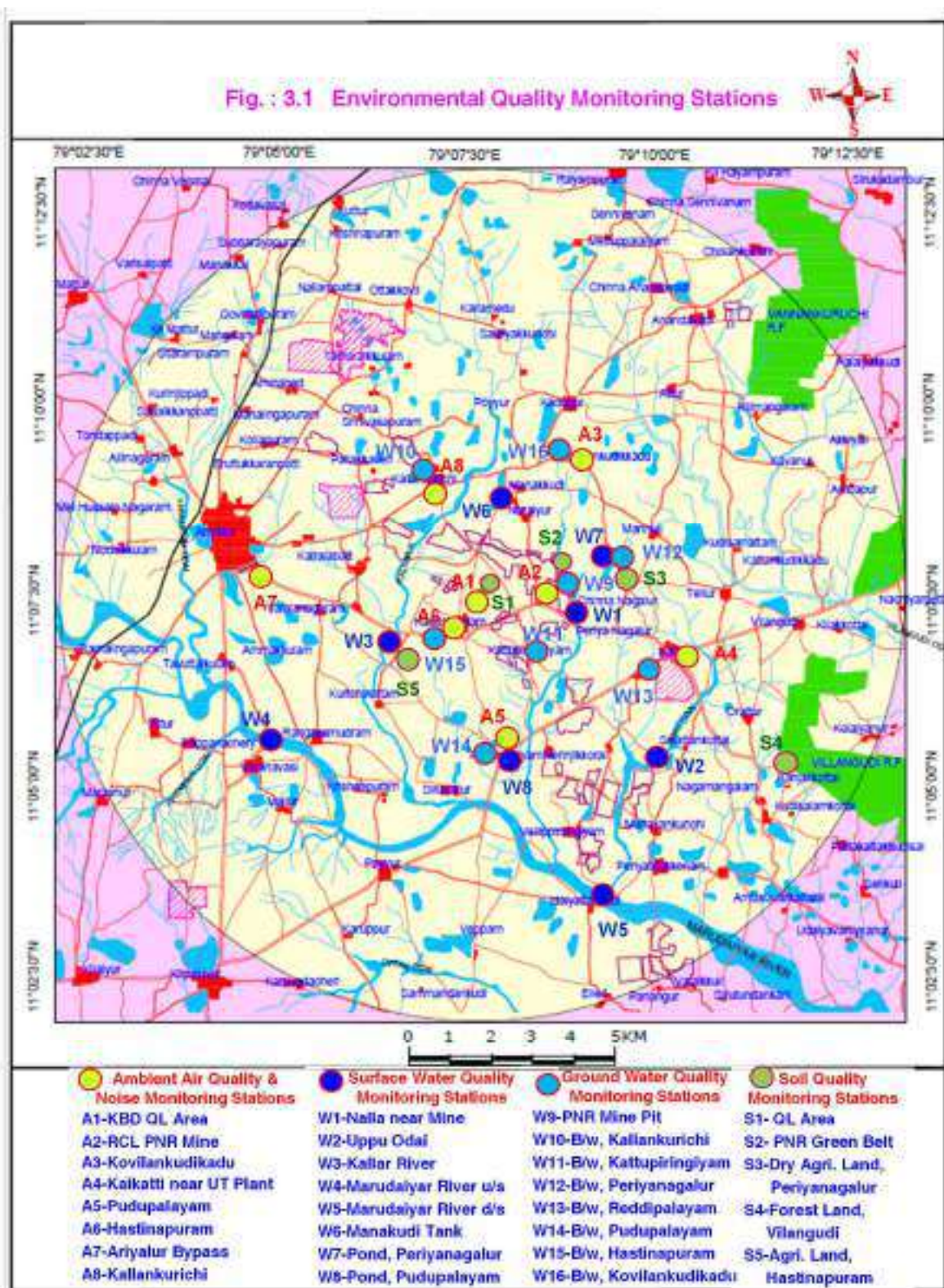
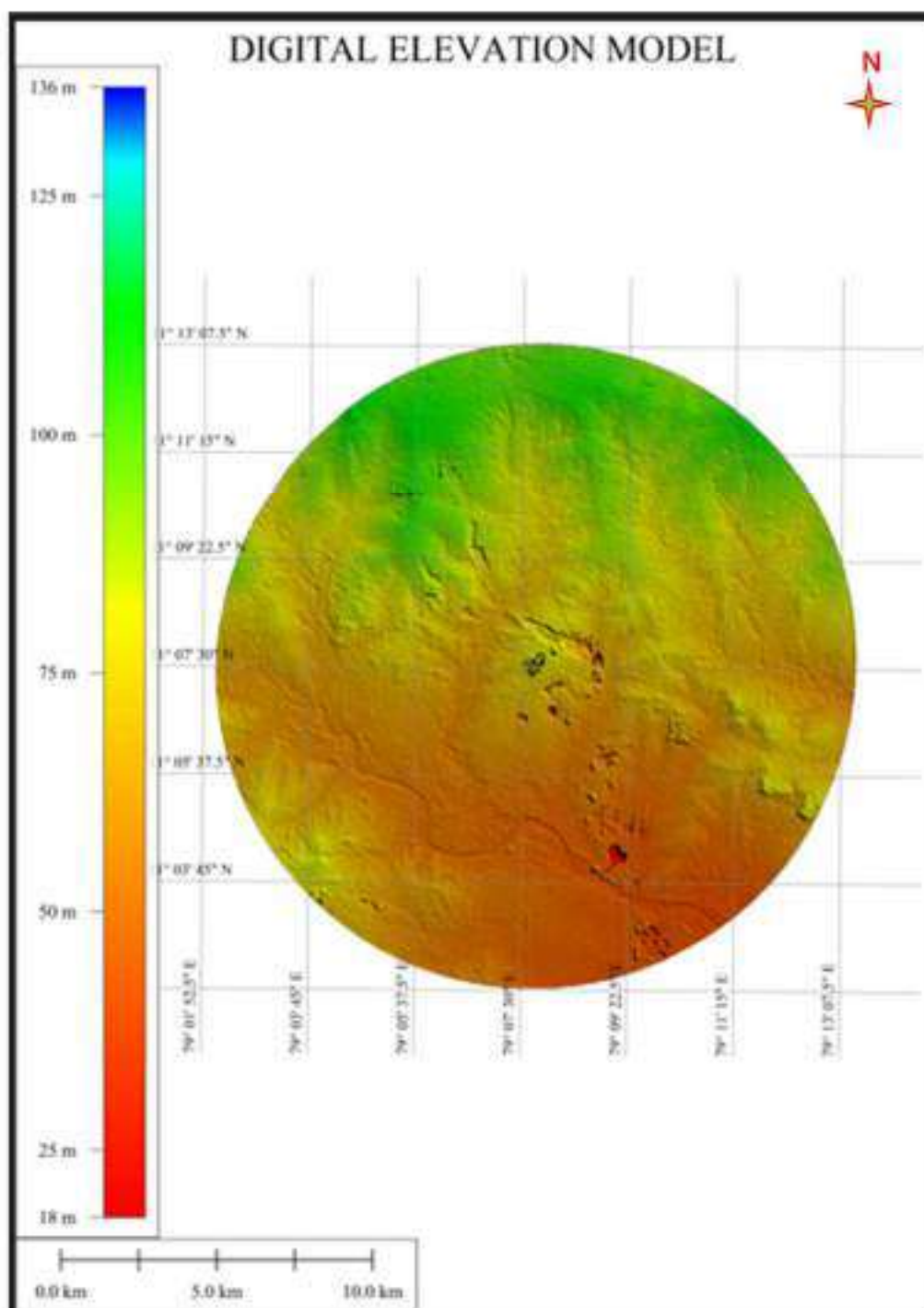
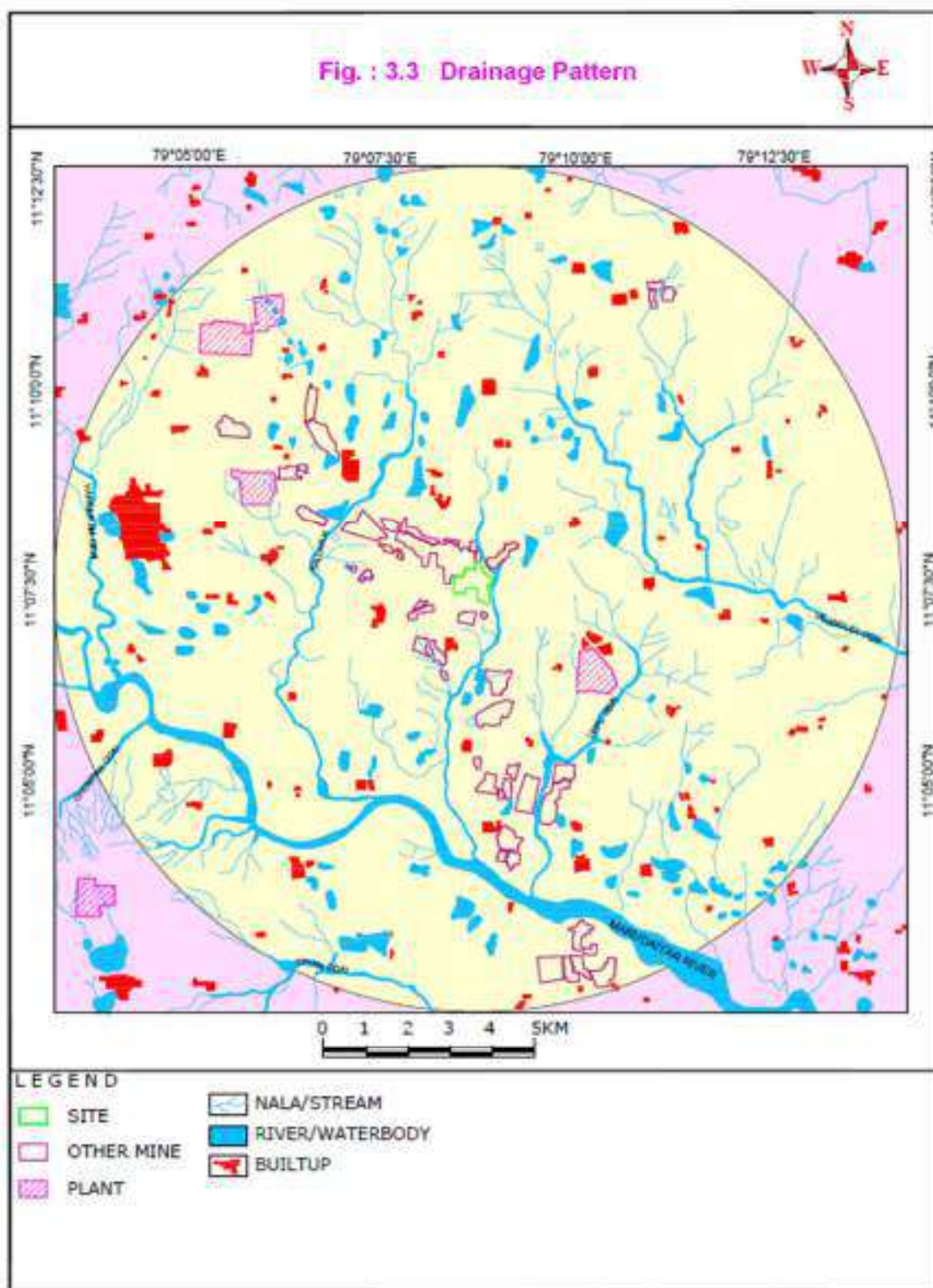


Fig. : 3.2 Physiography (DEM)





3.2 Environmental Components

Considering the Environmental setting of the project, project activities and their interaction, environmental regulations and Standards, following Environmental Attributes have been included in the EIA Study (Table 3.1).

Table : 3.1 Baseline Data Collection – Monitoring Locations

Attributes		Sampling		Remarks
		No. of Locations	Frequency	
Air	Meteorological Parameters at Core Zone	1	For a Season	Wind speed, wind direction (wind rose), temperature, humidity, cloud cover, atmospheric pressure, rainfall, etc.
	AAQ Parameters	8	24-hourly basis, continuously for 2 days in a week for 4 weeks in a month for a season	For the parameters as per Revised NAAQ Norms
Noise	Leq Levels	8	Once in the season	For Leq, Lday and Lnight values
Water	Surface Water Quality Parameters	8	Once in the Season	As per CPCB Norms
	Ground Water Quality Parameters	8		As per IS:10500 Norms
Land	Soil Quality	5	Once in the Season	Season for Textural & Physical Parameters & Nutrients.
	Land Use	Study Area	Once during the Study Period	Based on recent available Satellite Imagery
Biological	Aquatic	Study Area	Once during the Study Period	Flora & Fauna in Core & Buffer Zones
	Terrestrial			
Socio economic Parameters		Study Area	Once during the Study Period	Based on 2011-Census and Need Based Assessment for: Total Population / Household Size, Gender Composition, S.C / S.T Population, Literacy Levels, Occupational Structure, etc.

Plate : VI Monitoring Stations - Photographs



Plate : VII Monitoring Stations - Photographs



3.3 Methodology Adopted

Micrometeorology : As a part of the study, the micrometeorology and microclimatic parameters were recorded by installing a weather monitoring station (Envirotech WM 200) near the Lease at 10 m height. Data of wind velocity, wind direction, ambient temperature, relative humidity, cloud cover and atmospheric pressure were recorded at hourly intervals along with rainfall during the monitoring period.

Ambient Air Quality : The study area represents the Industrial, Residential, Rural and other Areas with respect to Revised National Ambient Air Quality (NAAQ) Norms stipulated by CPCB. Calibrated Fine Particulate Samplers (Envirotech APM 550) & Respirable Dust Samplers (Envirotech APM 460) were used for monitoring of PM_{2.5} & PM₁₀. Gaseous samples are collected by integrated gas sampling assembly (Envirotech APM 411). A tapping provided in the hopper of the sampler is utilised for gaseous sampling. with proper flow controller and a flow of 1.0 l/min.

PM_{2.5} & PM₁₀ : APM 550 system is a manual method for sampling fine particles and is based on impactor designs standardized by EPA for Ambient Air Quality Monitoring. Ambient Air enters the APM 550 system through an omni-directional inlet designed to provide a clean aerodynamic cut point for particles greater than 10 microns. Particles in the air stream finer than 10 microns proceed to a second impactor that has an aerodynamic cut point at 2.5 microns. The air sample and the fine particulates existing from the PM_{2.5} impactor is passed through a 47 mm dia filter. Teflon filter membrane that retains the FPM. The APM 550 system allows removal of the PM_{2.5} impactor from the sample stream so that the same system may be optionally used as a PM₁₀ sampler also.

SO₂ : Modified West & Gaeke method (spectrophotometric) was adopted. SO₂ was collected in a scrubbing solution of sodium tetrachloro mercurate (TCM) and was allowed to react with sulphamic acid, formaldehyde and then with pararosaniline hydrochloride. The absorbance of product red-violet dye was measured using UV Visible Spectrophotometer at a wavelength of 560 nm. Concentration of SO₂ was calculated by multiplying the absorbance with calibration factor and dividing by volume of air sampled.

NO_x : Jacob and Hocheiser modified method was adopted. Nitrogen oxides as nitrogen dioxide were collected by bubbling air through sodium hydroxide-sodium arsenite solution to form a stable solution of sodium nitrite. The nitrite ion produced during sampling was determined spectrophotometrically (at 540 nm) by reacting the exposed absorbing reagent with phosphoric acid, sulphanilamide and N (1-naphthyl) ethylamine dihydrochloride. Concentration of NO_x was calculated as described in SO₂ measurement.

Ammonia : Indophenols method (APHA Method 401, Air Sampling and Analysis, 3rd Edition) was adopted. Ammonia in the atmosphere is collected by bubbling a measured volume of air through a dilute solution of sulphuric acid to form ammonium sulphate. The ammonium sulphate formed in

the sample is analysed colorimetrically by reaction with phenol and alkaline sodium hypochlorite to produce indophenols. The reaction is accelerated by addition of Sodium nitroprusside as catalyst.

Ozone : IS:5182 Part IX (Methods for Measurement of Air Pollution - Oxidants)/ APHA Method 410 was adopted. Micro amounts of ozone and the oxidants liberate iodine when absorbed in a 1% solution of potassium iodine buffered at pH 6.8 $\pm$ 0.2. The iodine is determined spectrophotometrically by measuring the absorption of tri-iodide ion at 352 nm. Drager Multiwarn Detector was also used for real time value.

CO : Envirotech APM 850 Organic Vapour Samplers are used for CO monitoring. Standard MSA tubes are used for monitoring carbon monoxide. A measured volume of air is passed at the flow rate of 100 to 200 ml/min for 1 to 8 hours and the colour change (yellow to green) in indicating gel filled in the detector tubes and is matched with the colour chart provided with detector tubes for finding out CO concentration. Drager Multiwarn Detector was also used for real time value.

Particulate Lead : The exposed glass fibre filter papers were cut into small pieces and to it 100 ml distilled water and 10 ml nitric acid were added and heated on a hot plate for 4-6 hours. The clear solution obtained after digestion was filtered and made upto 25 ml and were analysed on a Analytic Jena Atomic Absorption Spectrophotometer (AAS) employing Lead Hollow Cathode Lamp. Concentration of lead was calculated by taking the result obtained from AAS analysis and dividing it with the volume of air sampled.

Benzene : The charcoal tubes are available in different sizes and contain varying amount of activated charcoal. The ambient air was sucked through the tube using a low flow sampler used for collection of BTX sample in a way that results in an enrichment of the relevant substances in the activated charcoal. Desorption of the adsorbed benzene was done using Carbon disulphide (CS₂). The substances desorbed in CS₂ were analyzed by capillary Gas Chromatography.

Benzo (a) Pyrene (BaP) is one of the most important constituent of PAH compounds and also one of the most potent carcinogens. This can be measured in both particulate phase and vapour phase. In the vapour phase the concentration of B(a)P is significantly less than the particulate phase. Therefore, more care to be taken for the measurement of Benzo(a) Pyrene in the particulate phase. It is based on BIS method IS 5182 (Part XII). This method is designed to collect particulate phase PAHs in ambient air and fugitive emissions and to determine individual PAH compounds using capillary Gas Chromatography equipped with flame ionization detector.

Nickel and Arsenic : The Atomic Absorption Spectroscopy (AAS) technique makes use of absorption spectrometry to assess the concentration of an analyte in the sample. The method is based on active sampling using PM10 High Volume Sampler and then sample analysis is done by atomic absorption spectroscopy.

The **detectable range** of the Air Pollutants are given in **Table 3.2**.

Table : 3.2 AAQ Parameters– Detectable Range

Parameter	Method	Range
Respirable Particulate Matter (less than 10 µm or PM10)	IS 5182: (Part 23) : 2006 RA: 2017	5-1000 µg/m ³
Particulate matter (less than 2.5 µm or PM2.5)	USEPA Quality Assurance Handbook Vol II Part II - Guidance Documents 2.12 issue year: Nov-1998	10-1000 µg/m ³
Sulphur Dioxide	IS 5182: (Part 2), 2001 RA: 2017	5-1000 µg/m ³
Nitrogen Dioxide	IS 5182: (Part 6), 2006 RA: 2017	6-750 µg/m ³
Carbon Monoxide	IS 5182: (Part 10), 1999 RA: 2014	1-200 mg/m ³
Ammonia	Indophenol Method (Method of Air sampling and analysis 3 rd edition method 401)	5-700 µg/m ³
Ozone	IS 5182: (Part 9), 1974, RA 2014	10-19000 µg/m ³
Benzene (C ₆ H ₆)	IS 5182 (Part 11), 2006 RA: 2017	0.01-1000 µg/m ³
Banzo (α) Pyrene Particulate Phase only	IS 5182: (Part 12): 2004, RA: 2014	0.1-10,000 ng/ m ³
Nickel	IS 5182: (Part 22), 2004, RA: 2014 /NAAQS Monitoring & Analysis Guidelines Volume-I	1.0 -50 ng/m ³
Arsenic		1.0-10 ng/ m ³
Lead		0.1-50 µg/m ³

Noise Levels : Noise levels were monitored at all air monitoring locations during day time as well as night time in a day. A totally portable measurement systems, Lutron SL 4001 with an internal calibrator and wind screen was used. The built-in internal oscillation system 1 KHz sine wave generator is used for on the spot calibration at 94.0 dB(A) at 1000 Hz. The basic unit of measurement is A-weighted sound level.

Water Quality : Water samples of both surface and ground waters were collected during the survey period and analysed for physico-chemical and bacteriological parameters (**Table 3.3**). Parameters like pH, conductivity, temperature, DO, etc. were measured in the field itself while collecting the samples using a microprocessor based Portable Water Analysis Kit (Elico Model PE136). Samples for chemical analysis were collected as per IS:2488. Sterilised bottles were used for collection of bacteriological samples.

Soil Quality : Samples at 3 depths viz. 0-30 cm, 30-60 cm and 60-90 cm were collected using sampling augers and field capacity apparatus. Soil extraction (10%) were used for analysis.

Calibration : The monitoring and analytical instruments are being calibrated periodically. The correction factors, if any, are being used in computation of the data.

Flora & Fauna : A general ecological survey covering an area of 10 km radius area were conducted and reported. Faunal survey covers the Terrestrial and Avian Fauna. This study included the identification of endangered and rare species as per Red Book.

Socio-Economic profile of population in study area is based on Census 2011 data.

Table : 3.3 Methodology Adopted for Water Analysis

Sl. No.	Parameter	Unit	Reference	Method
1	Taste & Odour	-	IS:3025 (5/7)*	As perceived
2	pH	-	IS:3025 (11)	Digital pH meter
3	Colour	Hazen units	IS:3025 (4)	Comparison with Standards
4	Turbidity	NTU	IS:3025 (10)	Nephelometric
5	Total Dissolved Solids	mg/l	IS:3025 (16)	Gravimetric
6	Total Hardness	mg/l	IS:3025 (21)	Titrimetric (EDTA)
7	Iron (as Fe)	mg/l	32 of IS3025	Colorimetric (Phenonthroline)
8	Chlorides (as Cl)	mg/l	IS:3025 (32)	Titrimetric (Argentometric)
9	Residual Chlorine	mg/l	IS:3025 (26)	Titrimetric
10	Calcium (as Ca)	mg/l	IS:3025 (40)	Titrimetric (EDTA)
11	Magnesium (as Mg)	mg/l	IS:3025 (46)	Titrimetric (by difference between Total Hardness and Calcium Hardness)
12	Alkalinity (as CaCO ₃)	mg/l	IS:3025 (23)	Colour indicator titration
13	Dissolved Oxygen	mg/l	IS:3025 (38)	Winkler titrimetric-azide modification
14	Sulphate (as SO ₄)	mg/l	IS:3025 (24)	Turbidimetric/Gravimetric
15	Fluoride (as F)	mg/l	IS:2488 (II)*	Distillation followed by Colorimetric (SPADNS)
16	Nitrate (as NO ₃)	mg/l	IS:3025 (34)	Colorimetric (PDA)
17	Cyanide (as CN)	mg/l	IS:3025 (27)	Colorimetric (Pyridine-Bispyrazolone)
18	Pesticides	mg/	IS:2488 (III)	Gas chromatograph
19	Phenols (as C ₆ H ₅ OH)	mg/l	IS:3025 (43)	Distillation followed by colorimetric (4-Aminoantipyrine)
20	Manganese (as Mn)	mg/l	35 of IS3025	Colorimetric (Persulpahte)
21	Chromium (as Cr ⁶⁺)	mg/l	IS:2488 (II)	Colorimetric (Diphenyl carbazide)
22	Copper (as Cu)	mg/l	IS:3025 (42)	Atomic Absorption Spectrophotometric
23	Selenium (as Se)	mg/l	IS:2488 (II)	Atomic Absorption Spectrophotometric
24	Cadmium (as Cd)	mg/l	IS:3025 (41)	Atomic Absorption Spectrophotometric
25	Arsenic (as As)	mg/l	IS:3025 (37)	Atomic Absorption Spectrophotometric
26	Boron (as B)	mg/l	IS:2488 (III)	Colorimetric (Curcumin)
27	Mercury (as Hg)	mg/l	IS:3025 (48)	Mercury analyser
28	Lead (as Pb)	mg/l	IS:3025 (47)	Atomic Absorption Spectrophotometric
29	Zinc (as Zn)	mg/l	IS:3025 (49)	Colorimetric (Dithizone)
30	Percent sodium	%	IS:2488 (V)	From Na, K, Ca & Mg values
31	BOD-3 days@27 °C	mg/l	IS:3025 (44)	3 days @ 27°C
32	COD	mg/l	IS:2488 (V)	Dichromate reflux
33	Oil & Grease	mg/l	IS:3025 (39)	Gravimetric
34	Coliforms	MPN/100 ml	IS:1622	Multiple tube fermentation (5 tubes)
35	Plate Counts	No. of Colonies/ml	IS:1622	Colony count in Agar-agar medium

* : IS:3025 (Parts)-Methods of Sampling and Test (Physical and Chemical) for Water and Wastewater;

+ : IS:2488 (Parts)-Methods of Sampling and Test for Industrial Effluents.

3.4 Micrometeorology

Regional Status : Sub-tropical climate prevails over the study area. The nearest IMD station is Trichy Airport. The maximum temperature ranges from 40 °C to 44 °C and minimum temperature from 22 °C to 27 °C. As per TWAD Data, **70 year Normal Rainfall** of nearby Ariyalur Rain Gauge Station is **1,096 mm**. Around 50% of the rainfall occurs during Northeast monsoon and the remaining rainfall occurs during Southwest and Transitional periods. The chances of receiving normal annual rainfall is about 40-45%.

Site Specific Status : The abstract of collected hourly meteorological data are presented in **Tables 3.4-3.6**. Based on the wind parameters, wind rose is drawn and presented as **Fig. 3.2**.

March 2025 : Predominant winds were from WNW direction. Mean Wind velocity was 6.7 kmph. Temperature values were ranging from 21.3 °C to 37.3 °C with mean value of 28.6 °C. Mean maximum relative humidity value was 60.7%. Mean atmospheric pressure value was computed as 761.9 mm of mercury. Clear sky prevailed predominantly. There was no rainy day in the month.

April 2025 : Predominant winds were from NW direction. Mean Wind velocity was 6.1 kmph. Temperature values were ranging from 24.0 °C to 39.3 °C with mean value of 30.9 °C. Mean maximum relative humidity value was 60.2%. Mean atmospheric pressure value was computed as 760.1 mm of mercury. Clear sky prevailed predominantly. There was no rainy day in the month.

May 2025 : Predominant winds were from NW directions. Mean Wind velocity was 6.7 kmph. Temperature values were ranging from 22.9 °C to 39.1 °C with mean value of 30.1 °C. Mean maximum relative humidity value was 60.7%. Mean atmospheric pressure value was computed as 758.7 mm of mercury. Clear sky prevailed predominantly. There was no rainy day in the month.

Summer Season 2025 :

- ❖ Predominant winds were from NW quadrant.
- ❖ Mean Wind velocity was 6.5 kmph with Calm condition 0%.
- ❖ Temperature values were ranging from 21.3 °C to 39.3 °C with mean value of 29.9 °C.
- ❖ Mean maximum relative humidity value was 60.5%.
- ❖ Mean atmospheric pressure value was computed as 760.2 mm of mercury.
- ❖ Clear sky prevailed predominantly.
- ❖ There was no rainy day in the Season.

The monitored meteorological data were found to be **in compliance with local weather phenomena**.

Table : 3.4 Micrometeorological Data – March 2025

Location : Mine Area

Date	Mean Wind Velocity, kmph	Pred. Wind Direction, Deg. (from)	Temperature, °C			Relative Humidity (Mean), %	Cloud Cover, oktas	Atm. Pressure (Mean), mm of Hg	Rain-fall, mm
			Min.	Max.	Mean				
01.03.2025	9.6	295	24.1	32.2	27.8	62	1.8	762.4	0
02.03.2025	7.9	313	24.5	33.9	28.5	64	1.9	761.6	0
03.03.2025	6.7	328	24.6	34.8	28.9	64	2.1	761.8	0
04.03.2025	6.1	329	23.7	35.0	28.4	65	2.0	761.8	0
05.03.2025	5.9	339	22.9	35.7	28.6	61	1.8	761.6	0
06.03.2025	5.9	309	22.9	37.2	29.2	57	2.1	761.9	0
07.03.2025	6.8	280	23.0	35.5	28.7	61	2.0	761.2	0
08.03.2025	6.4	296	23.0	31.9	25.8	63	2.1	761.5	0
09.03.2025	6.8	307	21.3	33.5	26.9	61	2.3	761.4	0
10.03.2025	10.0	316	21.9	33.4	27.2	60	2.4	762.7	0
11.03.2025	9.6	325	21.9	33.4	26.2	63	1.7	762.8	0
12.03.2025	9.3	266	21.9	33.4	26.6	60	2.0	762.6	0
13.03.2025	5.4	225	22.4	33.2	27.8	59	2.2	761.6	0
14.03.2025	5.8	334	23.0	33.9	28.1	54	2.3	761.9	0
15.03.2025	5.8	327	22.9	33.7	28.2	60	1.5	762.4	0
16.03.2025	6.0	295	24.0	34.5	29.4	62	2.0	762.1	0
17.03.2025	5.8	320	24.8	35.3	29.6	63	2.7	761.9	0
18.03.2025	5.8	304	25.7	35.2	29.6	60	1.7	761.9	0
19.03.2025	6.4	293	24.8	34.5	29.0	62	2.0	763.4	0
20.03.2025	6.1	297	24.5	34.9	29.0	63	1.8	764.2	0
21.03.2025	7.0	303	25.3	34.9	30.0	65	1.6	763.8	0
22.03.2025	6.5	283	25.6	34.7	29.5	66	1.9	763.5	0
23.03.2025	6.8	275	25.4	34.2	29.3	63	2.1	763.4	0
24.03.2025	7.4	281	25.5	35.2	29.5	61	2.4	763.2	0
25.03.2025	7.4	302	25.5	34.5	28.8	62	2.2	763.4	0
26.03.2025	6.4	322	25.5	35.4	30.2	55	1.8	761.4	0
27.03.2025	5.3	304	23.9	37.0	29.9	58	2.2	759.9	0
28.03.2025	4.9	278	24.8	36.7	30.4	56	2.0	759.4	0
29.03.2025	5.4	340	23.7	37.3	30.2	58	2.7	759.4	0
30.03.2025	5.3	320	23.7	32.6	26.5	57	2.3	759.8	0
31.03.2025	6.0	324	23.7	35.0	29.8	56	2.1	759.8	0
Monthly Abstract	6.7	304	21.3	37.3	28.6	60.7	2.1	761.9	0

Note : Abstract values are taken from the hourly readings (00:00-24:00 hrs.) recorded continuously during the monitoring period.

Table : 3.5 Micrometeorological Data – April 2025

Location : Mine Area

Date	Mean Wind Velocity, kmph	Pred. Wind Direction, Deg. (from)	Temperature, °C			Relative Humidity (Mean), %	Cloud Cover, oktas	Atm. Pressure (Mean), mm of Hg	Rain-fall, mm
			Min.	Max.	Mean				
01.04.2025	6.3	321	24.4	34.3	28.6	55	2.2	760.3	0
02.04.2025	6.2	335	24.6	35.3	29.5	62	2.1	760.7	0
03.04.2025	6.2	358	24.0	29.8	26.8	63	1.8	762.4	0
04.04.2025	7.3	335	25.0	35.5	29.3	60	1.6	762.2	0
05.04.2025	6.6	340	24.8	35.6	29.8	57	1.3	761.4	0
06.04.2025	5.9	347	26.3	37.0	31.0	60	1.5	760.2	0
07.04.2025	7.0	342	26.6	36.4	30.7	58	1.3	760.5	0
08.04.2025	7.8	340	26.1	35.5	30.3	61	1.6	761.2	0
09.04.2025	7.4	305	26.0	36.2	30.3	63	1.5	760.7	0
10.04.2025	6.6	295	25.5	36.9	31.0	62	1.1	758.9	0
11.04.2025	7.2	280	27.8	37.3	31.7	64	1.3	758.2	0
12.04.2025	7.3	281	27.8	37.6	32.1	63	1.1	758.4	0
13.04.2025	6.7	285	27.8	36.1	30.5	62	1.8	759.2	0
14.04.2025	5.2	302	27.5	36.2	31.2	64	2.0	760.1	0
15.04.2025	5.7	340	27.2	36.0	30.9	65	1.7	760.3	0
16.04.2025	5.7	338	26.7	36.1	30.0	60	1.4	760.6	0
17.04.2025	5.2	270	26.7	36.5	31.5	58	1.2	759.9	0
18.04.2025	5.4	306	27.4	37.3	31.6	55	1.0	759.4	0
19.04.2025	6.7	318	29.0	39.3	33.9	62	1.2	759.2	0
20.04.2025	5.4	305	28.2	38.2	32.3	63	1.3	759.2	0
21.04.2025	5.4	303	27.9	38.2	32.2	58	1.1	760.3	0
22.04.2025	5.1	338	26.8	37.0	31.6	60	1.3	761.3	0
23.04.2025	5.6	286	27.1	37.8	31.5	54	1.7	760.5	0
24.04.2025	5.6	280	27.6	38.1	32.3	51	1.5	759.2	0
25.04.2025	4.9	305	27.6	39.1	32.4	60	1.3	759.3	0
26.04.2025	5.2	283	27.9	36.7	31.4	59	1.5	759.6	0
27.04.2025	5.7	306	27.2	30.3	30.5	58	1.7	760.3	0
28.04.2025	5.4	350	27.1	35.3	30.0	64	1.5	759.6	0
29.04.2025	5.3	345	26.7	37.2	31.2	62	2.0	759.4	0
30.04.2025	5.7	346	27.2	35.5	30.5	63	1.8	760.3	0
Monthly Abstract	6.1	316	24.0	39.3	30.9	60.2	1.5	760.1	0

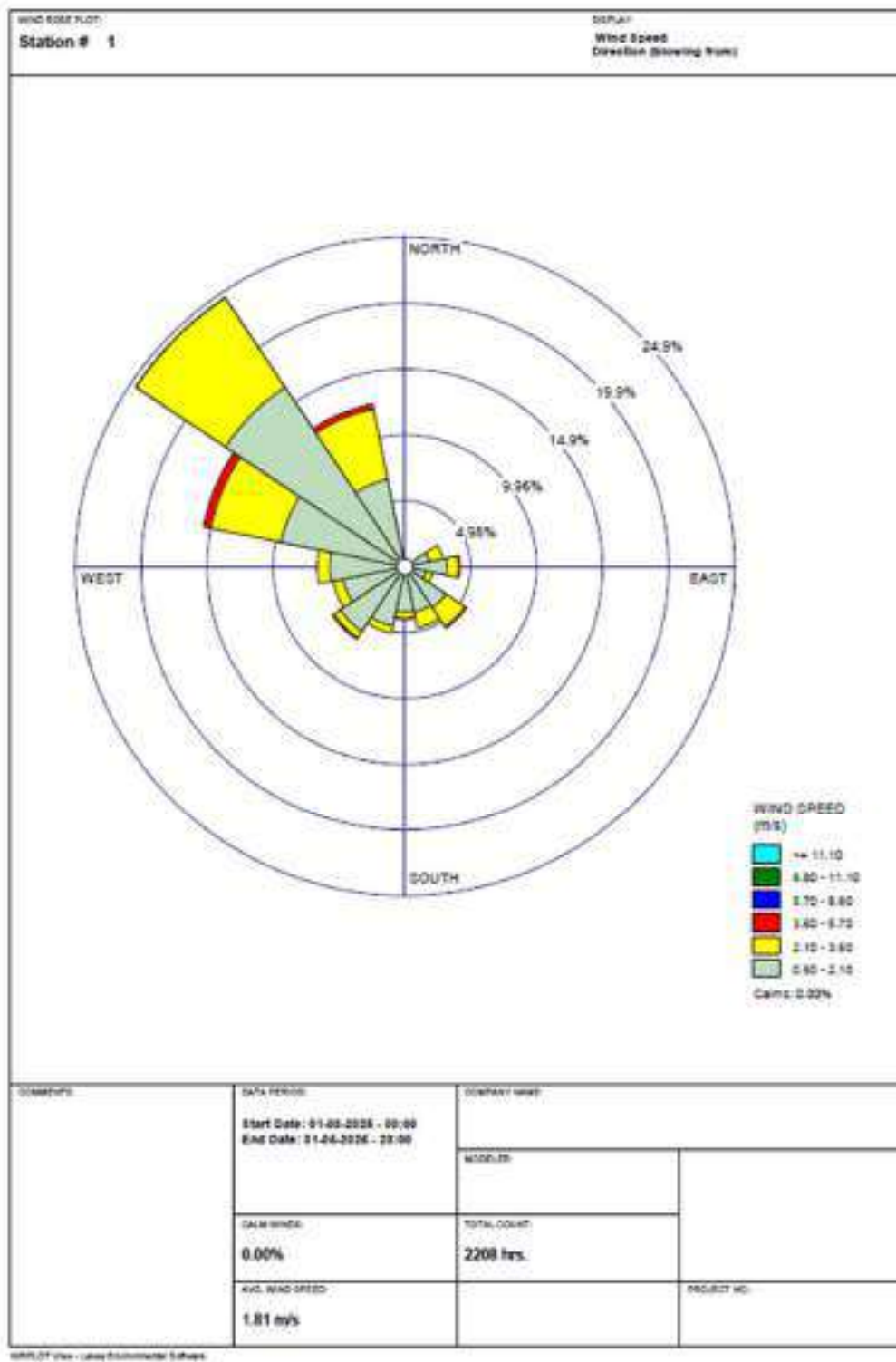
Note : Abstract values are taken from the hourly readings (00:00-24:00 hrs.) recorded continuously during the monitoring period.

Table : 3.6 Micrometeorological Data – May 2025

Location : Mine Area

Date	Mean Wind Velocity, kmph	Pred. Wind Direction, Deg. (from)	Temperature, °C			Relative Humidity (Mean), %	Cloud Cover, oktas	Atm. Pressure (Mean), mm of Hg	Rain-fall, mm
			Min.	Max.	Mean				
01.05.2025	5.3	336	27.1	34.9	29.2	61	1.5	760.1	0
02.05.2025	5.8	329	27.1	35.5	30.8	62	1.4	759.9	0
03.05.2025	5.5	343	27.2	35.5	30.6	64	1.7	760.2	0
04.05.2025	5.0	316	27.1	34.9	28.9	60	1.7	760.1	0
05.05.2025	5.9	344	27.1	35.5	30.4	58	2.1	760.4	0
06.05.2025	6.3	304	25.0	37.7	30.4	56	2.3	759.2	0
07.05.2025	8.0	302	22.9	36.9	29.4	54	1.8	758.8	0
08.05.2025	9.8	313	25.0	34.7	26.6	61	1.3	759.4	0
09.05.2025	6.9	290	25.4	37.2	31.2	60	1.0	759.1	0
10.05.2025	4.9	305	24.2	34.8	28.0	66	0.7	759.7	0
11.05.2025	6.5	307	27.0	38.4	32.1	63	0.9	758.8	0
12.05.2025	7.1	309	27.9	39.1	32.3	61	1.2	757.8	0
13.05.2025	6.8	335	26.8	39.1	32.4	64	1.3	757.4	0
14.05.2025	6.3	345	25.2	38.7	31.7	63	1.7	757.7	0
15.05.2025	5.5	346	25.9	38.5	30.9	68	2.0	758.4	0
16.05.2025	7.2	309	25.8	38.5	30.4	64	2.3	758.4	0
17.05.2025	8.1	325	23.6	33.0	28.0	58	1.7	758.4	0
18.05.2025	5.5	338	24.2	35.8	27.7	59	1.1	757.6	0
19.05.2025	7.1	336	24.2	34.4	29.9	60	1.3	757.0	0
20.05.2025	8.0	340	26.3	34.6	29.9	65	1.5	756.4	0
21.05.2025	8.6	335	27.1	35.5	30.7	62	1.3	757.1	0
22.05.2025	8.2	347	27.1	36.2	31.1	60	1.0	757.6	0
23.05.2025	6.7	317	24.6	36.3	30.6	58	1.2	756.8	0
24.05.2025	8.5	345	25.7	33.0	29.3	56	1.5	756.7	0
25.05.2025	9.5	326	24.9	33.1	28.8	60	1.0	757.5	0
26.05.2025	5.7	346	27.2	35.5	30.3	61	1.3	760.1	0
27.05.2025	5.5	352	27.1	34.9	30.0	57	1.6	759.8	0
28.05.2025	5.7	340	27.2	35.5	30.5	59	1.5	760.3	0
29.05.2025	5.3	358	27.1	34.9	29.2	62	1.3	760.1	0
30.05.2025	5.8	328	27.1	35.5	30.8	62	1.2	759.9	0
31.05.2025	5.5	343	27.2	35.5	30.6	57	1.1	760.2	0
Monthly Abstract	6.7	329	22.9	39.1	30.1	60.7	1.4	758.7	0

Note : Abstract values are taken from the hourly readings (00:00-24:00 hrs.) recorded continuously during the monitoring period.

Fig. : 3.4 Seasonal Wind Rose (Summer 2025)

3.5 Ambient Air Quality

3.5.1 Monitoring Locations

AAQ Monitoring Stations were selected based on the **Upwind & Downwind directions for the Season (Table 3.7)** and covering the existing Mines & Industries. **Mobile Stations were also deployed** for the monitoring. All **12 AAQ parameters (24/8/1 hourly basis)** were monitored in compliance with NAAQ Norms. The monitored ambient air quality data are presented in **Tables 3.8-3.15**. The abstract of those monitored data is given as **Table 3.16** and ambient air quality status in the study area as **Table 3.17**.

Table : 3.7 Ambient Air Quality Monitoring Stations-Location & Bearing

Sl. No.	Location	N-Latitude	E-Longitude	Direction from Mine	Distance from Mine, km	Location Scenario
1	A1-KBD QL Area	11° 7'40.9"	79° 7'49.2"	-	-	Core zone
2	A2-PNR Mine	11°07'27.9"	79°08'33.0"	ENE	1.2	Downwind
3	A3-Kovilankudikadu	11°09'10.6"	79°09'13.1"	NE	3.5	Downwind
4	A4- Kaikatti near UT Plant	11°06'28.3"	79°10'29.2"	ESE	4.7	Downwind
5	A5-Pudupalayam	11°05'28.8"	79°08'05.3"	SSE	3.6	Crosswind
6	A6-Hastinapuram	11°07'10.4"	79°07'43.6"	S	0.4	Upwind
7	A7-Ariyalur Bypass	11°07'40.7"	79°05'03.8"	W	4.5	Upwind
8	A8-Kallankurichi	11°08'52.8"	79°07'13.6"	NW	2.6	Upwind

3.5.2 AAQ Status

During the study, each 192 samples were collected, analysed and reported. On the synthesized data, the following observations are made :

PM_{2.5} values (24 hours Time Weighted) were monitored in the range between 15-48 microgram/cu.m (**ug/m³**) in the Study Area with **mean value of 25.4 ug/m³** against NAAQ Norm value of **60 ug/m³** (24 hours Time Weighted).

PM₁₀ values were monitored in the range between 32-78 ug/m³ with **mean value of 49.1 ug/m³** against NAAQ Norm value of **100 ug/m³** (24 hours Time Weighted).

SO₂ values were monitored in the range between 7-28 ug/m³ with **mean value of 15.9 ug/m³** against NAAQ limit value of **80 ug/m³** (24 hours Time Weighted).

NO_x values were monitored in the range between 9-33 ug/m³ with **mean value of 19.6 ug/m³** against NAAQ limit value of **80 ug/m³** (24 hours Time Weighted).

Ammonia (NH₃) concentrations were monitored less than 5 ug/m³ at all monitoring locations against NAAQ limit value of 400 ug/m³ (24 hours Time Weighted).

O₃ concentrations (hourly samples reported for 8-hour average) were monitored in the range between <10-41.4 ug/m³ with **mean value of 19.9 ug/m³** against NAAQ limit value of 100 ug/m³ (8 hours Time Weighted).

CO : Monitored CO values were less than 1000 ug/m³ during the study period against NAAQ limit value of 2 mg/m³ (2,000 ug/m³) (8 hours Time Weighted).

Particulate Lead (Pb) concentrations were monitored less than 0.1 ug/m³ at all monitoring locations against NAAQ limit value of 1.0 ug/m³ (24 hours Time Weighted).

Arsenic (As) concentrations were monitored less than 1 **nanogram/cu.m (ng/m³)** at all monitoring locations against NAAQ limit value of 6 ng/m³ (annual mean).

Nickel (Ni) concentrations were monitored less than 1 ng/m³ at all monitoring locations against NAAQ limit value of 20 ng/m³ (annual mean).

Benzene (C₆H₆) concentrations were monitored less than 0.01 ug/m³ at all monitoring locations against NAAQ limit value of 5 ug/m³ (annual mean).

Benzo(a) Pyrene (BaP) concentrations were monitored less than 0.1 ng/m³ at all monitoring locations against NAAQ limit value of 1.0 ng/m³ (annual mean).

While comparing with the National Ambient Air Quality (NAAQ) Standards revised as per GSR 826(E) dated 16.11.2009, **all monitored values were found to be well within the respective limit values for 24-hourly periods** for Industrial, Residential, Rural and other Areas.

Exceedance Factor (EF) : (Monitored Avg. Value of criteria Pollutant/NAAQ Norm of the Pollutant) : Critical Pollution if EF is 1.5; High Pollution if EF is between 1.0-<1.5, Moderate Pollution if EF is between 0.5-<1.0 and Low Pollution if EF is <0.5. **Study Area is falling under Low to Moderate Pollution Level.**

Pollutant	Mean Concentration	NAAQ Norm	Exceedance Factor (EF)	Pollution Category
PM2.5, ug/m ³	25.4	60	0.42	Low
PM10, ug/m ³	49.1	100	0.49	Low
SO ₂ , ug/m ³	15.9	80	0.20	Low
NO ₂ , ug/m ³	19.6	80	0.25	Low

Table : 3.8 Ambient Air Quality Data at A1- KBD QL Area

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	24	49	10	15	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	20	43	11	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	26	55	10	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	22	47	12	16	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	26	54	11	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	24	51	13	17	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	32	60	12	15	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	27	55	14	18	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	23	50	10	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	26	55	11	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	21	45	12	16	12.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	17	35	9	12	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	21	43	10	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	20	43	8	10	13.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	23	45	9	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	24	48	11	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	26	53	10	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	21	44	9	11	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	23	49	10	13	12.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	23	41	12	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	20	38	10	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	21	40	9	12	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	24	42	11	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	18	35	10	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		17-32	35-60	8-14	10-18	<10-13.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		23.0	46.7	10.6	13.8	12.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-**Revised as per GSR 826(E) dated 16.11.2009** for Industrial, Residential, Rural and other Areas.

Table : 3.9 Ambient Air Quality Data at A2- PNR Mine

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	22	45	13	16	14.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	20	43	12	15	12.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	23	46	11	16	10.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	21	40	13	18	11.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	24	49	12	15	10.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	27	51	14	17	12.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	23	44	11	14	15.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	25	47	13	15	18.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	22	45	14	18	22.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	21	40	15	20	20.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	27	48	12	16	20.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	23	45	15	18	19.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	25	47	13	15	21.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	28	52	14	17	18.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	22	45	16	19	22.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	24	48	12	15	18.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	27	51	14	18	20.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	25	46	17	23	22.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	22	45	19	25	28.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	24	44	22	28	22.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	21	40	19	24	20.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	23	42	17	20	19.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	24	45	18	22	22.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	21	40	17	23	18.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		20-28	40-52	11-22	14-28	10.4-28.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		23.5	45.3	14.7	18.6	18.5	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Table : 3.10 Ambient Air Quality Data at A3-Kovilankudikadu

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	16	35	8	11	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	19	40	8	10	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	23	43	9	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	21	44	11	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	20	42	7	9	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	18	38	8	11	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	20	41	7	9	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	18	38	9	12	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	20	43	8	10	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	21	43	10	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	18	38	8	11	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	21	40	11	15	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	23	44	8	11	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	24	47	11	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	19	40	10	12	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	19	41	11	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	16	38	9	14	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	22	40	12	16	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	17	39	9	10	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	20	43	11	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	22	45	8	10	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	16	34	10	12	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	18	37	8	11	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	15	32	10	13	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		15-24	32-47	7-12	9-16	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		19.4	40.2	9.2	12.0	<10	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Table : 3.11 Ambient Air Quality Data at A4- Kaikatti near UT Cement Plant

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	25	54	20	26	23.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	30	63	24	28	28.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	34	66	28	32	26.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	37	68	25	30	25.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	33	65	22	27	24.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	35	68	24	31	26.0	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	32	61	20	26	25.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	36	70	21	28	22.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	34	65	23	28	23.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	37	68	26	30	40.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	41	72	27	32	26.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	36	64	25	27	27.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	33	62	21	24	31.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	35	66	23	29	27.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	30	58	20	22	23.5	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	33	62	18	20	28.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	27	55	18	22	28.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	35	64	22	25	32.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	34	62	16	19	41.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	31	58	21	24	38.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	33	65	23	25	40.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	31	63	17	21	36.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	36	74	19	23	28.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	30	65	20	24	30.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		25-41	54-74	16-28	19-32	22.4-41.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		33.3	64.1	21.8	26.0	29.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Table : 3.12 Ambient Air Quality Data at A5-Pudupalayam (on NH-81)

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	22	40	18	22	27.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	25	45	21	26	30.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	20	41	16	20	26.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	27	45	19	23	28.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	22	42	20	25	30.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	25	47	22	27	33.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	28	51	21	25	27.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	24	44	23	28	25.5	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	26	46	22	28	20.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	22	40	20	24	14.9	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	24	46	24	33	23.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	30	53	20	25	20.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	23	41	21	32	21.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	20	38	19	22	22.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	22	40	24	30	20.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	26	44	18	23	21.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	24	41	21	28	26.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	21	37	16	24	17.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	23	38	16	20	18.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	27	45	12	16	15.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	21	44	14	18	18.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	23	47	13	17	20.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	20	43	15	18	11.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	25	48	18	21	10.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		20-30	37-53	12-24	16-33	10.3-33.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		23.8	43.6	18.9	24.0	22.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Table : 3.13 Ambient Air Quality Data at A6-Hastinapuram (on SH-139)

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	23	47	18	21	11.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	24	50	14	17	13.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	22	43	17	20	16.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	26	49	13	16	14.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	19	41	15	18	18.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	21	43	14	16	14.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	22	46	16	18	16.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	20	42	14	17	13.9	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	24	47	17	20	12.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	21	40	20	22	14.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	23	44	16	18	11.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	20	43	18	21	12.5	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	18	39	15	18	14.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	20	38	18	21	12.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	23	41	20	23	15.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	17	35	22	25	10.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	21	40	24	27	12.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	20	38	21	24	11.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	23	41	20	23	13.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	18	35	18	21	11.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	21	44	22	24	10.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	20	38	20	23	12.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	18	35	24	26	14.0	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	21	40	18	21	11.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		17-26	35-50	13-24	16-27	10.4-18.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		21.0	41.6	18.1	20.8	13.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Table : 3.14 Ambient Air Quality Data at A7-Ariyalur Bypass

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	41	70	24	29	22.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	45	77	21	25	19.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	48	78	25	28	21.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	44	74	23	26	27.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	40	72	22	27	20.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	43	75	20	25	28.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	42	71	24	28	30.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	38	68	21	25	33.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	44	77	23	27	26.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	40	72	26	31	21.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	46	78	26	30	22.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	42	75	22	27	26.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	33	61	24	30	23.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	30	58	21	26	25.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	37	66	23	28	20.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	39	71	24	31	22.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	34	62	22	25	24.0	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	40	73	25	33	23.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	38	68	27	32	28.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	43	75	22	27	24.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	35	72	24	29	30.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	39	78	23	27	33.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	42	73	21	25	26.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	37	72	25	30	25.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		30-48	58-78	20-27	25-33	19.6-33.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		40.0	71.5	23.3	28.0	25.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Table : 3.15 Ambient Air Quality Data at A8-Kallankurichi

Season : Summer 2025

Sample Size : 24 hly. (otherwise mentioned)

Monitoring		Particulates, ug/m ³		Gaseous Pollutants, ug/m ³					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NO _x	O ₃ (8-hly Avg.)	NH ₃	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
03-04.03.2025	06:00-06:00	20	38	11	14	15.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.03.2025	06:00-06:00	23	42	9	12	10.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.03.2025	06:00-06:00	22	41	11	13	11.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.03.2025	06:00-06:00	18	39	10	12	13.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.03.2025	06:00-06:00	17	37	13	15	10.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.03.2025	06:00-06:00	19	40	12	15	11.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.03.2025	06:00-06:00	23	44	10	14	10.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.03.2025	06:00-06:00	20	41	9	12	10.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.04.2025	06:00-06:00	16	35	11	14	12.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.04.2025	06:00-06:00	18	38	13	16	10.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.04.2025	06:00-06:00	22	42	12	15	11.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.04.2025	06:00-06:00	16	34	10	13	10.8	<5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.04.2025	06:00-06:00	16	37	9	12	11.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.04.2025	06:00-06:00	19	40	11	14	10.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.04.2025	06:00-06:00	15	32	12	14	11.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.04.2025	06:00-06:00	17	35	10	13	10.6	<5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.05.2025	06:00-06:00	20	43	13	15	10.4	<5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.05.2025	06:00-06:00	18	38	11	14	12.1	<5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.05.2025	06:00-06:00	22	41	10	16	10.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.05.2025	06:00-06:00	23	46	12	14	11.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.05.2025	06:00-06:00	21	40	11	14	12.0	<5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.05.2025	06:00-06:00	24	45	12	16	10.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.05.2025	06:00-06:00	18	37	10	14	11.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.05.2025	06:00-06:00	22	42	14	17	10.7	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		15-24	32-46	9-14	12-17	10.1-15.2	<5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		19.5	39.5	11.1	14.1	11.3	<5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	100 (8 hrs.)	400 (24 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	6.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : **PM2.5**-Particulate Matter size less than 2.5 um; **PM10**-Respirable Particulate Matter size less than 10 um; **SO₂**-Sulphur dioxide; **NO_x**-Oxides of Nitrogen; **NH₃**-Ammonia; **O₃**-Ozone; **CO**-Carbon monoxide; **Pb**-Particulate Lead; **As**-Particulate Arsenic; **Ni**-Particulate Nickel; **C₆H₆**-Benzene & **BaP**- Benzo (a) pyrene in particulate phase. ug-microgram & ng-nanogram. * : **NAAQ Norms**-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Table : 3.16 Abstract of Ambient Air Quality Data

Sl. No.	Parameter	Pollutant Concentration, ug/m ³							
		PM2.5	PM10	SO ₂	NO _x	PM2.5	PM10	SO ₂	NO _x
		A1- PNR Mine Office				A2- RCL PNR Mine			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	17	35	8	10	20	40	11	14
3	10 th Percentile Value	20	39	9	12	21	40	12	15
4	20 th Percentile Value	21	42	10	13	22	43	12	15
5	30 th Percentile Value	21	43	10	13	22	44	13	16
6	40 th Percentile Value	22	44	10	13	23	45	13	17
7	50 th Percentile Value	23	46	10	14	23	45	14	18
8	60 th Percentile Value	24	49	11	14	24	46	15	18
9	70 th Percentile Value	24	50	11	14	24	47	16	20
10	80 th Percentile Value	26	53	12	15	25	48	17	22
11	90 th Percentile Value	26	55	12	16	27	50	19	24
12	95 th Percentile Value	27	55	13	17	27	51	19	25
13	98 th Percentile Value	30	58	14	18	28	52	21	27
14	Maximum	32	60	14	18	28	52	22	28
15	Arithmetic Mean	23.0	46.7	10.6	13.8	23.5	45.3	14.7	18.6
16	Geometric Mean	22.8	46.2	10.5	13.7	23.4	45.2	14.5	18.3
17	Standard Deviation	3.2	6.7	1.4	1.8	2.2	3.5	2.9	3.8
18	NAAQ Norms*	60	100	80	80	60	100	80	80
19	% Values exceeding Norms*	0	0	0	0	0	0	0	0
		A3-Kovilankudikadu				A4-Kaikatti near UT Plant			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	15	32	7	9	25	54	16	19
3	10 th Percentile Value	16	36	8	10	30	58	18	21
4	20 th Percentile Value	18	38	8	10	31	62	20	23
5	30 th Percentile Value	18	38	8	11	32	62	20	24
6	40 th Percentile Value	19	40	8	11	33	63	21	25
7	50 th Percentile Value	20	40	9	12	34	65	22	26
8	60 th Percentile Value	20	41	10	13	34	65	23	27
9	70 th Percentile Value	21	43	10	13	35	66	23	28
10	80 th Percentile Value	21	43	11	13	36	68	24	29
11	90 th Percentile Value	23	44	11	14	37	69	26	31
12	95 th Percentile Value	23	45	11	15	37	72	27	32
13	98 th Percentile Value	24	46	12	16	39	73	28	32
14	Maximum	24	47	12	16	41	74	28	32
15	Arithmetic Mean	19.4	40.2	9.2	12.0	33.3	64.1	21.8	26.0
16	Geometric Mean	19.3	40.0	9.1	11.8	33.1	63.9	21.6	25.7
17	Standard Deviation	2.4	3.6	1.4	1.9	3.4	4.8	3.1	3.7
18	NAAQ Norms*	60	100	80	80	60	100	80	80
19	% Values exceeding Norms*	0	0	0	0	0	0	0	0

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10-Respirable Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; NO_x-Oxides of Nitrogen. ug-microgram. O₃-Ozone values are reported locationwise.

NH₃-Ammonia; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; C₆H₆-Benzene and BaP-Benzo (a) pyrene in particulate phase levels were monitored below respective detectable limits.

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

Table : 3.16 (Contn.) Abstract of Ambient Air Quality Data

Sl. No.	Parameter	Pollutant Concentration, ug/m ³							
		PM2.5	PM10	SO ₂	NOx	PM2.5	PM10	SO ₂	NOx
		A5-Pudupalayam				A6-Hastinapuram			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	20	37	12	16	17	35	13	16
3	10 th Percentile Value	20	39	14	18	18	36	14	17
4	20 th Percentile Value	22	40	16	20	20	38	15	18
5	30 th Percentile Value	22	41	18	22	20	40	16	18
6	40 th Percentile Value	23	42	18	23	20	40	17	20
7	50 th Percentile Value	24	44	20	24	21	41	18	21
8	60 th Percentile Value	24	45	20	25	21	43	18	21
9	70 th Percentile Value	25	45	21	26	22	43	20	23
10	80 th Percentile Value	26	46	21	28	23	45	20	23
11	90 th Percentile Value	27	48	23	29	24	47	22	25
12	95 th Percentile Value	28	51	24	32	24	49	24	26
13	98 th Percentile Value	29	52	24	33	25	50	24	27
14	Maximum	30	53	24	33	26	50	24	27
15	Arithmetic Mean	23.8	43.6	18.9	24.0	21.0	41.6	18.1	20.8
16	Geometric Mean	23.6	43.4	18.6	23.5	20.9	41.4	17.8	20.6
17	Standard Deviation	2.7	4.0	3.4	4.6	2.2	4.2	3.2	3.1
18	NAAQ Norms*	60	100	80	80	60	100	80	80
19	% Values exceeding Norms*	0	0	0	0	0	0	0	0
		A7-Ariyalur Bypass				A8-Kallankurichi			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	30	58	20	25	15	32	9	12
3	10 th Percentile Value	34	63	21	25	16	35	9	12
4	20 th Percentile Value	37	68	22	26	17	37	10	13
5	30 th Percentile Value	38	71	22	27	18	38	10	14
6	40 th Percentile Value	39	72	23	27	18	38	11	14
7	50 th Percentile Value	40	72	23	28	20	40	11	14
8	60 th Percentile Value	42	73	24	28	20	41	11	14
9	70 th Percentile Value	42	75	24	29	22	41	12	15
10	80 th Percentile Value	43	76	25	30	22	42	12	15
11	90 th Percentile Value	45	78	26	31	23	44	13	16
12	95 th Percentile Value	46	78	26	32	23	45	13	16
13	98 th Percentile Value	47	78	27	33	24	46	14	17
14	Maximum	48	78	27	33	24	46	14	17
15	Arithmetic Mean	40.0	71.5	23.3	28.0	19.5	39.5	11.1	14.1
16	Geometric Mean	39.8	71.3	23.2	27.9	19.4	39.3	11.0	14.0
17	Standard Deviation	4.3	5.4	1.8	2.4	2.7	3.5	1.4	1.4
18	NAAQ Norms*	60	100	80	80	60	100	80	80
19	% Values exceeding Norms*	0	0	0	0	0	0	0	0

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10-Respirable Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen. ug-microgram. O₃-Ozone values are reported locationwise.

NH₃-Ammonia; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; C₆H₆-Benzene and BaP-Benzo (a) pyrene in particulate phase levels were monitored below respective detectable limits.

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

Table : 3.17 Ambient Air Quality Status

Season : Summer 2025

No. of Locations : 8

Sample Size : 24-Hourly

Sl. No.	Parameter	Pollutant Concentration, ug/m ³			
		PM2.5	PM10	SO ₂	NO _x
1	No. of Observations	192	192	192	192
2	Minimum	15	32	7	9
3	10 th Percentile Value	18	38	9	12
4	20 th Percentile Value	20	40	10	14
5	30 th Percentile Value	21	41	11	15
6	40 th Percentile Value	22	43	13	16
7	50 th Percentile Value	23	45	15	18
8	60 th Percentile Value	24	47	18	22
9	70 th Percentile Value	26	51	20	24
10	80 th Percentile Value	33	62	22	26
11	90 th Percentile Value	37	70	24	28
12	95 th Percentile Value	41	73	25	30
13	98 th Percentile Value	44	77	26	32
14	Maximum	48	78	28	33
15	Arithmetic Mean	25.4	49.1	15.9	19.6
16	Geometric Mean	24.5	47.7	15.0	18.6
17	Standard Deviation	7.5	12.1	5.6	6.4
18	NAAQ Norms*	60	100	80	80
19	% Values exceeding NAAQ Norms	0	0	0	0

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10-Respirable Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; NO_x-Oxides of Nitrogen. ug-microgram. O₃-Ozone values are reported locationwise.

NH₃-Ammonia; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; C₆H₆-Benzene and BaP-Benzo (a) pyrene in particulate phase levels were monitored below respective detectable limits.

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

National Ambient Air Quality Standard : The levels of air quality with an adequate margin of safety, to protect the public health, vegetation and property. Whenever and wherever two consecutive values exceed the limit specified above for the respective category, it would be considered adequate reason to institute regular/continuous monitoring and further investigations.

1. 24-hly./8-hly. values should be met 98% of the time in a year; however, 2% of the time it may exceed but not on two consecutive days.

2. Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24-hourly at uniform interval.

3.5.3 RSPM Analysis

With the samples of Respirable Suspended Particulate Matter (RSPM or PM₁₀) monitored, the main focus is on characterization and apportionment of PM₁₀ to have a better understanding and correlation between the RSPM fraction at source and receptor. The results are tabulated in **Table 3.18**. There was no significant variation in the characteristics of RSPM values in the upwind and downwind direction locations. Free Respirable Silica in RSPM was also monitored using Personal Sampler and FTIR Method of Analysis. The Silica Content was found to be 2.7% of RSPM that monitored in the Study Area.

Free Respirable Silica Content (FTIR Method) : 2.7%.

Table : 3.18 RSPM Analytical Data

Parameter	Percentage in RSPM Content	
	Upwind Direction (Location A6)	Downwind Direction (Location A2)
Loss on Ignition	12.3	12.5
Iron oxides (Fe ₂ O ₃)	7.5	7.7
Calcium oxide (CaO)	18.4	19.3
Magnesium oxide (MgO)	15.2	15.7
Sodium oxide (Na ₂ O)	0.30	0.31
Potassium oxide (K ₂ O)	0.18	0.20
Aluminium oxide (Al ₂ O ₃)	17.0	17.2
Titanium oxide (TiO ₂)	0.05	0.05

3.6 Noise Levels

Study area represents Industrial, Commercial & Residential Areas to compare with the MoEF&CC Ambient Noise Norms. The abstract of monitored noise data are presented in **Table 3.19**.

Ambient Noise Levels were ranging from 32.5 dB(A) to 103.6 dB(A) during day times and from 32.2 dB(A) to 102.5 dB(A) during night times on the monitoring days. Day Equivalent Noise (Leq-d) levels were found to be in the range 40.4-48.8 dB(A) with a mean value of 44.0 dB(A) and Night Equivalent Noise (Leq-n) level were found to be in the range 39.8-44.8 dB(A) with a mean value of 42.5 dB(A). While comparing with the MoEF&CC Leq Norms for day and night times, the monitored **ambient noise levels were well within the limit values** for their respective Category Area.

Workzone Noise Levels within the Lease Area will be maintained at **<85 db(A)**, well within **OSHA Standard of 85 dB(A) for 8-hours exposure**. Also, Leq Noise levels at the boundaries will be maintained at <55 dB(A) during day times and <45 dB(A) during night times, well within MoEF&CC Leq Norms for day and night times for Residential Areas.

Table : 3.19 Ambient Noise Level Data (Abstract)

Monitoring Date : 19-20.03.2025

Sl. No.	Location	Area	Noise Levels, dB(A)					
			Day Time (06:00-22:00 hrs.)			Night Time (22:00-06:00 hrs.)		
			Lmin.	Lmax.	Leq	Lmin.	Lmax.	Leq
1	A1-KBD QL Area	Industrial	33.8	85.7	40.4	33.0	80.2	39.8
2	A2-PNR Mine	Industrial	34.0	92.0	44.8	33.8	90.6	43.2
3	A3-Kovilankudikadu	Residential	32.8	88.1	41.2	32.4	82.4	40.5
4	A4- Kaikatti near UT Plant	Industrial	34.8	101.4	48.8	33.0	102.5	44.8
5	A5-Pudupalayam	Residential	33.5	101.2	44.8	32.8	101.8	43.5
6	A6-Hastinapuram	Residential	34.0	100.8	43.8	33.1	101.4	42.7
7	A7-Ariyalur Bypass	Commercial	33.8	103.6	46.9	33.5	102.2	44.8
8	A8-Kallankurichi	Residential	32.5	90.7	41.6	32.2	88.7	40.4
Study Area			32.5	103.6	44.0	32.2	102.5	42.5
MoEF&CC Norms* for Residential Areas			-			55	-	45
MoEF&CC Norms for Commercial Areas			-			65	-	55
MoEF&CC Norms for Industrial Areas			-			75	-	70

* : MoEF&CC Norms-Ministry of Environment, Forest & Climate Change Ambient Noise Norms (Leq).

Day time is reckoned in between 6 a.m and 10 p.m. and Night time is reckoned in between 10 p.m. and 6 a.m.

3.7 Water Environment

3.7.1 Hydrogeology

RCL has engaged the **Department of Remote Sensing, Bharathidasan University, Trichy** for 'Integrated Hydrological Investigations-A Geospatial Approach' in and around their Mine Lease Areas in Ariyalur Region (Project 'Hydrolime') since May 2017 and submitted the periodical Reports to the Authorities. Also, the EIA Coordinator and Officials of M/s. Thrust Geo-consultants Private Limited, an **Accredited Ground Water Professionals** for 'Hydrogeological Report for Mining Projects' by Central Ground Water Authority (CGWA) have carried out the Hydrogeological Survey including a Pumping Test during 18-19.12.2023 and submitted the Report.



Ground Water Levels : As per TWAD Data, **70 year Normal Rainfall** of Ariyalur Rain Gauge Station is **1,096 mm** viz. Transitional Period (Jan.-May)-199 mm, SW Monsoon Period (Jun.-Sep.)-379 mm & NE Monsoon Period (Oct.-Dec.)-518 mm. **Based on the mine workings**, the Ground water-table level in the vicinity was at **40 m BGL** during **Postmonsoon** & **45 m BGL** during **Premonsoon** periods.

RCL has installed a Piezometer in PNR Mine Area and monitoring the ground water level periodically (**Table 3.20**).

Table : 3.20 Monitored Ground Water Level Data in PNR Mine

Month/Year	Piezometer Water Level Readings, m BGL				
	2019	2020	2021	2022	2023
January	20.76	14.87	14.94	8.35	16.81
February	22.32	15.64	15.31	9.83	15.32
March	24.90	16.35	14.96	11.57	16.40
April	26.45	17.51	16.13	13.23	17.16
May	27.32	18.47	17.25	16.08	17.54
June	26.70	19.07	17.16	15.10	18.22
July	25.79	20.08	17.63	15.42	18.81
August	23.89	20.32	18.40	15.95	19.31
September	22.24	20.60	18.80	15.75	19.00
October	19.25	19.16	17.13	15.46	18.50
November	16.30	17.21	11.43	15.29	16.55
December	18.94	14.81	8.73	13.72	16.32

On the monitoring day, the water levels observed in the 6 Borewells in the PNR Mine vicinity (within 2 km) are given in **Table 3.21**. The levels were found to be 8.14 m BGL to 22.30 m BGL while it was 15.50 m BGL at PNR Mine.

Table : 3.21 Monitored Ground Water Level Data

Sl. No.	Borewell at	Coordinates	Distance from the Mine, km	Water Level Readings, m BGL
1	Periyanaagalur	11° 8'8.20"N - 79° 9'19.94"E	1.8	18.84
2	Chinnanagalur	11° 7'31.73"N- 79° 9'20.04"E	2.1	17.17
3	PNR Mine	11° 7'27.85"N- 79° 8'33.59"E	1.5	15.50
4	RCL Mine Office	11° 7'11.45"N- 79° 8'49.24"E	1.4	15.90
5	Kattupiringiyam	11° 6'50.37"N- 79° 8'22.30"E	1.3	8.14
6	Kattupiringiyam Mine	11° 6'53.80"N- 79° 8'1.08"E	1.5	22.30
7	Hastinapuram	11° 7'3.97"N- 79° 7'19.98"E	0.4	18.93

The monitored water levels in the Study Area are brought to Reduced Levels (RLs) for comparison and '**Water Level Contours**' are plotted in Google Earth Imagery and is appended.



Ground Water Levels from the **27 number of Observation Wells** of TWAD in Ariyalur District have been analysed for Post-Monsoon and Pre-Monsoon periods (**Table 3.22**). Ground Water-table in the District ranges from 23.0 m to 28.7 m with average level at **25.4 m BGL during Post-monsoon** and 25.6 m to 31.7 m with average level at **29.2 m BGL during Premonsoon Period**.

Table : 3.22 Ground Water Level Data (TWAD)

Monitored Month & Ground Water Level, m BGL													
Jan 2015	May 2015	Jan 2016	May 2016	Jan 2017	May 2017	Jan 2018	May 2018	Jan 2019	May 2019	Jan 2020	May 2020	Jan 2021	May 2021
23.6	25.6	23.0	28.7	28.7	31.7	25.0	31.3	26.9	30.0	26.1	29.1	24.6	27.9

Source : TWAD Data for Ariyalur District.

3.7.2 Stage of Development

The ground water in Ariyalur region occurs in three different geological formations viz. River Alluvium, Marine Limestone and Tertiary Formations (Central Ground Water Board - CGWB District Brochure; March 2011). In the river alluvium, the ground water occurs under water table condition. The average thickness of the river alluvium varies from 12 m to 22 m. The ground water in these formations serves as irrigation and drinking water sources. In the Cretaceous limestone formations the ground water occurs in water table conditions. The depth of the wells in these formations ranges between 10-20 m and some area has high ground water potential due to the presence of limestone cavities. In the Tertiary formations, the ground water occurs predominantly in semi-confined and confined conditions which yield good quantity and quality of waters. The depth of bore wells in these formation ranges from 30 to 120 m BGL.

Based on the aquifer parameters, the **Stage of Development of Ariyalur Block falls in Safe Category (<70%)**.

Table : 3.23 Aquifer Characteristics & Stage of Development

Aquifer Parameters	Alluvium	Sedimentary	Hard Rock
Well Yield, lpm	300-950	300-550	80-210
Transmissivity (T), m ² /day	225-1500	90-190	35-130
Permeability (K), m/day	20-50	15-30	5-20
Net Groundwater Availability, MCM			314.97
Existing Gross Groundwater Draft for All Users, MCM			161.52
Stage of Groundwater Development			51 %
Categorization of the District			Safe

3.7.3 Water Quality

The Central Pollution Control Board (CPCB) has identified Five **Designated Best Use of Surface Waters** viz. **Class A** (Drinking Water Source without Conventional Treatment but after Disinfection), **B** (Out Door Bathing-Organised), **C** (Drinking Water Source after Conventional Treatment and Disinfection), **D** (Propagation of Wild life and Fisheries) & **E** (Irrigation, Industrial Cooling, Controlled Waste Disposal) and stipulated the Norms for the Classes; for few Parameters (**Table 3.24**). Further, Bureau of Indian Standards (BIS) had also recommended Tolerance Limits for Inland Surface Waters for the different uses (**IS 2296:1982**). Even though, IS 2296:1982 has been withdrawn, the analysed data are compared with this Standard to have better understanding.

Table : 3.24 CPCB Criteria for Designated Best Use of Water

Parameter	Designated Best Use Class & Required Criteria				
	A	B	C	D	E
pH	6.5-8.5	6.5-8.5	6.5-9.0	6.5-8.5	6.5-8.5
EC, umhos/cm (max.)	-	-	-	-	2,250
DO, mg/l	6 or more	5 or more	4 or more	4 or more	6 or more
BOD-3 days @ 27 °C	2 or less	3 or less	3 or less	-	2 or less
Total Coliforms, MPN/100 ml	50 or less	500 or less	5000 or less	-	50 or less
Free Ammonia (as N), mg/l	-	-	-	1.2 or less	-
Boron, mg/l (max.)	-	-	-	-	2
Sodium Absorption Ratio (max.)	-	-	-	-	26

- : Not included/Not specified.

The Ground Water Quality Parameters are compared with **BIS 10500:2012 Standards** of Acceptable and Permissible Limits for Drinking purpose with Ground Water as source. The monitored water quality data are presented in **Tables 3.25-3.26** and the abstract of those data is given as **Table 3.27**.

The **Surface Water** samples were monitored with pH in the range 7.49-7.73 against the Limit value of 6.5-9.0. DO levels were in the range 4.2-5.6 mg/l against the minimum requirement value of 4.0 mg/l. TDS values were monitored in the range of 390-550 mg/l. Chloride values ranging from 118 mg/l to 156 mg/l. Iron content was found to be in the range 0.08-0.13 mg/l. Oil and grease, phenolic compounds, cyanides, sulphides and insecticides were found to be absent. Trace metals were found to be in traceable levels. BOD and COD values were found to be <2 mg/l and 4-19 mg/l respectively. The surface water quality was found to be within the prescribed CPCB Norms.

The pH of **Ground Water** samples were ranging from 7.52-7.82 against the BIS Norm of 6.5-8.5. TDS and Chloride values were found to be in the range 440-620 mg/l (Norm 500 mg/l or 2,000 mg/l in the absence of alternate source) and 120-162 mg/l (Norm 250/1000 mg/l) respectively. Iron content was found to be in the range 0.08-0.14 mg/l. Oil & Grease, Cyanides, Phenols, Pesticides, etc. were found to be absent. Most of the trace metals were monitored to be below their detectable limits. In general, the water quality of ground waters was found to be within the prescribed IS 10500:2012 Norms for Drinking in the absence of an alternative source.

Table : 3.25 Surface Water Quality Data

Monitoring Dates : 19.05.2025
(Worst case & Mean values are reported)

Sl. No.	Parameter	W1 Nalla near Mine	W2 Uppu Odai	W3 Kallar River	W4 Marudaiyar River Up stream	CPCB Norms*
1	pH	7.71	7.56	7.61	7.73	6.5-8.5
2	Colour, Hazen units	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	10-30
3	Temperature, °C	27.5	27.3	27.7	27.8	-
4	Turbidity, NTU	2.0	1.5	1.8	2.1	-
5	Residual Chlorine, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
6	Dissolved Oxygen, mg/l	4.9	5.3	5.1	5.6	4.0-6.0
7	Total Suspended Solids, mg/l	22	23	28	23	-
8	Electrical Conductivity, umhos/cm	740	680	760	810	-
9	Total Dissolved Solids, mg/l	470	430	480	520	500-2100
10	Total Hardness (as CaCO ₃), mg/l	200	190	210	220	-
11	Calcium Hardness, mg/l	110	100	110	120	-
12	Magnesium Hardness, mg/l	90	90	100	100	-
13	Calcium (as Ca), mg/l	44	40	44	48	-
14	Magnesium (as Mg), mg/l	22	22	24	24	-
15	Sodium (as Na), mg/l	46	43	49	52	-
16	Potassium (as K), mg/l	9	7	9	12	-
17	Chlorides (as Cl), mg/l	135	130	138	147	250-600
18	Sulphates (as SO ₄), mg/l	37	35	41	44	400-1000
19	Total Alkalinity (as CaCO ₃), mg/l	110	90	110	120	-
20	BOD-3 days @ 27°C, mg/l	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	<3
21	COD, mg/l	6	4	4	8	-
22	Oil & Grease, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
23	Iron (as Fe), mg/l	0.08	0.09	0.11	0.10	0.3-5.0
24	Fluorides (as F), mg/l	0.17	0.14	0.19	0.28	1.5
25	Nitrates (as NO ₃), mg/l	8	11	9	17	20-50
26	Phosphates (as PO ₄), mg/l	<0.01	<0.01	<0.01	<0.01	-
27	Cyanides (as CN), mg/l	<0.01	<0.01	<0.01	<0.01	-
28	Pesticides (as Malathion), mg/l	<0.01	<0.01	<0.01	<0.01	-
29	Phenols (as C ₆ H ₅ OH), mg/l	<0.01	<0.01	<0.01	<0.01	-
30	Manganese (as Mn), mg/l	<0.01	<0.01	<0.01	<0.01	-
31	Chromium (as Cr), mg/l	<0.01	<0.01	<0.01	<0.01	-
32	Copper (as Cu), mg/l	<0.01	<0.01	<0.01	<0.01	1.5
33	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	-
34	Aluminium (as Al), mg/l	<0.01	<0.01	<0.01	<0.01	-
35	Cadmium (as Cd), mg/l	<0.01	<0.01	<0.01	<0.01	-
36	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.05-0.2
37	Boron (as B), mg/l	<0.01	<0.01	<0.01	<0.01	2
38	Mercury (as Hg), mg/l	<0.01	<0.01	<0.01	<0.01	-
39	Lead (as Pb), mg/l	<0.01	<0.01	<0.01	<0.01	0.1
40	Zinc (as Zn), mg/l	<0.01	<0.01	<0.01	<0.01	1.5-15
41	Percent Sodium, %	32.1	32.0	32.5	32.4	-
42	Total Coliforms, MPN/100 ml	48	42	46	60	50-5000
43	Faecal Coliforms, MPN/100 ml	20	19	21	25	-
44	E. Coli, MPN/100 ml	15	14	14	20	-

* : CPCB Norms-Central Pollution Control Board Norms for Surface Waters-**Class C**.

- : Not included/Not available.

Table : 3.25 (Contn.) Surface Water Quality Data

Monitoring Dates : 19.05.2025
(Worst case & Mean values are reported)

Sl. No.	Parameter	W5 Marudaiyar River Down stream	W6 Manakudi Tank	W7 Pond, PeriyanaGalur	W8 Pond, Pudupalayam	CPCB Norms*
1	pH	7.67	7.49	7.60	7.63	6.5-8.5
2	Colour, Hazen units	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	10-30
3	Temperature, °C	27.4	27.0	26.9	27.0	-
4	Turbidity, NTU	2.2	1.8	1.7	1.2	-
5	Residual Chlorine, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
6	Dissolved Oxygen, mg/l	5.4	4.8	4.4	4.2	4.0-6.0
7	Total Suspended Solids, mg/l	33	25	20	14	-
8	Electrical Conductivity, umhos/cm	870	660	760	620	-
9	Total Dissolved Solids, mg/l	550	420	480	390	500-2100
10	Total Hardness (as CaCO ₃), mg/l	230	190	210	170	-
11	Calcium Hardness, mg/l	120	100	110	90	-
12	Magnesium Hardness, mg/l	110	90	100	80	-
13	Calcium (as Ca), mg/l	48	40	44	36	-
14	Magnesium (as Mg), mg/l	26	22	24	19	-
15	Sodium (as Na), mg/l	58	41	48	39	-
16	Potassium (as K), mg/l	13	4	9	4	-
17	Chlorides (as Cl), mg/l	156	124	142	118	250-600
18	Sulphates (as SO ₄), mg/l	49	32	37	29	400-1000
19	Total Alkalinity (as CaCO ₃), mg/l	130	90	110	80	-
20	BOD-3 days @ 27°C, mg/l	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	<3
21	COD, mg/l	6	13	8	10	-
22	Oil & Grease, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
23	Iron (as Fe), mg/l	0.13	0.10	0.08	0.12	0.3-5.0
24	Fluorides (as F), mg/l	0.24	0.14	0.20	0.24	1.5
25	Nitrates (as NO ₃), mg/l	14	6	9	13	20-50
26	Phosphates (as PO ₄), mg/l	<0.01	<0.01	<0.01	<0.01	-
27	Cyanides (as CN), mg/l	<0.01	<0.01	<0.01	<0.01	-
28	Pesticides (as Malathion), mg/l	<0.01	<0.01	<0.01	<0.01	-
29	Phenols (as C ₆ H ₅ OH), mg/l	<0.01	<0.01	<0.01	<0.01	-
30	Manganese (as Mn), mg/l	<0.01	<0.01	<0.01	<0.01	-
31	Chromium (as Cr), mg/l	<0.01	<0.01	<0.01	<0.01	-
32	Copper (as Cu), mg/l	<0.01	<0.01	<0.01	<0.01	1.5
33	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	-
34	Aluminium (as Al), mg/l	<0.01	<0.01	<0.01	<0.01	-
35	Cadmium (as Cd), mg/l	<0.01	<0.01	<0.01	<0.01	-
36	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.05-0.2
37	Boron (as B), mg/l	<0.01	<0.01	<0.01	<0.01	2
38	Mercury (as Hg), mg/l	<0.01	<0.01	<0.01	<0.01	-
39	Lead (as Pb), mg/l	<0.01	<0.01	<0.01	<0.01	0.1
40	Zinc (as Zn), mg/l	<0.01	<0.01	<0.01	<0.01	1.5-15
41	Percent Sodium, %	33.8	31.4	32.0	32.6	-
42	Total Coliforms, MPN/100 ml	64	69	52	45	50-5000
43	Faecal Coliforms, MPN/100 ml	26	28	22	24	-
44	E. Coli, MPN/100 ml	17	22	17	19	-

* : CPCB Norms-Central Pollution Control Board Norms for Surface Waters-**Class C**.

- : Not included/Not available.

Table : 3.26 Ground Water Quality Data

Monitoring Dates : 19.05.2025
(Worst case & Mean values are reported)

Sl. No.	Parameter	W9 PNR Mine Pit	W10 Borewell, Kallankurichi	W11 Borewell, Kattupirin- giyam	W12 Borewell, Periya- nagalur	IS:10500 Norms*
1	pH	7.67	7.52	7.58	7.82	6.5-8.5
2	Colour, Hazen units	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	5/15*
3	Temperature, °C	27.1	26.7	27.3	27.4	-
4	Turbidity, NTU	1.2	0.7	0.7	1.1	1/5
5	Residual Chlorine, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	0.2/1.0
6	Dissolved Oxygen, mg/l	5.1	5.5	4.9	4.7	-
7	Total Suspended Solids, mg/l	26	13	17	18	-
8	Electrical Conductivity, umhos/cm	920	690	790	820	-
9	Total Dissolved Solids, mg/l	580	440	500	520	500/2000
10	Total Hardness (as CaCO ₃), mg/l	250	200	220	220	200/600
11	Calcium Hardness, mg/l	130	110	120	120	-
12	Magnesium Hardness, mg/l	120	90	100	100	-
13	Calcium (as Ca), mg/l	52	44	48	48	75/200
14	Magnesium (as Mg), mg/l	29	22	24	24	30/100
15	Sodium (as Na), mg/l	61	43	51	54	-
16	Potassium (as K), mg/l	17	9	12	14	-
17	Chlorides (as Cl), mg/l	155	120	137	143	250/1000
18	Sulphates (as SO ₄), mg/l	68	41	52	56	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	130	90	110	110	200/600
20	BOD-3 days @ 27°C, mg/l	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	-
21	COD, mg/l	9	3	7	6	-
22	Oil & Grease, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
23	Iron (as Fe), mg/l	0.12	0.08	0.08	0.11	0.3
24	Fluorides (as F), mg/l	0.19	0.13	0.17	0.15	1.0/1.5
25	Nitrates (as NO ₃), mg/l	0.19	8	11	15	45
26	Phosphates (as PO ₄), mg/l	<0.01	<0.01	<0.01	<0.01	-
27	Cyanides (as CN), mg/l	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	0.05
28	Pesticides (as Malathion), mg/l	<0.01	<0.01	<0.01	<0.01	Abs./0.001
29	Phenols (as C ₆ H ₅ OH), mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.001/0.002
30	Manganese (as Mn), mg/l	<0.01	<0.01	<0.01	<0.01	0.1/0.3
31	Chromium (as Cr), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
32	Copper (as Cu), mg/l	<0.01	<0.01	<0.01	<0.01	0.05/1.5
33	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
34	Aluminium (as Al), mg/l	<0.01	<0.01	<0.01	<0.01	0.03/0.2
35	Cadmium (as Cd), mg/l	<0.01	<0.01	<0.01	<0.01	0.003
36	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.01/0.05
37	Boron (as B), mg/l	<0.01	<0.01	<0.01	<0.01	0.5/1.0
38	Mercury (as Hg), mg/l	<0.001	<0.001	<0.001	<0.001	0.001
39	Lead (as Pb), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
40	Zinc (as Zn), mg/l	<0.01	<0.01	<0.01	<0.01	5/15
41	Percent Sodium, %	32.8	30.6	32.0	33.0	-
42	Total Coliforms, MPN/100 ml	<2	<2	<2	<2	Absent
43	Faecal Coliforms, MPN/100 ml	<2	<2	<2	<2	Absent
44	E. Coli, MPN/100 ml	<2	<2	<2	<2	Absent

* : IS:10500 :2012-Drinking Water Standards; # : Requirement/Permissible Limit in the absence of alternate source.

Table : 3.26 (Contn.) Ground Water Quality Data

Monitoring Dates : 19.05.2025
(Worst case & Mean values are reported)

Sl. No.	Parameter	W13 Borewell, Reddipalayam	W14 Borewell, Pudupalayam	W15 Borewell, Hastinapuram	W16 Borewell, Kovilan-kudikadu	IS:10500 Norms*
1	pH	7.63	7.60	7.70	7.63	6.5-8.5
2	Colour, Hazen units	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	5/15#
3	Temperature, °C	27.0	27.1	27.4	27.1	-
4	Turbidity, NTU	0.9	1.3	1.3	1.1	1/5
5	Residual Chlorine, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	0.2/1.0
6	Dissolved Oxygen, mg/l	5.3	5.0	5.4	4.9	-
7	Total Suspended Solids, mg/l	21	18	21	17	-
8	Electrical Conductivity, umhos/cm	980	710	850	720	-
9	Total Dissolved Solids, mg/l	620	450	540	460	500/2000
10	Total Hardness (as CaCO ₃), mg/l	280	210	230	210	200/600
11	Calcium Hardness, mg/l	150	110	120	110	-
12	Magnesium Hardness, mg/l	130	100	110	100	-
13	Calcium (as Ca), mg/l	60	44	48	44	75/200
14	Magnesium (as Mg), mg/l	31	24	26	24	30/100
15	Sodium (as Na), mg/l	66	46	56	47	-
16	Potassium (as K), mg/l	19	10	14	10	-
17	Chlorides (as Cl), mg/l	162	127	146	129	250/1000
18	Sulphates (as SO ₄), mg/l	74	44	59	46	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	140	90	120	90	200/600
20	BOD-3 days @ 27°C, mg/l	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	-
21	COD, mg/l	11	7	8	4	-
22	Oil & Grease, mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
23	Iron (as Fe), mg/l	0.14	0.11	0.09	0.09	0.3
24	Fluorides (as F), mg/l	0.21	0.19	0.17	0.14	1.0/1.5
25	Nitrates (as NO ₃), mg/l	23	12	15	10	45
26	Phosphates (as PO ₄), mg/l	<0.01	<0.01	<0.01	<0.01	-
27	Cyanides (as CN), mg/l	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	0.05
28	Pesticides (as Malathion), mg/l	<0.01	<0.01	<0.01	<0.01	Abs./0.001
29	Phenols (as C ₆ H ₅ OH), mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.001/0.002
30	Manganese (as Mn), mg/l	<0.01	<0.01	<0.01	<0.01	0.1/0.3
31	Chromium (as Cr), mg/l	<0.01	<0.01	<0.01	<0.01	0.05
32	Copper (as Cu), mg/l	<0.01	<0.01	<0.01	<0.01	0.05/1.5
33	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
34	Aluminium (as Al), mg/l	<0.01	<0.01	<0.01	<0.01	0.03/0.2
35	Cadmium (as Cd), mg/l	<0.01	<0.01	<0.01	<0.01	0.003
36	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	0.01/0.05
37	Boron (as B), mg/l	<0.01	<0.01	<0.01	<0.01	0.5/1.0
38	Mercury (as Hg), mg/l	<0.001	<0.001	<0.001	<0.001	0.001
39	Lead (as Pb), mg/l	<0.01	<0.01	<0.01	<0.01	0.01
40	Zinc (as Zn), mg/l	<0.01	<0.01	<0.01	<0.01	5/15
41	Percent Sodium, %	32.0	31.0	32.9	31.4	-
42	Total Coliforms, MPN/100 ml	<2	<2	<2	<2	Absent
43	Faecal Coliforms, MPN/100 ml	<2	<2	<2	<2	Absent
44	E. Coli, MPN/100 ml	<2	<2	<2	<2	Absent

* : IS:10500 :2012-Drinking Water Standards; # : Requirement/Permissible Limit in the absence of alternate source.

Table : 3.27 Water Quality Status

Monitoring Dates : 19.05.2025

Sl. No.	Parameter	Concentration Range & Norms			
		Surface Waters	CPCB Norms* for Surface Waters	Ground Waters	IS:10500 Norms** for Drinking Waters
1	pH	7.49-7.73	6.5-8.5	7.52-7.82	6.5-8.5
2	Total Dissolved Solids, mg/l	390-550	-	440-620	500-2000*
3	Dissolved Oxygen, mg/l	4.2-5.6	4.0-6.0	4.7-5.5	-
4	BOD (3 days @ 27 °C), mg/l	BDL(DL:2.0)	<3	BDL(DL:2.0)	-
5	COD, mg/l	4-13	-	3-11	-
6	Oil & Grease, mg/l	BDL(DL:1.0)	-	BDL(DL:1.0)	-
7	Chlorides (as Cl), mg/l	118-156	250-600	120-162	250-1000
8	Iron (as Fe), mg/l	0.08-0.13	0.3-5.0	0.08-0.14	0.3
9	Trace Metals, mg/l	<0.01	-	<0.01	<0.001-<0.01
10	Total Coliforms, MPN/100 ml	42-69	50-5000	<2	Absent

* : CPCB Norms-Central Pollution Control Board Norms for Surface Waters-**Class C**. - : Not included/Not available.

** : * : IS:10500 :2012-Drinking Water Standards; # : Requirement/Permissible Limit in the absence of alternate source.

3.8 Land Environment

3.8.1 Soil Status

The collected soil quality data are given as **Table 3.28**. Soils with medium compaction and silty loam texture were predominant in the study area. Soil pH values (7.56-7.81) were found to be in alkaline range and Electrical Conductivity values were in the range 1.53-1.90 mmhos/cm. There was low moisture at all the monitoring locations. Low levels of Nitrogen, Phosphorous and Potassium (NPK) values were monitored at all locations. Sodium Absorption Ratio was in the range 1.28-2.99 (desirable value being <5). There was **no heavy metals intrusion**/leaching into the ground strata. Wilting coefficient in significant levels would mean that these soils would support the vegetation, if amended suitably and will suit for salt tolerant & semisalt tolerant plants

3.8.2 Land Use Pattern

For Land use study of the Study Area, IRS P6 LIS-IV **Satellite Imagery**/data (dated 05.05.2023) is used (**Fig. 3.5**). Visual interpretation technique has been adopted for the interpretation keys suggested in guidelines of NNRMS, Bangalore. Level-3 Classification with 1:50,000 scale was made for the preparation of land use mapping (**Fig. 3.6**). Land Use Pattern is given in **Table 3.29**. The Crop Land & Plantations occupy about 46.11%. Fallow Land occupies about 29.97%. Mines & Industrial Area occupies 4.22%. Water body occupies about 3.16%. Only 4.96% of the study area is covered by built-up land.

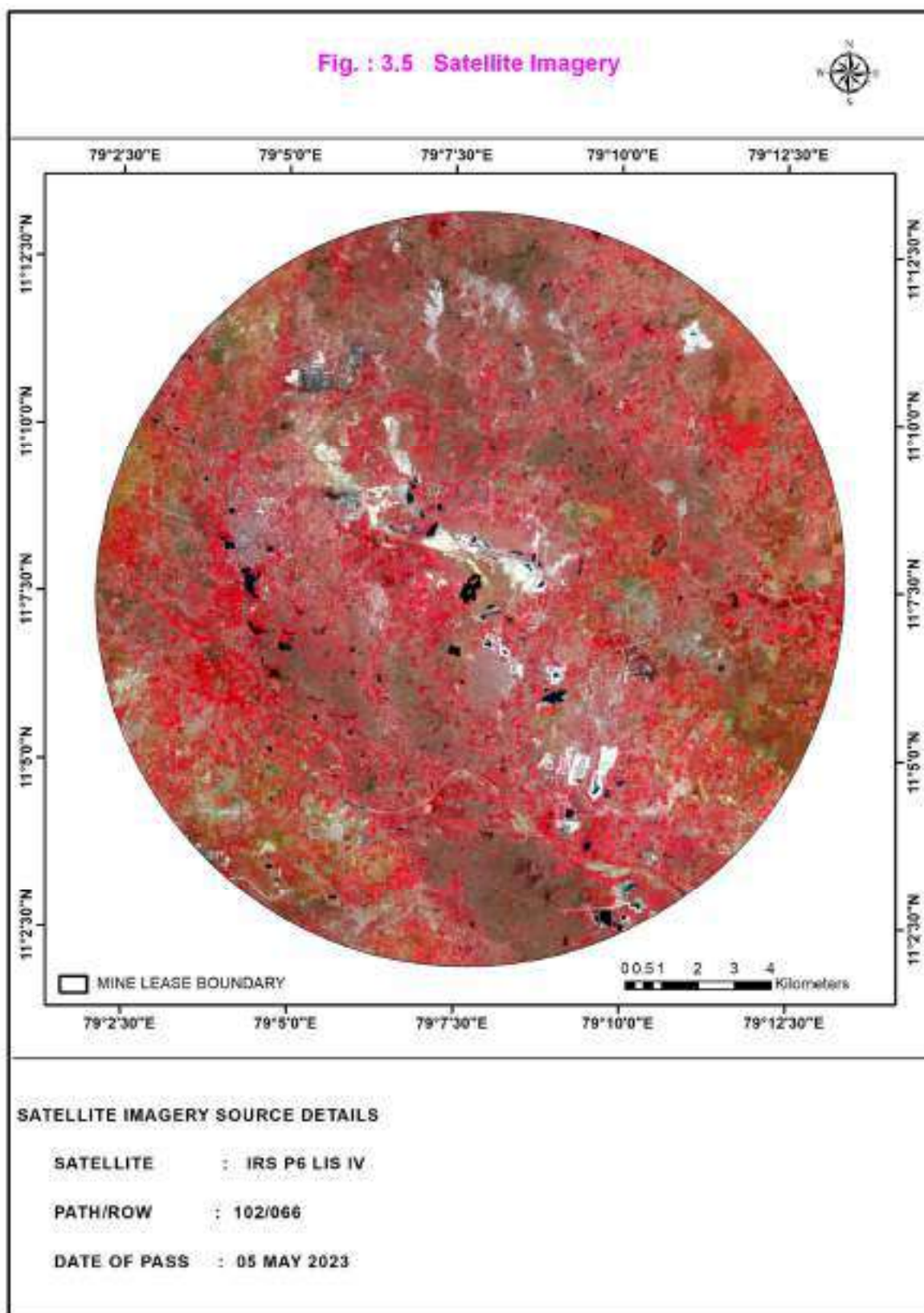
Table : 3.28 Soil Status
Monitoring Date 19.05.2025

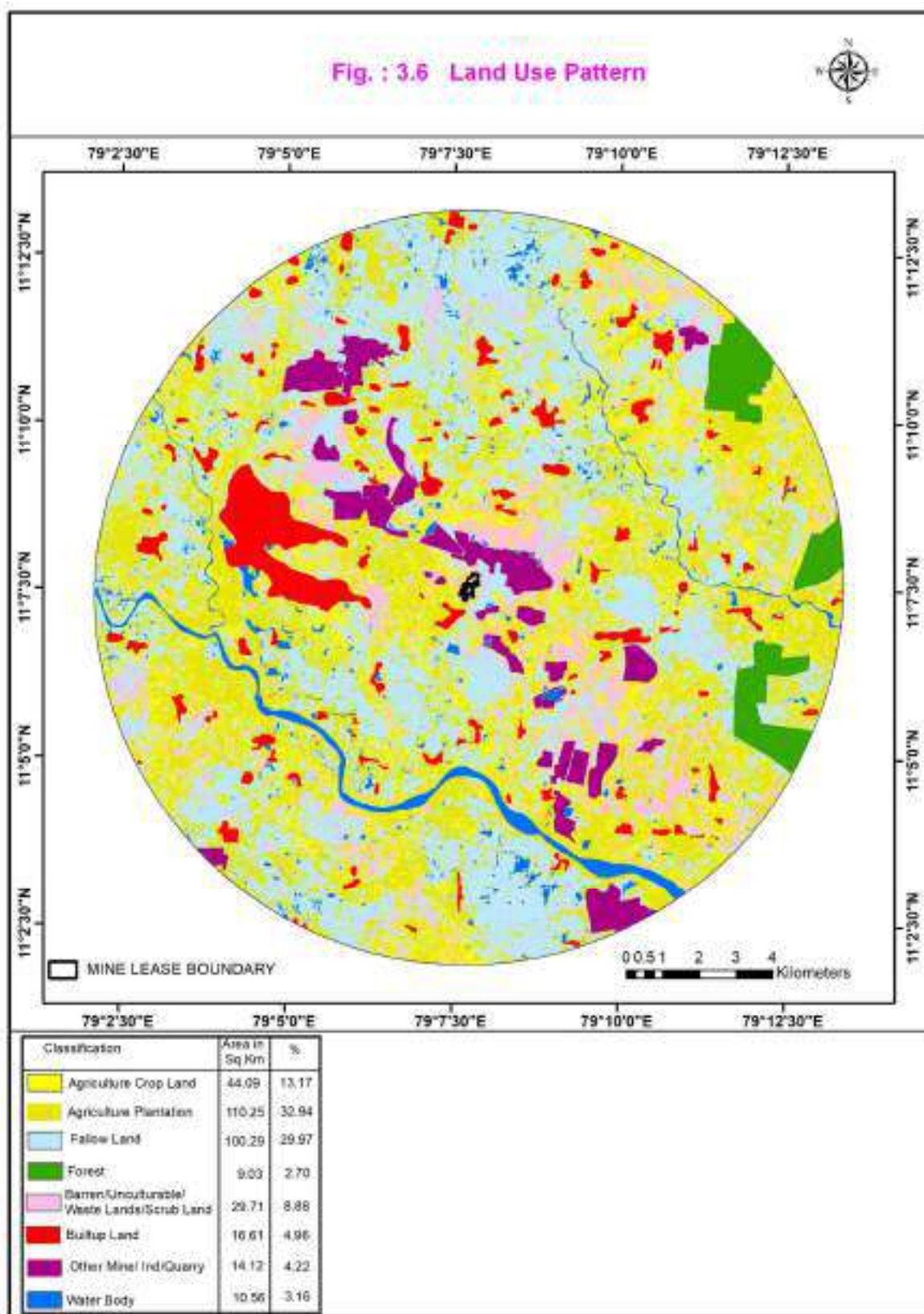
Sl. No.	Parameter	S1 Green Belt	S2 Dump Area	S3 Dry Agri. Land, Periyana nagalur	S4 Forrest Land, Vilangudi	S5 Agri. Land, Pudukpalayam	Desirable Range*
i	Colour	Brown	Brown	Grey	Reddish Brown	Brown	-
ii	Compaction	Medium	Low	Medium	Medium	Medium	-
1	pH (10% Solution)	7.64	7.81	7.69	7.68	7.56	5.5-9.0
2	Electrical Conductivity, mmhos/cm	1.58	1.53	1.80	1.79	1.90	0.2-0.5
3	Natural Moisture Content, %	12.6	10.4	11.2	13.6	14.2	-
4	Organic Carbon, %	0.97	0.89	1.06	0.98	1.02	>0.75
5	Nitrogen (as N), %	0.012	0.010	0.015	0.014	0.016	0.01-0.02
6	Phosphorus (as P), %	0.005	0.003	0.009	0.010	0.011	0.002-0.004
7	Potassium (as K), %	0.008	0.005	0.012	0.011	0.014	>0.01
8	Sodium (as Na), ppm	90	70	130	130	130	-
9	Calcium (as Ca), ppm	80	110	60	70	80	-
10	Magnesium (as Mg), ppm	50	70	50	50	60	-
11	Chlorides (as Cl), ppm	210	190	260	230	230	-
12	Sulphates (as SO ₄), ppm	140	110	170	170	190	-
13	Cation Exchange Capacity, meq/100 g	22.6	19.7	23.2	22.3	23.4	10-30
14	Grain Size Distribution :i. Sand, %	31.9	33.7	34.2	28.8	32.9	-
ii	Silt, %	63.7	60.9	60.9	64.9	63.4	-
iii	Clay, %	4.4	5.4	4.9	6.3	3.7	-
15	Textural Class	Silty loam	Silty loam	Sandy loam	Silty loam	Silty loam	Loam
16	Bulk Density, g/cc	1.38	1.35	1.35	1.37	1.36	-
17	Infiltration Rate, cm/hr	3.8	4.3	4.0	3.9	3.6	-
18	Field Capacity, %	22.3	18.9	23.9	23.6	23.8	-
19	Wilting Coefficient, %	0.6	0.6	0.5	0.8	0.7	>0.4
20	Available Water Storage Capacity, %	21.7	18.3	23.4	22.8	23.1	-
21	Sodium Absorbing Ratio	1.94	1.28	2.99	2.89	2.66	<5

* : Desirable Range for High Production Soil.

Table : 3.29 Land Use Pattern

Land Use	Area, sq.km	Coverage, %
Agricultural Crop Land	44.09	13.17
Agri. Plantations	110.25	32.93
Fallow Land	100.29	29.96
Forests	9.03	2.70
Barren/Scrub Land	29.71	8.88
Other Mines, Industries, Quarries, etc.	14.12	4.22
Built-up Land	16.61	4.98
Water Bodies	10.56	3.16
Total	334.66	100





3.9 Flora and Fauna

3.9.1 Flora

A general ecological survey was carried out in the study area of 10 km radius around the Mine area. **Study Area is not part of any National Park, Sanctuary, Biosphere Reserve, Wildlife Corridors, Migratory Path, etc.** The primary data was generated through preparing a general checklist of all plants encountered in the study area. The species of vegetation found were identified and listed according to their families. The list of plant species in the **Reserved Forests Area** are presented in **Table 3.30**. The list of plant species in the Core and Buffer Zones are presented in **Table 3.31 & Table 3.22** respectively.

Table : 3.30 List of Flora in the Reserve Forests

Sl. No.	Botanical Name	Family	Common Name	Local Name
1	Acacia arabica (wild)	Mimosaceae	Karuvel	Black babool
2	Acaia catechu	Fabaceae	Karungali	-
3	Aegle marmelos	Rutaceae	Vilam	-
4	Albizia amara (Roxb).	Mimosaceae	Ushilai	Slris
5	Anacardium occidentale	Anacardiaceae	Mundiri	Cashew
6	Azadirachta indica	Meliaceae	Vembu, Veppa	Neem
7	Bambusa vulgaris	Bambusaceae	Mungil	Bamboo
8	Borassus flabelliformis	Arecaceae	Panai	Palm
9	Butea monosperma	Fabaceae	Purasu	Flame of the forest
10	Cassia siamea	Caesalpiniaceae	Konnai	Kassod
11	Eucalyptus globulus	Myrtaceae	Araspadi, Thailam	Eucalyptus
12	Ficus benghalensis	Moraceae	Alamaram	Banyan
13	Lannea coromandelica	Anacardiaceae	Udhaiyam	Indian ash tree
14	Peltophorum peterocarpum	Fabaceae	Perunkonai	Pettophorum
15	Phoenix sylvestris	Arecaceae	Echcha	Indian date
16	Pongamia pinnata	Fabaceae	Pungai, Pungan	Indian Beech
17	Prosopis juliflora	Fabaceae	Velikathan, Velikaruvel	Babool
18	Senna occidentalis	Fabaceae	Ponnavarai	Coffe senna
19	Swietenia macrophylla	Meliaceae	Mahogany	-
20	Tectona garandis	Lamiaceae	Tekku	Teak
21	Ziziphus oenopia	Rhamnaceae	Suraimul	-

The nature of shrubs and trees in the study areas were of drought resistant types. Besides the natural vegetation, the agricultural and commercial crops were cultivated in and around the study area. Paddy, Maize, Green Gram, Black gram, Groundnut, Ragi, etc. were found to be cultivated among the agricultural crops whereas Sugarcane, Cotton, Turmeric, Cashew, etc. were commercially cultivated.

Table : 3.31 List of Flora - Core Zone (including Green Belt)

Sl. No.	Botanical Name	Family	Common Name	Habit
1	Azadirachta indica	Meliaceae	Vembu, Veppa	Tree
2	Abutilon indicum	Malvaceae	Country Mallow, Tutti	Herb
3	Acalypha indica	Euphorbiaceae	Kuppaimeni	Herb
4	Albizia lebbek	Mimosaceae	Siris Tree, Vagai	Tree
5	Aristida adscensionis	Poaceae	Common Needle grass	Herb
6	Cassia auriculata	Fabaceae	Aavarampoo	Shrub
7	Cassia fistula	Fabaceae	Golden shower tree,	Tree
8	Cassia siamea	Caesalpiniaceae	Manja konnai	Tree
9	Datura metel	Solanaceae	Thorn apple, Oomathai	Shrub
10	Holoptelea integrifolia	Aavimaram, Indian elm	Ulmaceae	Tree
11	Leucaena leucocephala	Fabaceae	Periyatagarai, Horse	Tree
12	Morinda tinctoria	Rubiaceae	Nuna	Tree
13	Pongamia pinnata	Fabaceae	Pungai, Pungan	Tree
14	Samanea saman	Mimosodeae	Thoongumoonij maram	Tree
15	Tecoma stans	Majorali, Yellow Bells	Bignoniaceae	Shrub
16	Vitex negundo	Lamiaceae	Nochi	Shrub

Table : 3.32 List of Flora - Distribution of Vegetation in Buffer Zone

Sl. No.	Scientific Name	Family Name	Common Name	Habit
Agricultural Crops				
1	Arachis hypogea	Fabaceae	Groundnut	Herb
2	Oryza sativa	Poaceae	Rice	Herb
3	Phaseolus mungo	Fabaceae	Black gram	Herb
4	Sacharum officinarum	Poaceae	Sugarcane	Herb
5	Zea mays	Poaceae	Maize	Herb
Commercial Crops (including vegetables)				
1	Capsicum frutescens	Solanaceae	Milagaai	Herb
2	Carica papaya	Caricaceae	Papaya	Tree
3	Citrus limon	Rutaceae	Lemon	Tree
4	Cocus nucifera	Arecaceae	Coconut, Thennai	Tree
5	Cucurbita pepo	Cucurbitaceae	Pumpkin	Creeper
6	Cyamopsis tetragonoloba	Fabaceae	Cluster bean	Shrub
7	Gossypium arboreum	Malvaceae	Cotton, Paruthi	Shrub
8	Hibiscus esculentus	Malvaceae	Lady's finger, Vendai	Herb
9	Lagenaria vulgaris	Cucurbitaceae	Bottle gourd	Creeper
10	Lycopersicum esculentum	Solanaceae	Tomato	Herb
11	Mangifera indica	Anacardiaceae	Mango	Tree
12	Momordica charantia	Cucurbitaceae	Bittergourd	Creeper
13	Moringa oleifera	Moringaceae	Drumstick, Murungai	Tree
14	Musa paradisiaca	Musaceae	Plantain, Vazhai	Tree
15	Psidium gujava	Myrtaceae	Guava	Tree
16	Ricinus communis	Euphorbiaceae	Castor Bean Plant	Shrub
17	Sesamum indicum	Pedaliaceae	Seasame, Ellu	Herb
18	Solanum melongena	Solanaceae	Brinjal	Herb
19	Solanum torvum	Solanaceae	Turkey berry	Shrub
20	Trichosanthes cucurmina	Cucurbitaceae	Snake gourd	Creeper
21	Vicia faba	Fabaceae	Broad Bean	Creeper
Plantations				
1	Anacardium occidentale	Anacardiaceae	Cashew	Tree
2	Cocus nucifera	Arecaceae	Coconut, Thennai	Tree

Sl. No.	Scientific Name	Family Name	Common Name	Habit
3	Casuarina equisetifolia	Casuarinaceae	Casuarina, Savukku	Tree
4	Eucalyptus sp.	Myrtaceae	Eucalyptus	Tree
5	Musa paradisiaca	Musaceae	Plantain, Vazhai	Tree
6	Tectona grandis	Lamiaceae	Teak	Tree
Natural Vegetation				
1	Abrus precatorius	Fabaceae	Coral bead vine, Rosary pea,	Climber
2	Abutilon indicum	Malvaceae	Country Mallow, Tutti	Herb
3	Acacia leucophloea	Mimosaceae	Velvelam, White babool	Tree
4	Acacia nilotica	Mimosaceae	Babul, Karuvelam	Tree
5	Acalypha indica	Euphorbiaceae	Kuppaimeni	Herb
6	Acanthospermum hispidum	Asteraceae	Seruppadithazhai,	Herb
7	Achchyranthes aspera	Amaranthaceae	Prickly Chaff flower, Nayuruvi	Herb
8	Adathoda vasica	Acanthaceae	Vasaca, Adathodai	Shrub
9	Adina cordifolia	Rubiaceae	Manjakadambu	Tree
10	Aegle marmelos	Rutaceae	Wood Apple, Vilvam	Tree
11	Aerva lanata	Amaranthaceae	Sirupulai	Herb
12	Agave sisalana	Agavaceae	Kathalai, Sisal	Herb
13	Ageratum conyzoides	Asteraceae	Goat weed, Pumppillu	Herb
14	Ailanthus excelsa	Simaroubaceae	Indian Tree of Heaven, Perumaram	Tree
15	Alangium salviifolium	Cornaceae	Alingi	Tree
16	Albizia amara	Mimosaceae	Usilamaram	Tree
17	Albizia lebbek	Mimosaceae	Siris Tree, Vagai	Tree
18	Aloe vera	Liliaceae	Kathalai	Herb
19	Alternanthera sessilis	Amaranthaceae	Dwarf Copperleaf, Ponnanganni	Herb
20	Amaranthus spinosus	Amaranthaceae	Mullukkirai	Herb
21	Amaranthus viridis	Amaranthaceae	Kuppaikerai	Herb
22	Ammannia baccifera	Lythraceae	Acrid weed, Kalluruvi	Herb
23	Anacardium occidentale	Anacardiaceae	Cashew	Tree
24	Anisomeles malabarica	Lamiaceae	Malabar Catmint/ Peimiratti	Shrub
25	Anona squamosa	Anonaceae	Custard apple	Tree
26	Apluda mutica	Poaceae	Mauritian Grass	Herb
27	Arachis hypogea	Faboideae	Ground nut	Herb
28	Argemone mexicana	Papaveraceae	Prickly poppy, Kudiyotti	Shrub
29	Aristida adscensionis	Poaceae	Coomon Needle grass	Herb
30	Artocarpus heterophyllus	Moraceae	Jackfruit	Tree
31	Azadirachta indica	Meliaceae	Neem, Vembu	Tree
32	Bambusa arundanacea	Poaceae	Bamboo	Tree
33	Barleria buxifolia L.	Acanthaceae	Box-leaved Barleria/ Rosemullipoondur	Herb
34	Barleria prionitis	Acanthaceae	Porcupine flower, Kundan	Herb
35	Bassia latifolia	Sapotaceae	Iluppai	Tree
36	Blumea lacera	Asteraceae	Kattumullangi, Narakkarandai	Herb
37	Boerhaavia diffusa	Nyctaginaceae	Pig weed, Mukkarattai Keerai	Herb
38	Borassus flabellifer	Arecaceae	Palmyra Palm	Tree
39	Bougainvillea spectabilis	Nyctaginaceae	Kaakithapoo	Shrub
40	Bulbostylis barbatta	Cyperaceae	Mukkutikorei	Herb
41	Butea monosperma	Fabaceae	Flame of Forest	Tree
42	Caesalpinia pulcherrima	Caesalpinaceae	Peacock Flower, Mayurkondrai	Tree
43	Calendula officinalis	Asteraceae	Marigold	Herb
44	Calophyllum inophyllum	Clusiaceae	Punnai	Tree
45	Calotropis gigantea	Asclepiadaceae	Crown Flower, Erukku	Shrub

Sl. No.	Scientific Name	Family Name	Common Name	Habit
46	<i>Calotropis procera</i>	Asclepiadaceae	Vellerukku	Shrub
47	<i>Canna indica</i>	Cannaceae	Indian shot, Kalvalai	Shrub
48	<i>Capparis sepiaria</i>	Capparaceae	Kattukkathiri	Shrub
49	<i>Carica papaya</i>	Caricaceae	Pappaali	Tree
50	<i>Cassia auriculata</i>	Fabaceae	Aavarampoo	Shrub
51	<i>Cascabela thevetia</i>	Apocynaceae	Yellow oleander/ Arali	Shrub
52	<i>Cassia fistula</i>	Fabaceae	Golden shower tree, Kondrai	Tree
53	<i>Cassia occidentalis</i>	Caesalpiniaceae	Coffee weed, Payaverai	Herb
54	<i>Cassia siamea</i>	Caesalpiniaceae	Manja konnai	Tree
55	<i>Cassia tora</i>	Caesalpiniaceae	Sickle senna, Tagarai	Herb
56	<i>Casuarina equisetifolia</i>	Casuarinaceae	Whistling Pine, Savukku	Tree
57	<i>Ceiba pentandra</i>	Bombacaceae	Silk-Cotton Tree, Ilavampanchumaram	Tree
58	<i>Cenchrus ciliaris</i>	Poaceae	Buffel grass	Herb
59	<i>Chloris barbata</i>	Poaceae	Finger grass	Grass
60	<i>Chloris dolichostachya</i>	Poaceae	Finger grass, Kuruthupillu	Herb
61	<i>Chloroxylon swietenia</i>	Rutaceae	Porasu maram	Tree
62	<i>Chrysanthemum</i> sp.	Asteraceae	Chrysanthemum, Samanthi	Herb
63	<i>Cissus quadrangularis</i>	Vitaceae	Devil's Backbone, Pirandai	Climber
64	<i>Citrus limon</i>	Rutaceae	Lemon	Tree
65	<i>Clausena anisate</i>	Rutaceae	Horse wood/Kaatu Karuveppillai	Shrub
66	<i>Cleome gynandra</i>	Cleomaceae	Wild Spider flower, Nalvelai	Herb
67	<i>Cleome viscosa</i>	Cleomaceae	Tickweed, Naikkaduku	Herb
68	<i>Clitoria ternatea</i>	Fabaceae	Sankupushpam	Climber
69	<i>Coccinia indica</i>	Cucurbitaceae	Kovai	Climber
70	<i>Cocculus hirsutus</i>	Menispermaceae	Broom Creeper, Kattukkodi	Climber
71	<i>Cocos nucifera</i>	Palmae	Coconut	Tree
72	<i>Codiaeum variegatum</i>	Euphorbiaceae	Croton	Shrub
73	<i>Commelina benghalensis</i>	Commelinaceae	Dew Flower, Kanavachai	Herb
74	<i>Corchorus olitorius</i>	Tiliaceae	Perattikkirai	Shrub
75	<i>Crotalaria retusa</i>	Fabaceae	Rattlepod	Herb
76	<i>Croton bonplandianus</i>	Euphorbiaceae	Ban Tulsi/ Railpoondur	Herb
77	<i>Cucumis melo</i>	Cucurbitaceae	Musk melon, Thumattikai	Herb
78	<i>Cucumis sativus</i>	Cucurbitaceae	Cucumber	Climber
79	<i>Cuscuta reflexa</i>	Convolvulaceae	Verillakothan, Kodyagundal	Climber
80	<i>Cymbopogon</i> sp.	Poaceae	Lemon grass	Herb
81	<i>Cynodon dactylon</i>	Poaceae	Bermuda grass, Arugampul	Herb
82	<i>Cyperus difformis</i>	Cyperaceae	Smallflower umbrella-sedge	Herb
83	<i>Cyperus rotundus</i>	Cyperaceae	Korai, Nut grass	Herb
84	<i>Datura metel</i>	Solanaceae	Thorn apple, Oomathai	Shrub
85	<i>Delonix regia</i>	Fabaceae	Gulmohar	Tree
86	<i>Dendrophthoe falcata</i>	Loranthaceae	Honey Suckle Mistletoe, Pulluruvi	Herb
87	<i>Dentella repens</i>	Rubiaceae	Creeping lickstool	Herb
88	<i>Desmostachya bipinnata</i>	Poaceae	Tharpai grass/halfa grass	Grass
89	<i>Dichanthium annulatum</i>	Poaceae	Marvel grass	Herb
90	<i>Digetaria adscendens</i>	Poaceae	Crab grass	Herb
91	<i>Digetaria bicornis</i>	Poaceae	Finger grass	Herb
92	<i>Dodonaea viscosa</i>	Sapindaceae	Hopbush/Virali	Shrub
93	<i>Dolichandrone falcata</i>	Bignoniaceae	Medhshingi	Tree
94	<i>Eclipta alba</i>	Asteraceae	Bhringaraj, Karisalankanni	Herb
95	<i>Eclipta prostrata</i>	Asteraceae	False daisy, Karisalankanni	Herb

Sl. No.	Scientific Name	Family Name	Common Name	Habit
96	<i>Eichhornia crassipes</i>	Pontederiaceae	Water hyacinth	Aquatic
97	<i>Embllica officinalis</i>	Phyllanthaceae	Indian gooseberry, Nelli	Tree
98	<i>Enicostemma axillare</i>	Gentianaceae	Vellarugu	Herb
99	<i>Eragrostis spectabilis</i>	Poaceae	Bunchgrass	Herb
100	<i>Erythrina indica</i>	Fabaceae	Mullu murungai	Tree
101	<i>Erythrina variegata</i>	Fabaceae	Indian coral tree, Kalyanamurungai	Tree
102	<i>Eucalyptus globulus</i>	Myrtaceae	Blue gum	Tree
103	<i>Euphorbia antiquorum</i>	Euphorbiaceae	Kalli, Triangular Spurge	Tree
104	<i>Euphorbia heterophylla</i>	Euphorbiaceae	Painted euphorbia	Herb
105	<i>Euphorbia hirta</i>	Euphorbiaceae	Asthma weed, Ammam	Herb
106	<i>Euphorbia lactea</i>	Euphorbiaceae	Indian spurge tree	Tree
107	<i>Euphorbia prostrata</i>	Euphorbiaceae	Prostrate sandmat	Herb
108	<i>Euphorbia tirucalli</i>	Euphorbiaceae	Pencil cactus, Thirukalli	Shrub
109	<i>Evolvulus alsinoides</i>	Convolvulaceae	Dwarf Morning Glory, Vishnukranthi	Herb
110	<i>Ficus benghalensis</i>	Moraceae	Banyan, Alamaram	Tree
111	<i>Ficus religiosa</i>	Moraceae	Peepal, Arasamaram	Tree
112	<i>Fimbristylis cymose</i>	Cyperaceae	Button sedge, grass	Herb
113	<i>Fimbristylis dichotoma</i>	Cyperaceae	Forked fimbry	Grass
114	<i>Gardenia jasminoides</i>	Rubiaceae	Cape jasmine, Kumbai	Shrub
115	<i>Gisekia pharnaceoides</i>	Aizoaceae	Manal keera	Herb
116	<i>Gloriosa superba</i>	Colchicaceae	Flame lily, Kallappai kilangu	Herb
117	<i>Gomphrena globosa</i>	Amaranthaceae	Globe Amaranth, Vaadamalli	Herb
118	<i>Heliotropium indicum</i>	Boraginaceae	Indian heliotrope, Thel kodukku	Herb
119	<i>Hemidesmus indicus</i>	Apocynaceae	Indian sarasaparilla, Nannari	Herb
120	<i>Heterostemma tanjorens</i>	Asclepiadaceae	Palakeera	Herb
121	<i>Hibiscus cannabinus</i>	Malvaceae	Pulichakeera	Shrub
122	<i>Hibiscus esculentus</i>	Malvaceae	Lady's finger, Vendai	Herb
123	<i>Hibiscus micranthus</i>	Malvaceae	Tiny Flower Hibiscus	Herb
124	<i>Hibiscus rosasinensis</i>	Malvaceae	Shoeflower, Sembaruthi	Shrub
125	<i>Holoptelea integrifolia</i>	Ulmaceae	Indian elm/Tambachi	Tree
126	<i>Hygrophila auriculata</i>	Acanthaceae	Marsh Barbel, Neermulli	Herb
127	<i>Hyptis suaveolens</i>	Lamiaceae	Pignut	Shrub
128	<i>Impatiens balsamina</i>	Balsaminaceae	Garden Balsam,	Herb
129	<i>Indigofera linnaei</i>	Fabaceae	Birdsville indigo	Herb
130	<i>Indigofera tinctoria</i>	Fabaceae	Cassia Indigo, Avuri	Shrub
131	<i>Ipomea carnea</i>	Convolvulaceae	Bush Morning Glory	Shrub
132	<i>Ipomea hederfolia</i>	Convolvulaceae	Kanavalikkodi	Herb
133	<i>Ipomea obscura</i>	Convolvulaceae	Obscure morning glory, Chirutali	Herb
134	<i>Ixora coccinea</i>	Rubiaceae	Ixora, Vedchi	Shrub
135	<i>Ixora parviflora</i>	Rubiaceae	Torch tree, Shulundu	Tree
136	<i>Jasminum officinalae</i> L.	Oleaceae	Jasmine	Shrub
137	<i>Jasminum arborescens</i>	Oleaceae	Shrubby Jasmine, Kattumalligai	Shrub
138	<i>Jatropha gossypifolia</i>	Euphorbiaceae	Bellyache Bush/ Adalai	Shrub
139	<i>Jatropha glandulifera</i>	Euphorbiaceae	Kaatumanakku	Shrub
140	<i>Kyllinga triceps</i>	Cyperaceae	Spikes edge, Velutta Nirbasi	Herb
141	<i>Lanea coromandelica</i>	Anacardiaceae	Indian Ash Tree, Othiyamaram	Tree
142	<i>Lantana camara</i>	Verbenaceae	Lantana, Unnichi	Shrub
143	<i>Lawsonia inermis</i>	Lythraceae	Henna, Maruthondri	Shrub
144	<i>Lemna minor</i>	Arecaceae	Common Duckweed	Weed
145	<i>Leucaena leucocephala</i>	Fabaceae	Periyatagarai, Horse Tamarind	Shrub
146	<i>Leucas aspera</i>	Lamiaceae	Common Leucas, Thumbai	Herb

Sl. No.	Scientific Name	Family Name	Common Name	Habit
147	<i>Limonia acidissima</i>	Rutaceae	Wood apple, Vilampazham	Tree
148	<i>Lycopersicon esculentum</i>	Solanaceae	Thakkali	Herb
149	<i>Malvastrum</i>	Malvaceae	False Mallow	Herb
150	<i>Mangifera indica</i>	Anacardiaceae	Mango	Tree
151	<i>Marselia quadrifolia</i>	Marsileaceae	Four Leaf Clover, Araaikkeerai	Herb
152	<i>Melia azadirachta</i>	Meliaceae	Indian Liliac, Malaivembu	Tree
153	<i>Merremia emarginata</i>	Convolvulaceae	Kidney Leaf Morning Glory, Elikkadhukeerai	Herb
154	<i>Millingtonia hortensis</i>	Bignoniaceae	Tree Jasmine, Katmalli	Shrub
155	<i>Mimosa hamata</i>	Mimosaceae	Hooked Mimosa	Shrub
156	<i>Mimosa pudica</i>	Mimosaceae	Touch-me-not, Thottachurungi	Herb
157	<i>Morinda coreia</i>	Rubiaceae	Indian Mulberry/ Manjal athi	Tree
158	<i>Morinda tinctoria</i>	Rubiaceae	Nuna	Tree
159	<i>Moringa oleifera</i>	Moringaceae	Drumstick, Murungai	Tree
160	<i>Murraya koengii</i>	Rutaceae	Curry leaf, Karuveppilai	Shrub
161	<i>Musa paradisiaca</i>	Musaceae	Banana	Tree
162	<i>Nelumbo nucifera</i>	Nelumbonaceae	Lotus	Aquatic
163	<i>Nerium indicum</i>	Apocynaceae	Sevvarali	Shrub
164	<i>Nerium oleander</i>	Apocynaceae	Oleander, Arali	Shrub
165	<i>Nymphaea</i> sp.	Nymphaeaceae	Water Lily	Aquatic
166	<i>Ocimum americanum</i>	Lamiaceae	Hoary Basil, Nai Thulasi	Herb
167	<i>Ocimum basilicum</i>	Lamiaceae	Sweet Basil, Thirunithulasi	Herb
168	<i>Ocimum gratissimum</i>	Lamiaceae	Wild Basil, Peruntulasi	Herb
169	<i>Ocimum sanctum</i>	Lamiaceae	Holy Basil, Thulasi	Herb
170	<i>Oldenlandia umbellata</i>	Rubiaceae	Choyroot, Chayaver	Herb
171	<i>Opuntia dillenii</i>	Cactaceae	Prickly Pear, Chappathikkalli	Shrub
172	<i>Opuntia ficus-indica</i>	Cactaceae	Fig opuntia/Kalli	Shrub
173	<i>Opuntia vulgaris</i>	Aizoaceae	Pricklypear	Shrub
174	<i>Oureta lanata</i>	Amaranthaceae	Mountain Knot grass	Herb
175	<i>Oxalis corniculata</i>	Oxalidaceae	Creeping Wood Sorrel, Paliakiri	Climber
176	<i>Pandanus odoratissimus</i>	Pandanaceae	Thazhai	Shrub
177	<i>Parthenium hysterophorus</i>	Asteraceae	Congress grass	Herb
178	<i>Passiflora foetida</i>	Passifloraceae	Stinking passionflower, Mosukkattan	Climber
179	<i>Pavetta indica</i>	Rubiaceae	Indian Pavetta, Kattukkarana	Shrub
180	<i>Pavonia zeylanica</i>	Malvaceae	Sittamutti, Thengai poondu	Shrub
181	<i>Peltophorum pterocarpum</i>	Fabaceae	Copperpod, Perunkondrai	Tree
182	<i>Pergularia daemia</i>	Asclepiadaceae	Pergularia, Uttamani, Seendhal	Climber
183	<i>Phoenix acaulis</i>	Arecaceae	Stemless Date Palm	Shrub
184	<i>Phoenix sylvestris</i>	Arecaceae	Eecham	Tree
185	<i>Phyllanthus nodifolia</i>	Verbanaceae	Poduthalai	Herb
186	<i>Phyllanthus</i>	Phyllanthaceae	Madras Leaf flower/Nila neli	Herb
187	<i>Phyllanthus niruri</i>	Phyllanthaceae	Keelanelli, Seed under leaf	Herb
188	<i>Phyllanthus reticulatus</i>	Phyllanthaceae	Black-berried featherfoil,	Herb
189	<i>Phyllanthus virgatus</i>	Phyllanthaceae	Joint weed/Kaadu nelli	Herb
190	<i>Physalis minima</i>	Solanaceae	Ground Cherry, Kupanti	Herb
191	<i>Pigea enneasperma</i>	Violaceae	Spade Flower/ Oorithal thamarai	Herb
192	<i>Pistia stratiotes</i>	Arecaceae	Water lettuce, Agasatamarai	Aquatic
193	<i>Pithecellobium dulce</i>	Mimosaceae	Sweet tamarind, Kodukkappuli	Tree
194	<i>Polygala erioptra</i>	Polygalaceae	Wolly-winged	Shrub
195	<i>Polypogon viridis</i>	Poaceae	Rabbit foot grass.	Grass
196	<i>Polyalthia longifolia</i>	Annonaceae	Indian mast tree, Vansulam	Tree

Sl. No.	Scientific Name	Family Name	Common Name	Habit
197	<i>Pongamia pinnata</i>	Fabaceae	Indian Beech, Pungam	Tree
198	<i>Portulaca oleracea</i>	Portulacaceae	Common Purslane, Paruppu	Herb
199	<i>Premna tomentosa</i>	Verbenaceae	Bastard Teak, Malaithaekku	Tree
200	<i>Prosopis glandulosa</i>	Mimosodeae	Vaelikkaruvai	Tree
201	<i>Prosopis juliflora</i>	Fabaceae	Algaroba, Seemaikaruvel	Tree
202	<i>Psidium gujava</i>	Myrtaceae	Guava	Tree
203	<i>Punica granatum</i>	Lythraceae	Pomegranate, Mathulai	Shrub
204	<i>Rosa indica</i>	Rosaceae	Rose	Herb
205	<i>Saccharum munja</i>	Poaceae	Munja grass	Herb
206	<i>Saccharum spontaneum</i>	Poaceae	Kans grass, Pekkarimpu	Herb
207	<i>Samanea saman</i>	Mimosodeae	Thoongumoonij maram	Tree
208	<i>Scoparia dulcis</i>	Plantaginaceae	Goat weed/Sarakkoththini	Herb
209	<i>Senna auriculata</i>	Fabaceae	Avaram	Shrub
210	<i>Senna siamea</i>	Fabaceae	Ironwood/ Majal Konai	Tree
211	<i>Senna tora</i>	Fabaceae	Sickle senna/ Thagarai	Herb
212	<i>Sesbania grandiflora</i>	Fabaceae	Agathikeerai	Tree
213	<i>Sida acuta</i>	Malvaceae	Common Wireweed, Palambasi	Herb
214	<i>Sida cordifolia</i>	Malvaceae	Country Mallow, Kurunthotti	Herb
215	<i>Sida rhombifolia</i>	Malvaceae	Wild mallow, Jelly Leaf	Herb
216	<i>Solanum nigrum</i>	Solanaceae	Black-berry night	Herb
217	<i>Solanum surattense</i>	Solanaceae	Kandan kattiri	Herb
218	<i>Solanum torvum</i>	Solanaceae	Turkey berry, Sundaikkai	Shrub
219	<i>Solanum trilobatum</i>	Solanaceae	Thoodhuvalai	Shrub
220	<i>Solanum virginianum</i>	Solanaceae	Yellow fruit night shade	Herb
221	<i>Sorghum bicolor</i>	Poaceae	Fox tail millet, Maize	Herb
222	<i>Syzygium cumini</i>	Myrtaceae	Jamun, Navalpazham	Tree
223	<i>Tabernaemontana coronaria</i>	Apocynaceae	Nandiyarvattam	Shrub
224	<i>Tamarindus indica</i>	Fabaceae	Tamarind, Puliymaram	Tree
225	<i>Tectona grandis</i>	Lamiaceae	Teak	Tree
226	<i>Tephrosia purpurea</i>	Fabaceae	Fish poison, Kollukkai Velai	Herb
227	<i>Thespesia lampas</i>	Malvaceae	Common Mallow, Kattupparuthi	Herb
228	<i>Thespesia populnea</i>	Malvaceae	Indian Tulip Tree, Poovarasu	Tree
229	<i>Thevetia peruviana</i>	Apocynaceae	Yellow Oleander, Arali	Tree
230	<i>Tinospora cordifolia</i>	Menispermaceae	Guduchi, Shindilakodi	Climber
231	<i>Tribulus terrestris</i>	Zygophyllaceae	Puncture Vine, Nerunji	Herb
232	<i>Tridax procumbens</i>	Asteraceae	Tridax daisy, Vettukkaayapoondur	Herb
233	<i>Typha angustifolia</i>	Typhaceae	Narrow Leaf Cat tail reed	Herb
234	<i>Vachellia leucophloea</i>	Fabaceae	White bark Acacia/ Velvelam	Tree
235	<i>Vachellia nilotica</i>	Fabaceae	Balck bark Acacia/ Karuvelam	Tree
236	<i>Vernonia cinerea</i>	Asteraceae	Purple Fleabane, Mookuthipoondur	Herb
237	<i>Vicoa indica</i>	Asteraceae	Mukkuthipoo	Herb
238	<i>Vinca rosea</i>	Apocynaceae	Nithyakalyani	Herb
239	<i>Vitex negundo</i>	Lamiaceae	Nochi	Shrub
240	<i>Xanthium strumarium</i>	Asteraceae	Common Cocklebur, Marulumattai	Shrub
241	<i>Ziziphus jujube</i>	Rhamnaceae	Jujube, Elandhai	Tree
242	<i>Ziziphus mauritiana</i>	Rhamnaceae	Jujube/Ezhanthai	Tree
243	<i>Ziziphus nummularia</i>	Rhamnaceae	Jhar Beri, Narielandai	Shrub
244	<i>Ziziphus oenoplia</i>	Rhamnaceae	Jackal Jujube, Suraimullu	Shrub

Sl. No.	Scientific Name	Family Name	Common Name	Habit
Medicinal species				
1	<i>Abrus precatorius</i>	Fabaceae	Coral bead vine, Rosary pea,	Creepers
2	<i>Achchyranthes aspera</i>	Amaranthaceae	Prickly Chaff flower, Nayuruvi	Herb
3	<i>Adathoda vasica</i>	Acanthaceae	Vasaca, Adathodai	Shrub
4	<i>Aegle marmelos</i>	Rutaceae	Wood Apple, vilvam	Tree
5	<i>Aloe vera</i>	Liliaceae	Kathalai	Herb
6	<i>Alternanthera sessilis</i>	Amaranthaceae	Dwarf Copperleaf, Ponnanganni	Herb
7	<i>Amaranthus viridis</i>	Amaranthaceae	Kuppaikeerai	Herb
8	<i>Asparagus racemosus</i>	Asparagaceae	Satawari, Tannir muttan	Herb
9	<i>Azadirachta indica</i>	Meliaceae	Neem, Vembu	Tree
10	<i>Calotropis gigantea</i>	Asclepiadaceae	Crown Flower, Erukku	Shrub
11	<i>Cassia auriculata</i>	Fabaceae	Tanners cassia, Avaram	Shrub
12	<i>Cissus quadrangularis</i>	Vitaceae	Devil's Backbone, Pirandai	Climber
13	<i>Cynodon dactylon</i>	Poaceae	Bermuda grass, Arugampul	Herb
14	<i>Eclipta alba</i>	Asteraceae	Bhringaraj, Karisalankanni	Herb
15	<i>Enicostemma axillare</i>	Gentianaceae	Vellarugu	Herb
16	<i>Euphorbia hirta</i>	Euphorbiaceae	Asthma weed, Ammam	Herb
17	<i>Ficus benghalensis</i>	Moraceae	Banyan, Alamaram	Tree
18	<i>Heterostemma tanjorensis</i>	Asclepiadaceae	Palakeerai	Herb
19	<i>Jatropha glandulifera</i>	Euphorbiaceae	Kaatuamanakku	Shrub
20	<i>Leucas aspera</i>	Lamiaceae	Common Leucas, Thumbai	Herb
21	<i>Ocimum sanctum</i>	Lamiaceae	Holy Basil, Thulasi	Herb
22	<i>Solanum surattense</i>	Solanaceae	Yellow-berried Nightshade,	Herb
23	<i>Solanum trilobatum</i>	Solanaceae	Thoodhuvalai	Shrub
24	<i>Tridax procumbens</i>	Asteraceae	Tridax daisy,	Herb
25	<i>Vitex negundo</i>	Lamiaceae	Nochi	Shrub

The Plant species recorded are as follows :

Agricultural Crops	:	5 species
Commercial Crops including Vegetables	:	21 species
Plantations	:	6 species
Natural Vegetations	:	244 species
Medicinal Plants	:	25 species
Endangered Species	:	Nil
Endemic Species	:	Nil

The vegetation of the study area was found to be predominantly occupied by dry deciduous species. The recorded plant species are largely herbaceous and grass species with some climbers and Trees. Tree species planted in social forestry, tree plantation program and along road side were recorded. Direct observation showed that *Pongamia pinnata*, *Delonix elata*, *Tamarindus indica* and *Delonix regia* are the common plant species planted along the road side. The other tree species recorded were part of the social forestry and in the home gardens.

The **air pollutant resistant plant species** such as *Ficus*, *Borassus*, *Eucalyptus*, *Bambusa*, *Zizyphus*, *Acacia*, *Prosopis*, *Jatropha* and *Sorghum* were found to be without any setback in their growth and development. The moderately resistant plant species such as *Tamarindus*, *Azadirachta indica* and sugarcane have shown moderate growth.

The sensitive plant species such as Morinda, Ipomoea, Moringa have shown minimum numbers in their population. Thick population of herbs was formed due to the moderate rainfall. The emergence of herbs in vacant places indicates the formation of **plant diversity**.

Besides the natural vegetation, the agricultural and commercial crops were cultivated in and around the study area. Paddy, Sorghum, Black gram, Groundnut, etc. were found to be cultivated among the agricultural crops. Sugarcane, Cotton, etc. were commercially cultivated.

Plants of Economic Importance : Cultivated plants like cereals, vegetables, pulses, fruits, fodder, timber and wood provide valuable resources to mankind for agricultural implements. The plant species of economic importance observed in the study area are:

Cereals : Oryza sativa (rice), Zea mays (Maize).

Pulses : Phaseolus sp. (beans), Phaseolus mungo (green gram), Phaseolus radiates (Black gram).

Vegetables (leafy) : Hibiscus cannabinus (Pulicha keera), Amaranthus viridis (math)

Vegetables (Fruit) : Solanum melongena (Brinjal), Momordica charantia (Bitter gourd), Lycopersium esculentum (Tomato), Hibiscus esculentus (Ladies finger), Carica papaya (Pappali)

Fruits : Carica papaya (Papaya), Cucurbita sp., Cucumis melo (Pumpkin), Feronia elephantum (Wood apple), Tamarindus indicus (tamarind), Musa paradisiaca spp. (Banana), Cocos nucifera (Coconut), Citrus limon (Lemon), Anacardium occidentale (Cashew), Psidium gujava (Koyya), Mangifera indica (Mango)

3.9.2 Fauna

Both direct and indirect observation methods were used to survey the fauna. Visual Encounter (search) Method was employed to record vertebrate species. Additionally, survey of relevant literature was also done to consolidate the list of vertebrate fauna distributed in the area. Since birds may be considered as indicators for monitoring and understanding human impacts on ecological systems, attempt was made to gather quantitative data on the group.

The list of Fauna is given with reference to the **Wild Life (Protection) Amendment Act, 2022** by clearly indicating the type and short-listed as Schedule II or I and considered as endangered species. The details of fauna recorded are given in **Tables 3.33-3.34**.

Table : 3.33 List of Fauna in the Reserve Forests

Sl. No.	Scientific Name	Family	Common Name
Mammals			
1.	Felis chaus	Felidae	Cat
2.	Funambulus palmarum	Sciuridae	Squirrel
3.	Herpestes auropunctatus	Herpestidae	Mongoose
4.	Oryctolagus cuniculus	Leporidae	Rabbit
5.	Paradoxurus henmaphroditors	Viverridae	Civit
6.	Rattus rattus	Muridae	Rat

Sl. No.	Scientific Name	Family	Common Name
Reptiles			
1.	Bungaruscaeruleus	Elapidae	Krait
2.	Calotesversicolor	Agamidae	Common garden lizard
3.	Lygosomapunctata	Scincidae	Spotted supple skink
4.	Ptyasmuscosa	Colubridae	Indian rat snake
5.	Xenochrophispiscator	Colubridae	Checkered keel back
Birds			
1.	Ardea alba	Ardeidae	Large egret
2.	Ardeola grayii	Ardeidae	Pond heron
3.	Athene brama	Strigidae	Owl
4.	Bubulcus ibis	Ardeidae	Cattle egret
5.	Corvus macrorhynchos	Corvidae	Jungle crow
6.	Corvus splendens	Corvidae	House crow
7.	Dicrurus macrocercus	Dicruridae	Black drongo
8.	Egretta garzetta	Ardeidae	Little egret
9.	Haliaeetus albicilla	Accipitridae	Eagle

Table : 3.34 List of Fauna in the Study Area

Sl. No.	Scientific Name	Common Name	WPA Schedule	IUCN Status
Insects				
1	Myrmarachne plateloides	Ant mimicking jumping spider	Unlisted	C
2	Camponotus compressus	Black Ant	Unlisted	C
3	Heterometrus sp.	Black scorpion	Unlisted	C
4	Apis florea	Flower Bee	Unlisted	C
5	Aiolopus thalassinus tumulus	Green grass hopper	Unlisted	C
6	Asemonea sp.	Green leaf spider	Unlisted	C
7	Musca domestica	Housefly	Unlisted	C
8	Episyrphus sp.	Hoverfly	Unlisted	C
9	Apis cerana indica	Indian Honey Bee	Unlisted	C
10	Attacus selene	Indian Lunar Moth	Unlisted	C
11	Carrhotus viduus	Jumping spider	Unlisted	C
12	Hyllus semicuperus	Jumping spider	Unlisted	C
13	Cheilomenes sexmaculata	Ladybird Beetle	Unlisted	C
14	Trigoniulus sp.	Millipede	Unlisted	C
15	Aedes sp.	Mosquito	Unlisted	C
16	Culex sp.	Mosquito	Unlisted	C
17	Creobroter sp.	Praying mantis	Unlisted	C
18	Dysdercus sp.	Red Silk Cotton Bug	Unlisted	C
19	Argiope pulchella	Signature spider	Unlisted	C
20	Chrysilla sp.	Spider	Unlisted	C
21	Acrida exaltata	Toothpick grasshopper	Unlisted	C
22	Gryllodes sigillatus	Tropical house cricket	Unlisted	C
23	Hippasa sp.	Tunnel sheet spider	Unlisted	C
24	Limnogonus nitidus	Water Strider	Unlisted	C
25	Pardosa sp.	Wolf Spider	Unlisted	C
Butterflies				
1	Papilio polymnestor Cramer	Blue Mormon	Unlisted	
2	Tirumala limniace Cramer	Blue Tiger	Unlisted	LC

Sl. No.	Scientific Name	Common Name	WPA Schedule	IUCN Status
3	<i>Appias albina</i> Boisduval	Common Albatross	II	
4	<i>Hasora chromus</i> Cramer	Common Banded Awl	Unlisted	
5	<i>Jamides celeno</i> Cramer	Common Cerulean	Unlisted	
6	<i>Euploea core</i> Cramer	Common Crow	Unlisted	LC
7	<i>Catopsilia pomona</i>	Common Emigrant	Unlisted	
8	<i>Melanitis leda</i>	Common Evening Brown	Unlisted	LC
9	<i>Eurema hecabe</i>	Common Grass Yellow	Unlisted	
10	<i>Cepora nerissa</i>	Common Gull	Unlisted	
11	<i>Graphium doson</i>	Common Jay	Unlisted	
12	<i>Delias eucharis</i>	Common Jezebel	Unlisted	
13	<i>Papilio polytes</i>	Common Mormon	Unlisted	
14	<i>Pachliopta aristolochiae</i>	Common Rose	II	
15	<i>Pachliopta hector</i>	Crimson Rose	II	
16	<i>Hypolimnas misippus</i>	Danaid Eggfly	Unlisted	LC
17	<i>Tirumala septentrionis</i>	Dark Blue Tiger	Unlisted	LC
18	<i>Freyeria trochylus</i>	Grass Jewel	Unlisted	
19	<i>Hypolimnas bolina</i>	Great Egg fly	Unlisted	
20	<i>Chilades lajus</i>	Lime Blue	Unlisted	
21	<i>Papilio demoleus</i>	Lime Butterfly	Unlisted	
22	<i>Catopsilia pyranthe</i>	Mottled Emigrant	Unlisted	
23	<i>Anaphaeis aurota</i>	Pioneer	Unlisted	
24	<i>Danaus chrysippus</i>	Plain Tiger	Unlisted	LC
25	<i>Eurema brigitta</i>	Small Grass Yellow	Unlisted	
26	<i>Danaus genutia</i>	Striped Tiger	Unlisted	LC
27	<i>Graphium agamemnon</i>	Tailed Jay	Unlisted	
28	<i>Zizula hylax</i>	Tiny Grass Blue	Unlisted	
Mammals				
1	<i>Bandicota indica</i>	Large (Greater) Bandicoot-rat	Unlisted	LC
2	<i>Bos indicus</i>	Cow	Unlisted	LC
3	<i>Bubalus bubalis</i>	Buffalo	Unlisted	LC
4	<i>Canis familiaris</i>	Dog	Unlisted	LC
5	<i>Capra hircus</i>	Goat	Unlisted	LC
6	<i>Cynopterus sphinx</i>	Short-nosed Fruit Bat	Unlisted	LC
7	<i>Funambulus palmarum</i>	Three-striped Palm Squirrel	Unlisted	LC
8	<i>Hemiechinus micropus</i>	Indian Hedgehog	II	LC
9	<i>Lepus nigricollis</i>	Indian Hare, Black-naped Hare	II	LC
10	<i>Mus booduga</i>	Indian Field Mouse	Unlisted	LC
11	<i>Mus musculus</i>	House Mouse	Unlisted	LC
12	<i>Ovis aries</i>	Sheep	Unlisted	LC
13	<i>Pipistrellus coromandra</i>	Indian Pipistrelle	Unlisted	LC
14	<i>Pteropus giganteus</i>	Indian Flying Fox	II	LC
15	<i>Rattus norvegicus</i>	Field mouse	Unlisted	LC
16	<i>Rattus rattus</i>	House (Roof, Black) Rat	Unlisted	LC
17	<i>Sauria lacertidae</i>	Lizard	Unlisted	LC
18	<i>Sorex caeruleus</i>	Common mush shrew	Unlisted	LC
19	<i>Suncus murinus</i>	House (Grey Musk) Shrew	Unlisted	LC
20	<i>Vulpus benghalensis</i>	Indian Fox	II	LC
Birds				

Sl. No.	Scientific Name	Common Name	WPA Schedule	IUCN Status
1	Alcedo atthis	Common kingfisher	II	R
2	Accipiter badius	Shikra	Unlisted	R
3	Acridotheres tristis	Common myna	II	R
4	Actitis hypoleucos	Common sandpiper	II	M
5	Aegithina tiphia	Common iora	II	R
6	Anas porcilorhyncha	Spot billed duck	Unlisted	R
7	Anas querquedula	Garganey	II	R
8	Anastomus oscitans	Asian openbill	II	R
9	Anhinga melanogaster	Oriental Darter	II	R
10	Ardea cinerea	Grey heron	II	R
11	Ardea purpurea	Purple heron	II	R
12	Ardeola grayii	Indian pond heron	II	R
13	Athene brama	Spotted owlet	Unlisted	R
14	Bubulcus ibis	Cattle egret	II	R
15	Centropus sinensis	Southern coucal	Unlisted	R
16	Ceryle rudis	Pied kingfisher	II	R
17	Charadrius dubius	Little ringed plover	II	M
18	Cinnyris asiaticus	Purple sunbird	II	R
19	Clamator jacobinus	Pied cuckoo	II	R
20	Columba livia	Rock pigeon	Unlisted	R
21	Corvus macrorhynchos	Large-billed crow	II	R
22	Corvus splendens	House crow	Unlisted	R
23	Cypsiurus balasiensis	Asian palm swift	II	R
24	Dendrocitta vagabunda	Rufous treepie	II	R
25	Dicrurus macrocercus	Black drongo	II	R
26	Egretta garzetta	Little egret	II	R
27	Eudynamys scolopacea	Asian koel	II	R
28	Fulica atra	Common coot	Unlisted	R
29	Gallinula chloropus	Common moorhen	II	R
30	Haliastur indus	Brahminy kite	Unlisted	R
31	Halycon smyrensis	White-throated kingfisher	II	R
32	Hierococcyx varius	Common hawk cuckoo	II	R
33	Himantopus himantopus	Black-winged stilt	II	R
34	Hirundo rustica	Barn swallow	II	R
35	Lanchura punctulata	Scaly-breasted munia	II	R
36	Leptocoma zeylonica	Purple-rumped sunbird	II	R
37	Mesophoyx intermedia	Intermediate egret	II	R
38	Milvus migrans	Black kite	II	R
39	Mycteria leucocephala	Painted storks	II	R
40	Oriolus oriolus	Eurasian golden oriole	II	M
41	Passer domesticus	House sparrow	II	R
42	Pelecanus philippensis	Spot-billed pelican	II	R
43	Phalacrocorax carbo	Great cormorant	II	R
44	Phalacrocorax niger	Little cormorant	II	R
45	Plegadis falcinellus	Glossy ibis	II	R
46	Porphyrio porphyrio	Purple swampen	Unlisted	R

Sl. No.	Scientific Name	Common Name	WPA Schedule	IUCN Status
47	<i>Psittacula krameri</i>	Rose-ringed parakeet	Unlisted	R
48	<i>Streptopelia chinensis</i>	Spotted dove	II	R
49	<i>Streptopelia decaocto</i>	Eurasian collared dove	II	R
50	<i>Streptopelia senegalensis</i>	Laughing dove	II	R
51	<i>Threskiornis melanocephalus</i>	Black-headed ibis	II	R
52	<i>Turdoides affinis</i>	Yellow-billed babbler	II	R
53	<i>Tyto alba</i>	Barn owl	Unlisted	R
54	<i>Vanellus indicus</i>	Red-wattled lapwing	II	R
55	<i>Vanellus malarbaricus</i>	Yellow-wattled lapwing	II	R
Reptiles				
1	<i>Ahaetulla nasuta</i>	Common vine snake	II	LC
2	<i>Amphiesma stolatum</i>	Striped keelback	II	LC
3	<i>Boiga trigonata</i>	Common cat snake	II	LC
4	<i>Bungarus caeruleus</i>	Common Indian Krait	II	LC
5	<i>Calotes versicolor</i>	Indian garden lizard	Unlisted	LC
6	<i>Coelognathus helena</i>	Common trinket snake	II	LC
7	<i>Dendrelaphis tristis</i>	Common bronzeback	II	LC
8	<i>Dryocalamus nympha</i>	Bridal snake	II	LC
9	<i>Echis carinatus</i>	Indian saw scaled viper	II	LC
10	<i>Eyrx conicus</i>	Common Sand boa	II	LC
11	<i>Gongylophis conicus</i>	Rough tailed Sand boa, Pudaiyan	II	LC
12	<i>Hemidactylus flaviviridis</i>	House gecko	II	LC
13	<i>Indotyphlops braminus</i>	Brahminy worm snake	II	LC
14	<i>Lissemys punctata</i>	Indian mud turtle	II	LC
15	<i>Lycodon aulicus</i>	Common wolf snake	II	LC
16	<i>Mabuya carinata</i>	Brahminy Skink	II	LC
17	<i>Oligodon arnensis</i>	Common kukri snake	II	LC
18	<i>Passerita mycerizaris</i>	Common Green Snake	II	LC
19	<i>Sitana ponticeriana</i>	Pondichery Fan throated lizard	Unlisted	LC

Legend : C- Common, M- Migratory, R- Resident, T- Threatened

Endangered Species: Among the fauna recorded, **most of them are common resident population and no Schedule-I or endangered species encountered** in the study area.

Planktons : The aquatic ecosystems present in the study area of 10 km radius include lentic and lotic water body. To assess the planktonic profile of Phytoplankton and Zooplankton, water samples from 5 locations were collected at sub-surface level using standard methods and analyzed for plankton diversity in the study area. The analysis of Phyto and Zoo-plankton was carried out as per the procedures of APHA (**Table 3.35**).

The **Fish fauna** of the area includes Major carps like Catla, Rohu, Mirgal, Exotic carps like Silver carp, Grass carp, Minor carps, etc.

Table : 3.35 List of Planktons

Sl. No.	Scientific Name	Group Name	Species Population in identified Stations				
1	Acartia tonsa	Copepods	2	-	-	-	5
2	Alona quadria	Cladocera	11	-	-	21	22
3	Branchionus	Rotifers	9	-	5	5	8
4	<i>Ceriodaphnia cornuta</i>	Cladocera	3	7	-	1	-
5	Cypris sp.	Ostrocooda	6	-	1	-	18
6	Flatworm larvae	Trematods	-	-	3	-	-
7	Freshwater shrimp larvae	Small crustaceans	-	5	11	-	-
8	Hookworm larvae	Nematods	8	4	2	29	-
9	<i>Keratella tropica</i>	Rotifers	2	2	4	10	3
10	Nauplius sp.	Copepods	1	-	-	7	22
11	Shrimp larvae	Crustaceans	20	-	-	-	-

Aquatic weeds are found to be growing everywhere in 10 km radius study area, in every water body, pond, etc. (Table 3.36). Typha angustata is found growing all along the drains of villages, small water-logged depressions, and agricultural fields lacking water but containing enough moisture to support its growth. And where water is present, Eichhornia crassipes has taken its roots and covers the entire water surface by its sprawl and invasion.

Table : 3.36 List of Aquatic Plants

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

Shanon Weaver Index (SWI) : The SWI is a measure of diversity and it may be considered as an overall index of diversity as it concedes a true picture of the information theory. The species diversity of such a community may be computed by employing the SWI of diversity by applying the Index.

$$H = - \sum n/N \log n/N$$

Or

$$H = - \sum p_i \log p_i$$

where,

n = Number of individual species

N = Total number of individual species

Pi = Importance value for each species n/N

SWI can be interpreted based on the SWI-H values obtained by computing the values of quantitative plankton analysis. Based on the H-values of SWI, the quality of water can be classified into the following three categories.

<u>SWI-H values</u>	<u>Quality of Water</u>
X>3	Clear
1<X<3	Moderately polluted
X<1	Heavily Polluted

SWI-H values were calculated and the results indicate that the water bodies in the study area are moderately polluted (**Table 3.37**).

Table : 3.37 Diversity Index

Sl. No.	Water body	Usage	SWI – H Value	Quality of Water
1	Pond, Periyagalur	Bathing, Washing & irrigation	3.185	Clear
2	Pond, Chinnagalur	Irrigation, Bathing & washing	3.652	Clear
3	Pond, Kattupiriyam	Bathing, Washing & irrigation	3.295	Clear
4	Pond, Nagamangalam	Bathing, Washing & irrigation	3.465	Clear
5	Pond, Pudupalayam	Irrigation, Bathing & washing	3.842	Clear

The SWI – H values were calculated and the results show that the water quality is clear in all the identified locations.

3.10 Socio-economic Environment

Ariyalur District consists of two Revenue Divisions viz., Ariyalur and Udayarpalayam, four Taluks viz., Ariyalur, Udayarpalayam, Sendurai and Andimadam comprising of 195 Revenue Villages. The District has six blocks viz. Ariyalur, Thirumanur, Sendurai, Jayankondam, Andimadam and T.Palur comprising 201 Village Panchayats. There are two Municipalities viz. Ariyalur & Jayankondam and two Town Panchayats viz. Udayarpalayam & Varadharajanpettai. Salient features of Census Data (2001 & 2011) (Ariyalur District Statistical Hand Book 2019-20) are given in **Table 3.38**.

District Population by Religion is as follows :

Hindu	:	93.44%
Muslim	:	2.73%
Christian	:	3.76%
Not Stated	:	0.07%

Table : 3.38 Population – Decennial Growth

Description	Census-2001	Census-2011
Population :		
Male	346763	374703
Female	348761	380191
Total	695524	754894
Urban	78985	94362
Rural	616539	660532
Density per sq. km	358	390.33
Literacy Rate		71.45%
Male	64.10%	81.2%
Female		61.7%
Sex Ratio	1006	1015
Juvenile Sex Ratio (JSR)	949	930

Workers Population in the District along with comparison of State Data is appended.

POPULATION BY BROAD INDUSTRIAL CATEGORIES OF WORKERS

Sl. No. (1)	Industrial Category (2)	YEAR : 2019-2020			
		District		Tamil Nadu	
		Persons (3)	% to total workers (4)	Persons (5)	% to total workers (6)
1	Total Workers (Main)	272241	75.7	27942181	85.0
	a) Cultivators	94912	26.4	3855375	11.7
	b) Agricultural Labourers	106252	29.5	7234101	22.0
	c) Household Industry Manufacturing, Processing, Servicing and Repairs	10756	3.0	1119458	3.4
	d) Other Workers	60321	16.8	15733247	47.8
2	Marginal Workers	87610	24.3	4942500	15.0
	a. Cultivators	12400	3.4	393082	1.2
	b. Agricultural Labourers	60585	16.8	2372446	7.2
	c. HHI	2808	0.8	245435	0.8
	d. Others	11817	3.3	1931537	5.9
	Total Workers	359851	100	32884681	100
	Non Workers	395043	—	39262349	—
	Total Population	754894	---	72147030	

In addition to Ariyalur Medical College, The available **Health Infrastructures** in the District are given in **Table 3.39**.

Table : 3.39 Health Infrastructures

No. of PHCs	39
No. of Sub-Centres	118
No. of Nursing Colleges	2 (Private)
No. of Taluk Hospitals	3
No. of Non-Taluk Hospitals	1
No. of Private Hospitals	32
No. of Private Clinics	29
No. of Blood Storage units	5
No. of Scan Centres	8 (Govt.) & 9 (Private)
No. of ICTCs	8

There are 29 Revenue villages including Ariyalur Town Panchayat (TP) in the study area of 10 km radius. The relevant socio-economic data such as demographic features including population distribution, literacy rate, occupational status, educational facilities, medical facilities, etc. are reported in **Tables 3.40-3.46**.

Population : In the study area of 10 km radius, there are 1,27,501 persons (63,678 males-49.9% and 63,823 females-50.1%) in 33198 Households (HHs) in the 28 villages and 1 Town Panchayat. As far as the population of Scheduled Castes and Scheduled Tribes are concerned, there were 29,651 (23.3%) Scheduled Castes Population and 711(0.6%) Scheduled Tribes. In the total population, the Literate population was 82,432 (64.7%) whereas the illiterate population was 45,069 (35.3)%.

Occupational Structure : According to the 2011 census, Total Workers in the total population were about 59,323 (46.5%). About 68,178 (53.5%) persons were non-workers. About 16.2% of the people were engaged in tertiary activities which included different services. The workers in the primary activities (Cultivators) and the secondary activities (Agricultural Labourers) were 13.2% and 17.2% respectively.

Educational, Medical & Infrastructural Facilities : Common diseases were only reported. Primary and Middle Schools are available in almost all villages whereas Senior secondary schools, are available in some of the villages. However, college education is available only at Ariyalur, Thathanur, Jayamkondam, etc. Almost all villages are having one or more Women Self Help Groups through which the people earn various sources of livelihood and are financially secured. There are community based organizations in some of the villages.

Public Health : Local people are frequently suffering from fever, diarrhea, etc. and no occupational related disease recorded. Primary Health Centres Maternity & Child Welfare Centre are available only in some of the villages. For major ailments villagers have to go to Ariyalur, Perambalur, Thanjavur and Trichy.

Table : 3.40 Demographic Profile- 2011 Census

Sl. No.	Name of the Village	No. of House-holds	Population			Scheduled Caste			Scheduled Tribes			Literate			Illiterate		
			Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1	Arumabesur	824	3150	1594	1556	1103	556	547	48	25	23	2030	1168	862	1099	436	873
2	Arumabath	170	654	315	339	522	269	253	0	0	0	349	218	131	305	97	208
3	Arumavandi	1067	4262	2108	2154	1436	731	705	132	63	71	2461	1437	1024	1801	671	1130
4	Arulur (TP)	7319	28802	14346	14456	3254	1620	1634	8	5	3	21977	11560	10417	6655	278	4183
5	Eduthakkudi	604	2191	1126	1065	936	52	57	81	42	39	1261	778	483	930	357	573
6	Gandhidasam	1242	4995	2592	2403	1347	674	673	0	0	0	3250	1671	1579	1736	631	1105
7	Kadapur	866	3217	1627	1590	492	253	240	1	1	0	1893	1172	721	1324	455	868
8	Kalankurichi	1380	5385	2693	2722	1363	686	677	1	1	0	2382	1267	1115	1993	700	1293
9	Kanapur	1239	4773	2385	2388	1031	530	501	120	53	67	2680	1518	1162	3093	660	1224
10	Kanaru	841	3242	1634	1608	594	307	287	11	7	4	1790	1062	688	1452	542	910
11	Kanarabath	1289	5235	2632	2603	881	451	430	5	3	2	3932	2128	1804	1278	474	804
12	Kiranasakam	818	2920	1461	1459	640	320	316	0	0	0	1777	1077	700	1149	404	745
13	Makur	734	2956	1500	1456	956	493	463	0	0	0	1662	979	683	1294	521	773
14	Mananthi	1042	3916	1960	1918	1208	604	604	74	37	37	2423	1427	996	1483	571	922
15	Naganasakam	868	3360	1716	1644	1295	652	643	90	40	50	1978	1143	735	1482	573	909
16	Ottakal	1210	4703	2344	2359	1099	559	540	0	0	0	2746	1640	1106	1955	709	1245
17	Papanathi	400	1482	736	746	342	171	171	0	0	0	1036	582	454	456	144	312
18	Pernanapur	1041	3536	1792	1744	592	347	345	0	0	0	1975	1175	800	1563	587	976
19	Pervathukuram	718	2708	1320	1388	552	291	262	0	0	0	1629	863	676	1069	357	712
20	Pudupalayam	922	3535	1750	1785	1072	536	536	3	2	1	2006	1187	819	1526	563	963
21	Savayam	947	3718	1846	1872	1466	720	746	0	0	0	2085	1229	856	1621	617	1006
22	Reddikulam	1125	4125	2055	2031	570	280	290	5	3	2	2452	1432	1020	1699	663	1036
23	Sankaravaram	474	1870	902	938	1179	586	593	0	0	0	1257	711	546	812	221	355
24	Sivakur	594	2155	1043	1112	453	230	223	0	0	0	1261	743	518	854	300	554
25	Thakur	1064	4215	2136	2079	794	400	394	4	3	1	2407	1423	984	1888	713	1095
26	Vakkuruthi	571	2210	1144	1066	912	471	441	0	0	0	1523	880	733	587	258	329
27	Vakkuravaram	1046	3755	1792	1963	1560	806	754	0	0	0	1678	973	705	2277	820	1458
28	Vasuvai	1091	4087	1947	2140	1412	651	761	0	0	0	2521	1369	1152	1666	588	978
29	Vilankudi	883	2835	1312	1523	1058	533	525	120	64	54	1526	880	646	1180	452	628
Total		3398	12790	6390	6400	3661	1847	1814	71	34	31	8478	4806	3672	10516	3791	6725
Percentage		-	-	48.3	50.1	28.3	11.7	11.6	0.8	0.3	0.3	64.6	36.5	38.1	35.4	13.4	22.8

Table : 3.41 Occupation of Population and Work Forces- 2011 Census

Sl. No.	Name of the Village	Total Population	Workers			Non-Workers			Main Workers				Marginal Workers			
			Total	Male	Female	Total	Male	Female	Cultivators	Non-cultivators	Household Industries	Other Workers	Cultivators	Non-cultivators	Household Industries	Other Workers
1	Arumabesur	3150	1547	820	727	1712	814	1098	232	572	8	272	5	330	1	27
2	Arumabath	654	243	167	76	411	148	263	30	0	0	10	0	15	1	70
3	Arumavandi	4262	1931	1130	801	2331	978	1353	712	648	31	201	20	212	12	86
4	Arulur (TP)	28802	10263	7015	2448	18619	8534	10085	315	670	286	7166	150	175	150	1581
5	Eduthakkudi	2191	1321	666	623	870	437	433	656	419	19	154	5	61	0	7
6	Gandhidasam	4995	2399	1488	912	2597	1318	1281	660	843	28	712	25	79	10	101
7	Kadapur	3217	1977	1018	959	1240	630	610	662	570	33	79	74	329	9	21
8	Kalankurichi	5385	2335	1482	853	3030	1193	1837	648	100	71	713	25	274	3	64
9	Kanapur	4773	2735	1518	1198	2037	867	1170	653	1332	54	179	29	247	2	14
10	Kanaru	3242	1808	970	838	1434	664	770	1000	209	13	133	38	165	2	70
11	Kanarabath	5215	1878	1414	464	3337	1188	2149	238	351	34	1020	17	108	5	66
12	Kiranasakam	2920	1451	650	801	1475	631	844	251	1041	7	124	3	22	0	3
13	Makur	2956	1300	610	690	1456	660	796	829	623	22	184	8	12	6	15
14	Mananthi	3916	2225	1296	929	1691	732	959	529	834	12	153	306	353	14	24
15	Naganasakam	3360	1629	864	765	1731	732	999	743	570	1	128	2	167	1	16
16	Ottakal	4703	2543	1296	1147	2160	946	1212	704	561	40	625	215	553	16	47
17	Papanathi	1482	636	467	469	856	289	287	335	363	3	64	16	67	6	48
18	Pernanapur	3536	1805	1021	784	1733	741	992	756	331	62	431	4	195	1	25
19	Pervathukuram	2708	1585	820	745	1143	500	643	899	86	28	169	5	342	2	34
20	Pudupalayam	3535	1891	1015	876	1644	736	1109	543	261	2	303	159	691	9	129
21	Savayam	3718	1969	1073	896	1749	773	976	678	260	36	210	30	502	14	219
22	Reddikulam	4126	1948	1210	738	2180	885	1295	362	569	33	577	28	321	8	48
23	Sankaravaram	1870	1144	580	564	720	342	378	225	330	9	135	22	388	9	20
24	Sivakur	2155	1125	569	495	1030	414	616	442	273	5	190	4	229	1	12
25	Thakur	4215	2077	1278	799	2138	856	1282	736	504	48	380	5	313	1	8
26	Vakkuruthi	2210	1247	749	498	963	355	608	457	431	17	129	6	30	10	143
27	Vakkuravaram	3755	2033	1017	1016	4322	1693	2629	528	475	44	1069	108	563	11	213
28	Vasuvai	4087	1832	1117	715	2265	930	1335	287	570	17	447	4	14	0	22
29	Vilankudi	2835	1297	703	514	1538	620	918	258	616	17	349	0	24	1	32
Total		12790	5933	3686	2247	6679	2697	4181	1529	1525	92	1873	1391	6882	321	3078
Percentage		-	46.3	38.9	17.9	33.5	21.9	32.5	12.1	11.8	6.8	12.7	1.1	6.3	0.3	2.4

Note : Others category includes Constructors, Trade & Commerce, Transport Storage & Communications, Other Services, etc.

Table : 3.42 Educational Facilities in the Study Area

Sl. No.	Name of the Village	PPS*	PS*	MS*	SS*	SSS*	DC*	EC*	MC*	MP*	PT*	VTS*	SSD*
1	Anandapur	1	1	1	1	1	c	c	c	c	c	c	c
2	Anandabadi	1	1	a	a	b	b	c	c	a	c	a	c
3	Anandavai	1	1	1	1	1	c	c	c	c	c	a	c
4	Ariyalur (TP)	1	1	1	1	1	1	c	c	c	1	1	c
5	Eelathankud	1	1	1	a	a	c	c	c	c	c	c	c
6	Govindapuram	1	1	1	1	b	b	c	c	c	c	c	c
7	Kadavur	1	1	a	a	b	c	a	c	c	c	c	c
8	Kallankurichi	1	1	1	1	b	b	a	c	c	c	a	b
9	Kanuppur	1	1	1	1	1	c	c	c	c	c	c	b
10	Kavai	1	1	1	1	b	b	1	c	a	a	c	b
11	Kavayabadi	1	1	1	1	1	a	c	c	a	c	a	b
12	Kilangulam	1	1	1	b	b	c	c	c	c	c	c	c
13	Mallur	1	1	a	a	b	b	c	c	a	c	a	c
14	Managathi	1	1	1	1	1	a	a	c	a	a	c	c
15	Nagavandiam	1	1	1	1	a	c	b	c	a	a	c	b
16	Ottakal	1	1	b	1	b	c	c	c	c	c	a	c
17	Papanasalai	1	1	1	1	b	b	c	c	a	c	a	b
18	Pennanagur	1	1	1	1	b	b	b	c	c	c	b	1
19	Pennathurukottam	1	1	1	1	1	c	c	c	c	c	c	c
20	Pudupalayam	1	1	1	b	b	b	c	c	a	c	a	a
21	Ravampalayam	1	1	1	1	b	c	c	c	c	c	c	c
22	Reddipalayam	1	1	1	1	a	c	c	c	c	c	c	b
23	Sethupalam	1	1	1	a	a	c	c	c	c	c	b	c
24	Sivakudi	1	1	1	1	b	b	c	c	a	c	a	b
25	Talur	1	1	a	a	c	c	b	c	a	a	c	a
26	Vakkurichi	1	1	1	b	b	c	c	c	c	c	c	c
27	Vakkampalayam	1	1	1	a	a	a	c	c	a	a	1	c
28	Varanivai	1	1	1	b	b	b	c	c	a	c	a	c
29	Vilangudi	1	1	1	1	b	b	a	c	a	a	c	b

PPS-Pre Primary	SSS-Senior Secondary	DC-Degree College	PT-Polytechnic	*Numbers
PS-Primary School		EC-Engineering College	VTS-Vocational School (ITI)	a-Facility available at <5
MS-Middle School		MC-Medical College	SSD-Special School for	b-Facility available at 5-10
SS-Secondary		MH-Management College /		c-Facility available at >10

Table : 3.43 Medical Facilities in the Study Area

Sl. No.	Name of the Village	GHD*	PHD*	PHSC*	MOW*	TBC*	HA*	HAM*	D*	VH*	MHD*	PWC*	NOM-10*
1	Anandapur	c	1	1	1	1	c	c	1	1	0	1	0
2	Anandabadi	a	a	a	b	b	b	b	a	b	0	a	0
3	Anandavai	b	1	1	1	1	b	b	1	b	0	1	0
4	Ariyalur (TP)	1	1	1	1	1	1	1	1	1	0	1	1
5	Eelathankud	b	0	a	0	0	c	c	b	b	0	b	0
6	Govindapuram	b	1	1	1	1	b	b	1	b	0	1	0
7	Kadavur	1	1	1	1	1	c	a	1	b	0	1	0
8	Kallankurichi	b	b	1	b	b	b	b	b	b	0	b	0
9	Kanuppur	c	1	1	1	1	c	c	1	1	0	1	0
10	Kavai	b	0	1	0	0	c	c	b	b	0	b	0
11	Kavayabadi	b	b	1	a	a	a	a	b	a	0	b	1
12	Kilangulam	b	b	b	b	b	c	c	b	b	0	b	0
13	Mallur	c	a	a	a	b	b	b	a	a	0	a	0
14	Managathi	c	a	1	1	a	c	c	a	c	0	a	0
15	Nagavandiam	c	0	1	0	0	c	c	b	b	0	b	0
16	Ottakal	b	a	1	a	b	b	b	a	b	0	a	0
17	Papanasalai	c	0	a	0	0	b	b	b	b	0	b	0
18	Pennanagur	b	0	1	1	0	b	b	b	1	0	b	0
19	Pennathurukottam	c	b	1	b	c	c	c	b	c	0	b	0
20	Pudupalayam	b	0	1	0	0	b	b	b	b	0	b	0
21	Ravampalayam	b	b	1	b	c	c	c	b	b	0	b	1
22	Reddipalayam	c	a	1	a	c	c	c	a	b	0	a	0
23	Sethupalam	b	b	a	b	b	c	c	b	b	0	b	0
24	Sivakudi	c	0	a	0	0	b	b	b	b	0	b	0
25	Talur	0	a	1	a	0	c	c	a	a	0	a	1
26	Vakkurichi	b	b	1	b	b	c	c	b	b	0	b	0
27	Vakkampalayam	b	0	1	a	a	a	a	b	a	0	b	0
28	Varanivai	c	0	1	0	0	b	b	b	b	0	b	0
29	Vilangudi	c	1	1	1	1	c	c	1	1	0	1	1

GHC-Community Health Centre	TBC-TB Clinic	VH-Veterinary Hospital	*Numbers
PHC-Primary Health Centre	HA-Jalappathi Hospital	PWC-Primary Welfare Centre	a-Facility available at <5
PHSC-Primary Health Sub Centre	HAM- Alternative Medicine	MH-Male Health Clinic	b-Facility available at 5-10
MCH- Maternity and Child Welfare Centre	D-Dispensary	NOM-10 Non Government Medical facilities in E.O.U	c-Facility available at >10

Table : 3.44 Communication & Transport Facilities in the Study Area

SL No.	Name of the Village	PO*	SPO*	P&T*	T*	POD*	MP*	IC*	PCF*	BS*	PBS*	RS*	NH*	SS*	MDR*	STR*	GR	AMS*
1	Arundhaspur	1	3	1	1	1	1	C	3	1	1	C	3	3	1	1	1	1
2	Arundhaswathi	3	1	0	1	1	1	3	3	1	1	3	3	3	3	1	1	1
3	Arundhaswathi	3	1	3	1	3	1	3	3	1	1	3	3	3	3	1	1	1
4	Arundhaswathi (TP)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Arundhaswathi	C	1	C	1	1	1	3	0	1	1	C	3	C	C	1	1	1
6	Govindaswami	3	1	0	1	1	1	3	3	1	1	3	3	3	3	1	1	1
7	Kankar	3	1	0	1	1	1	3	C	1	1	C	C	C	3	1	1	1
8	Kankaruruthi	1	1	1	1	1	1	1	3	1	1	3	3	3	1	1	1	1
9	Kankaruruthi	3	1	C	1	3	1	3	3	1	1	C	1	1	1	1	1	1
10	Kankaruruthi	C	1	C	1	1	1	C	C	1	1	C	3	3	1	1	1	1
11	Kankaruruthi	3	1	3	1	1	1	1	1	1	1	3	1	3	C	1	1	1
12	Kankaruruthi	C	1	C	1	1	1	C	C	1	3	C	C	C	3	1	1	1
13	Malar	3	1	0	1	1	1	3	3	1	1	3	3	3	3	1	1	1
14	Managathi	3	1	0	1	1	1	3	3	1	1	C	1	1	1	1	1	1
15	Narasimhaswami	3	1	0	1	1	1	C	C	1	1	C	3	3	1	1	1	1
16	Orakur	3	1	0	1	1	1	1	1	1	1	1	3	3	3	1	1	1
17	Papanaswami	3	3	0	1	1	1	3	3	1	1	3	3	3	3	1	1	1
18	Papanaswami	3	1	0	1	1	1	3	3	1	1	3	3	3	1	1	1	1
19	Paniyathur	C	1	0	1	1	1	3	3	1	1	C	C	3	3	1	1	1
20	Pudupalayam	3	3	0	1	2	1	3	3	1	1	3	3	3	1	1	1	1
21	Pudupalayam	1	1	1	1	1	1	3	1	1	1	3	C	3	3	1	1	1
22	Reddipalayam	C	1	C	1	1	1	1	1	1	1	C	C	1	1	1	1	1
23	Seshadripuram	3	1	3	1	1	1	3	3	1	1	3	C	C	3	1	1	1
24	Sivakasi	3	1	0	1	1	1	3	1	1	3	3	3	1	1	1	1	1
25	Thalavai	C	1	C	1	1	1	C	C	1	1	C	C	1	1	1	1	1
26	Vadakkur	3	1	0	1	1	1	3	3	1	1	3	C	3	1	1	1	1
27	Vadakkur	3	1	3	1	1	1	1	1	1	1	3	1	1	1	1	1	1
28	Varanasi	3	1	0	1	1	1	3	3	3	3	3	1	1	1	1	1	1
29	Vilangudi	C	1	C	1	1	1	C	C	1	1	C	C	1	1	1	1	1

PO-Post Office	PCO-Public Call Office/Mobile PCO	BS-Public Bus Service	GR-Gravel (Supp) Roads	*-Status	a-Facility available at <5 kms
SPO-Sub Post Office	MP-Mobile Phone Coverage	PBS-Private Bus Service	AWR-All Weather Road	1-Available	b-Facility available at 5-10 kms
P&T-Post/Telegraph Office	IC-Internet Cables / Common Service Centre (CSC)	RS-Railway Station	MDR-Major District Road	2-Not Available	c-Facility available at >10 kms
T-Telephone (landline)	PCF-Private Courier Facility	NH-National Highways	BRN-Block Trunked (Pucca) Roads		

Table : 3.45 Water & Drainage Facilities in the Study Area

SL No.	Name of the Village	SP	CW	UCW	HP	TWBH	S	R/C	TP/L	CD	OD	CT
1	Arundhaspur	1	1	1	1	2	2	2	1	1	2	1
2	Arundhaswathi	1	2	2	1	2	2	2	1	1	2	1
3	Arundhaswathi	1	2	1	1	2	2	2	1	1	1	1
4	Arundhaswathi (TP)	1	1	1	1	1	2	2	1	1	1	1
5	Arundhaswathi	1	1	1	1	2	2	2	2	1	2	1
6	Govindaswami	1	1	2	1	2	2	2	1	1	1	1
7	Kankar	1	2	2	1	2	2	2	1	1	2	1
8	Kankaruruthi	2	2	1	1	1	2	2	1	1	1	2
9	Kankaruruthi	1	2	1	1	1	2	2	1	1	2	1
10	Kankaruruthi	1	1	1	1	1	1	1	1	1	1	1
11	Kankaruruthi	1	1	1	1	1	1	1	1	1	1	1
12	Kankaruruthi	1	1	2	1	1	2	2	1	1	2	1
13	Malar	1	2	1	1	2	2	2	2	1	2	1
14	Managathi	1	2	1	1	2	2	2	1	1	1	1
15	Narasimhaswami	1	2	2	1	2	2	2	1	1	1	1
16	Orakur	1	1	1	1	2	2	2	1	1	2	1
17	Papanaswami	1	2	2	1	2	2	2	1	1	1	1
18	Papanaswami	1	1	1	1	2	2	2	1	1	1	1
19	Paniyathur	1	1	1	1	1	2	2	1	1	2	1
20	Pudupalayam	1	1	1	1	2	2	2	1	1	1	1
21	Pudupalayam	1	2	1	1	2	2	2	1	1	1	1
22	Reddipalayam	1	1	1	1	2	2	2	1	1	1	1
23	Seshadripuram	1	2	2	1	2	2	2	1	1	2	1
24	Sivakasi	1	2	1	1	1	2	2	2	1	2	1
25	Thalavai	1	2	1	1	1	2	2	1	1	2	1
26	Vadakkur	2	2	1	1	2	2	2	2	1	1	2
27	Vadakkur	1	1	1	1	2	2	2	1	1	1	1
28	Varanasi	1	2	1	1	2	2	2	1	1	2	1
29	Vilangudi	1	1	1	1	2	2	2	1	1	2	1

T-Tap Water	TPBH-Tube Borehole Well	CD-Covered Drainage	*-Status
CW-Covered Well	S-Spring	OD-Open Drainage	1-Available
UCW-Uncovered Well	R/C-River Canal	CT-Community Toilet Complex for General Public	2-Not Available
HP-Hand Pump	TP/L-Tank/Pond/Lake		

Table : 3.45 Other Facilities in the Study Area

Sl. No.	Name of the Village	ATM	CB	DOB	ACS	SHG	PDS	RM	AMS	NC	NC-AC	CC	SF	PL	NP	APS	BORD	PS
1	Arakkur	b	b	c	1	1	1	c	c	1	1	1	2	1	1	1	1	1
2	Arakkur	b	b	b	2	1	1	b	b	1	1	1	2	1	1	1	1	1
3	Arakkur	b	1	b	1	1	1	c	c	1	1	1	2	1	1	1	1	1
4	Arakkur (TP)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Arakkur	b	b	a	1	1	1	c	c	1	1	1	1	1	1	1	1	1
6	Gunnaravaram	b	b	b	1	1	1	b	b	1	1	1	1	1	1	1	1	1
7	Kadavur	c	c	a	2	1	1	c	c	1	1	1	1	1	1	1	1	1
8	Kallankur	b	b	b	b	1	1	b	b	1	1	1	1	1	1	1	1	1
9	Kandur	b	b	1	1	1	1	c	c	1	1	1	1	1	1	1	1	1
10	Kandur	b	b	c	a	1	1	c	c	1	1	1	1	1	1	1	1	1
11	Kandur	a	a	a	1	1	1	a	a	1	1	1	1	1	1	1	1	1
12	Kandur	c	b	a	b	1	1	c	c	1	1	1	1	1	1	1	1	1
13	Madar	b	b	b	b	1	1	b	b	1	1	1	2	1	1	1	1	1
14	Managur	b	a	a	b	1	1	c	c	1	1	1	1	1	1	1	1	1
15	Narayanapuram	a	a	b	b	1	1	c	c	1	1	1	1	1	1	1	1	1
16	Oranur	b	b	b	b	1	1	b	b	1	1	1	1	1	1	1	1	1
17	Periyavaram	b	b	b	a	1	1	b	b	1	1	1	1	1	1	1	1	1
18	Periyavaram	b	b	b	1	1	1	b	b	1	1	1	1	1	1	1	1	1
19	Periyavaram	b	c	1	1	1	1	c	c	1	1	1	1	1	1	1	1	1
20	Puducherry	b	b	1	1	1	1	b	b	1	1	1	1	1	1	1	1	1
21	Puducherry	b	b	b	1	1	1	c	c	1	1	1	1	1	1	1	1	1
22	Puducherry	1	1	1	1	1	1	c	c	1	1	1	2	1	1	1	1	1
23	Puducherry	b	b	b	a	1	1	c	c	1	1	1	2	1	1	1	1	1
24	Puducherry	b	b	a	a	1	1	b	b	1	1	1	1	1	1	1	1	1
25	Puducherry	a	c	c	a	1	1	c	c	1	1	1	1	1	1	1	1	1
26	Valanur	b	b	b	b	1	1	b	c	1	1	1	1	1	1	1	1	1
27	Valanur	a	a	a	b	1	1	a	a	1	1	1	1	1	1	1	1	1
28	Valanur	b	b	1	b	1	1	b	b	1	1	1	1	1	1	1	1	1
29	Valanur	a	a	c	1	1	1	c	c	1	1	1	1	1	1	1	1	1

CB-Commercial Bank	PDS-Public Distribution System (Shop)	NC-AC-Nutritional Centre- Angewide Centre	NP-Daily Newspaper Supply	ATM-Automated Teller Machine	a-Facility available at <1 Km
DOB-Co-operative Bank	PS-Regulate Market	CC-Community Centre with/without TV	APS-Assembly Polling Station	*Status	b-Facility available at 1-10 Km
ACS-Agriculture Credit Societies	AMS-Agricultural Marketing Society	SF-Sports Field	BORD-Birth and Death Registration Office	1-Available	c-Facility available at >10 Km
SHG-Self Help Group	NC-Multisectoral Centres (C2B)	PL-Public Library	PS-Power Supply	2-Not Available	

Other infrastructural Facilities : Drinking water facilities are available almost in all villages in the study area. Wells and hand pumps are the major source of drinking water. Villagers depend upon both rain water and also irrigation tanks for the agriculture needs. Public water supply and Power supply are available in most of the villages.

There are good approach roads in the form of panchayat roads and State Highways passing through the study area and bus transportation is there to almost all villages. The villages situated on the main road have marketing facilities for their day to day requirements and for major purchases they go to Ariyalur, Perambalur, Thanjavur and Trichy. Post and Telecommunications facilities are available in all villages. All the villages in the study area have the basic medical facilities, transport, phone connection, post and telegraph, Banking services and market facilities.

Need Based Assessment : Based on the details collected by Household Survey, the following assessments are made. In general, there have been the following demands/expectations from the public:

- ❖ Job opportunities.
- ❖ Training of local youths for suitable jobs.
- ❖ Training in computer typing, driving heavy vehicles, etc.
- ❖ Employment for older people and unskilled persons in gardening, cleaning, etc.
- ❖ Facilities like ambulance, health care, educational, community centres, etc.

Perception of the Project : Almost all villagers are aware about the Ramco Cement Plant & its Captive Mines in the region and supporting the Proposal.

3.11 Summary of Baseline Status

The copies of Laboratory Test Report (Extracts) are given as **Document-4**.

The findings of baseline environmental status of the study area are summarized below :

- ❖ The collected meteorological data during this season represented the local weather phenomena.
- ❖ The monitored ambient air quality in the study area was found to be in compliance with the Revised National Ambient Air Quality (NAAQ) 24-hourly Norms for Industrial, Residential, Rural and other areas.
- ❖ Ambient equivalent noise levels (Leq) during day and night times were found to be well within the MoEF&CC Norms.
- ❖ The water quality of surface waters was found to be in compliance with CPCB Norms.
- ❖ The ground water quality was found to be in compliance with the IS:10500-2012 Norms.
- ❖ The soil in the study area would very well support vegetation after amending it suitably.
- ❖ There is no eco sensitive area exists in the study area and only domesticated animals exist.
- ❖ The area is thinly populated and basic amenities are available almost in all villages.

Thus, there is **adequate buffer** for the proposed Project in the physical, biological and edaphic environments of the study area.

4.0 Anticipated Environmental Impact and Mitigation Measures

4.1 Identification of Impacts

Environmental Impacts are categorized as Primary and Secondary Impacts. **Primary Impacts** are those which are attributed directly to the project and **Secondary Impacts** are those which are indirectly induced by the Project. Any Project would create impact on the environment in two distinct phases viz. Construction Phase which may be regarded as temporary & short term and Operation Phase which would have long term effects. Identification of all potential environmental impacts due to the Proposal are critically examined and major impacts (both **Beneficial & Adverse**) are studied.

4.2 Construction Phase

Being a Quarry Project, it **does not involve any major establishment or construction**. A small Mine Office will be constructed on **temporary structures**.

4.3 Operation Phase

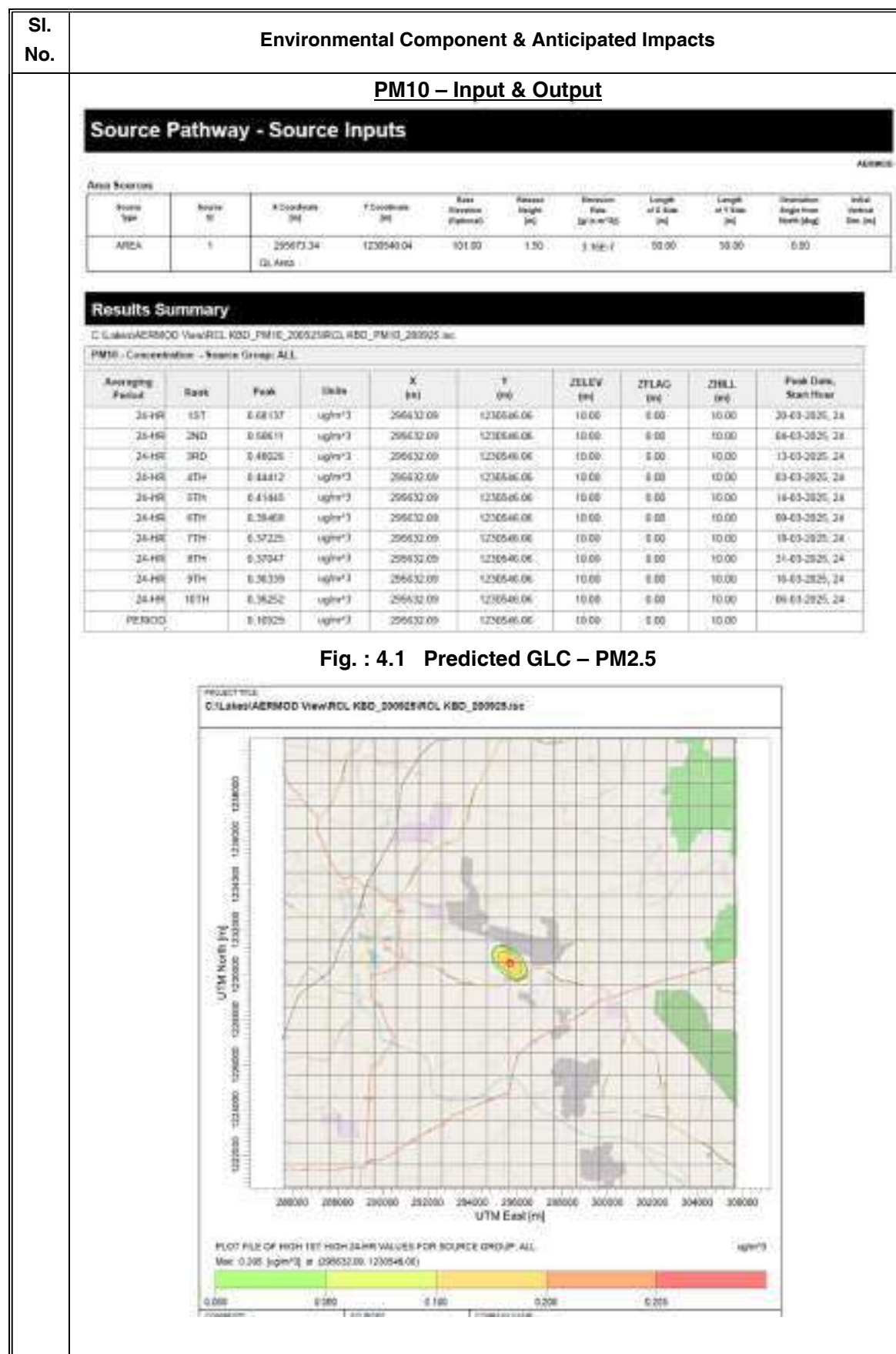
The impacts have been divided into two categories, viz. **Localised and Cumulative**. Localised Impact is confined to the area of influence of the Project and is not transmitted beyond its area. On the other hand, Cumulative Impact is aggregate impact of a number of projects on any component. Cumulative impacts can result from individually minor but collectively significant over a period of time. There are Cement Plants and Limestone Mines in the Study Area. Accordingly, the **Cumulative Impact** has been assessed for the identified Industries and assumed that the **pollution due to other existing Industrial/Mining activities have already been covered under baseline environmental status** and continue to remain same till the operation of the project. The identified Impacts during Operation Phase are given in **Table 4.1**.

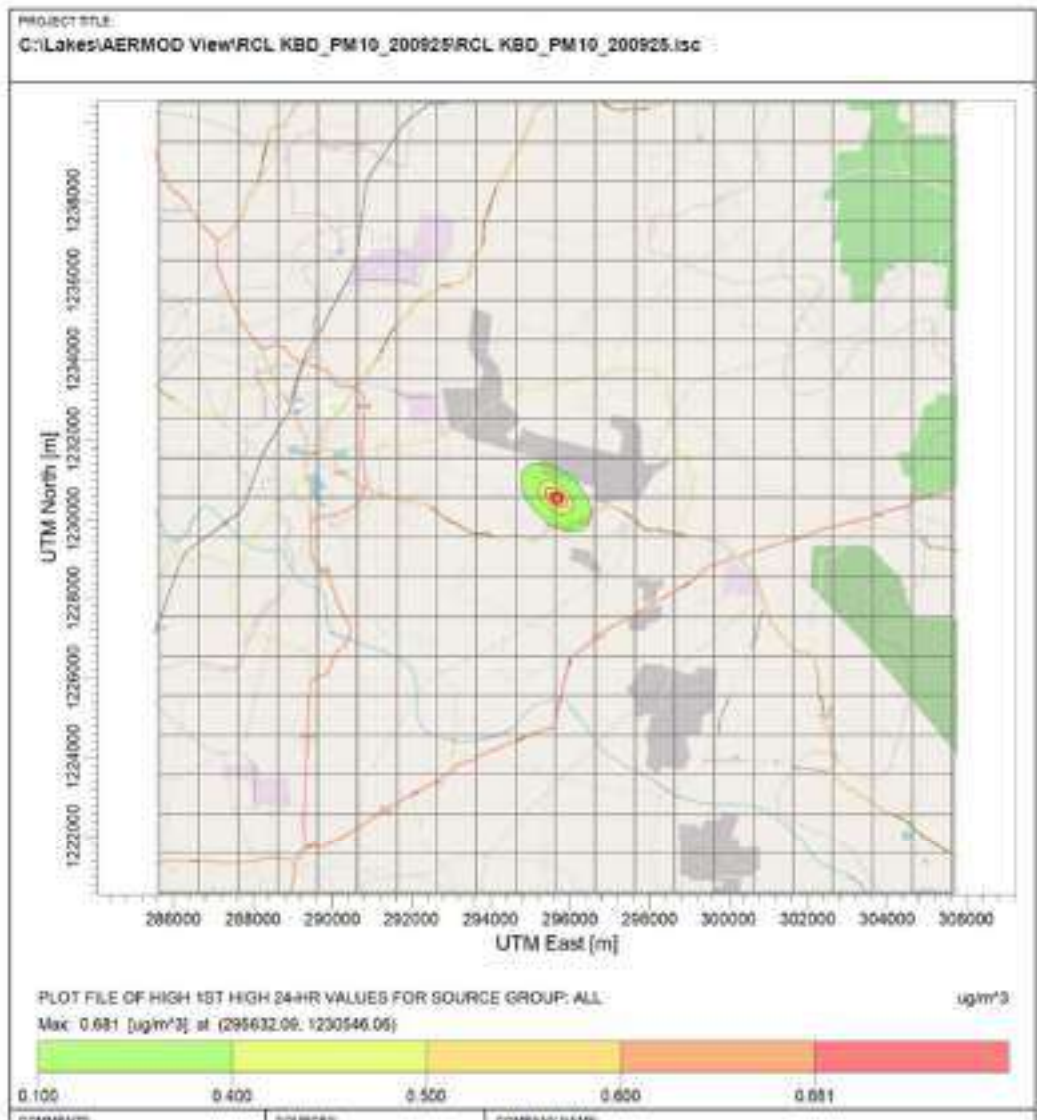
Table : 4.1 Identified Impacts

Sl. No.	Environmental Component & Anticipated Impacts
1	Land Environment : In the total Lease Area of 15.135 Ha, effective quarry area will be 8.14 Ha. At the end of life of the quarry, the entire pit of 8.140 Ha will be converted as a water reservoir . About 2.50 Ha of Safety Zone will be under Green Belt with a Coverage of 16.51% at Conceptual Stage.
2	Traffic Volume : The existing traffic volume in the Project vicinity was found to be 6,410.7 Passenger Car Units (PCUs)/day (Table 4.1.1) . In the Post-Project Scenario, there will be an addition of 54 Vehicles (118.8 PCU/day) (in 2 ways) due to the Project. Cumulatively, the traffic volume in the Project vicinity will be 6,529.5 PCU/day . The existing SH is adequate to handle the proposed traffic volume due to the Project. Adequate parking

Sl. No.	Environmental Component & Anticipated Impacts																																																																		
	area will be provided in the Lease. Facilities for drivers (rest room, toilet, etc.) will also be provided. Table : 4.1.1 Traffic Volume <table><tr><th rowspan="3">Type of Vehicle</th><th colspan="3">SH-139 near KBD QL</th><th rowspan="3">PCU Factor</th><th rowspan="3">PCU/day</th></tr><tr><th colspan="3">No. of Vehicles/day</th></tr><tr><th>Week Day (15.04.2024; Wednesday)</th><th>Week End (19.04.2024; Sunday)</th><th>Avg. Traffic</th></tr><tr><td>2-wheelers</td><td>664</td><td>552</td><td>648.0</td><td>0.5</td><td>324.0</td></tr><tr><td>Autos</td><td>58</td><td>66</td><td>59.1</td><td>1.2</td><td>71.0</td></tr><tr><td>Vans/Tempos</td><td>74</td><td>57</td><td>71.6</td><td>1.4</td><td>100.2</td></tr><tr><td>Cars</td><td>358</td><td>382</td><td>361.4</td><td>1.0</td><td>361.4</td></tr><tr><td>Buses</td><td>168</td><td>112</td><td>160.0</td><td>2.2</td><td>352.0</td></tr><tr><td>Trucks</td><td>2570</td><td>1132</td><td>2364.6</td><td>2.2</td><td>5202.1</td></tr><tr><td>Total</td><td>3892</td><td>2301</td><td>3664.7</td><td>-</td><td>6410.7</td></tr><tr><td>Proposed Tippers</td><td>-</td><td>-</td><td>54</td><td>2.2</td><td>118.8</td></tr><tr><td>Total</td><td>-</td><td>-</td><td>3718.7</td><td>-</td><td>6529.5</td></tr></table>	Type of Vehicle	SH-139 near KBD QL			PCU Factor	PCU/day	No. of Vehicles/day			Week Day (15.04.2024; Wednesday)	Week End (19.04.2024; Sunday)	Avg. Traffic	2-wheelers	664	552	648.0	0.5	324.0	Autos	58	66	59.1	1.2	71.0	Vans/Tempos	74	57	71.6	1.4	100.2	Cars	358	382	361.4	1.0	361.4	Buses	168	112	160.0	2.2	352.0	Trucks	2570	1132	2364.6	2.2	5202.1	Total	3892	2301	3664.7	-	6410.7	Proposed Tippers	-	-	54	2.2	118.8	Total	-	-	3718.7	-	6529.5
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3	Air Quality : Quarrying, Loading and Transporting activities would generate both fugitive dust emissions and smoke from HEM Machineries/Equipments & Transporting Tippers. Quantification of particulate emissions from the Mine is computed 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. The equations used for Inputs of various activities are as below : <table><tr><td>Activity</td><td>Emission Factor</td></tr><tr><td>Excavation of Waste & Ore</td><td>= 23.6 kg/hr particulate matter for every 1,000 Tonnes per hour material handling</td></tr><tr><td>Ore & Waste transportation</td><td>= 0.2 kg/vehicle/km.</td></tr></table> Accordingly, the computed values for various activities are : <table><tr><th rowspan="2">Activity</th><th colspan="2">Emissions, g/sec</th></tr><tr><th>PM2.5</th><th>PM10</th></tr><tr><td>Excavation</td><td>0.000000192</td><td>0.000000192</td></tr><tr><td>Loading</td><td>0.000000222</td><td>0.000000222</td></tr><tr><td>Wastes-Haulage</td><td>5.81346E-10</td><td>5.81346E-10</td></tr><tr><td>Ore transportation</td><td>2.74543E-06</td><td>2.74543E-06</td></tr><tr><td>Total</td><td>9.47963E-08</td><td>3.15988E-07</td></tr></table>	Activity	Emission Factor	Excavation of Waste & Ore	= 23.6 kg/hr particulate matter for every 1,000 Tonnes per hour material handling	Ore & Waste transportation	= 0.2 kg/vehicle/km.	Activity	Emissions, g/sec		PM2.5	PM10	Excavation	0.000000192	0.000000192	Loading	0.000000222	0.000000222	Wastes-Haulage	5.81346E-10	5.81346E-10	Ore transportation	2.74543E-06	2.74543E-06	Total	9.47963E-08	3.15988E-07																																								
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Ore transportation	2.74543E-06	2.74543E-06																																																																	
Total	9.47963E-08	3.15988E-07																																																																	

Sl. No.	Environmental Component & Anticipated Impacts																																																																																																																																																																								
	Other pollutants SO₂ and NO_x emissions due to mining activities are found to be low or insignificant. As site specific mixing heights were not available, mixing heights based on CPCB publication, “Spatial Distribution of Hourly Mixing Depth over Indian Region”. PROBES/88/2002-03 has been considered. Prediction Modelling : AERMOD View Software is used for Predicting the maximum Ground Level Concentrations (GLCs) including Transportation Impact. The predicted maximum GLC-PM_{2.5} for cumulative activities is 0.20 ug/m³ and GLC-PM₁₀ for cumulative activities is 0.68 ug/m³ and found to be confined locally i.e. within 0.04 km radius. Also, adequate Buffer Level available in the Air Environment for the Proposal (Table 4.1.2). Modelling Input & Output files are appended. Predicted GLCs are superimposed on existing Baseline Map and shown as Figs. 4.1-4.2. Table : 4.1.2 Predicted GLCs <table><tr><th>Pollutant</th><th>Baseline, ug/m³</th><th>Predicted, ug/m³</th><th>Total, ug/m³</th><th>Norms, ug/m³</th><th>Buffer, %</th></tr><tr><td>PM_{2.5}</td><td>25.4</td><td>0.20</td><td>25.60</td><td>60</td><td>57.3</td></tr><tr><td>PM₁₀</td><td>49.1</td><td>0.68</td><td>49.78</td><td>100</td><td>50.22</td></tr></table> PM_{2.5} – Input & Output Source Pathway - Source Inputs AERMOD Area Sources <table><tr><th>Source Type</th><th>Source ID</th><th>X Coordinate (m)</th><th>Y Coordinate (m)</th><th>Area Emission (kg/hr)</th><th>Emission Rate (g/hr/m²)</th><th>Length of X Side (m)</th><th>Length of Y Side (m)</th><th>Orientation Angle from North (deg)</th><th>Initial Vertical Rise (m)</th></tr><tr><td>AREA</td><td>1</td><td>295873.34</td><td>1230548.04</td><td>101.08</td><td>1.60</td><td>3.50E+0</td><td>80.00</td><td>80.00</td><td>0.00</td></tr><tr><td></td><td></td><td>GL Area</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> Results Summary C:\Users\AERMOD View\ICL KBD_200925\ICL KBD_200925.nc PM_{2.5} - Concentration - Source Group: ALL <table><tr><th>Averaging Period</th><th>Rank</th><th>Peak</th><th>Units</th><th>X (m)</th><th>Y (m)</th><th>ZBLV (m)</th><th>ZFLAG (m)</th><th>ZHLL (m)</th><th>Peak Date, Start Hour</th></tr><tr><td>24-HR</td><td>1ST</td><td>0.20404</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>20-03-2025, 24</td></tr><tr><td>24-HR</td><td>2ND</td><td>0.15215</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>04-03-2025, 24</td></tr><tr><td>24-HR</td><td>3RD</td><td>0.14438</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>13-03-2025, 24</td></tr><tr><td>24-HR</td><td>4TH</td><td>0.13352</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>03-03-2025, 24</td></tr><tr><td>24-HR</td><td>5TH</td><td>0.12460</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>14-03-2025, 24</td></tr><tr><td>24-HR</td><td>6TH</td><td>0.11865</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>09-03-2025, 24</td></tr><tr><td>24-HR</td><td>7TH</td><td>0.11191</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>18-03-2025, 24</td></tr><tr><td>24-HR</td><td>8TH</td><td>0.11135</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>31-03-2025, 24</td></tr><tr><td>24-HR</td><td>9TH</td><td>0.10925</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>16-03-2025, 24</td></tr><tr><td>24-HR</td><td>10TH</td><td>0.10809</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td>06-03-2025, 24</td></tr><tr><td>PERIOD</td><td></td><td>0.83205</td><td>ug/m³</td><td>295832.89</td><td>1238546.06</td><td>10.00</td><td>0.00</td><td>80.00</td><td></td></tr></table>	Pollutant	Baseline, ug/m ³	Predicted, ug/m ³	Total, ug/m ³	Norms, ug/m ³	Buffer, %	PM _{2.5}	25.4	0.20	25.60	60	57.3	PM ₁₀	49.1	0.68	49.78	100	50.22	Source Type	Source ID	X Coordinate (m)	Y Coordinate (m)	Area Emission (kg/hr)	Emission Rate (g/hr/m ²)	Length of X Side (m)	Length of Y Side (m)	Orientation Angle from North (deg)	Initial Vertical Rise (m)	AREA	1	295873.34	1230548.04	101.08	1.60	3.50E+0	80.00	80.00	0.00			GL Area								Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZBLV (m)	ZFLAG (m)	ZHLL (m)	Peak Date, Start Hour	24-HR	1ST	0.20404	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	20-03-2025, 24	24-HR	2ND	0.15215	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	04-03-2025, 24	24-HR	3RD	0.14438	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	13-03-2025, 24	24-HR	4TH	0.13352	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	03-03-2025, 24	24-HR	5TH	0.12460	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	14-03-2025, 24	24-HR	6TH	0.11865	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	09-03-2025, 24	24-HR	7TH	0.11191	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	18-03-2025, 24	24-HR	8TH	0.11135	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	31-03-2025, 24	24-HR	9TH	0.10925	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	16-03-2025, 24	24-HR	10TH	0.10809	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	06-03-2025, 24	PERIOD		0.83205	ug/m ³	295832.89	1238546.06	10.00	0.00	80.00	
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Sl. No.	Environmental Component & Anticipated Impacts
	Fig : 4.2 Predicted GLC – PM10  PROJECT FILE: C:\Lakes\AERMOD View\RCL KBD_PM10_200925\RCL KBD_PM10_200925.isc UTM North [m] UTM East [m] PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL Max: 0.681 [ug/m³] at (295632.06, 1230546.06) 0.100 0.400 0.500 0.600 0.681 ug/m³
4	Noise Levels : There is no Drilling and Blasting in this Quarry and thus, no vibration. Excavation, Loading and Transportation activities are the sources of Noise. In general, work force will be exposed to <85 dB(A) levels during 8-hours Shift. Noise level at nearest Lease boundary will be <55 dB(A) during day times and <45 dB(A) during night times as stipulated by MoEF&CC- Leq Noise Norms for Residential & Rural Areas.
5	Water Environment : Impact on Surface Waters : The Surface run-offs due to the rain in the Lease Area are drained by natural courses i.e. first order streams. There are 3 first order streams in the southern parts of QL Area and a channel in the eastern boundary. As directed in the

Sl. No.	Environmental Component & Anticipated Impacts
	PAC Order & approved Mining Plan, the safety barrier of 50 meter from the streams & channel are provided and its flow will be maintained as such till the Conceptual Stage. The Normal Rainfall of the Site is 1,096 mm. Pre-Project and Post Project Surface Runoffs from the Quarry Area are estimated as per Manual of Artificial Recharge of Ground Water (CGWB, 2007). Pre-Project Runoffs from Quarry Area will be 2,30,672 KL/Annum and Post Project Runoffs will be 2,13,546 KL/Annum. There will be less Runoffs in the Post-Project Scenario due to more green belt area. This is the impact on Surface Waters due to the Project. There is no Quarry Pit Water Discharge. Impact on Ground Waters : The QL requires about 5 Kilo Liters per Day (KLD) water towards domestic consumption (1 KLD), Dust Control Measures (1 KLD) and Green Belt development (3 KLD) which will be brought by own Tankers from the Cement Plant. There will not be any water drawl from Surface or Ground Water Sources in the QL Area. Domestic sewage generation will be about 0.8 KLD which will be biologically treated in a Septic Tank followed by a Dispersion Trench of adequate size. No workshop is proposed and thus, no effluent generation from the QL. Thus, the impact on the Ground Waters would be minimum.
6	Biological Environment : There is no Eco Sensitive Area/Zone (ESA/ESZ) in the Region. Only Native Flora and Fauna exists. With natural vegetation and domestic fauna predominant in the Study Area, impact on the existing flora-fauna would be nil/minimum. QL area is surrounded by barren lands, dry agricultural lands & Mines/Industries within 10 km area. As the baseline AAQ are in lower levels as well as Predicted GLC is very low/insignificant, there will be no impact on the surrounding dry agricultural lands due to the Project.
7	Socio-economics : Project will employ 14 persons directly and 20 persons indirectly. A budget of Rs.9.30 Lakhs (2% of the Project Cost) will be allotted as CER Budget to Kairulabad Village. DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees will also be spent for Kairulabad. The direct & indirect employment, CSR/CER activities, etc., will have a positive impact on the Socioeconomic Structure of the area. RCL is carrying out number of social activities in and around the villages of its Mines and Factory under the Corporate Social Responsibility (CSR) Budget. RCL has the CSR Committee as per the provisions notified by the Ministry of Corporate Affairs on February 27, 2014. Based on the CSR Committee and declared CSR Policy of the Company, CSR activities are carried out and reported. The direct & indirect employment, CER & CSR activities, etc., will have a positive impact on Socioeconomic Structure of the area.
8	Occupational Health : RCL is operating an Occupational Health Centre at Factory for supporting the health care needs of employees & their families. Periodic Health tests (Pulmonary test, Audiometric test, blood test, chest x-ray examination etc.) have been conducted every year for the employees. Supported by test observations, adequate and need based treatment has been offered to employees. RCL is committed to provide a

Sl. No.	Environmental Component & Anticipated Impacts												
	Safety & Healthy working conditions in the QL. The first aid boxes will be made available in the Site Office for immediate treatment. Occupational health surveillance programme will be carried out for all the employees regularly.												
9	Climate Change : About 50 KVA industrial supply for lighting is required which will be met from TANGEDCO Grid. For operating the mining equipments, High Speed Diesel (HSD) is required @ 2,500 Liters/day. A licensed fuel storage tanks is established at the Factory and the daily requirement of HSD and other lubricants will be met by a licensed mobile bowser. There will be no standby DG set. By considering the Transport Emission Factors for Medium & Heavy Duty Trucks viz. 0.997 kg CO₂/km, 0.012 g CH₄/km and 0.008 g N₂O/km [as per US EPA 2014 emission factors for Green House Gases (GHGs) Inventories], the gaseous emissions will be as follows : <table><tr><td>HSD consumption</td><td>:</td><td>7.50 LPA</td></tr><tr><td>Total CO₂ Emissions</td><td>:</td><td>0.249 Tons/Annum</td></tr><tr><td>CO_{2-e} for CH₄ Emissions</td><td>:</td><td>0.075 Tons/Annum</td></tr><tr><td>CO_{2-e} for N₂O Emissions</td><td>:</td><td>0.596 Tons/Annum.</td></tr></table> Thus, total CO₂ Emission due to the Proposal will be 0.920 Tons/Annum. Carbon sequestration is the long-term storage of carbon in oceans, soils, vegetation (especially forests) and geologic formations. Adequate Green Belt shall be developed around the project for carbon sequestration. As trees grow, they store carbon in woody tissues and soil organic matter. Through the process of photosynthesis, plants assimilate carbon and return some of it to the atmosphere through respiration. The carbon that remains as plant tissue is then consumed by animals or added to the soil as litter when plants die and decompose. About 2.50 Ha of Safety Zone will be under Green Belt with a Coverage of 16.51%. About, 3,750 local tree species like Neem, Pungan, Teak, etc. will be planted @ 1,500 Trees/Ha with a Survival Rate of about 90%. The primary way that carbon is stored in the soil is as <i>soil organic matter (SOM)</i>. SOM is a complex mixture of carbon compounds, consisting of decomposing plant and animal tissue, microbes (protozoa, nematodes, fungi, and bacteria), and carbon associated with soil minerals. It will be ensured that Plant operations do not result in loss of soil biological properties and nutrients. Soil amendments as required will be carried out to improve soil heath. Bio remediation using micro organisms will be carried out to restore the soil environment to enable carbon sequestration.	HSD consumption	:	7.50 LPA	Total CO ₂ Emissions	:	0.249 Tons/Annum	CO _{2-e} for CH ₄ Emissions	:	0.075 Tons/Annum	CO _{2-e} for N ₂ O Emissions	:	0.596 Tons/Annum.
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5.0 Analysis of Alternatives (Technology & Site)

5.1 Technology

- ❖ The deployment of eco friendly quarrying (no drilling and blasting) is proposed.
- ❖ A part of the quarried out area will be backfilled, reclaimed and afforested.
- ❖ Water Reservoirs are proposed to harvest the rain water and to recharge the Ground water-table levels.

5.2 Alternative Sites Considered

This is a Mineral bearing area and Mineral deposits are site specific. Thus, site selection criteria is not required.

6.0 Environmental Monitoring Programme

6.1 Environment Cell and Compliances

For effective implementations of Environmental Management Cell (EMC), RCL has the Environment Cell under the overall supervision of the Unit Head. Environmental Engineer, Mines Manager, Geologists and Horticulturists form part of the Cell.

6.2 Post Project Monitoring

Periodical monitoring of the Ambient Air Quality (at 4 locations) as per NAAQ Norms, Fugitive/Workzone Air Quality/emissions (4 locations), Noise Levels (Ambient & Workzone areas), Water (4 Surface & 4 Ground waters) and Soil Quality (3 Locations) shall be undertaken. The monitoring details are given in **Table 6.1**.

Table : 6.1 Post Project Monitoring Schedule

Per Lease	Environmental Component				
	Ambient Air Quality	Fugitive Emissions	Noise Levels	Water Quality	Soil Quality
No. of Locations	4 (in & around Lease-Upwind & Downwind)	4 (Excavation area, Loading Area, Haul Road & Quarry Edge)	Ambient-4 Workzones-4	Surface waters-4 Ground waters-4	3
Frequency	24-hourly once in fortnight continuously for whole year	Two 8-hourly samples, once in a week for 2 weeks in a Season	Once in a month	Quarterly once	Biannual
No. of Samples	96	64	96	32	6
Parameters	All 12 Parameters	PM10, SPM, SO ₂ , NOx & CO	Day & Night Leq Noise levels dB(A)	Physico-chemical & Trace Metals	Physico-chemical & Nutrients
Norms to be Complied	NAAQ Norms	IBM Norms for Limestone Mine	MoEF&CC and DGMS Norms	CPCB/IS:10500 & TNPCB Norms	Soil Fertility
Budget	Rs.4,80,000	Rs.3,20,000	Rs.96,000	Rs.96,000	Rs.18,000

About **Rs.10.10 Lakhs/annum per Lease** will be allotted for the Monitoring Works. The periodical reports shall be submitted to TNPCB monthly, IBM Quarterly and MoEF&CC Monitoring Cell/ SEIAA as Half Yearly Status Reports.

7.0 Additional Studies

7.1 Hazards Identification & Risk Assessment

Hazards Identification & Risk Assessment (HIRA) is the Tool to identify the potential Hazards due to the proposed activities and assessment of the Risks to propose the Emergency Preparedness Plan (EPP). There is no storage of Hazardous Chemicals in the Quarry and thus, no Modelling is warranted. The Potential Hazards that could have impacts during Operation Phase are given in Table 7.1.

Table : 7.1 Potential Hazards due to Proposal

Potential Hazard	Probable Impact
Manmade :-	
Accident due to Quarrying Activities	Can occur at any time during the Quarrying.
Natural :-	
Natural Calamities	Can occur at any time.
Others :-	
Medical Emergency	Can occur at any time during the Operational Phase.

7.2 Emergency Preparedness Plan

The hazard scenarios were risk ranked using the Risk Matrix (R) are shown in Table 7.2.

Table : 7.2 Risk Matrix (R)

Potential Severity	Risk			
	Low (1)	Medium (2)	High (3)	Continuous (4)
Major (4)	2.5	3.0	3.5	4.0
Moderate (3)	2.0	2.5	3.0	3.5
Minor (2)	1.5	2.0	2.5	3.0
Negligible (1)	1.0	1.5	2.0	2.5

The Quarrying operations are ranked in Low-Major Risks with Score of 1-4. It shall be ensured that engaged Personnel are aware of the Hazards involved and are trained in responding to the Disasters. **First Aid Kits and Medical Supplies** should be maintained at the Lease. All personnel shall use **Personal Protective Equipment (PPEs)** like Safety Shoes, Helmets, Safety glasses, etc. They should be trained in Safety Procedures to ensure that accidents and injuries are minimised. Government Hospitals in the vicinity will be used for any Medical Emergencies.

7.3 Disaster Management Plan

The proposed Disaster Management Plan (DMP) for the Risks involved in the Quarrying Operations are listed in **Table 7.3**.

Table : 7.3 DMP Measures

Sl. No.	Factors	Causes of risks	Control measures
1	Removal of O.B	a) Top soil bench may slide due to its unconsolidated nature. b) Vibration due to movement of vehicles in the O.B benches	Not applicable. Both Top Soil & Kankar deposits will be quarried out.
2	Drilling	a) Due to high pressure of compressed air hoses may burst b) Drill rod may broken due to improper maintenance of the rod	Not applicable. No drilling and hence no compressors is required to quarry this deposit
3	Blasting	a) Fly rock, ground vibration and noise etc., b) Improper charging of explosives	Not applicable. No Blasting is proposed.
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 un authorized 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 of ore	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 Audio visual reverse horn will be provided 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.	All electrical parts shall be cleaned frequently with the help of dry air blower All fastening parts and places will be tightening.
7	Natural calamities	Unexpected happenings	The management is capable to deal with the situation

RCL management is able to deal with the situation efficiently to reduce confusion keeping in view of the likely sources of danger in the mine. In case of eventuality and sudden occurrence of abnormalities during mining activity leads to any danger for persons and machinery in the mines, the following person will be coordinating to restore the normalcy of the situation.

Mr. Madhusudhan Kulkarni
Sr. Vice President (Mfg.)
The Ramco Cements Limited,
Govidapuram Works,
Sendurai Road, Ariyalur District
Ph.No. : 04329-294400.

Outline of Disaster Management Plan : The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to abnormalities in the course of mining activity leading to a serious danger to workers or any machinery or the environment

System of communication: RCL has an internal communication system for the department head and to their line of command with telephone. And also we are having the telephone Nos. and addresses of adjoining mines, rescue station, police station, Fire service station, local hospital, electricity supply agency and standing consultative committee members.

Consultative Committee: A standing consultative committee is formed under the head of Mines Manager. The members consists of safety officer / medical officer / Asst. manager/ public relation officer/ Foreman/ and environmental engineer.

Facilities & Accommodation: Accommodation and facilities for medical centre, rescue room and for various working groups will be provided.

First Aid & Medical facilities: The mine management is having first aid / medical centre for use in emergency situation. All casualties would be registered and will be given first aid. The centre will have facilities for first aid & minor treatment, resuscitation, ambulance and transport. It has proper telephone / wireless set for quick communication with hospitals where the complicated cases are to be sent.

Stores and equipment : A detailed list of equipment is available with its type & capacity and items reserved for emergency.

Transport services : A well defined transport control system is provided to deal with the situation.

Functions of public relations group: To make a cordial relation with government officials and other social service organization and working groups. To liaise with representatives of the mine to ameliorate the situation of panic , tension, sentiments , grievances and misgivings created by

any disaster. To ameliorate the injured, survivors and family members of affected persons by providing material, moral support and establishing contact with relatives of victims.

Security :- Manning of security posts.

Catering & Refreshment:- Arrangement to be made for the victims, rescue teams and others.

Care and maintenance during temporary discontinuance: If the mine will be discontinued temporarily for more than 90 days, notice will be given 105 days before the date of such discontinuance to the concerned authorities. During discontinuance period safety arrangement and fencing will be provided to avoid the entry of unauthorized persons. The accessibility to the mine from the surface will be prevented by providing fencing arrangement.

Emergency Plan:

- ❖ On realizing anything serious will be happened anywhere in the mine, immediately inform the nearest mining official
- ❖ On being informed about the emergency, it will be verified for the correctness of information and telephone in particular to the Manager and other part of the mine and managers of adjoining mine so that persons may be withdrawn.
- ❖ On receiving information of emergency, intimation will be sent to the consultative committee which is already formed. Shift in-charge will ensure that all the materials and transport system to deal with emergency situation.
- ❖ First aid facilities to be ready to receive the cases.

Emergency Response Organization : Following Officers of the mines will be responsible for co ordination in case of emergency situated in any section of the mine.

<u>Person</u>	<u>Responsibility</u>
Head of the department/Mine Agent	Site Controller
Shift In charge/Section In charge	Accident Controller/ Communication officer
Employee who gives the first information about the accident	Primary Controller
P & A Dept. (HOD)	Liaison officer

Capability of Lessee:

Following facilities will be available:

Public addressing system
 Telephones/ Mobile handsets
 Runners/messenger
 Emergency alarm
 Fire fighting equipments & accessories with trained manpower
 Full fledged dispensary at RCL Plant

Training Centre

Fire tender

Ambulance.

Facilities available outside RCL : Government Hospital & Medical College at Ariyalur.

The possibility of 'Offsite Emergency' situation are ruled out as RCL Quarry is not likely to pose any offsite emergency and hence does not call for any preparation of an off-site emergency plan.

8.0 Project Benefits

Environmental Benefits : The proposal ensures continuous Raw Material supply to the Cement Plant. Effective utilization of the Minor Mineral for Cement manufacturing is a Mineral Conservation Measure.

Financial Benefits : Project cost is **Rs.4.65 Crores**. Mineable Reserves from the Lease is 3,66,300 Tonnes. As per MMDR Act 2015, DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees to the Exchequer will improve local and regional economy.

Social Benefits : Project will employ 14 persons directly and 20 persons indirectly. A budget of **Rs.9.30 Lakhs** (2% of the Project Cost) will be allotted as **CER Budget** to Kairulabad Village. DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees will also be spent for Kairulabad. The direct & indirect employment, CSR/CER activities, etc., will have a positive impact on the Socioeconomic Structure of the area.

9.0 Environmental Cost Benefit Analysis

Cost Benefit Analysis is not applicable for the Proposal as there is no forest land is envisaged for the Project and also no tree cutting is proposed.

10.0 Environmental Management Plan

There will be **no Construction Phase** for the Project. Environmental Management Plan (EMP) is suggested to mitigate the possible negative impacts that may be caused to the various attributes of environment due to the proposed mining operations. The EMP Measures proposed are given in **Table 10.1**.

Table : 10.1 Proposed EMP Measures

Sl. No.	Environmental Component & Proposed EMP Measures
1	Land Environment :- ❖ Earthen bunds are to be strengthened along the boundaries to arrest wash-offs. ❖ Garland drains are to be provided and maintained periodically around the Lease. ❖ Green Belt has to be developed and maintained along the Lease boundary. ❖ No. of trees planted shall be numbered and referenced for review. ❖ The land shall be restored to its original conditions at the end.
2	Transportation :- ❖ Regular wetting of haul roads has to be undertaken to arrest fugitive emissions. ❖ Tippers are to be fully covered with Tarpaulin to avoid any spillage. ❖ No overloading of Tippers is allowed strictly. ❖ A strict Speed Limit of 30 km/hr. has to be enforced and monitored continuously. ❖ Compliance to 'Pollution under Control' Certification has to be ensured. ❖ Restriction of Truck parking in the Public Road has to be implemented. ❖ Security Guards to be posted at the public road junction.
3	Air Quality :- ❖ Eco friendly quarrying (with out Drilling & Blasting) shall be adopted. ❖ Green belt shall be developed along the periphery, haul roads, waste dumps, etc. ❖ Water sprinkling at excavation areas, loading, haul roads, etc. has to be carried out periodically. ❖ Periodical maintenance of mining equipments has to be carried out. ❖ Periodical Air Quality Monitoring & Fugitive Emissions shall be carried out and Reports submitted.
4	Noise Levels :- ❖ Deploying equipments shall be with in-built mechanism for reducing noise. ❖ Providing sound proof operator's cabin of equipments. ❖ Provision of ear muffs/ear plugs to the workers in higher noise zones. ❖ Green Belt with thick foliage shall be maintained around lease boundary as acoustic barriers. ❖ Ambient Noise Levels at boundaries shall comply MoEF&CC Norms for Residential Areas. ❖ Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.
5	Water Environment :- ❖ Natural drains or nallas should not be disturbed. ❖ The existing Pre-Project Drainage Pattern should be maintained to the extent

Sl. No.	Environmental Component & Proposed EMP Measures
	possible so that Post Project Runoff distribution is not affected. ❖ Runoffs from Quarry and Waste Dump should be regulated by constructing garland drains. ❖ Garland Drains and Settling Tanks are to be maintained and desilted periodically. ❖ Ground Water Levels and Water Quality are to be periodically monitored at identified Borewells & Dugwells in the Project vicinity. ❖ Monitored Water Quality data are to be periodically submitted to IBM, SEIAA-TN & IRO-MoEF&CC, Chennai.
6	Biological Environment :- ❖ Effective Green Belt has to be developed and maintained with about 90% Survival Rate. ❖ Native species shall be preferred for Green Belt development. ❖ Fruit bearing trees may also be preferred. ❖ The primary way that carbon is stored in the soil is as soil organic matter (SOM). Climatic conditions, natural vegetation, soil texture, and drainage all affect the amount and length of time carbon is stored.
7	Socio-economics :- CSR activities shall be carried out by providing social and welfare measures for the local residents and nearby villages around the Lease area. The prime focus will be on the creating and maintaining of drinking water facilities for the students at the nearby Government Schools, establishing toilets especially for girl students at the schools, setting up of computer centres, maintenance of village roads & ponds, providing solar street lights, conducting free medical camps, etc.
8	Occupational Health :- ❖ All employees are to undergo Medical Check-up on recruitment and periodically during employment. ❖ Maintenance of Pre, during & Post Employment Records are to be kept for periodical review. ❖ Required Personal Protective Equipments for the employees are to be provided. ❖ Provision of ergonomically designed seats for drivers has to be ensured.

Plastic Waste Management : There will be ban on one-time use and throw away Plastic usage in the Lease. Encourage the use of eco friendly alternatives such as banana leaf, areca nut palm plate, stainless steel glass, porcelain plates / cups, cloth bag, jute bag etc.

EMP Budget : Project cost is **Rs.4.65 Crores**. An amount of **Rs. 7.00 Lakhs** has been earmarked as **EMP Capital Budget** and **Rs. 10.20 Lakhs per Annum as EMP Operating Cost** towards Green Belt maintenance, Environmental Monitoring, etc. A budget of **Rs.9.30 Lakhs** (2% of the Project Cost) will be allotted as **CER Budget** to Kairulabad Village. DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees will also be spent for Kairulabad.

11.0 Summary Environmental Impact Assessment Report

1.0 Introduction

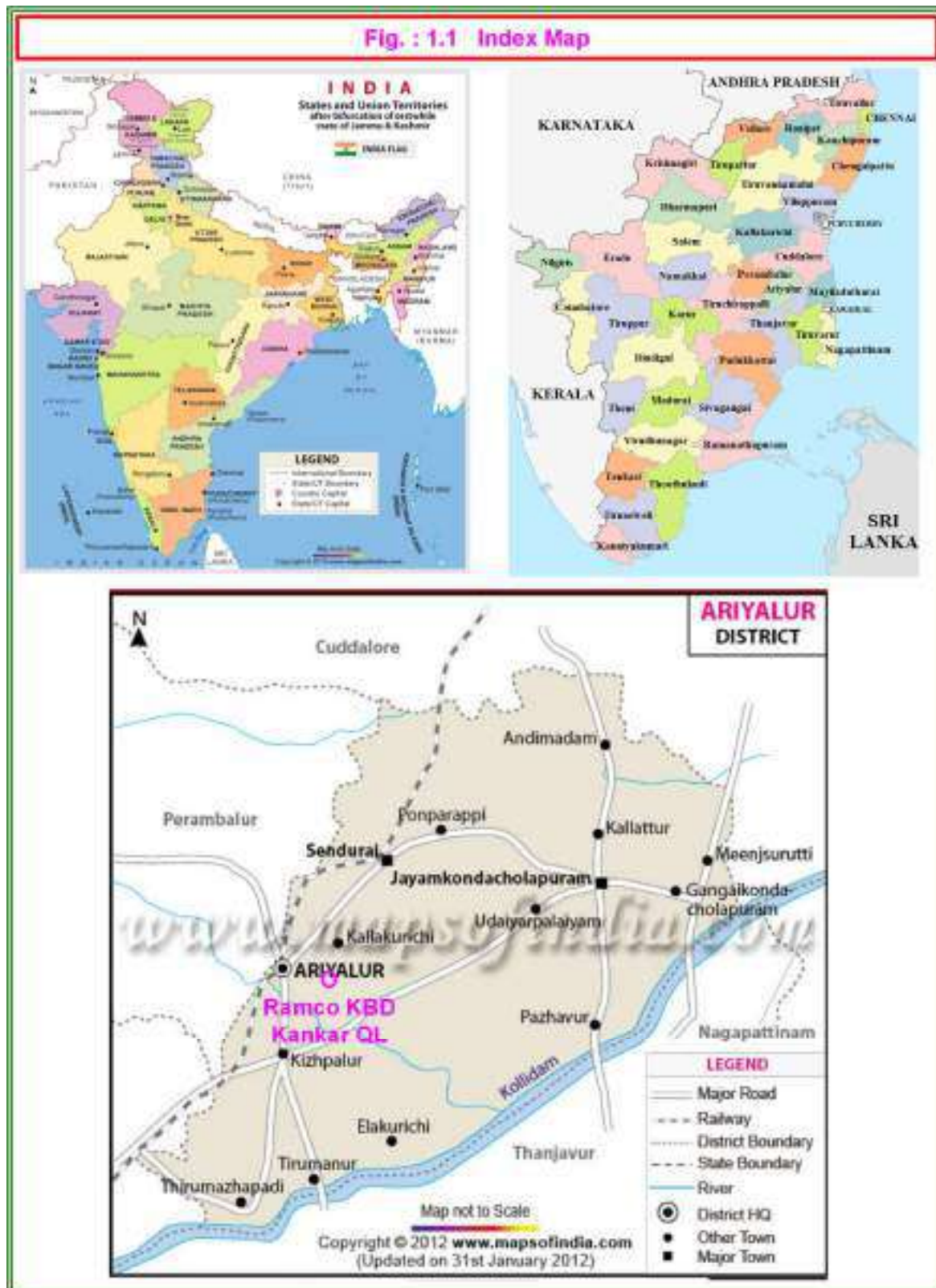
1.1 Project Proponent

M/s. The Ramco Cements Limited (RCL), under RAMCO Group, is one of the reputed Cement Companies in India. The cement production of RCL is about 16.85 million tons per annum (MTPA) from their **Cement Plants** in India. RCL is operating its Govindapuram Cement Plant near Ariyalur for 3.62 MTPA Clinker & 5.50 MTPA Cement production. The Plant requires about 6.5-7.0 MTPA of different grade Limestone and Kankar depending on the production. The existing Captive Mines viz. Amalgamated Periyannagalur Mines, Kattupirangium, Reddipalayam, Pudupalayam-North & Usenabad-South Limestone Mines and Illupaiyur, Ottakovil & Ottakovil-II Kankar Quarries in the Ariyalur Region supply the Raw Materials Limestone & Kankar to the Plant.

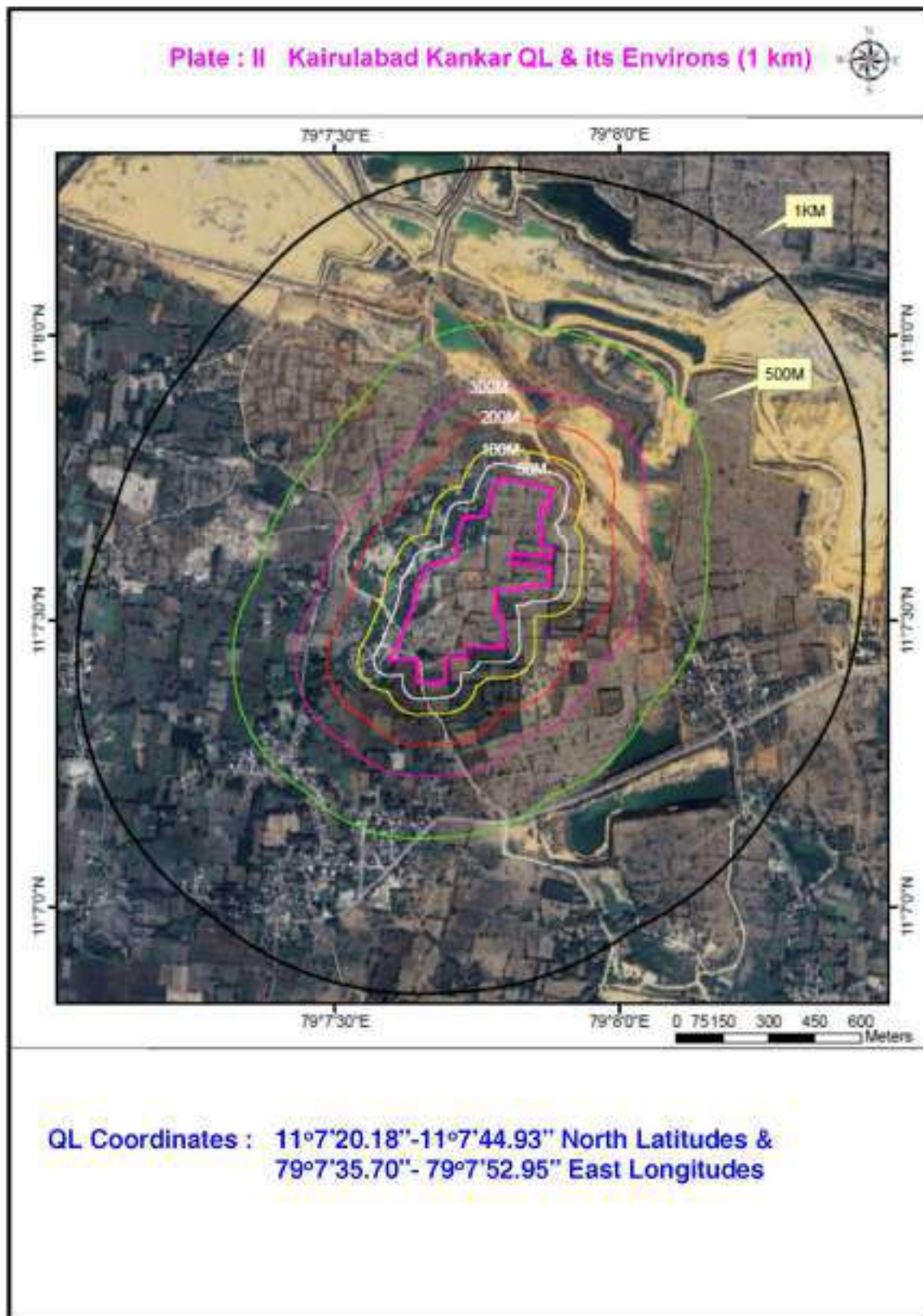
In addition to the existing Leases in Ariyalur Region, RCL has obtained Precise Area Communication from the State Government for **Kairulabad Kankar Quarry Lease** over an extent of **15.135 Ha of own Patta Land** in SF Nos. 414/8A, 414/8B, 415/5, 415/6, 415/7, 415/8, 415/9, 415/10, 415/11, 415/12, 415/13, 415/14, 416/7, 417/1, 417/2, 417/3, 417/4, 417/5, 417/6, 417/7, 417/8, 417/9, 417/10A, 417/10B, 417/11A, 417/11B, 417/11C, 417/12, 417/13, 417/14A, 417/14B, 417/15, 417/16A, 417/16B, 417/17A, 417/17B, 418/1A, 418/1B, 418/2, 418/3, 418/7, 418/8, 418/10C, 419/1A, 419/1B, 419/2A, 419/2B, 419/3A, 419/3B, 419/4, 419/5A, 419/5B, 419/5C, 419/7, 419/8, 419/9, 419/10, 419/13, 433/2A, 433/2B, 433/3A, 433/3B, 433/4A, 433/4B, 433/5, 433/6A, 433/6B, 433/7, 433/8, 433/9, 433/10, 433/11, 433/12A, 433/12B, 433/12C, 433/12D, 433/12E, 433/13A, 433/13B, 433/13C, 433/13D, 433/15, 433/16, 433/17, 433/18, 433/19, 433/20, 434/1A, 434/1B, 434/2, 434/3, 434/5, 434/6, 434/7, 434/8, 434/9A, 434/9B, 434/9C, 434/10, 434/11, 434/12A, 434/12B, 434/12C, 434/13A, 434/13B, 434/14, 434/15, 434/18 & 434/19 of Kairulabad Village, Ariyalur Taluk & District, Tamil, Nadu (**Fig. 1.1**).

The entire area is **patta land owned by RCL**. There is no Forest/Government Land involved. There is **no Rehabilitation & Resettlement (R&R)** issue. Also, there is **no litigation/pending case** against the Proposal. FMB Sketch is given as **Plate-I**. Lease Area in Google Earth Imagery & nearby Settlements are shown in **Plate-II**. The **Contact information are** :

RCL Corporate Office:- Shri.M.Srinivasan, Executive Director (Operations), The Ramco Cements Limited, 5 th Floor, Auras Corporate Centre, No. 98A, Dr.Radhakrishnan Road, Mylapore, Chennai-600 004. Tel. No. : 044-28478666 Fax No. : 044-28478676 e-Mail : ramcoenv@ramcocements.co.in	RCL Govindapuram Works :- The Sr. Vice President (Mfg.) & Unit Head, The Ramco Cements Limited, Govindapuram Cement Plant, Sendurai Road, Ariyalur District-621 713. Tel. No. : 04329-226001 to 226004 Fax No. : 04329-226005 e-Mail : madhusudan.k@ramcocements.co.in
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1.2 Project Profile

Project Name : Proposed Kairulabad Lime Kankar Quarry Lease over an Extent of 15.135 Ha & Production in Plan Period of 3,66,300 Tonnes @ Maximum 1,99,800 Tonnes per Annum (TPA) at Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu by M/s. The Ramo Cements Limited.

Project Location : SF Nos. 414/8A, 414/8B, 415/5, 415/6, 415/7, 415/8, 415/9, 415/10, 415/11, 415/12, 415/13, 415/14, 416/7, 417/1, 417/2, 417/3, 417/4, 417/5, 417/6, 417/7, 417/8, 417/9, 417/10A, 417/10B, 417/11A, 417/11B, 417/11C, 417/12, 417/13, 417/14A, 417/14B, 417/15, 417/16A, 417/16B, 417/17A, 417/17B, 418/1A, 418/1B, 418/2, 418/3, 418/7, 418/8, 418/10C, 419/1A, 419/1B, 419/2A, 419/2B, 419/3A, 419/3B, 419/4, 419/5A, 419/5B, 419/5C, 419/7, 419/8, 419/9, 419/10, 419/13, 433/2A, 433/2B, 433/3A, 433/3B, 433/4A, 433/4B, 433/5, 433/6A, 433/6B, 433/7, 433/8, 433/9, 433/10, 433/11, 433/12A, 433/12B, 433/12C, 433/12D, 433/12E, 433/13A, 433/13B, 433/13C, 433/13D, 433/15, 433/16, 433/17, 433/18, 433/19, 433/20, 434/1A, 434/1B, 434/2, 434/3, 434/5, 434/6, 434/7, 434/8, 434/9A, 434/9B, 434/9C, 434/10, 434/11, 434/12A, 434/12B, 434/12C, 434/13A, 434/13B, 434/14, 434/15, 434/18 & 434/19 of Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu. **There is no other Kankar Quarry within 500 m radius area.**

Statutory Approvals : Precise Area Communication (PAC) has been issued vide Industries Department Letter No. 2963/MMC.2/2022-1 dated 19.05.2023. Mining Plan has been approved by the Directorate of Geology & Mining, Chennai vide Letter Rc. No. 1271/MM7/2021 dated 17.08.2023.

Proposal : The **effective quarrying area will be 8.140 Ha** after leaving the safety barriers of 6.995 Ha. Mineable Reserves is 3,66,300 Tonnes of Lime Kankar. Mechanized **Non-Conventional Opencast Mining, without Drilling and Blasting**, with deployment of Excavators & Dozers-Tippers combination will be adopted. The average depth of Over Burden (OB) in the form of Top Soil is 0.30 m. Below the Top Soil, Lime Kankar exists up to a depth of 2.0 m BGL. The depth of the quarry will be **2.30 m BGL only. Quarrying activities will not intersect the ground water-table.** Also, there will be **no Solid Waste Dump** in the Lease.

To win the 3.663 Lakh Tonnes of Lime Kankar in the Plan Period (@ maximum 1,99,800 TPA in the First Year), about 0.24 Lakh m³ of OB will be removed and utilized for periphery bund & Green Belt development. The Ore:OB ratio will be 1:0.067. The ROM Lime Kankar produced from the quarry will be transported by 25 T Tarus Tippers through SH-139 to Govindapuram Cement Plant for Cement manufacturing.

The Quarry Layout, with Green Belt development, is given as **Fig. 2.1**. Quarry Particulars are detailed in **Table 1.1**. Proposed Production during the Plan Period is given in **Table 1.2**.



Table : 1.1 Quarry Particulars

Sl. No.	Details on	Particulars
1	Name of the Lease	Kairulabad Lime Kankar Quarry Lease
2	Lease Owner	The Ramco Cements Limited (RCL)
3	Extent of Lease	15.135 Ha
4	Deed Execution	New Lease; to be executed after obtaining EC
5	Lease Validity	5 Years from date of Lease Deed Execution
6	Lease Location	Kairulabad Village, Ariyalur Taluk & District, Tamil Nadu
7	Land Ownership	Own Land of RCL
8	Lithology	Top Soil : 0-0.3 m BGL Lime Kankar : 0.3-2.3 m BGL (max. depth of 2.3 m BGL).
9	Permitted Minerals	Lime Kankar
10	Commencement on	New Lease; commencement will be after obtaining all statutory approvals.
11	Mining Plan / Scheme Approvals	Mining Plan has been approved by the Directorate of Geology & Mining, Chennai vide Letter Rc. No. 1271/MM7/2021 dated 17.08.2023
12	Past Production (since Commencement)	Not Applicable; New Lease
13	Assessed Reserves	Lime Kankar - 6,81,075 Tonnes
14	Mineable Reserves	Lime Kankar - 3,66,300 Tonnes
15	Production so far	Nil
16	Dispatch Quantity	Nil
17	Process Description	Mechanized Non-Conventional Opencast Mining, without Drilling and Blasting , with deployment of Excavators & Dozers-Tippers combination will be adopted. ROM Lime Kankar produced from the quarry will be transported by 25 T Tarus Tippers through SH-139 to Govindapuram Cement Plant for Cement manufacturing.
18	Proposed Production	The entire Reserves of 3,66,300 Tonnes will be quarried during the Plan Period itself with a maximum production of 1,99,800 TPA in the First Year.
19	Ground water table intersection	The total depth of quarrying will be to a maximum of 2.3 m BGL only. As ground water-table fluctuates between 40-45 m BGL in the vicinity, thus, no ground water-table intersection .
20	Project Cost	Rs.4.65 Crores
21	Project Schedule	Life of the Lease is 5 Years.
22	R & R Issue	Nil
23	Litigation/Case Details	Nil
24	CER Budget	Rs.9.30 Lakhs
25	Financial Assurance	Not applicable now
26	Violation, if any	Nil

Quarry Profile :

Mineable Reserves	:	3,66,300 Tonnes
Proposed Lime Kankar Production	:	1,99,800 TPA (maximum)
Ore : OB Ratio	:	1: 0.067
Bench Height & Width	:	- (No benches)
Life of the QL	:	5 years
No. of working days/annum	:	300 (2 shifts)
Ultimate Pit Limit-Conceptual	:	2.3 m (BGL)
Ground Water-table at	:	Pre monsoon - 45 m BGL & Post monsoon - 40 m BGL

Quarrying activities will not intersect the ground water-table.

Table : 1.2 Proposed Development & Production Plan

Year	Area, Ha	Development			Production			Ore:OB Ratio
		RL, m	Depth, m	OB, cu.m	RL, m	Depth, m	Lime Kankar, Tonnes	
I	4.440	89.0-88.7	0.3	13,320	88.7-86.7	2.0	1,99,800	1:0.067
II	2.225	90.0-89.7	0.3	6,675	89.7-87.7	2.0	1,00,125	1:0.067
III	0.555	90.0-89.7	0.3	1,665	89.7-87.7	2.0	24,975	1:0.067
IV	0.555	91.0-90.7	0.3	1665	90.7-88.7	2.0	24,975	1:0.067
V	0.365	91.0-90.7	0.3	1095	90.7-88.7	2.0	16,425	1:0.067
Total	8.140	-	-	24,420	-	-	3,66,300	1:0.067

EIA Study : The Lime Kankar to be quarried out from this Lease is **Minor Mineral over an extent of 15.135 Ha** and falls in **Category 'B1'** of Sl. No. 1(a) of EIA Notification 2006, as amended, for prior EC from State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu. Accordingly, TOR Application/Form-1 (Form 1M is Not Applicable) has been submitted by RCL vide Parivesh Online proposal No. **SIA/TN/MIN/495135/2024 on 02.09.2024**. After paying Online Scrutiny Fees, the File has been accepted by SEIAA on 06.09.2024. The Proposal was deliberated in 502nd SEAC Meeting held on 03.10.2024 and in 765th SEIAA Meeting held on 18.10.2024. Terms of Reference (TOR) for carrying out EIA Study has been awarded vide **TOR Identification No. TO24B0108TN5653629N dated 22.10.2024** under **File No. 11231/2024**, with Public Hearing.

EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including **Sector-1 (Mining Projects) for Category 'A'** by the National Accreditation Board for Education & Training (**NABET**) vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with validity till 16.11.2025 (Sl. No. 5 of List). ABC Laboratory is accredited by the National Accreditation Board for Testing & Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2024 - valid till 02.04.2026.

Baseline Data (BLD) has been collected during **Mar.-May 2025 (Summer Season)** for Environmental Impact Assessment (EIA) Study. Draft EIA Report has been prepared in compliance with awarded TORs and submitted along with Summary EIA Reports (both in English and Tamil versions) for Public Consultation & Public Hearing.

2.0 Description of the Environment

2.1 Environmental Setting

Kairulabad Quarry Lease is located in Survey of India Topo Sheet No.58 M/4 and in-between the Coordinates 11°7'20.18"-11°7'44.93" North Latitudes and 79°7'35.70"- 79°7'52.95" East Longitudes (**Fig. 1.2**). The site is free from seismic effects (Seismic Zone III). The Lease area is having almost a gentle topography with elevation in the range 88-91 m aMSL. There are **no eco sensitive areas** like National Parks, Wildlife Sanctuaries, Biosphere Reserves, Elephant Corridor, Mangroves, Historical Monuments, Heritage sites, etc. within 10 km from the Lease boundary. Parts of **Vannankurichi RF** (7.8 km in NE), **Managethi RF** (8.6 km in east), **Vilangudi Extn. RF** (7.4 km in ESE) and **Vilangudi RF** (7.6 km in SE) fall in the Study Area.

Seasonal **River Marudaiyar** drains the region which flows at 4.6 km in the south. Seasonal Nallah Kallar River flows at 1.7 km in west-northwest.

State Highway (SH)-139 (Ariyalur-V.Kaikatti-Jayamkondam Section) runs at 0.4 km in south. National Highway (NH)- 81 connecting Trichy-Kilapaluvur-Chidambaram runs at 3.3 km (in SSE), NH-136 connecting Tanjore-Ariyalur-Perambalur runs at 4.9 km (W). Southern Railway BG Line runs through Ariyalur at a distance of 7.0 km in the west-northwest. The nearest Airport Trichy is at 60 km in southwest. The nearest Ports are at Chennai (300 km) and Cuddalore (95 km).

QL Area is about 0.15 km from nearby Hastinapuram village in south and 0.6 km Kattupirangium village in the east. Valajanagaram is at 2.5 km in the west. The nearest Town & District Headquarters is Ariyalur at a distance of 5.1 km in the west.

RCL Govindapuram Cement Plant is located at a distance of 6.2 km aerial distance (13 km by road) in northwest. From the Lease, Ultratech Cement Plant-Reddipalayam is at 4.4 km (SE), TANCEM Cement Plant-Kallankurichi at 3.5 km (WNW), Dalmia Ariyalur Plant at 6.5 km (NW) and Chettinad Kilapaluvur Cement Plant at 9.5 km (SW). These Cement Plants & other have Limestone Mines & Quarries in the Region. The Lease is adjacent to TAMIN-PNR Mine @ 0.5 km (SSE) and Dalmia Cement Periyanaalur-AK Limestone Mines @ 0.5 km (N).

From the Lease, UltraTech Periyanaalur Limestone Mine is @ 1.6 km (NE), TANCEM PNR & Kallankurichi Mines @ 0.8-1.3 km (NE) and RCL Mines viz. Usenabad South @ 3.8 km (NW), Kattupirangium @ 1.3 km (SE), Pudupalayam-North @ 2.8 km (SE) & Reddipalayam Mines @ 5.4 km (SE) are existing.



2.2 Baseline Environmental Status

The study area of 10 km radius (from ML boundary) (Fig. 3.1) has been considered for assessing the baseline environmental status. The monitoring stations are selected in such a way that baseline data reflects the **Cumulative Impact of existing Mines & Plants** in the Study area. The summary of baseline status is given in Table 2.1.

Table : 2.1 Environmental Baseline Status

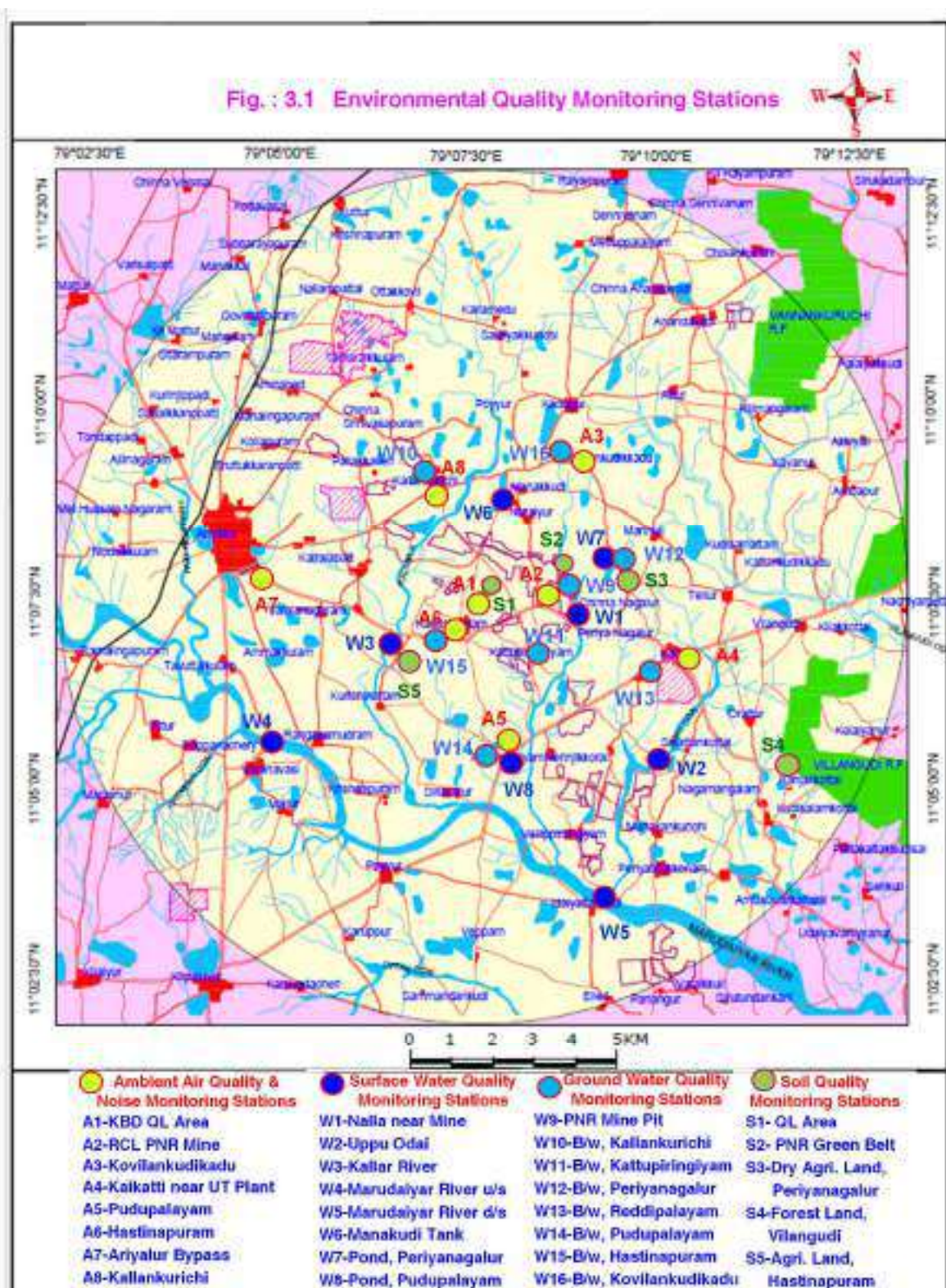
Envl. Component	Main Parameters	Minimum	Maximum	Mean	Desirable Norms
Ambient Air Quality, ug/m ³	PM2.5	15	48	25.4	60
	PM10	32	78	49.1	100
	SO ₂	7	28	15.9	80
	NO _x	9	33	19.6	80
Ambient Noise, dB(A)	Leq-Day	40.4	48.8	44.0	55
	Leq-Night	39.8	44.8	42.5	45
Surface Waters	TDS, mg/l	390	550	-	500/2100
Ground Waters	TDS, mg/l	440	620	-	500-2000
Soil Status	EC, mmhos/cm	1.53	1.90	-	0.2-0.5
	SAR	1.28	2.99	-	<5

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10- Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; NO_x-Oxides of Nitrogen; Leq-Day & Leq-Night - Equivalent Noise Levels during Day & Night Times; TDS-Total Dissolved Solids; EC-Electrical Conductivity & SAR-Sodium Absorption Ratio.

The findings of baseline environmental status of the study area are summarized below :

- ❖ The collected meteorological data during this season represented the local weather phenomena.
- ❖ The monitored ambient air quality in the study area was found to be in compliance with the Revised National Ambient Air Quality (NAAQ) 24-hourly Norms for Industrial, Residential, Rural and other areas.
- ❖ Ambient equivalent noise levels (Leq) during day and night times were found to be well within the MoEF&CC Norms.
- ❖ The water quality of surface waters was found to be in compliance with CPCB Norms.
- ❖ The ground water quality was found to be in compliance with the IS:10500-2012 Norms.
- ❖ The soil in the study area would very well support vegetation after amending it suitably.
- ❖ There is no eco sensitive area exists in the study area and only domesticated animals exist.
- ❖ The area is thinly populated and basic amenities are available almost in all villages.

Thus, there is **adequate buffer** for the proposed Project in the study area.



3.0 Anticipated Environmental Impacts

Being a Quarry Project, it **does not involve any major establishment or construction**. A small Mine Office will be constructed on **temporary structures**. The identified Impacts during Operation Phase are given in **Table 3.1**.

Table : 3.1 Identified Impacts

Sl. No.	Environmental Component & Anticipated Impacts
1	Land Environment : In the total Lease Area of 15.135 Ha, effective quarry area will be 8.14 Ha. At the end of life of the quarry, the entire pit of 8.140 Ha will be converted as a water reservoir . About 2.50 Ha of Safety Zone will be under Green Belt with a Coverage of 16.51% at Conceptual Stage.
2	Traffic Volume : The existing traffic volume in the Project vicinity was found to be 6,410.7 Passenger Car Units (PCUs)/day . In the Post-Project Scenario, there will be an addition of 54 Vehicles (118.8 PCU/day) (in 2 ways) due to the Project. Cumulatively, the traffic volume in the Project vicinity will be 6,529.5 PCU/day . The existing SH is adequate to handle the proposed traffic volume due to the Project. Adequate parking area will be provided in the Lease. Facilities for drivers (rest room, toilet, etc.) will also be provided.
3	Air Quality : Quarrying, Loading and Transporting activities would generate both fugitive dust emissions and smoke from HEM Machineries/Equipments & Transporting Tippers. AERMOD View Software is used for Predicting the maximum Ground Level Concentrations (GLCs) including Transportation Impact. The predicted maximum GLC-PM _{2.5} for cumulative activities is 0.20 ug/m ³ and GLC-PM ₁₀ for cumulative activities is 0.68 ug/m ³ and found to be confined locally i.e. within 0.04 km radius. Also, adequate Buffer Level available in the Air Environment for the Proposal.
4	Noise Levels : There is no Drilling and Blasting in this Quarry and thus, no vibration . Excavation, Loading and Transportation activities are the sources of Noise. In general, work force will be exposed to <85 dB(A) levels during 8-hours Shift. Noise level at nearest Lease boundary will be <55 dB(A) during day times and <45 dB(A) during night times as stipulated by MoEF&CC- Leq Noise Norms for Residential & Rural Areas.
5	Water Environment : Impact on Surface Waters : The Surface run-offs due to the rain in the Lease Area are drained by natural courses i.e. first order streams. There are 3 first order streams in the southern parts of QL Area and a channel in the eastern boundary. As directed in the PAC Order & approved Mining Plan, the safety barrier of 50 meter from the streams & channel are provided and its flow will be maintained as such till the Conceptual Stage.

Sl. No.	Environmental Component & Anticipated Impacts
	The Normal Rainfall of the Site is 1,096 mm. Pre-Project and Post Project Surface Runoffs from the Quarry Area are estimated as per Manual of Artificial Recharge of Ground Water (CGWB, 2007). Pre-Project Runoffs from Quarry Area will be 2,30,672 KL/Annum and Post Project Runoffs will be 2,13,546 KL/Annum. There will be less Runoffs in the Post-Project Scenario due to more green belt area. This is the impact on Surface Waters due to the Project. There is no Quarry Pit Water Discharge. Impact on Ground Waters : The QL requires about 5 Kilo Liters per Day (KLD) water towards domestic consumption (1 KLD), Dust Control Measures (1 KLD) and Green Belt development (3 KLD) which will be brought by own Tankers from the Cement Plant. There will not be any water drawl from Surface or Ground Water Sources in the QL Area. Domestic sewage generation will be about 0.8 KLD which will be biologically treated in a Septic Tank followed by a Dispersion Trench of adequate size. No workshop is proposed and thus, no effluent generation from the QL. Thus, the impact on the Ground Waters would be minimum.
6	Biological Environment : There is no Eco Sensitive Area/Zone (ESA/ESZ) in the Region. Only Native Flora and Fauna exists. With natural vegetation and domestic fauna predominant in the Study Area, impact on the existing flora-fauna would be nil/minimum. QL area is surrounded by barren lands, dry agricultural lands & Mines/Industries within 10 km area. As the baseline AAQ are in lower levels as well as Predicted GLC is very low/insignificant, there will be no impact on the surrounding dry agricultural lands due to the Project.
7	Socio-economics : Project will employ 14 persons directly and 20 persons indirectly. A budget of Rs.9.30 Lakhs (2% of the Project Cost) will be allotted as CER Budget to Kairulabad Village. DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees will also be spent for Kairulabad. RCL is carrying out number of social activities in and around the villages of its Mines and Factory under the Corporate Social Responsibility (CSR) Budget. RCL has the CSR Committee as per the provisions notified by the Ministry of Corporate Affairs on February 27, 2014. Based on the CSR Committee and declared CSR Policy of the Company, CSR activities are carried out and reported. The direct & indirect employment, CER & CSR activities, etc., will have a positive impact on the Socioeconomic Structure of the area.
8	Occupational Health : RCL is operating an Occupational Health Centre at Factory for supporting the health care needs of employees & their families. Periodic Health tests (Pulmonary test, Audiometric test, blood test, chest x-ray examination etc.) have been conducted every year for the employees. Supported by test observations, adequate and need based treatment has been offered to employees. RCL is committed to provide a Safety & Healthy working conditions in the QL. The first aid boxes will be made available in the Site Office for immediate treatment.

Sl. No.	Environmental Component & Anticipated Impacts
	Occupational health surveillance programme will be carried out for all the employees regularly.
9	Climate Change : About 50 KVA industrial supply for lighting is required which will be met from TANGEDCO Grid. For operating the mining equipments, High Speed Diesel (HSD) is required @ 2,500 Liters/day. A licensed fuel storage tanks is established at the Factory and the daily requirement of HSD and other lubricants will be met by a licensed mobile bowser. There will be no standby DG set. About 2.50 Ha of Safety Zone will be under Green Belt with a Coverage of 16.51%. About, 3,750 local tree species like Neem, Pungan, Teak, etc. will be planted @ 1,500 Trees/Ha with a Survival Rate of about 90%.

4.0 Environmental Monitoring Programme

Periodical monitoring of the Ambient Air Quality (at 4 locations) as per NAAQ Norms, Fugitive/Workzone Air Quality/emissions (4 locations), Noise Levels (Ambient & Workzone areas), Water (4 Surface & 4 Ground waters) and Soil Quality (3 Locations) shall be undertaken as per MoEF&CC/TNPCB Norms by appointing an accredited external agency. The status reports will be submitted periodically to TNPCB on monthly basis, IBM on quarterly basis and SEIAA & IRO, MoEF&CC Chennai on six monthly basis.

5.0 Additional Studies

Detailed Risk Assessment and mitigative measures are delineated and an effective Disaster Management Plan, for natural and man-made disasters, is also submitted. Safety aspects will also be ensured to reduce incidents, if any.

6.0 Project Benefits

Environmental Benefits : The proposal ensures continuous Raw Material supply to the Cement Plant. Effective utilization of the Minor Mineral for Cement manufacturing is a Mineral Conservation Measure.

Financial Benefits : Project cost is **Rs.4.65 Crores**. Mineable Reserves from the Lease is 3,66,300 Tonnes. As per MMDR Act 2015, DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees to the Exchequer will improve local and regional economy.

Social Benefits : Project will employ 14 persons directly and 20 persons indirectly. A budget of **Rs.9.30 Lakhs** (2% of the Project Cost) will be allotted as **CER Budget** to Kairulabad Village. DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees will also be spent for Kairulabad. The direct & indirect employment, CSR/CER activities, etc., will have a positive impact on the Socioeconomic Structure of the area.

7.0 Environmental Management Plan

There will be **no Construction Phase** for the Project. Environmental Management Plan (EMP) is suggested to mitigate possible negative impacts that may be caused to various attributes of environment due to proposed mining operations. EMP Measures proposed are given in **Table 7.1**.

Table : 7.1 Proposed EMP Measures

Sl. No.	Environmental Component & Proposed EMP Measures
1	Land Environment :- ❖ Earthen bunds are to be strengthened along the boundaries to arrest wash-offs. ❖ Garland drains are to be provided and maintained periodically around the Lease. ❖ Green Belt has to be developed and maintained along the Lease boundary. ❖ No. of trees planted shall be numbered and referenced for review. ❖ The land shall be restored to its original conditions at the end.
2	Transportation :- ❖ Regular wetting of haul roads has to be undertaken to arrest fugitive emissions. ❖ Tippers are to be fully covered with Tarpaulin to avoid any spillage. ❖ No overloading of Tippers is allowed strictly. ❖ A strict Speed Limit of 30 km/hr. has to be enforced and monitored continuously. ❖ Compliance to 'Pollution under Control' Certification has to be ensured. ❖ Restriction of Truck parking in the Public Road has to be implemented. ❖ Security Guards to be posted at the public road junction.
3	Air Quality :- ❖ Eco friendly quarrying (with out Drilling & Blasting) shall be adopted. ❖ Green belt shall be developed along the periphery, haul roads, waste dumps, etc. ❖ Water sprinkling at excavation areas, loading, haul roads, etc. has to be carried out periodically. ❖ Periodical maintenance of mining equipments has to be carried out. ❖ Periodical Air Quality Monitoring & Fugitive Emissions shall be carried out and Reports submitted.
4	Noise Levels :- ❖ Deploying equipments shall be with in-built mechanism for reducing noise. ❖ Providing sound proof operator's cabin of equipments. ❖ Provision of ear muffs/ear plugs to the workers in higher noise zones. ❖ Green Belt with thick foliage shall be maintained around lease boundary as acoustic barriers. ❖ Ambient Noise Levels at boundaries shall comply MoEF&CC Norms for Residential Areas. ❖ Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.
5	Water Environment :- ❖ Natural drains or nallas should not be disturbed. ❖ The existing Pre-Project Drainage Pattern should be maintained to the extent

Sl. No.	Environmental Component & Proposed EMP Measures
	possible so that Post Project Runoff distribution is not affected. ❖ Runoffs from Quarry and Waste Dump should be regulated by constructing garland drains. ❖ Garland Drains and Settling Tanks are to be maintained and desilted periodically. ❖ Ground Water Levels and Water Quality are to be periodically monitored at identified Borewells & Dugwells in the Project vicinity. ❖ Monitored Water Quality data are to be periodically submitted to IBM, SEIAA-TN & IRO-MoEF&CC, Chennai.
6	Biological Environment :- ❖ Effective Green Belt has to be developed and maintained with 90% Survival Rate. ❖ Native species shall be preferred for Green Belt development. ❖ Fruit bearing trees may also be preferred. ❖ The primary way that carbon is stored in the soil is as soil organic matter (SOM). Climatic conditions, natural vegetation, soil texture, and drainage all affect the amount and length of time carbon is stored.
7	Socio-economics :- CSR activities shall be carried out by providing social and welfare measures for the local residents and nearby villages around the Lease area. The prime focus will be on the creating and maintaining of drinking water facilities for the students at the nearby Government Schools, establishing toilets especially for girl students at the schools, setting up of computer centres, maintenance of village roads & ponds, providing solar street lights, conducting free medical camps, etc.
8	Occupational Health :- ❖ All employees are to undergo Medical Check-up on recruitment and periodically during employment. ❖ Maintenance of Pre, during & Post Employment Records are to be kept for periodical review. ❖ Required Personal Protective Equipments for the employees are to be provided. ❖ Provision of ergonomically designed seats for drivers/operators has to be ensured.

Plastic Waste Management : There will be ban on one-time use and throw away Plastic usage in the Lease. Encourage the use of eco friendly alternatives such as banana leaf, areca nut palm plate, stainless steel glass, porcelain plates / cups, cloth bag, jute bag etc.

EMP Budget : Project cost is **Rs.4.65 Crores**. An amount of **Rs. 7.00 Lakhs** has been earmarked as **EMP Capital Budget** and **Rs. 10.20 Lakhs per Annum as EMP Operating Cost** towards Green Belt maintenance, Environmental Monitoring, etc. A budget of **Rs.9.30 Lakhs** (2% of the Project Cost) will be allotted as **CER Budget** to Kairulabad Village. DMF amount @ 10% Royalty & Green Fund on Seigniorage Fees will also be spent for Kairulabad.

12.0 Disclosure of Consultants

EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including **Sector-1 (Mining Projects) for Category 'A'** by the National Accreditation Board for Education & Training (**NABET**) vide Certificate NABET/EIA/2225/RA0290 dated 11.06.2023 with validity till 16.11.2025 (Sl. No. 4 of List). ABC Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2024 with validity till 02.04.2026. RCL has utilized the services of Ensysiscon, Chennai for the coordination of the Study.

ABC comprises a team of highly talented professionals, who work in sync with clients ensuring that the defined assessment and survey or reporting is executed with high level of efficiency. The proficient team consists of Environmentalists, Policy makers, Geologists, Chemists, Engineers, Industrial hygienists, Technicians, Research Associates, Sociologists and others with expertise in various key areas.

ABC has a proven successful track record of working with industry & institutions and in executing multi faceted projects funded by organizations like World Bank, UNDP, MoEF&CC, amongst others. ABC Techno labs India Private Ltd has laid down new benchmarks in all its areas of strategic operations by the dedicated team of outstanding professionals and client-centric approach, clearly evident by the accomplishments/ clients list.

The **accredited Sectors and approved Experts** of ABC are appended.


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



**National Accreditation Board
for Education and Training**



Certificate of Accreditation

ABC Techno Labs India Private Limited, Chennai
 ABC Tower, 400, 13th Street, SIDCO Industrial Estate, North Phase, Ambattur, Chennai 600098
 The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast/ underground mining	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	A
5	Mineral beneficiation including pelletisation	7	2 (b)	A
6	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
7	Cement Plants	9	3 (b)	A
8	Petroleum refining industry	10	4 (a)	A
9	Leather/skin/hide processing industry	15	4 (f)	A
10	Chemical fertilizers	16	5 (a)	A
11	Petro-chemical complexes	18	5 (c)	A
12	Petrochemical based processing	20	5 (e)	A
13	Synthetic organic chemicals industry	21	5 (f)	A
14	Distilleries	22	5 (g)	A
15	Integrated paint industry	23	5 (j)	B
16	Sugar Industry	25	5 (i)	B
17	Oil & gas transportation pipeline, passing through national parks/ sanctuaries/coral reefs / ecologically sensitive areas including LNG terminal	27	6 (a)	A
18	Airports	29	7 (a)	A
19	Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	31	7 (c)	A
20	Ports, harbours, break waters and dredging	33	7 (e)	A
21	Highways	34	7 (f)	A
22	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
23	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
24	Building and construction projects	38	8 (a)	B
25	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated June 08, 2023 posted on QCI-NABET website.

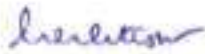
The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/MCO/23/2795 dated July 11, 2023. The accreditation needs to be renewed before the expiry date by ABC Techno Labs India Private Limited, Chennai following due process of assessment.


Sr. Director, NABET
Dated: July 11, 2023

Certificate No.
NABET/EIA/2225/RA 0290

Valid up to
Nov 16, 2025

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

		National Accreditation Board for Testing and Calibration Laboratories
CERTIFICATE OF ACCREDITATION		
ABC TECHNO LABS INDIA PRIVATE LIMITED		
has been assessed and accredited in accordance with the standard		
ISO/IEC 17025:2017		
"General Requirements for the Competence of Testing & Calibration Laboratories"		
for its facilities at		
ABC TOWER, NO 400, 13TH STREET, SIDCO INDUSTRIAL ESTATE-NORTH PHASE, AMBATTUR, CHENNAI, TAMIL NADU, INDIA		
in the field of		
TESTING		
Certificate Number:	TC-5770	
Issue Date:	03/04/2024	Valid Until: 02/04/2026
This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL. (To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)		
Name of Legal Entity: ABC Techno Labs India Private Limited		
Signed for and on behalf of NABL		
	 N. Venkateswaran Chief Executive Officer	

List of Experts




**SCHEME FOR ACCREDITATION OF EIA
CONSULTANT ORGANIZATIONS**

NATIONAL ACCREDITATION BOARD FOR EDUCATION AND TRAINING

(EIA_LoginForm.aspx)

Online Portal for Scheme of Accreditation of EIA Consultant Organizat

**ABC Techno Labs India Private Limited (formerly known
as ABC Environ Solutions Pvt. Ltd.)**

S No	Name	Type	Designation	Sector	FA	Plan
1	Dr Devi Velusamy	In House	TM/FAE	33 Ports, harbours, break waters and dredging,38 Building and construction projects	WP,EB	
2	Dr Geetha S	In House	FAE		SE	
3	Dr Hemambika Balakrishnan	In House	FAE		EB	
4	Dr M Sangeetha	In House	EIA Coordinator	1. Mining of minerals including opencast/ underground mining,23 Integrated paint industry,38 Building and construction project,39. Townships and Area development projects,15 Leather/skin/hide processing industry.	NV,AP	

S No	Name	Type	Designation	Sector	FA	Ren
5	Dr Mohit Kumar Ray	Empanelled	EIA Coordinator	4. Thermal power plants,10. Petroleum refining industry,18.Petrochemical complexes,20. Petrochemical based processing	RH,SHW,AQ	
6	Dr Muthiah Mariappan	In House	EIA Coordinator	4. Thermal power plants,15.Leather/skin/hide processing industry,16. Chemical fertilizers,10. Petroleum refining industry	AP,WP	SHV
7	Dr N Rama Krishnan	In House	EIA Coordinator	33. Ports, harbours, break waters and dredging	LU,SE	
8	Dr R K Jayaseelan	In House	EIA Coordinator	1. Mining of minerals including opencast/ underground mining,21. Synthetic organic chemicals industry,Industrial estates/ parks/ complexes/ Areas, export processing zones(EPZ Special economic zones (SEZs), Biotech parks, Leather complexes,37. Common Municipal Solid Waste Management Facility (CMSWMP),39. Townships and Area development projects	LU,HG,WP	SHV
9	Dr R Parmasivam	In House	EIA Coordinator	31. Industrial estates/ parks/ complexes/ Areas, export processing zones(EPZ Special economic zones (SEZs), Biotech parks, Leather complexes,36. Common Effluent Treatment Plants (CETPs)	HG,WP	

S No	Name	Type	Designation	Sector	FA	Ren
10	Dr S Veezhinathan	In House	EIA Coordinator	1. Mining of minerals including opencast/ underground mining, 6 Metallurgical industries (ferrous & non-ferrous), 27. Oil & gas transportation pipeline, passing through national parks/ sanctuaries/ coral reefs / ecologically sensitive areas including LNG terminal, 31. Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZ Special economic zones (SEZs), Biotech parks, Leather complexes, 39. Townships and Area development projects	Nuclear power projects and processing of nuclear fuel, Geo.HQ	
11	Mr Abhik Saha	In House	EIA Coordinator	2. Offshore and onshore oil and gas exploration, development & production, 21. Synthetic organic chemicals industry, 22 Distilleries, 9. Cement Plants, 29. Airports	AP, WP, EB	SHV
12	Mr Anjit Panja	In House	FAE		AP, NV, LU	WP
13	Mr K R Haneesh	Empanelled	EIA Coordinator	36. Common Effluent Treatment Plants (CETPs), 37. Common Municipal Solid Waste Management Facility (CMSWMF), 38. Building and construction projects, 39. Townships and Area development projects	AP, WP, NV	

S No	Name	Type	Designation	Sector	FA	Ren
14	Mr K Sekar	Empanelled	EIA Coordinator	1. Mining of minerals including opencast/ underground mining,7. Mineral beneficiation including pelletisation,9. Cement Plants,31. Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZ), Special economic zones (SEZs), Biotech parks, Leather complexes,33. Ports, harbours, break waters and dredging		
15	Mr Mohammad Akhtar	Empanelled	EIA Coordinator	29 Airports,34. Highways,38. Building and construction projects	AP,AQ	
16	Mr P Seemirajan	Empanelled	EIA Coordinator	34. Highways		
17	Mr Vinod Kumar Gautam	Empanelled	EIA Coordinator	29. Airports		
18	Mr Widdhi Pratim Bose	In House	EIA Coordinator	2 Offshore and onshore oil and gas exploration, development & production,23 Integrated paint industry,38 Building and construction project,39. Townships and Area development projects	WP	SHW
19	Ms Kavita Zog	Empanelled	EIA Coordinator	3. River Valley projects,4. Thermal power plants,22. Distilleries,25. Sugar Industry,39. Townships and Area development projects	EB,SW,WP	

S No	Name	Type	Designation	Sector	FA	Ren
20	Ms Vaishnavi Dhinakaran	In House	EIA Coordinator	38 Building and construction projects	WP	SHW



Industries, Investment Promotion and Commerce (MMC.2) Department, Secretariat, Chennai – 600 009.

Letter No.2963/MMC.2/2022-1, dated: 19.05.2023

From

Thiru S. Krishnan, I.A.S.,
Additional Chief Secretary to Government.

To

✓ The Ramco Cements Limited,
Auras Corporate Centre, 5th Floor,
98-A, Dr.Radhakrishnan Salai,
Mylapore, Chennai – 600 004.

Sir,

Sub: Industries, Investment Promotion and Commerce Department - Mines and Minerals - Minor Mineral - quarry lease application of The Ramco Cements Limited, Chennai for quarrying Limekankar over an extent of 15.13.5 hectares of patta lands in S.F.Nos.414/8A, 414/8B, 415/5, 415/6 etc., of Kairulabad Village, Ariyalur Taluk and District – Precise Area communicated – Approved Mining Plan and Environmental Clearance Certificate – Requested – Regarding.

- Ref: 1. Your Quarry Lease application dated 17.09.2019.
2. From the Assistant Director (i/c), Ariyalur District, Letter Rc.No.228/G&M/2020, dated 15.02.2021.
3. From the Commissioner of Geology and Mining, File Rc.No.1271/MM7/2021, dated 25.01.2023.

I am directed to invite your attention to the reference first cited and to state that in the references second and third cited, the Assistant Director (i/c), Ariyalur District and the Commissioner of Geology and Mining respectively have recommended your quarry lease application for grant of quarry lease for quarrying Limekankar over an extent of 15.13.5 hectares of patta lands in S.F.Nos.414/8A, 414/8B, 415/5, 415/6 etc., of Kairulabad Village, Ariyalur Taluk and 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. Therefore, I request you to furnish an approved mining plan for the above precise area by incorporating the following conditions 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(3) of the Tamil Nadu Minor Mineral Concession Rules, 1959:-

- i. The quarrying operations shall be carried out up to a depth of 2.0 meters only in the lease applied area.
- ii. The lessee 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.
- iii. The lessee shall not quarry limestone deposited below the limekankar deposit.
- iv. The Assistant Director (Geology & Mining), Ariyalur shall inspect the subject quarry lease before issuing permits and to ascertain whether the lessee is quarrying only limekankar.
- v. If 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.
- vi. The applicant company should provide and maintain a safety distance of 10 meters for the Government poramboke land (Meichal Tharai) situated in SF.No.415/15.
- vii. The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapuram Kasi Viswanathar temple situated in SF.Nos. 419/11 & 419/12 in the southern side of the applied area.
- viii. The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapuram Kasi Viswanathar temple situated in SF.Nos. 433/14 in the eastern side of the applied area.
- ix. The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapuram Kasi Viswanathar temple situated in SF.Nos. 434/16 & 434/17 in the eastern side of the applied area.
- x. The applicant company should provide and maintain necessary approach road to the patta lands in SF.Nos. 419/2 & 434/4 owned by private pattadars situated in the middle of the applied area.
- xi. The applicant company should provide and maintain a safety distance of 10 meters for the Government poramboke land (VandiPathai) situated in SF. Nos.414/7, 415/4, 416/6, 433/1, 435/6 & 436/10 in the western side of the applied area.
- xii. The applicant company should provide and maintain a safety distance of 50 meters for the low tension power line passing in SF Nos. 416/7, 417/1, 417/2, 418/1B, 418/3, 419/6, 419/7, 419/8, 428/4B, 428/4C in the east west direction.

- xiii. The applicant company should provide and maintain a safety distance of 50 meters for the low tension power line passing in SF Nos.386, 387 in Valajanagaram village and SF No.420 in Kairulabad village in the southern side of the applied area.
- xiv. The applicant company should provide and maintain a safety distance of 50 meters for the Udaiyar Kuttai situated in SF.Nos.419/6 in the southern side of applied area.
- xv. The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF.Nos.418/4, 418/11 in the southern side of the applied area.
- xvi. The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF.No.419/14 in the south and southeastern side of the applied area.
- xvii. The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF.No.386/16 in Valajanagaram village in the south western side of the applied area.
- xviii. The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF.No.428/3 in the eastern side of the applied area.
- xix. The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in SF.No.427/2 in the south eastern side of the applied area.
- xx. The applicant company should provide and maintain a safety distance of 50 meters for the detailed channel demarcated in SF.Nos.428/1 & 428/6.
- xxi. The applicant company shall provide and maintain a safety distance of 7.5 metres to the adjoining patta lands.
- xxii. The applicant company should not encroach the adjacent patta lands.
- xxiii. The applicant company should obtain consent from Tamil Nadu Pollution Control Board before the commencement of quarrying activities.
- xxiv. 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 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 DGPS readings should be submitted in the CD form to the Deputy Director (Geology and Mining), Ariyalur.

xxv. 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. 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. The survey no. wise details of extent of land applied for lease is annexed with this letter.

Yours faithfully,

For. 25/5/2023
19/5/2023
for Additional Chief Secretary to Government

Copy to:

The Commissioner of Geology and Mining,
Guindy, Chennai -32.

The District Collector,
Ariyalur District.

The Assistant Director (G&M),
O/o. District Collectorate,
Ariyalur District.

**Industries, Investment Promotion and
Commerce (MMC.2) Department**
Annexure

Government Letter No.2963/MMC.2/2022-1, dated 19.05.2023

Survey Numbers of the precise area in respect of the quarry lease application of The Ramco Cements Limited, Chennai for quarrying Limekankar over an extent of 15.13.5 hectares in S.F.Nos.414/8A, 414/8B, 415/5, 415/6 etc., of Kairulabad Village, Ariyalur Taluk and District.

Survey No.	Sub-Division	Total Extent in (Hectares)	Extent applied in (Acres)	Classification
414	8A	0.02.5	0.06	Patta Dry
414	8B	0.31.0	0.77	Patta Dry
		0.33.5	0.83	
415	5	0.26.0	0.64	Patta Dry
415	6	0.04.5	0.11	Patta Dry
415	7	0.08.0	0.20	Patta Dry
415	8	0.14.0	0.35	Patta Dry
415	9	0.08.5	0.21	Patta Dry
415	10	0.07.5	0.19	Patta Dry
415	11	0.07.5	0.19	Patta Dry
415	12	0.25.5	0.63	Patta Dry
415	13	0.13.5	0.33	Patta Dry
415	14	0.10.5	0.26	Patta Dry
		1.25.5	3.10	
416	7	0.27.5	0.68	Patta Dry
		0.27.5	0.68	
417	1	0.20.0	0.49	Patta Dry
417	2	0.06.0	0.15	Patta Dry
417	3	0.13.5	0.33	Patta Dry
417	4	0.13.5	0.33	Patta Dry
417	5	0.16.0	0.40	Patta Dry
417	6	0.31.5	0.78	Patta Dry
417	7	0.06.5	0.16	Patta Dry
417	8	0.15.5	0.38	Patta Dry
417	9	0.11.0	0.27	Patta Dry
417	10A	0.02.5	0.06	Patta Dry
417	10B	0.03.0	0.07	Patta Dry
417	11A	0.06.0	0.15	Patta Dry
417	11B	0.07.5	0.19	Patta Dry
417	11C	0.09.0	0.22	Patta Dry
417	12	0.08.5	0.21	Patta Dry
417	13	0.09.5	0.23	Patta Dry
417	14A	0.09.5	0.23	Patta Dry

417	14B	0.10.5	0.26	Patta Dry
417	15	0.09.5	0.23	Patta Dry
417	16A	0.10.0	0.25	Patta Dry
417	16B	0.11.0	0.27	Patta Dry
417	17A	0.18.0	0.44	Patta Dry
417	17B	0.07.0	0.17	Patta Dry
		2.55.0	6.30	
418	1A	0.27.0	0.67	Patta Dry
418	1B	0.26.5	0.65	Patta Dry
418	2	0.18.0	0.44	Patta Dry
418	3	0.16.0	0.40	Patta Dry
418	7	0.14.5	0.36	Patta Dry
418	8	0.18.0	0.44	Patta Dry
418	10C	0.15.0	0.37	Patta Dry
		1.35.0	3.34	
419	1A	0.02.5	0.06	Patta Dry
419	1B	0.03.0	0.07	Patta Dry
419	2A	0.03.0	0.07	Patta Dry
419	2B	0.02.5	0.06	Patta Dry
419	3A	0.02.5	0.06	Patta Dry
419	3B	0.02.5	0.06	Patta Dry
419	4	0.38.5	0.95	Patta Dry
419	5A	0.02.0	0.05	Patta Dry
419	5B	0.03.0	0.07	Patta Dry
419	5C	0.04.5	0.11	Patta Dry
419	7	0.18.0	0.44	Patta Dry
419	8	0.32.5	0.80	Patta Dry
419	9	0.03.0	0.07	Patta Dry
419	10	0.29.5	0.73	Patta Dry
419	13	0.31.0	0.77	Patta Dry
		1.78.0	4.40	
433	2A	0.16.0	0.40	Patta Dry
433	2B	0.15.5	0.38	Patta Dry
433	3A	0.08.0	0.20	Patta Dry
433	3B	0.10.0	0.25	Patta Dry
433	4A	0.26.0	0.64	Patta Dry
433	4B	0.09.5	0.23	Patta Dry
433	5	0.03.0	0.07	Patta Dry
433	6A	0.10.5	0.26	Patta Dry
433	6B	0.07.0	0.17	Patta Dry
433	7	0.14.0	0.35	Patta Dry
433	8	0.45.0	1.11	Patta Dry
433	9	0.26.0	0.64	Patta Dry
433	10	0.12.0	0.30	Patta Dry
433	11	0.07.0	0.17	Patta Dry

433	12A	0.07.5	0.19	Patta Dry
433	12B	0.06.0	0.15	Patta Dry
433	12C	0.06.0	0.15	Patta Dry
433	12D	0.02.0	0.05	Patta Dry
433	12E	0.05.5	0.14	Patta Dry
433	13A	0.14.5	0.36	Patta Dry
433	13B	0.01.5	0.04	Patta Dry
433	13C	0.01.5	0.04	Patta Dry
433	13D	0.02.0	0.05	Patta Dry
433	15	0.42.0	1.04	Patta Dry
433	16	0.03.5	0.09	Patta Dry
433	17	0.18.0	0.44	Patta Dry
433	18	0.04.0	0.10	Patta Dry
433	19	0.04.0	0.10	Patta Dry
433	20	0.57.0	1.41	Patta Dry
		3.84.5	9.50	
434	1A	0.11.0	0.27	Patta Dry
434	1B	0.10.0	0.25	Patta Dry
434	2	0.15.5	0.38	Patta Dry
434	3	0.09.0	0.22	Patta Dry
434	5	0.09.5	0.23	Patta Dry
434	6	0.25.0	0.62	Patta Dry
434	7	0.07.5	0.19	Patta Dry
434	8	0.42.0	1.04	Patta Dry
434	9A	0.04.5	0.11	Patta Dry
434	9B	0.02.5	0.06	Patta Dry
434	9C	0.05.0	0.12	Patta Dry
434	10	0.22.0	0.54	Patta Dry
434	11	0.22.0	0.54	Patta Dry
434	12A	0.03.0	0.07	Patta Dry
434	12B	0.03.0	0.07	Patta Dry
434	12C	0.02.0	0.05	Patta Dry
434	13A	0.10.5	0.26	Patta Dry
434	13B	0.10.5	0.26	Patta Dry
434	14	0.16.0	0.40	Patta Dry
434	15	0.86.5	2.14	Patta Dry
434	18	0.24.5	0.61	Patta Dry
434	19	0.33.0	0.82	Patta Dry
		3.74.5	9.25	
Net Total		15.13.5	37.40	

S. Krishnan
Additional Chief Secretary to Government

// True copy //

SECTION OFFICER

50.25 19/05/2023
19.5.2023

DIRECTORATE OF GEOLOGY AND MINING

From
 Thiru S.Sudarsanam, M.Sc.,
 Additional Director,
 Directorate of Geology and Mining,
 Guindy, Chennai - 600 032.

To
 The Ramco Cements Limited,
 Auras Corporate Center, 5th Floor,
 98-/A, Dr.Radhakrishnan Salai,
 Mylapore, Chennai - 600 004.

Re.No.1271/MM7/2021, dated 17.08.2023

Sir,

Sub: Mines and Quarries 31 Minor Minerals -
 Limckankar - Ariyalur Taluk & District -
 Kairulabad Village - S.F.Nos. 414/8A 414/8B,
 415/5, 415/6 etc., - over an extent of 15.13.5
 Hectares - Patta lands - Quarry lease application
 preferred by Tvl. The Ramco Cements Limited -
 Recommended and forwarded to Government -
 Precise area communicated by the Government
 Mining Plan submitted for approval accorded -
 Regarding.

- Ref: 1) Quarry lease application of Tvl. The Ramco
 Cements Limited dated 17.09.2019.
 2) The Assistant Director (i/c), Geology and
 Mining, Ariyalur letter Re.No.228/
 G&M/2020, dated 15.02.2021
 3) The Commissioner of Geology and Mining,
 File Re.No.1271/MM7/2021, dated
 25.01.2023.
 4) G.O.(D) No.60, Industries (MMC.1)
 Department, dated 12.06.2021.
 5) Government letter No.2963/ MMC.2/2022-1,
 dated 19.05.2023.
 6) Mining Plan Submitted by Tvl. The Ramco
 Cements Limited dated 20.07.2023.
 7) The Assistant Director (G&M), Ariyalur
 District letter Re.No.228/G&M/2020, dated
 27.07.2023.

-cc-

Kind attention is invited to the references cited above.

2] In the reference 5th cited, Precise Area has been
 communicated by the Government with a direction to the applicant
 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
 Limckankar over an extent of 15.13.5 hectares of patta lands in
 S.F.Nos.414/8A (0.02.5), 414/8B (0.31.0), 415/5 (0.26.0), 415/6
 (0.04.5), 415/7 (0.08.0), 415/8 (0.14.0), 415/9 (0.08.5), 415/10
 (0.07.5), 415/11 (0.07.5), 415/12 (0.25.5), 415/13 (0.13.5),
 415/14 (0.10.5), 416/7 (0.27.5), 417/1 (0.20.0), 417/2 (0.06.0).

417/3 (0.13.5), 417/4 (0.13.5), 417/5 (0.16.0), 417/6 (0.31.5), 417/7 (0.06.5), 417/8 (0.15.5), 417/9 (0.11.0), 417/10A (0.02.5), 417/10B (0.03.0), 417/11A (0.06.0), 417/11B (0.07.5), 417/11C (0.09.0), 417/12 (0.08.5), 417/13 (0.09.5), 417/14A (0.09.5), 417/14B (0.10.5), 417/15 (0.09.5), 417/16A (0.10.0), 417/16B (0.11.0), 417/17A (0.18.0), 417/17B (0.07.0), 418/1A (0.27.0), 418/1B (0.26.5), 418/2 (0.18.0), 418/3 (0.16.0), 418/7 (0.14.5), 418/8 (0.18.0), 418/10C (0.15.0), 419/1A (0.02.5), 419/1B (0.03.0), 419/2A (0.03.0), 419/2B (0.02.5), 419/3A (0.02.5), 419/3B (0.02.5), 419/4 (0.38.5), 419/5A (0.02.0), 419/5B (0.03.0), 419/5C (0.04.5), 419/7 (0.18.0), 419/8 (0.32.5), 419/9 (0.03.0), 419/10 (0.29.5), 419/13 (0.31.0), 433/2A (0.16.0), 433/2B (0.15.5), 433/3A (0.08.0), 433/3B (0.10.0), 433/4A (0.26.0), 433/4B (0.09.5), 433/5 (0.03.0), 433/6A (0.10.5), 433/6B (0.07.0), 433/7 (0.14.0), 433/8 (0.45.0), 433/9 (0.26.0), 433/10 (0.12.0), 433/11 (0.07.0), 433/12A (0.07.5), 433/12B (0.06.0), 433/12C (0.06.0), 433/12D (0.02.0), 433/12E (0.05.5), 433/13A (0.14.5), 433/13B (0.01.5), 433/13C (0.01.5), 433/13D (0.02.0), 433/15 (0.42.0), 433/16 (0.03.5), 433/17 (0.18.0), 433/18 (0.04.0), 433/19 (0.04.0), 433/20 (0.57.0), 434/1A (0.11.0), 434/1B (0.10.0), 434/2 (0.15.5), 434/3 (0.09.0), 434/5 (0.09.5), 434/6 (0.25.0), 434/7 (0.07.5), 434/8 (0.42.0), 434/9A (0.04.5), 434/9B (0.02.5), 434/9C (0.05.0), 434/10 (0.22.0), 434/11 (0.22.0), 434/12A (0.03.0), 434/12B (0.03.0), 434/12C (0.02.0), 434/13A (0.10.5), 434/13B (0.10.5), 434/14 (0.16.0), 434/15 (0.86.5), 434/18 (0.24.5), 434/19 (0.33.0) of Kairulabad Village, Ariyalur Taluk & District for a period of 5 years as per Rule 43 of Tamil Nadu Minor Mineral Concession Rules, 1959 by incorporating the conditions stipulated in the Government letter dated 19.05.2023.

3) In response to the Precise Area communicated by the Government, the applicant has submitted 5 copies of draft mining plan duly prepared by the Qualified Person for approval vide reference 6th cited.

4) In the reference 7th cited, the Assistant Director, Geology and Mining, Ariyalur has forwarded the copies of draft mining plan and reported that contents of the draft mining plan have been verified and all the conditions stipulated by the Government in letter No.2963/MMC.2/2022-1, dated 19.05.2023 were duly incorporated in the draft mining plan, including the safety distance and other conditions. The details such as Geological Reserves, Mineable Reserves, Year wise production and Development

programme have been incorporated in the mining plan. The special conditions imposed in the precise area communication are incorporated in the mining plan.

5) The Assistant Director, Geology and Mining, Ariyalur vide letter dated 27.07.2023 has described the Geology of the lease applied area as, the entire applied area is covered by black cotton soil as a top layer with a average thickness of 0.30 metres. Below the top soil, yellow/ yellowish brown coloured layer of Limckankar deposit is occurring upto a average thickness of 2.00 meters which belongs to Kallankurichi formation of Cretaceous age and recent formation. The calcium content in Limckankar varies from 20.0% to 45% as Cao. As observed in the field, the Limckankar deposit is occur as a capping over limestone for a thickness of ab out 2.00 meters. Therefore, the depth of persistence may be assumed as 2.00 meters for the purpose of estimation of reserves and the recovery of Limckankar may be around 100% of the total material mined. Mineable reserves (As per Mining Plan at the rate of 100% of recovery) 3.66,300 Tonnes. The Assistant Director, Geology and Mining, Ariyalur has recommended to approve the Mining Plan.

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 Mineral vide G.O.(D) No.60, Industries (MMC.1) Department, dated 12.06.2021.

7) In exercise of the powers conferred under Rule 43 (8) of Tamil Nadu Minor Mineral Concession Rules, 1959, the mining plan submitted by the applicant in respect of the precise area communicated for quarrying Limckankar over an extent of 15.13.5 hectares of patta lands in S.F.Nos.414/8A (0.02.5), 414/8B (0.31.0), 415/5 (0.26.0), 415/6 (0.04.5), 415/7 (0.08.0), 415/8 (0.14.0), 415/9 (0.08.5), 415/10 (0.07.5), 415/11 (0.07.5), 415/12 (0.25.5), 415/13 (0.13.5), 415/14 (0.10.5), 416/7 (0.27.5), 417/1 (0.20.0), 417/2 (0.06.0), 417/3 (0.13.5), 417/4 (0.13.5), 417/5 (0.16.0), 417/6 (0.31.5), 417/7 (0.06.5), 417/8 (0.15.5), 417/9 (0.11.0), 417/10A (0.02.5), 417/10B (0.03.0), 417/11A (0.06.0), 417/11B (0.07.5), 417/11C (0.09.0), 417/12 (0.08.5), 417/13 (0.09.5), 417/14A (0.09.5), 417/14B (0.10.5), 417/15 (0.09.5), 417/16A (0.10.0), 417/16B (0.11.0), 417/17A (0.18.0), 417/17B (0.07.0), 418/1A (0.27.0), 418/1B (0.26.5), 418/2 (0.18.0), 418/3 (0.16.0), 418/7 (0.14.5), 418/8 (0.18.0), 418/10C (0.15.0), 419/1A (0.02.5), 419/1B (0.03.0), 419/2A (0.03.0), 419/2B (0.02.5), 419/3A (0.02.5), 419/3B (0.02.5), 419/4 (0.38.5), 419/5A (0.02.0),

419/5B (0.03.0), 419/5C (0.04.5), 419/7 (0.18.0), 419/8 (0.32.5), 419/9 (0.03.0), 419/10 (0.29.5), 419/13 (0.31.0), 433/2A (0.16.0), 433/2B (0.15.5), 433/3A (0.08.0), 433/3B (0.10.0), 433/4A (0.26.0), 433/4B (0.09.5), 433/5 (0.03.0), 433/6A (0.10.5), 433/6B (0.07.0), 433/7 (0.14.0), 433/8 (0.45.0), 433/9 (0.26.0), 433/10 (0.12.0), 433/11 (0.07.0), 433/12A (0.07.5), 433/12B (0.06.0), 433/12C (0.06.0), 433/12D (0.02.0), 433/12E (0.05.5), 433/13A (0.14.5), 433/13B (0.01.5), 433/13C (0.01.5), 433/13D (0.02.0), 433/15 (0.42.0), 433/16 (0.03.5), 433/17 (0.18.0), 433/18 (0.04.0), 433/19 (0.04.0), 433/20 (0.57.0), 434/1A (0.11.0), 434/1B (0.10.0), 434/2 (0.15.5), 434/3 (0.09.0), 434/5 (0.09.5), 434/6 (0.25.0), 434/7 (0.07.5), 434/8 (0.42.0), 434/9A (0.04.5), 434/9B (0.02.5), 434/9C (0.05.0), 434/10 (0.22.0), 434/11 (0.22.0), 434/12A (0.03.0), 434/12B (0.03.0), 434/12C (0.02.0), 434/13A (0.10.5), 434/13B (0.10.5), 434/14 (0.16.0), 434/15 (0.86.5), 434/18 (0.24.5), 434/19 (0.33.0) of Kairulabad Village, Ariyalur Taluk & 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) The average depth of over burden in the form of black cotton soil is 0.30 mts and followed that the average thickness of Limekankar is 2.00 mts and hence, the quarrying operations shall be carried out upto a depth of 2.30 meters only in the lease applied area.
- v) The lessee 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.
- vi) The lessee shall not quarry Limestone deposited below the Limekankar deposit.

- vii) The Assistant Director (Geology & Mining), Ariyalur shall inspect the subject quarry lease before issuing permits and to ascertain whether the lessee is quarrying only Limekankar.
- viii) If quarrying of Limestone or any other minerals other than Limekankar is found, issuance of permit shall be stopped immediately and penal action shall be initiated against the lessee as per Act and Rules.
- ix) The applicant company should provide and maintain a safety distance of 10 meters for the Government poramboke land (Meichal Tharai) situated in S.F.No.415/15.
- x) The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapuram Kasi Viswanathar temple situated in S.F.Nos. 419/11 & 419/12 in the southern side of the applied area.
- xi) The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapuram Kasi Viswanathar temple situated in S.F.No.433/14 in the eastern side of the applied area.
- xii) The applicant company should provide and maintain a safety distance of 10 meters for the temple lands of Arulmigu Asthinapuram Kasi Viswanathar temple situated in S.F.Nos. 434/16 & 434/17 in the eastern side of the applied area.
- xiii) The applicant company should provide and maintain necessary approach road to the patta lands in S.F.Nos.419/2 & 434/4 owned by private pattadars situated in the middle of the applied area.
- xiv) The applicant company should provide and maintain a safety distance of 10 meters for the Government poramboke land (VandiPathai) situated in S.F.Nos. 414/7, 415/4, 416/6, 433/1, 435/6 & 436/10 in the western side of the applied area.
- xv) The applicant company should provide and maintain a safety distance of 50 meters for the low tension power line passing in S.F.Nos.416/7, 417/1, 417/2, 418/1B, 418/3, 419/6, 419/7, 419/8, 428/4B, 428/4C in the east west direction.
- xvi) The applicant company should provide and maintain a safety distance of 50 meters for the low tension power line passing in S.F.Nos.386, 387 in Valajanagaram village and S.F.No.420 in Kairulabad village in the southern side of the applied area.

- xvii) The applicant company should provide and maintain a safety distance of 50 metres for the Udaiyar Kutasi situated in S.F.No.419/6 in the southern side of applied area.
- xviii) The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in S.F.Nos.418/4, 418/11 in the southern side of the applied area.
- xix) The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in S.F.No.419/14 in the south and southeastern side of the applied area.
- xx) The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in S.F.No.386/16 in Valujanagaram village in the south western side of the applied area.
- xxi) The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in S.F.No.428/3 in the eastern side of the applied area.
- xxii) The applicant company should provide and maintain a safety distance of 50 meters for the vari course situated in S.F.No.427/2 in the south eastern side of the applied area.
- xxiii) The applicant company should provide and maintain a safety distance of 50 meters for the detailed channel demarcated in S.F.Nos.428/1 & 428/6.
- xxiv) The applicant company shall provide and maintain a safety distance of 7.5 meters to the adjoining patta lands.
- xxv) The applicant company should not encroach the adjacent patta lands.
- xxvi) The applicant company should obtain consent from Tamil Nadu Pollution Control Board before the commencement of quarrying activities.
- xxvii) The applicant should fence the lease granted area with barbed wire fencing before execution of lease deed as follows:-
 - 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.
- xxviii) The applicant company should ensure that all the quarry workers working under his 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.

- xxix) A green belt should be constructed by planting trees along the boundary of the area to control air and noise pollution.
- xxx) If any violations are noticed during the quarrying operations, the penal provisions of Tamil Nadu Minor Mineral Concession Rules, 1959 and other Act and Rules in force will attract. Further, issuance of transport permits shall be withheld / stopped till final decision on the violations are taken.
- xxxi) The applicant company shall, after mining operations undertaking re-grassing the mining area and any other area which may have been disturbed due to this mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna, etc.,
- xxxii) The child labour should not be engaged in the quarry works.
- xxxiii) The Assistant Director, Geology and Mining, Ariyalur District shall ensure the depth limit of the quarry pit not to exceed 2.30 meters before issue the transport permit.

Encl: Approved Mining Plan.

Additional Director of Geology and Mining

Copy Submitted to:

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

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.



- ABC Techno Labs India Private Limited

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Ph: +91-44-2625 7788 / 99, +91 94442 60000 / 95661 87777
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(An ISO : 9001, ISO : 14001, ISO : 45001 & ISO : 22000 Certified Company)

Accredited by NABL vide TC-5770, NABET / QCI, Approved by FSSAI, Recognised by MoEF&CC, BIS, APEDA, IOPEPC, Tea Board of India

ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyanaalur Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0184/001-004			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Ambient Air Quality Monitoring Core Zone-Quarter II, 2025 - Week-1			
Date of Sampling	:	07.05.2025 to 08.05.2025	Date of Completion	:	14.05.2025
Date of Receipt	:	09.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	10.05.2025	Page No	:	1 of 1
Sampling Method	:	IS 5182 Part 5 & 14			

Sl. No.	Location	Date	Period, hrs.	Unit	PM2.5	PM10	SPM	SO ₂	NO _x	CO
i	Protocol			-	40CFR Appendix L Part 50	IS 5182 Part 23	IS 5182 Part 4	IS 5182 Part 2	IS 5182 Part 6	IS 5182 Part 10
1	Quarry Edge (MM Office)	07.05.2025	06:00-14:00	ug/m ³	32	55	112	10	12	BDL(DL:1.0mg/m ³)
			14:00-22:00	ug/m ³	36	58	121	11	14	BDL(DL:1.0mg/m ³)
		08.05.2025	06:00-14:00	ug/m ³	30	51	108	13	14	BDL(DL:1.0mg/m ³)
			14:00-22:00	ug/m ³	28	48	104	12	13	BDL(DL:1.0mg/m ³)
2	Loading Area	07.05.2025	06:00-14:00	ug/m ³	33	55	112	10	12	BDL(DL:1.0mg/m ³)
			14:00-22:00	ug/m ³	31	50	106	13	15	BDL(DL:1.0mg/m ³)
		08.05.2025	06:00-14:00	ug/m ³	35	57	118	11	14	BDL(DL:1.0mg/m ³)
			14:00-22:00	ug/m ³	30	52	108	12	14	BDL(DL:1.0mg/m ³)
3	Haul Road	07.05.2025	06:00-14:00	ug/m ³	31	54	116	12	13	BDL(DL:1.0mg/m ³)
			14:00-22:00	ug/m ³	28	50	106	10	12	BDL(DL:1.0mg/m ³)
		08.05.2025	06:00-14:00	ug/m ³	34	58	121	12	15	BDL(DL:1.0mg/m ³)
			14:00-22:00	ug/m ³	32	55	115	13	16	BDL(DL:1.0mg/m ³)
i	Arithmetic Mean			ug/m ³	31.7	53.6	112.3	11.6	13.7	<1.0
ii	IBM Norms - TLV*			ug/m ³	-	350	700	5,000	6,000	40,000

Legend: PM2.5-Particulate Matter size less than 2.5 um; PM10-Respirable Particulate Matter size less than 10 um; SPM-Suspended Particulate Matter; SO₂-Sulphur dioxide (as SO₂); NO_x-Oxides of Nitrogen (as NO₂); CO-Carbon monoxide (as CO); - : Not included.

* : TLV-Threshold Limit Value for 8-hours Exposure stipulated by IBM for Limestone & Dolomite Mines for Workzone Areas.

-End of Report-

S. Dharani
Quality Manager



A. Robson Chinnadurai
Technical Manager - Lab

Verified by

Authorised Signatory

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ABCTL/FRM/QA/125 Issue No.1 01.26.04.2023



ABC Techno Labs India Private Limited

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Accredited by NABL vide TC-5770, NABET / QCI, Approved by FSSAI, Recognised by MoEF&CC, BIS, APEDA, IOPEPC, Tea Board of India

ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyannagar Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0260/001-004			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Ambient Air Quality Monitoring Core Zone-Quarter II, 2025 - Week-2			
Date of Sampling	:	19.05.2025 to 20.05.2025	Date of Completion	:	26.05.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	1 of 1
Sampling Method	:	IS 5182 Part 5 & 14			

Sl. No.	Location	Date	Period, hrs.	Unit	PM2.5	PM10	SPM	SO ₂	NO _x	CO
i	Protocol				44CPR Appendix I (Part 50)	IS 5182 Part 22	IS 5182 Part 4	IS 5182 Part 2	IS 5182 Part 6	IS 5182 Part 10
1	Quarry Edge (MM Office)	19.05.2025	06:00-14:00	ug/m ³	30	52	108	11	14	BDL(DL: 1.0mg/m ³)
			14:00-22:00	ug/m ³	38	62	128	13	15	BDL(DL: 1.0mg/m ³)
		20.05.2025	06:00-14:00	ug/m ³	33	56	112	11	13	BDL(DL: 1.0mg/m ³)
			14:00-22:00	ug/m ³	35	58	117	12	14	BDL(DL: 1.0mg/m ³)
2	Loading Area	19.05.2025	06:00-14:00	ug/m ³	30	54	110	11	12	BDL(DL: 1.0mg/m ³)
			14:00-22:00	ug/m ³	27	51	106	12	14	BDL(DL: 1.0mg/m ³)
		20.05.2025	06:00-14:00	ug/m ³	33	58	118	13	15	BDL(DL: 1.0mg/m ³)
			14:00-22:00	ug/m ³	36	61	132	12	13	BDL(DL: 1.0mg/m ³)
3	Haul Road	19.05.2025	06:00-14:00	ug/m ³	28	51	110	11	12	BDL(DL: 1.0mg/m ³)
			14:00-22:00	ug/m ³	31	53	115	13	15	BDL(DL: 1.0mg/m ³)
		20.05.2025	06:00-14:00	ug/m ³	34	57	121	13	16	BDL(DL: 1.0mg/m ³)
			14:00-22:00	ug/m ³	33	55	117	12	14	BDL(DL: 1.0mg/m ³)
i	Arithmetic Mean			ug/m ³	32.3	55.7	116.2	12.0	13.9	<1.0
ii	IBM Norms - TLV*			ug/m ³	-	350	700	5,000	6,000	40,000

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10-Respirable Particulate Matter size less than 10 um; SPM-Suspended Particulate Matter; SO₂-Sulphur dioxide (as SO₂); NO_x-Oxides of Nitrogen (as NO₂); CO-Carbon monoxide (as CO); -: Not included.

* : TLV-Threshold Limit Value for 8-hours Exposure stipulated by IBM for Limestone & Dolomite Mines for Workzone Areas.

-End of Report-

S. Dharani
Quality Manager



A. Robson Chinnadurai
Technical Manager - Lab

Verified by

Authorised Signatory

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ABCTL/FRM/QA/125 Issue No.1 Dt.25.04.2023



ABC Techno Labs India Private Limited

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TEST REPORT

The Ramco Cement Limited,
Periyanaalur Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0274/001			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Dustfall Rate - Quarter II, 2025			
Date of Sampling	:	01.05.2025 to 30.05.2025	Date of Completion	:	06.06.2025
Date of Receipt	:	31.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	02.06.2025	Page No	:	1 of 1
Sampling Method	:	IS 5182 Part 1			

Sl. No.	Parameter	Mines Manager Office
1	Retained Water, l	4.1
2	Regained Water, l	Nil
3	pH	7.61
4	Total Undissolved Matter, mg	461
5	Total Dissolved Matter, mg	96
6	Total Solids, mg	357
7	Ash, mg	116
8	Lead (as Pb), ppm	<0.005
9	Mercury (as Hg), ppm	<0.005
10	Cadmium (as Cd), ppm	<0.005
11	Dustfall Rate, g/m ² /day	0.2460
12	Dustfall Rate, MT/km ² /month	7.38

-End of Report-

S. Dharani
Quality Manager



A. Robson Chinnadurai
Technical Manager - Lab

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ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyannagalur Limestone Mines,
Ariyalur District.

Report Number	: ABCTL/Z505/0191/012
Sample Drawn by	: ABC Techno Labs India Private Limited
Sample Description	: Noise Levels - Quarter II, 2025
Date of Sampling	: 14.05.2025 to 15.05.2025
Date of Receipt	: 16.05.2025
Report Date	: 11.06.2025

Page 1 of 1

Sl. No.	Location	Noise Levels, dB(A)					
		Day Time (06:00-22:00 hrs.)			Night Time (22:00-06:00 hrs.)		
		Lmin.	Lmax.	Leq	Lmin.	Lmax.	Leq
1	Quarry Edge	34.3	86.9	49.5	33.1	83.4	42.9
2	Loading Area	32.4	81.6	42.2	30.6	78.2	37.6
3	Haul Road	35.2	90.4	52.9	33.5	86.1	44.5
4	PNR Crusher	32.8	83.7	42.6	31.2	80.9	39.3
Statutory Norm* for 8 hrs. Exposure		85		85		85	
Buffer Zone :							
5	Periyannagalur	33.6	84.5	42.1	31.8	81.3	39.8
6	V Kaikatti	35.7	89.7	53.4	33.7	86.6	43.9
7	Kattupirangiyam	32.9	83.1	41.2	31.5	81.7	39.5
MoEF Norms**		55		45		45	

Sampling & Test Method: IS: 9989-1981 (Reaff: 2014)

* : MoEF&CC Norms-Ministry of Environment, Forests & Climate Change Ambient Noise Norms (Leq) for Residential Areas.

Day time is reckoned in between 6 a.m and 10 p.m. and Night time is reckoned in between 10 p.m. and 6 a.m.

* : A warning limit value of 85 dB(A) may be set as the level below which very little risk to unprotected ear of hearing impairment exists for an eight hour exposure.

.....End of Report.....

S. Dharani
Quality Manager



A. Robson Chinnadurai
Technical Manager - Lab

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Authorised Signatory

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ABCTL/PRM/QA/125 Issue No.1 01.25.04.2025



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TC - 5770

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ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyanaalur Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0255/001-003			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Surface Water Quality -Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	1 of 2

Sl. No.	Parameters	IS:3025 Parts	Unit	Uppu Odai	Kallar River	Marudaiyar River	CPCB Norms*
1	pH	11	-	7.56	7.61	7.67	6.5-8.5
2	Colour	4	Hazen Units	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	10-30
3	Temperature	9	°C	27.3	27.7	27.4	-
4	Turbidity	10	NTU	1.5	1.8	2.2	-
5	Residual Chlorine	26	mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
6	Dissolved Oxygen	38	mg/l	5.3	5.1	5.4	4.0-6.0
7	Total Suspended Solids	17	mg/l	23	28	33	-
8	Electrical Conductivity	14	umhos/cm	680	760	870	-
9	Total Dissolved Solids	16	mg/l	430	480	550	500-2100
10	Total Hardness (as CaCO ₃)	21	mg/l	190	210	230	-
11	Calcium Hardness (as CaCO ₃)	21	mg/l	100	110	120	-
12	Magnesium Hardness (as CaCO ₃)	21	mg/l	90	100	110	-
13	Calcium (as Ca)	40	mg/l	40	44	48	-
14	Magnesium (as Mg)	46	mg/l	22	24	26	-
15	Sodium (as Na)	45	mg/l	43	49	58	-
16	Potassium (as K)	45	mg/l	7	9	13	-
17	Chlorides (as Cl)	32	mg/l	130	138	156	250-600
18	Sulphates (as SO ₄)	24	mg/l	35	41	49	400-1000
19	Total Alkalinity (as CaCO ₃)	23	mg/l	90	110	130	-
20	BOD-3 days @ 27 °C	44	mg/l	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	<3
21	COD	58	mg/l	4	4	6	-
22	Iron (as Fe)	53	mg/l	0.09	0.11	0.13	0.3-5.0
23	Fluorides (as F)	60	mg/l	0.14	0.19	0.24	1.5
24	Nitrates (as NO ₃)	34	mg/l	11	9	14	20-50
25	Phosphates (as PO ₄)	31	mg/l	<0.01	<0.01	<0.01	-

Contd...

S. Dharani
Quality Manager



Verified by

A. Robson Chinnadurai
Technical Manager - Lab

Authorised Signatory

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ABCTUFRM/QA/125 Issue No.1 Dt.25.06.2023



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ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyanaalur Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0255/001-003			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Surface Water Quality -Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	2 of 2

Sl. No.	Parameters	IS:3025 Parts	Unit	Uppu Odai	Kallar River	Maradalyar River	CPCB Norms*
26	Cyanides (as CN)	27	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	-
27	Pesticides (as Malathion)	ABCTL/INS/SOP-019	mg/l	<0.01	<0.01	<0.01	-
28	Phenols (as C ₆ H ₅ OH)	43	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	-
29	Manganese (as Mn)	59	mg/l	BDL(DL:0.002)	BDL(DL:0.002)	BDL(DL:0.002)	-
30	Chromium (as Cr)	52	mg/l	BDL(DL:0.03)	BDL(DL:0.03)	BDL(DL:0.03)	-
31	Copper (as Cu)	42	mg/l	<0.001	<0.001	<0.001	1.5
32	Selenium (as Se)	56	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	-
33	Aluminium (as Al)	55	mg/l	<0.001	<0.001	<0.001	-
34	Cadmium (as Cd)	41	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	-
35	Arsenic (as As)	37	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.05-0.2
36	Boron (as B)	57	mg/l	BDL(DL:0.025)	BDL(DL:0.025)	BDL(DL:0.025)	2
37	Mercury (as Hg)	48	mg/l	BDL(DL:0.0005)	BDL(DL:0.0005)	BDL(DL:0.0005)	-
38	Lead (as Pb)	47	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.1
39	Zinc (as Zn)	49	mg/l	<0.001	<0.001	<0.001	1.5-15
40	Total coliforms	IS:1622	MPN/100 ml	42	46	64	50-5000
41	Fecal coliforms	IS:1622	MPN/100 ml	19	21	26	-
42	E. coli	IS:1622	MPN/100 ml	14	14	17	-

*: CPCB Norms-Central Pollution Control Board Norms for Surface Waters/IS 2296:1982 Tolerance Limits for Inland Surface Waters for different uses. -: Not included/Not available.

.....End of Report.....

S. Dharani
Quality Manager



A. Robson Chinnadural
Technical Manager - Lab

Verified by

Authorised Signatory

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ABCTL/FRM/QA/125 Issues No.1 Dt.25.04.2023



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TEST REPORT

The Ramco Cement Limited,
Periyannagalur Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0255/001-003			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Surface Water Quality -Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	1 of 1

Sl. No.	Parameters	IS:3025 Parts	Unit	Uppu Odai	Kallar River	Marudaiyar River	CPCB Norms*
1	Oil & Grease	39	mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
2	Percent Sodium	IS:2488:P5	%	32.0	32.5	33.8	-

* : CPCB Norms-Central Pollution Control Board Norms for Surface Waters/IS 2296:1982 Tolerance Limits for Inland Surface Waters for different uses. - : Not included/Not available.

.....End of Report.....

S. Dharani
Quality Manager



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ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyannagar Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0255/004-007			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Ground Water Quality - Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	1 of 2

Sl. No.	Parameters	IS:302 5 Parts	Unit	Borewell, PNR Mines	Borewell, Periya- nagar	Borewell, Reddip- palaiyam	Borewell Kallan- kurichi	IS:10500* Norms
1	pH	11	-	7.67	7.82	7.63	7.52	6.5-8.5
2	Colour	4	Hazen Units	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	BDL(DL:5.0)	5/15*
3	Temperature	9	°C	27.1	27.4	27.0	26.7	-
4	Turbidity	10	NTU	1.2	1.1	0.9	0.7	1/5
5	Residual Chlorine	26	mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	0.2/1.0
6	Dissolved Oxygen	38	mg/l	5.1	4.7	5.3	5.5	-
7	Total Suspended Solids	17	mg/l	26	18	21	13	-
8	Electrical Conductivity	14	umhos/cm	920	820	980	690	-
9	Total Dissolved Solids	16	mg/l	580	520	620	440	500/2000
10	Total Hardness (as CaCO ₃)	21	mg/l	250	220	280	200	200/600
11	Calcium Hardness (as CaCO ₃)	21	mg/l	130	120	150	110	-
12	Magnesium Hardness (as CaCO ₃)	21	mg/l	120	100	130	90	-
13	Calcium (as Ca)	40	mg/l	52	48	60	44	75/200
14	Magnesium (as Mg)	46	mg/l	29	24	31	22	30/100
15	Sodium (as Na)	45	mg/l	61	54	66	43	-
16	Potassium (as K)	45	mg/l	17	14	19	9	-
17	Chlorides (as Cl)	32	mg/l	155	143	162	120	250/1000
18	Sulphates (as SO ₄)	24	mg/l	68	56	74	41	200/400
19	Total Alkalinity (as CaCO ₃)	23	mg/l	130	110	140	90	200/600
20	BOD-3 days @ 22 °C	44	mg/l	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	-
21	COD	58	mg/l	9	6	11	3	-
22	Iron (as Fe)	53	mg/l	0.12	0.11	0.14	0.08	0.3
23	Fluorides (as F)	60	mg/l	0.19	0.15	0.21	0.13	1.0/1.5
24	Nitrates (as NO ₃)	34	mg/l	19	15	23	8	45
25	Phosphates (as PO ₄)	31	mg/l	<0.01	<0.01	<0.01	<0.01	-

Contd...

S. Dharani
Quality Manager



Verified by



A. Robson Chinnadurai
Technical Manager - Lab

Authorised Signatory

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ABCTL/FRM/QA/125 Issue No. 01.01.2023



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Accredited by NABL vide TC-5770; NABET / QCI, Approved by FSSAI, Recognised by MoEF&CC, BIS, APEDA, IOPEPC, Tea Board of India

ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyannagar Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0255/004-007			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Ground Water Quality - Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	2 of 2

Sl. No.	Parameters	IS:3025 Parts	Unit	Borewell, PNR Mines	Borewell, Periya-nagarur	Borewell, Reddip-palayam	Borewell, Kallan-kurichi	IS:10500* Norms
26	Cyanides (as CN)	27	mg/l	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	0.05
27	Pesticides (as Malathion)	ABCTL/INS /SOP-019	mg/l	<0.01	<0.01	<0.01	<0.01	Abs./0.001
28	Phenols (as C ₆ H ₅ OH)	43	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.001/0.002
29	Manganese (as Mn)	59	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.1/0.3
30	Chromium (as Cr)	52	mg/l	BDL(DL:0.03)	BDL(DL:0.03)	BDL(DL:0.03)	BDL(DL:0.03)	0.05
31	Copper (as Cu)	42	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.05/1.5
32	Selenium (as Se)	56	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.01
33	Aluminium (as Al)	55	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.03/0.2
34	Cadmium (as Cd)	41	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.003
35	Arsenic (as As)	37	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.01/0.05
36	Boron (as B)	57	mg/l	BDL(DL:0.025)	BDL(DL:0.025)	BDL(DL:0.025)	BDL(DL:0.025)	0.5/2.4
37	Mercury (as Hg)	48	mg/l	BDL(DL:0.0005)	BDL(DL:0.0005)	BDL(DL:0.0005)	BDL(DL:0.0005)	0.001
38	Lead (as Pb)	47	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.01
39	Zinc (as Zn)	49	mg/l	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	5/15
40	Total coliforms	IS:1622	MPN/100 ml	<2	<2	<2	<2	Absent
41	Faecal coliforms	IS:1622	MPN/100 ml	<2	<2	<2	<2	Absent
42	E. coli	IS:1622	MPN/100 ml	<2	<2	<2	<2	Absent

* : IS 10500:2012-Drinking Water Standards; # : Requirement/Permissible Limit in the absence of alternate source.
Note: <2 can be taken as Absent

.....End of Report.....

S. Dharani
Quality Manager



A. Robson Chinnadurai
Technical Manager - Lab

Verified by

Authorised Signatory

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ABCTL/FRM/QA/125 Issue No. 1 Dt. 25.04.2023



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Email: lab@abctechnolab.com / Web: www.abctechnolab.com

TEST REPORT

The Ramco Cement Limited,
Periyanaalur Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0255/004-007			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Ground Water Quality - Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	1 of 1

Sl. No.	Parameters	IS:3025 Parts	Unit	Borewell, PNR Mines	Borewell, Periyanaalur	Borewell, Reddipalalayam	Borewell, Kallan-kurichi	IS:10500* Norms
1	Oil & Grease	39	mg/l	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	-
2	Percent Sodium	IS:2480:P5	%	32.8	33.0	32.0	30.6	-

* : IS 10500:2012-Drinking Water Standards; # : Requirement/Permissible Limit in the absence of alternate source.

Note: <2 can be taken as Absent

-----End of Report-----

S. Dharani
Quality Manager



A. Robson Chinnadurai
Technical Manager - Lab

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TEST REPORT

The Ramco Cement Limited,
Periyanaalur Limestone Mines,
Ariyalur District.

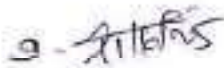
Report Number	:	ABCTL/2505/0256/001-003
Sample Drawn by	:	ABC Techno Labs India Private Limited
Sample Description	:	Ground Water Levels - Quarter II, 2025
Date of Sampling	:	19.05.2025
Date of Receipt	:	21.05.2025
Report Date	:	11.06.2025

Page 1 of 1

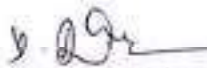
SL No.	Description	Water Level Monitored at (bgl*)		
		Borewell, Periyanaalur	Borewell, PNR Mine Area	Borewell, Kattupirangiyam
i	Monitoring Well Code	GW1	GW2	GW3
ii	Well Depth, m	65	90	70
1	Quarter I/2025 (27.01.2025)	8.1	14.8	7.7
2	Quarter II/2025 (19.05.2025)	10.4	15.9	8.8

* :bgl : below ground level.

.....End of Report.....


S. Dharani
Quality Manager




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ISSUED TO:

TEST REPORT

The Ramco Cement Limited,
Periyanalur Limestone Mines,
Ariyalur District.

Report Number	:	ABCTL/2505/0257/001-002			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Soil Quality - Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	1 of 1

Sl. No.	Parameters	Protocol (IS:)	Unit	Green Belt, PNR Office	OB Dump	Desirable Range*
1	pH @25°C	2720-Part-26	-	7.64	7.81	5.5-9.0
2	Electrical Conductivity	14767	mmhos/cm	1.58	1.53	0.2-0.5
3	Natural Moisture Content	2720-Part-2	%	12.6	10.4	-
4	Organic Carbon	2720-Part-12	%	0.97	0.89	>0.75
5	Nitrogen	14684	%	0.012	0.010	0.01-0.02
6	Phosphorus	FAO Chapter 3	%	0.005	0.003	0.002-0.006
7	Potassium (as K)	FAO Chapter 3	%	0.008	0.005	>0.01
8	Sodium (as Na)	FAO Chapter 3	ppm	90	70	-
9	Calcium (as Ca)	FAO Chapter 3	ppm	80	110	-
10	Magnesium (as Mg)	FAO Chapter 3	ppm	50	70	-
11	Chlorides (as Cl)	ABCTL/SOP/5/21 issue dated 30.11.2021	ppm	210	190	-
12	Sulphates (as SO ₄)	2720-Part-27	ppm	140	110	-
13	Cation Exchange Capacity	2720-Part-24	meq/100 g	22.6	19.7	10-30
14 i	Grain Size Distribution: Sand	2720-Part-4	%	31.9	33.7	-
ii	Silt	2720-Part-4	%	63.7	60.9	-
iii	Clay	2720-Part-4	%	4.4	5.4	-
15	Textural Class	2720-Part-4	-	Silty loam	Silty loam	Loam
16	Bulk Density	FAO Chapter 3	g/cc	1.38	1.35	-
17	Available Water Storage Capacity	ABCTL/SOP/5/22 issue dated 30.11.2021	%	21.7	19.2	-
18	Sodium Absorbing Ratio	ABCTL/SOP/5/20 issue dated 02.01.2015	-	1.94	1.28	<5

* : Desirable Range for High Production Soil.

.....End of Report.....

S. Dharani
Quality Manager



A. Robson Chinnadurai
Technical Manager - Lab

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ABCTL/PRB/QA/125 Issue No.1 Dt.25.04.2023



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TEST REPORT

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Ariyalur District.

Report Number	:	ABCTL/2505/0257/001-002			
Sample Drawn by	:	ABC Techno Labs India Private Limited			
Sample Description	:	Soil Quality - Quarter II, 2025 - (In compliance with IBM Circular No. 3/92)			
Date of Sampling	:	19.05.2025	Date of Completion	:	07.06.2025
Date of Receipt	:	21.05.2025	Report Date	:	11.06.2025
Date of Analysis	:	22.05.2025	Page No	:	1 of 1

Sl. No.	Parameters	Protocol (IS:)	Unit	Green Belt, PNR Office	OB Dump	Desirable Range*
1	Field Capacity	14765	%	21.3	18.9	-
2	Wilting Coefficient	14765	%	0.6	0.6	>0.4

* : Desirable Range for High Production Soil.

.....End of Report.....


S. Dharani
Quality Manager




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ABCTL COMPLIANCE - ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, ISO 22000:2018