



Dalmia Cement (Bharat) Limited

Amalgamated Aminabad & Khairulabad Limestone Mines under GO 50

Extent : 96.190 Ha

Plan Period Production : 73,33,330 Tonnes @ 14,66,666 TPA ROM (42 m BGL)

SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu

ML Validity as per MMDR Amendment Act, 2015 - 31.03.2030

**Mining Plan Approval for Amalgamated Lease by
IBM, Chennai vide Letter No. TN/ALR/LST/MP-2098.MDS dated 05.10.2023
(Plan Period 2023-24 to 2027-28)**

**Environmental Clearance under EIA Notification 2006
Schedule SI. No. 1(a) & Category 'B' (<250 Ha)**

Draft Environmental Impact Assessment Report

(after TOR for Public Hearing)

Awarded TOR Identification No. TO24B0000TN5124077N dated 15.05.2024

December 2024

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 dated 29.10.2024)

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

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GO 86 - AD (Mines) Proceedings

A&K Mines are in operation since Year 1970. The Ministry of Environment and Forests (MoEF) accorded the Environmental Clearance for vide its Letter J-11015/398/2005.IA.II(M) dated 13.01.2006 for the production capacity of 0.30 MTPA. EC for Enhancement in Limestone Production Quantity from 0.30 MTPA to 1.10 MTPA for GO 2 (now GO 86) over an Extent of 95.345 Ha was accorded vide MoEF Ltr. J-11015/ 104/2009-IA.II(M) dated **09.05.2011**. The **Production Quantity from GO 86** are appended below.

Table : GO 86 Production against EC Quantity of 11,00,000 TPA

Year	Production, Tonnes
2011-12	9,39,203.660
2012-13	9,39,850.670
2013-14	7,66,625.000
2014-15	9,04,069.000
2015-16	10,91,636.000
2016-17	10,83,029.000
2017-18	10,35,477.000
2018-19	10,97,655.000
2019-20	10,79,040.000
2020-21	10,84,388.000
2021-22	10,96,853.000
2022-23	10,99,716.000
2023-24 (till Feb. 2024)	10,12,494.000 (Audit proceedings to be obtained)

Limestone Quantity of 10,99,716 Tonnes dispatched during 2022-23 was the maximum quantity against the consented quantity of 11,00,000 TPA as per EC.

GO 106 is yet to be commenced for want of EC & CTO. There was no production from this Lease as on date.

The State Government has amalgamated the two Leases (GO Ms. No. 86-95.345 Ha & GO No.106-0.845 Ha) under **GO Ms. No. 50 dated 27.02.2023** for a total extent of **96.190 Ha with validity till 31.03.2030**. As per the conditions stipulated, the Environmental Clearance (EC) for the amalgamated Lease has to be submitted before the execution of 'Supplementary Lease Deed'.

Declaration by Project Proponent



cement! sugar! refractories! power!

Project Proponent Declaration

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

We, M/s. Dalmia Cement (Bharat) Limited (DCBL), have applied for Environmental Clearance of our Amalgamated Aminabad & Khairulabad Limestone Mines under GO:50 over an Extent 96.190 Ha in SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu vide Online Proposal No. SIA/TN/MIN/465337/2024 on 08.03.2024. Terms of Reference (TOR) has been awarded by SEIAA-TN vide TOR Identification No. TO24B0000TN5124077N dated 15.05.2024 for preparing Environmental Impact Assessment (EIA) Report.

The 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 dated 29.10.2024). 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.

The Environmental Impact Assessment (EIA) Report and the 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.

Dalmia Cement (Bharat) Limited

K. Vinayagamurthi
Executive Director & Mines Agent

Date : 20.11.2024
Place : Dalmiapuram

Dalmia Cement (Bharat) Limited

Dalmiapuram, District-Trichy-621 651, Tamil Nadu, India
T 91 4329235123, F 91 4329235111 W www.dalmiacement.com CIN : U65191TN1996PLC 035963
Registered Office : Dalmiapuram, Dist. Tiruchirappalli, Tamil Nadu - 621 651, India
A Dalmia Bharat Group company, www.dalmiabharat.com

Undertaking by EIA Consultant



EIA Consultant Undertaking

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

M/s. Dalmia Cement (Bharat) Limited (DCBL), have applied for Environmental Clearance of their Amalgamated Aminabad & Khairulabad Limestone Mines under GO 50 over an Extent 96.190 Ha in SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu vide Online Proposal No. SIA/TN/MIN/465337/2024 on 08.03.2024. Terms of Reference (TOR) has been awarded by SEIAA-TN vide TOR Identification No. TO24B0000TN5124077N dated 15.05.2024 for preparing Environmental Impact Assessment (EIA) Report.

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The Environmental Impact Assessment (EIA) Report and the 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 Private Limited

Authorised Signatory

Date : 18.11.2024

Place : Chennai



ABC TECHNO LABS INDIA PRIVATE LIMITED

(Accredited by NABL, NABET, Approved by FSSAI, APEDA & Agmark, Recognised by MoEFACC, BIS)

(In ISO 9001, ISO 14001, ISO 43001 & ISO 22000 Certified Company)

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VAO Certificates

சான்று

அரியலூர் வட்டம் மற்றும் மாவட்டம், கயர்லாபாத் கிராம நிர்வாக அலுவலர் அளிக்கும் சான்று. திருவாளர்கள் டால்மியா சிமெண்ட் (பாரத்) லிமிடெட் நிறுவனம்

சர்வே எண்கள்:

103/3,104/3,105/8,108,109,110,111,112,113/1,113/2,114/1,114/3,115,116/2,116/3,117/1,117/3,118/2,125,126/1,126/3,127,133,103/2,114/2,116/1,117/2,118/1 & 126/2 (அமினாபாத் கிராமம்)

448,449,452,453/5,455/2,456/1 & 478 (கயர்லாபாத் கிராமம்)

ஆகிய நிலங்களில் உள்ள மொத்த விஸ்தீரணம் 96.190 ஹெக்டேர் பரப்பளவில் சுரங்க பணி மேற்கொள்ள குவாரி குத்தகை

செயல்பாடுகளுக்கான நீடிப்பு மற்றும் பரிந்துரைக்கப்பட்ட ஆணை தொழில் துறை அறிவிப்பு கடித எண் Go(Ms).No.50 Dt. 27.02.2023 மூலம் ஒப்புதல் பெறப்பட்டுள்ளது.

மேற்கண்ட நிலங்கள் டால்மியா சிமெண்ட் (பாரத்) கம்பெனி நிறுவனத்திற்கு சுரங்க குத்தகைக்கு அனுமதிக்கப்பட்டுள்ளது. அவர்களது அனுபவத்தில் தற்சமயம் சுரங்க பணி செய்து வெட்டுப் பள்ளமாக உள்ளது. மேற்கண்ட நிலங்களுக்கு 300 மீட்டர் சுற்றளவில் எந்த குடியிருப்புகளும் இல்லை என்பதைத் தெரிவித்துக் கொள்கிறேன்.


கிராம நிர்வாக அலுவலர்
இறப்புச் சான்று
கயர்லாபாத் கிராமம்
11, கயாலைபரத் கிராமம்
அரியலூர் வட்டம் & மாவட்டம்

சான்று

அரியலூர் வட்டம் மற்றும் மாவட்டம் , கயர்லாபாத் கிராம நிர்வாக அலுவலர் அளிக்கும் சான்று, திருவாளர்கள் டால்மியா சிமெண்ட் (பாரத்) லிமிடெட் நிறுவனம்

சர்வே எண்கள்:

103/3,104/3,105/8,108,109,110,111,112,113/1,113/2,114/1,114/3,115,116/2,116/3,117/1,117/3,118/2,125,126/1,126/3,127,133,103/2,114/2,116/1,117/2,118/1 & 126/2 (அமினாபாத் கிராமம்)

448,449,452,453/5,455/2,456/1 & 478 (கயர்லாபாத் கிராமம்)

ஆகிய நிலங்களில் உள்ள மொத்த விஸ்தீரணம் 96.190 ஹெக்டேர் பரப்பளவில் சுரங்க பணி மேற்கொள்ள குவாரி குத்தகை செயல்பாடுகளுக்கான நீடிப்பு மற்றும் பரிந்துரைக்கப்பட்ட ஆணை தொழில் துறை அறிவிப்பு கடித எண். Go(Ms).No.50 Dt. 27.02.2023 மூலம் ஒப்புதல் பெறப்பட்டுள்ளது.

மேற்கண்ட நிலங்கள் டால்மியா சிமெண்ட் (பாரத்) கம்பெனி நிறுவனத்திற்கு சுரங்க குத்தகைக்கு அனுமதிக்கப்பட்டுள்ளது. அவர்களது அனுபவத்தில் தற்சமயம் சுரங்க பணி செய்து வெட்டுப் பள்ளமாக உள்ளது. மேற்கண்ட நிலங்களுக்கு 300 மீட்டர் சுற்றளவில் எந்த குடியிருப்புகளும் இல்லை என்பதைத் தெரிவித்துக் கொள்கிறேன்.


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

DFO Recommendation

Tel. No. 04329-299195
E.Mail dfoariyalur@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.3678/2023/D dated.30.08.2023

Sir,

Sub : Dalmia Cement (Bharat) limited – Aminabad and Khairulabad Limestone Mines under G.O.No.50 Industries Promotion and Commerce (MMA20 Department Dated.27.02.2023 – Extent 96.190 Ha situated in SF.No.103/2, 114/2 etc of Aminabad village, SF.No.448, 449 etc in Khairulabad village of Ariyalur Taluk and Ariyalur District Tamil Nadu – Existing Captive Mine – Environment Clearance under EIA Notification 2006 – Requisition for Forest Dept, NOC - Regarding.

- Ref 1) Dy.General Manager (Corp. Affairs), Dalmia Cements (Bharat) limited DP:GO:LL02, Dated.17.08.2023.
- 2) Forest Range Officer, Ariyalur Range No.491/2023 dated.28.08.2023.

I submit that in the reference 1st cited M/s Dalmia Cements (Bharat) limited, Khairulabad Works had requested "No Objection Certificate" for obtaining Environmental Clearance from Ministry of Environment and Climate Change for Aminabad and Khairulabad in the mining lease area extent of 96.190 Ha situated in SF.No.103/2, 114/2 etc of Aminabad village, SF.No.448, 449 etc in Khairulabad village of Ariyalur Taluk and Ariyalur District

In this connection the Forest Range Officer, Ariyalur has inspected the mining areas on 23.08.2023 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 forest is present within the one kilometer radius of the mines.

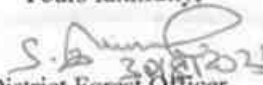
- ❖ The nearest Reserve forests is Vinnakurichi Reserved Forests which is 7.34 kilometers away from the mines.
- ❖ Other Reserved Forests lies within ten kilometers radius of the mines are Vilangudi Extension Reserved Forests, Vilangudi Reserved Forests, Managethi Reserved Forests which are 8.2, 8.5, 9.1 kilometers away from the mines respectively.
- ❖ Karaivetti Birds Sanctuary is 17 kilometer away from the said mines and no other protected area is present nearby.
- ❖ Also doesnot fall inside the Eco Sensitive Zone of Karaivetti Birds Sanctuary.

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 29.08.2023. The distance between existing lime stone mining area of Dalmia Cements (Bharat) Limited, Aminabad and Khairulabad village over an extent of 96.190 Hectares Karaivetti Birds Sanctuary and Eco-Sensitive Zone is 17 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.

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,


30/8/2023
District Forest Officer,
Ariyalur Forest Division,
Ariyalur.

1. Copy submitted to Chief Conservator of Forests, Trichy Circle. 30/8/2023

2. Copy to Dy.General Manager (Corp. Affairs), Dalmia Cements (Bharat) limited, Ariyalur 30/08/2023



File No: 10763
Government of India
Ministry of Environment, Forest and Climate Change
(Issued by the State Environment Impact Assessment Authority(SEIAA),
TAMIL NADU)



Dated 15/05/2024



To,

Karthikeyan V
 DALMIA CEMENT (BHARAT) LIMITED
 M/s Dalmia Cement (Bharat) Ltd. Dalmiapuram, P.O. Kallakudi, Aminabad & Khairulabad Villages ,
 TIRUCHIRAPPALLI, TAMIL NADU, , 621651
 env.head@dalmiacement.com

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

Sir/Madam,

This is in reference to your application for Grant of Terms of Reference under the provision of the EIA Notification 2006-regarding in respect of project Amalgamated Aminabad & Khairulabad Limestone Mines under GO 50 - Extent 96.190 Ha & Limestone Production : 1.10 MTPA at SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu by M/s.Dalmia Cement (Bharat) Limited submitted to Ministry vide proposal number SIA/TN/MIN/465337/2024 dated 02/04/2024.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO24B0000TN5124077N
(ii) File No.	10763
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals Amalgamated Aminabad & Khairulabad Limestone Mines under GO 50 - Extent 96.190 Ha & Limestone Production : 1.10 MTPA at SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk
(vii) Name of Project	

	& District, Tamil Nadu by M/s.Dalmia Cement (Bharat) Limited
(viii) Name of Company/Organization	DALMIA CEMENT (BHARAT) LIMITED
(ix) Location of Project (District, State)	Ariyalur, TAMIL NADU
(x) Issuing Authority	SEIAA
(xii) Applicability of General Conditions	no
(xiii) Applicability of Specific Conditions	no

3. 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 SEIAA under the provision of EIA notification 2006 and its subsequent amendments.
4. The above-mentioned proposal has been considered by State Environment Impact Assessment Authority(SEIAA) Appraisal Committee of SEIAA in the meeting held on 03/05/2024. The minutes of the meeting and all the Application and documents submitted are available on PARIVESH portal which can be accessed by scanning the QR Code above.
- 5.
6. The State Expert Appraisal Committee (SEAC), based on the information & clarifications provided by the project proponent and after detailed deliberations recommended the proposal for grant of Terms of Reference under the
7. provision of EIA Notification, 2006 and as amended thereof subject to the stipulation of specific and general conditions as detailed in Annexure (2).
8. 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 grant Terms of Reference for instant proposal of M/s. Karthikeyan V under the provisions of EIA Notification, 2006 and as amended thereof.
9. The Ministry/SEIAA-TN reserves the right to stipulate additional conditions, if found necessary.
10. The Terms of Reference 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.
11. This issues with the approval of the Competent Authority.
12. 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
- 13.

Copy To

1. The Additional Chief Secretary to Government, Environment & 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 110032.
3. The Member Secretary, Tamil Nadu Pollution Control Board, 76, Mount Salai, 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. The District Collector, Ariyalur District.
6. Stock File.

Annexure 1

Specific Terms of Reference for (Mining Of Minerals)

1. Seiaa Specific Conditions:

S. No	Terms of Reference
1.1	As per mining plan, the lease period is for 30 years valid upto 31.03.2030. The mining plan is for 5 years (05.10.2023 to 31.03.2028) & production should not exceed 73,33,330 Ts of RoM, 54,99,998 Ts of recoverable Limestone @ 75% & 18,33,332 Ts of Mineral Reject. The annual peak production should not exceed 14,66,666 Ts of RoM. The ultimate depth of mining is 42m BGL

2. Seac Conditions - Site Specific

S. No	Terms of Reference
2.1	1. The PP shall furnish mitigation measures for the non-compliance stated in the Certified Compliance Report (CCR) dt: 26.08.2022. 2. The PP shall furnish the following details, i. Existing pit dimension through precise mine surveying (DGPS) 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 carried out in the proposed quarry site 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 as on date 3. The PP shall submit the stability status of the existing quarry wall and slope stability action plan by carrying out the scientific studies to assess the slope stability of the working benches to be amalgamated and the remaining quarry walls in the pit, 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. 4. Since Kallar River is situated nearby, the PP shall carry out a hydrogeology study by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research / Dhanbad, NIRM/Bangalore, IIT-Madras, University of Madras – Dept of Geology/Guindy Campus, and Anna University Chennai-Dept of Geology/CEG Campus, to assess the influence of the mining operations on the Kallar river & vice versa along with indicating the flow level of water course in the Kallar river during the peak and off seasons. 5. 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. 6. The Proponent shall carry out Bio diversity study and the same shall be included in EIA Report. 7. 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. 8. The PP shall prepare a conceptual working plan accommodating the remedial actions such as inclusion of haul road accessibility keeping the benches intact, based on the studies carried out to assess the slope stability of the working benches to be constructed and existing quarry wall apart from the proposed mining methodology.

3. Seiaa Standard Conditions:

S. No	Terms of Reference
3.1	Cluster Management Committee - Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry. - The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc., - 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. - 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. - 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. - 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. - The committee shall furnish action plan regarding the restoration strategy with respect to the individual quarry falling under the cluster in a holistic manner. - The committee shall furnish the Emergency Management plan within the cluster. - The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public. - The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety. - The committee shall furnish the fire safety and evacuation plan in the case of fire accidents. Impact study of mining - Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following - Soil health & soil biological, physical land chemical features . - Climate change leading to Droughts, Floods etc. - Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local people. - Possibilities of water contamination and impact on aquatic ecosystem health. - Agriculture, Forestry & Traditional practices. - 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. Agriculture & Agro-Biodiversity - Impact on surrounding agricultural fields around the proposed mining Area. - Impact on soil flora & vegetation around the project site. - Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP. - The 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. - Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services. - The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock. Forests - The project proponent shall detailed study on impact of mining on Reserve forests free

S. No	Terms of Reference
	ranging wildlife. 20. The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna. 21. The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection. 22. The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site. Water Environment 23. Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period. 24. Erosion Control measures. 25. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas. 26. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. 27. The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities. 28. The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts. 29. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components. 30. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites. Energy 31. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished. Climate Change 32. The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities. 33. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock. Mine Closure Plan 34. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued. EMP 35. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued. 36. 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 37. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining. Disaster Management Plan 38. To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related

S. No	Terms of Reference
	activities covering the entire mine lease period as per precise area communication order issued. Others 39. The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc. 40. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan. 41. The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.

Standard Terms of Reference for (Mining of minerals)

1. Project Details

S. No	Terms of Reference
1.1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994. The production details need to submit since inception of mine duly authenticated by Department of Mines & Geology, State Government.
1.2	A copy of the document in support of rightful lessee of the mine should be submitted. In case of new mines copy of LoI granted by State Government to be submitted. PP should ensure that LoI is valid at the time of grant of ToR. PP should submit the copy of lease deed/supplementary lease deed/extension letter/transfer deed, from its initial grant to subsequent renewals/ transfer/extension of validity.
1.3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.
1.4	PP should submit the District Survey Report (DSR) as per S.O. 3611(E) dated 25.07.2018 in case of minor minerals.
1.5	Brief of proposal to be submitted which include total excavation of the material required for the production of certain quantity of the minerals, location of the project, mining lease area, latitude longitude, seismic zone etc. In case of expansion project details of expansion viz. expansion in mining lease area or expansion in production of any particular mineral or expansion in total excavation, latest certified Compliance report (CCR) from IRO of conditions granted in existing EC needs to be submitted.
1.6	The PP should submit the real-time aerial video footage & video of the mining lease area and of the transportation route.
1.7	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/toposheet, topographic sheet, geomorphology and geology of the area should be provided.

S. No	Terms of Reference
	Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
1.8	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
1.9	The PP should collect the Baseline data (BLD) in respect of initial level of the mining lease. For this permanent bench marks (BM) needs to be established at prominent location preferably close to mining leases in question and should have precisely known relationship to the level datum of the area, typically mean sea level.
1.10	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.
1.11	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.
1.12	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.
1.13	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
1.14	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
1.15	Compliance of the Ministry's Office Memorandum No. F: 3-50/2017-IA.III (Pt.), dated 30.05.2018 on the judgment of Hon'ble Supreme Court, dated the 2nd August, 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India needs to be submitted and included in the EIA/EMP Report.

2. Forest

S. No	Terms of Reference
2.1	PP shall submit a certificate from Chief Conservator of Forests regarding involvement of Forest Land in the mining lease area if any. In case forest land is involved i) PP should submit the proof of application made for obtaining forest clearance and ii) a map clearly showing the forest & non-forest area.
2.2	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

S. No	Terms of Reference
	indicated. A copy of the forestry clearance should also be furnished.
2.3	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.
2.4	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

3. Court Matters

S. No	Terms of Reference
3.1	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

4. Land Environment

S. No	Terms of Reference
4.1	PP should submit the details of survey number [viz. survey no, area in hectare, classification of land (government, private, forest, grazing land etc.), villages] duly authenticated by State Government, falling in the mining lease area.
4.2	The study area will comprise of 10km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
4.3	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.
4.4	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.

5. Wildlife

S. No	Terms of Reference
5.1	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.
5.2	A detailed biological study of the study area [core zone and buffer zone] 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. PP shall submit list of Schedule-1 species present in core and buffer zone duly authenticated by CWLW. In case of any Scheduled-I fauna found in the study area, the

S. No	Terms of Reference
	necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest/Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost. Proof of its submission of conservation plan to the CWLW needs to be submitted.
5.3	PP shall submit a certificate from Chief Wildlife Warden regarding distance of mining lease from the protected area falling within 10 KM of the mining lease. In case project requires clearance under Wildlife (Protection) Act, 1972 then copy of application made for the same needs to be submitted.

6. Baseline Environment

S. No	Terms of Reference
6.1	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.
6.2	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 windrose showing pre-dominant wind direction may also be indicated on the map.
6.3	The PP should submit the photograph of monitoring stations & sampling locations. The photograph should bear the date, time, latitude & longitude of the monitoring station/sampling location. In addition to this, PP should submit the original test reports and certificates of the labs from which samples were analyzed.

7. Water Environment

S. No	Terms of Reference
7.1	The water requirement for the Project, its availability and source should be furnished. Quantity of surface to be used for the Project should be indicated. A detailed water balance should also be provided. Submit the year wise target for reduction in consumption of the surface water by developing alternative source of water through rain water harvesting measures. Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided. The capital and recurring expenditure to be incurred needs to be submitted.
7.2	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.

8. Hydro Geology

S. No	Terms of Reference
8.1	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.
8.2	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.
8.3	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 bench 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. In case of surface water is proposed to be utilized then Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

9. Transportation

S. No	Terms of Reference
9.1	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.

10. Land Acquisition And R&r

S. No	Terms of Reference
10.1	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.
10.2	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.

11. Socio-economic Environment

S. No	Terms of Reference
11.1	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.
11.2	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.
11.3	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.
11.4	Activity-wise time-bound action plan on the issues raised and commitment made during public hearing to be submitted as part of the final EMP Report in compliance of the Ministry's OM F.No.22-65/2017-IA.III dated 30th September, 2020.

12. Environmental Monitoring And Management

S. No	Terms of Reference
12.1	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 proposed safeguard measures in each case should also be provided.
12.2	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.

13. Critically Polluted Areas, Aravali & Crz

S. No	Terms of Reference
13.1	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.
13.2	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).

14. Risk Assessment & Disaster Management

S. No	Terms of Reference
14.1	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.
14.2	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.
14.3	A Disaster Management Plan shall be prepared and included in the EIA/EMP Report.

15. Miscellaneous

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

SEAC STANDARD CONDITIONS:

1. In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following:
 - (i) Original pit dimension
 - (ii) Quantity achieved Vs EC Approved Quantity
 - (iii) Balance Quantity as per Mineable Reserve calculated.
 - (iv) Mined out Depth as on date Vs EC Permitted depth
 - (v) Details of illegal/illicit mining
 - (vi) Violation in the quarry during the past working.
 - (vii) Quantity of material mined out outside the mine lease area
 - (viii) Condition of Safety zone/benches
 - (ix) Revised/Modified Mining Plan showing the benches of not exceeding 6 m height and ultimate depth of not exceeding 50m.
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 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.
4. 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.
5. 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.

6. 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.
7. 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.
8. 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.
9. 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,
10. What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?
11. 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.
12. 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).
13. The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,

14. 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.
15. 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.
16. 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.
17. 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.
18. 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.
19. 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.
20. Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.
21. 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.
22. 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.
 23. 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.
 24. 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.
 25. Impact on local transport infrastructure due to the Project should be indicated.
 26. 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.
 27. A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.
 28. 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.
 29. 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.
 30. Taller/oneyear old Saplings raised in appropriate size of bags, preferably ecofriendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent

- shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner
31. 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.
 32. 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.
 33. 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.
 34. 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.
 35. 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.
 36. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
 37. 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.
 38. 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.
 39. 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.
 40. 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.



Signature Not Verified

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

Date: 15/05/2024 ☐

Awarded TORs & their incorporation in EIA Report

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	Specific Terms of Reference for Mining of Minerals	
1	SEIAA Specific Conditions	
1.1	As per mining plan, the lease period is for 30 years valid upto 31.03.2030. The mining plan is for 5 years (05.10.2023 to 31.03.2028) & production should not exceed 73,33,330 Ts of RoM, 54,99,998 Ts of recoverable Limestone @ 75% & 18,33,332 Ts of Mineral Reject. The annual peak production should not exceed 14,66,666 Ts of RoM. The ultimate depth of mining is 42 m BGL	Agreed to Comply
2	SEAC Conditions – Site Specific	
2.1	1. The PP shall furnish mitigation measures for the non-compliance stated in the Certified Compliance Report (CCR) dt. 26.08.2022. 2. The PP shall furnish the following details, i. Existing pit dimension through precise mine surveying (DGPS) 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 carried out in the proposed quarry site 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 as on date 3. The PP shall submit the stability status of the existing quarry wall and slope stability action plan by carrying out the scientific studies to assess the slope stability of the working benches to be amalgamated and the remaining quarry walls in the pit, 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. 4. Since Kallar River is situated nearby, the PP shall carry out a hydrogeology study by involving any one of the reputed Research and Academic Institutions - CSIR-Central Institute of Mining & Fuel Research /	There was no non-compliance stated in the CCR. Green Belt development is effectively maintained now. DGPS Plans are submitted 10,99,716 T against 1.1 MTPA EC Quantity 9.97 Million Tonnes 25 m BGL against permitted depth of 27.8 m BGL in EC Nil Nil Nil Safe & Stable The Department of Mining Engineering, Anna University conducted the Pit Slope Stability study in May 2024 and submitted the Report. The stability of slope in the mine is evaluated in term of critical SRF value which is in the range of 1.512 - 1.681. Thus, the Pit is stable. Page No. 155 The Department of Mining Engineering, Anna University conducted the Study on 'Influence of

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	Dhanbad, NIRM/Bangalore, IIT-Madras, University of Madras – Dept of Geology/Guindy Campus, and Anna University Chennai-Dept of Geology/CEG Campus, to assess the influence of the mining operations on the Kallar river & vice versa along with indicating the flow level of water course in the Kallar river during the peak and off seasons.	Mining Activity on Kallar River' and submitted. Page No. 156
	5. 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.	Shown in Plate IV. Page No. 65
	6. The Proponent shall carry out Bio diversity study and the same shall be included in EIA Report.	Chapter 3.9 Pages 131 & 134-147
	7. 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.	Pages 184-187
	8. The PP shall prepare a conceptual working plan accommodating the remedial actions such as inclusion of haul road accessibility keeping the benches intact, based on the studies carried out to assess the slope stability of the working benches to be constructed and existing quarry wall apart from the proposed mining methodology.	Pages 84-85
3	SEIAA Standard Conditions	
3.1	Cluster Management Committee - Cluster Management Committee shall be framed which must include all the proponents in the cluster as members including the existing as well as proposed quarry. - The members must coordinate among themselves for the effective implementation of EMP as committed including Green Belt Development, Water sprinkling, tree plantation, blasting etc., - 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. - 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. - 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. - 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	Not Applicable for this Major Mineral Proposal

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	implementing the environmental policy devised shall be given in detail. 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 furnish the Emergency Management plan within the cluster. 9. The committee shall deliberate on the health of the workers/staff involved in the mining as well as the health of the public. 10. The committee shall furnish an action plan to achieve sustainable development goals with reference to water, sanitation & safety. 11. The committee shall furnish the fire safety and evacuation plan in the case of fire accidents.	
	Impact study of mining 12. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area covering the entire mine lease period as per precise area communication order issued from reputed research institutions on the following a) Soil health & soil biological, physical land chemical features . b) Climate change leading to Droughts, Floods etc. c) Pollution leading to release of Greenhouse gases (GHG), rise in Temperature, & Livelihood of the local people. d) Possibilities of water contamination and impact on aquatic ecosystem health. e) Agriculture, Forestry & Traditional practices. f) Hydrothermal/Geothermal effect due to destruction in the Environment. g) Bio-geochemical processes and its foot prints including environmental stress. h) Sediment geochemistry in the surface streams.	The Department of Mining Engineering, Anna University conducted the Study and Report submitted. Pages 159-160 159 159 Pages 156-158 Page 158 Page 159 Page 1529 Page 156-159
	Agriculture & Agro-Biodiversity 13. Impact on surrounding agricultural fields around the proposed mining Area. 14. Impact on soil flora & vegetation around the project site. 15. Details of type of vegetations including no. of trees & shrubs within the proposed mining area and. If so, transplantation of such vegetations all along the boundary of the proposed mining area shall committed mentioned in EMP. 16. The Environmental Impact Assessment should study the biodiversity, the natural ecosystem, the soil micro flora, fauna and soil seed banks and suggest measures to maintain the natural Ecosystem. 17. Action should specifically suggest for sustainable management of the area and restoration of ecosystem for flow of goods and services.	Pages 156-158 Pages 156-158 No tree cutting proposed in the amalgamated Lease Page 172 Page 158

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	18.The project proponent shall study and furnish the impact of project on plantations in adjoining patta lands, Horticulture, Agriculture and livestock.	Pages 156-158
	Forests 19.The project proponent shall detailed study on impact of mining on Reserve forests free ranging wildlife. 20.The Environmental Impact Assessment should study impact on forest, vegetation, endemic, vulnerable and endangered indigenous flora and fauna. 21.The Environmental Impact Assessment should study impact on standing trees and the existing trees should be numbered and action suggested for protection. 22.The Environmental Impact Assessment should study impact on protected areas, Reserve Forests, National Parks, Corridors and Wildlife pathways, near project site.	Page 142 Page 134 No tree cutting proposed in the amalgamated Lease Page 172
	Water Environment 23. Hydro-geological study considering the contour map of the water table detailing the number of ground water pumping & open wells, and surface water bodies such as rivers, tanks, canals, ponds etc. within 1 km (radius) so as to assess the impacts on the nearby waterbodies due to mining activity. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided, covering the entire mine lease period. 24. Erosion Control measures. 25. Detailed study shall be carried out in regard to impact of mining around the proposed mine lease area on the nearby Villages, Water-bodies/ Rivers, & any ecological fragile areas. 26. The project proponent shall study impact on fish habitats and the food WEB/ food chain in the water body and Reservoir. 27. The project proponent shall study and furnish the details on potential fragmentation impact on natural environment, by the activities. 28. The project proponent shall study and furnish the impact on aquatic plants and animals in water bodies and possible scars on the landscape, damages to nearby caves, heritage site, and archaeological sites possible land form changes visual and aesthetic impacts. 29. The Terms of Reference should specifically study impact on soil health, soil erosion, the soil physical, chemical components and microbial components. 30. The Environmental Impact Assessment should study on wetlands, water bodies, rivers streams, lakes and farmer sites.	The Department of Mining Engineering, Anna University conducted the Study and Report submitted. Pages 121-123 Pages 167-171 Page 172 Pages 156-158 Page 142 Page 172 Page 146 Page 68-71 Page 158 Pages 156-158

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	Energy 31. The measures taken to control Noise, Air, Water, Dust Control and steps adopted to efficiently utilise the Energy shall be furnished.	Pages 182-184 Page 160
	Climate Change 32. The Environmental Impact Assessment shall study in detail the carbon emission and also suggest the measures to mitigate carbon emission including development of carbon sinks and temperature reduction including control of other emission and climate mitigation activities. 33. The Environmental Impact Assessment should study impact on climate change, temperature rise, pollution and above soil & below soil carbon stock.	Page 159 Page 159
	Mine Closure Plan 34. Detailed Mine Closure Plan covering the entire mine lease period as per precise area communication order issued.	Pages 84-85
	EMP 35. Detailed Environment Management Plan along with adaptation, mitigation & remedial strategies covering the entire mine lease period as per precise area communication order issued. 36. The Environmental Impact Assessment should hold detailed study on EMP with budget for Green belt development and mine closure plan including disaster management plan.	Pages 182-187 Pages 184-187
	Risk Assessment 37. To furnish risk assessment and management plan including anticipated vulnerabilities during operational and post operational phases of Mining.	Pages 176-180
	Disaster Management Plan 38. To furnish disaster management plan and disaster mitigation measures in regard to all aspects to avoid/reduce vulnerability to hazards & to cope with disaster/untoward accidents in & around the proposed mine lease area due to the proposed method of mining activity & its related activities covering the entire mine lease period as per precise area communication order issued.	Pages 177-180
	Others 39. The project proponent shall furnish VAO certificate with reference to 300m radius regard to approved habitations, schools, Archaeological sites, Structures, railway lines, roads, water bodies such as streams, odai, vaari, canal, channel, river, lake pond, tank etc. 40. As per the MoEF& CC office memorandum F.No.22-65/2017-IA.III dated: 30.09.2020 and 20.10.2020 the proponent shall address the concerns raised during the public consultation and all the activities proposed shall be part of the Environment Management Plan.	Submitted To be complied on Public Hearing completion

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	41. The project proponent shall study and furnish the possible pollution due to plastic and microplastic on the environment. The ecological risks and impacts of plastic & microplastics on aquatic environment and fresh water systems due to activities, contemplated during mining may be investigated and reported.	Page No. 184
	Standard Terms of Reference for Mining of Minerals	
1	Project Details	
1.1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994. The production details need to submit since inception of mine duly authenticated by Department of Mines & Geology, State Government.	AD Mines Proceedings submitted. 10,99,716 Tonnes was maximum production during 2022-23 against EC Quantity of 1.1 MTPA. There was no production violation.
1.2	A copy of the document in support of rightful lessee of the mine should be submitted. In case of new mines copy of Lol granted by State Government to be submitted. PP should ensure that Lol is valid at the time of grant of ToR. PP should submit the copy of lease deed/supplementary lease deed/extension letter/transfer deed, from its initial grant to subsequent renewals/ transfer/extension of validity.	Documents-1, 5 & 6 Page No. 209-263
1.3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Complied. All statutory approvals are in the name of the PP.
1.4	PP should submit the District Survey Report (DSR) as per S.O. 3611(E) dated 25.07.2018 in case of minor minerals.	Not Applicable
1.5	Brief of proposal to be submitted which include total excavation of the material required for the production of certain quantity of the minerals, location of the project, mining lease area, latitude longitude, seismic zone etc. In case of expansion project details of expansion viz. expansion in mining lease area or expansion in production of any particular mineral or expansion in total excavation, latest certified Compliance report (CCR) from IRO of conditions granted in existing EC needs to be submitted.	Page 51 CCR is given as Document-3 Pages 226-244
1.6	The PP should submit the real-time aerial video footage & video of the mining lease area and of the transportation route.	Pages 63-64
1.7	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and	Page 63

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	other ecological features of the study area (core and buffer zone).	
1.8	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics	Pages 69-70
1.9	The PP should collect the Baseline data (BLD) in respect of initial level of the mining lease. For this permanent bench marks (BM) needs to be established at prominent location preferably close to mining leases in question and should have precisely known relationship to the level datum of the area, typically mean sea level.	Page 52
1.10	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.	Page 86
1.11	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Page 84
1.12	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.	Pages 84-85
1.13	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Page 184
1.14	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.	Page 181
1.15	Compliance of the Ministry's Office Memorandum No. F: 3-50/2017-IA.III (Pt.), dated 30.05.2018 on the judgment of Hon'ble Supreme Court, dated the 2nd August, 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India needs to be submitted and included in the EIA/EMP Report.	Not Applicable as no violation involved
2	Forest	
2.1	PP shall submit a certificate from Chief Conservator of Forests regarding involvement of Forest Land in the mining lease area if any. In case forest land is involved i)	Page 12-13

Sl. No.	Awarded TOR	Incorporation in EIA Report Page No.
	PP should submit the proof of application made for obtaining forest clearance and ii) a map clearly showing the forest & nonforest area.	
2.2	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
2.3	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
2.4	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Page 134
3	Court Matters	
3.1	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 Page 67
4	Land Environment	
4.1	PP should submit the details of survey number [viz. survey no, area in hectare, classification of land (government, private, forest, grazing land etc.), villages] duly authenticated by State Government, falling in the mining lease area.	Page 62 Existing Mining Leases
4.2	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.	Page 87 Page 88
4.3	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.	Page 131-133 Page 84-85
4.4	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.	Page 84
5	Wildlife	
5.1	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.	Page 172
5.2	A detailed biological study of the study area [core zone and buffer zone] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly	Pages 131-147

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	authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. PP shall submit list of Schedule-1 species present in core and buffer zone duly authenticated by CWLW. 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/Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost. Proof of its submission of conservation plan to the CWLW needs to be submitted.	
5.3	PP shall submit a certificate from Chief Wildlife Warden regarding distance of mining lease from the protected area falling within 10 KM of the mining lease. In case project requires clearance under Wildlife (Protection) Act, 1972 then copy of application made for the same needs to be submitted.	Not Applicable
6	Baseline Environment	
6.1	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 predominant 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.	Baseline Data (BLD) has been collected during December 2023-February 2024 (Winter Season) for the EIA Study in compliance with MoEF&CC Office Memorandum No. J-11013/41/2006-IA-II(I)(Part) dated 29.08.2017. Pages 87-153
6.2	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 windrose showing pre-dominant wind direction may also be indicated on the map.	Pages 162-167
6.3	The PP should submit the photograph of monitoring stations & sampling locations. The photograph should bear the date, time, latitude & longitude of the monitoring station/sampling location. In addition to this, PP should submit the original test reports and certificates of the labs from which samples were analyzed.	Pages 89-90 Document-8 (Pages 266-275)

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7	Water Environment	
7.1	The water requirement for the Project, its availability and source should be furnished. Quantity of surface to be used for the Project should be indicated. A detailed water balance should also be provided. Submit the year wise target for reduction in consumption of the surface water by developing alternative source of water through rain water harvesting measures. Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided. The capital and recurring expenditure to be incurred needs to be submitted.	Page 86
7.2	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.	Pages 167-172
8	Hydrogeology	
8.1	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.	No nalla crossing in the existing mine.
8.2	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.	Page 52
8.3	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 bench 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. In case of surface water is proposed to be utilized then Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Mining will not intersect the ground water-table. Page 52
9	Transportation	
9.1	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.	Pages 160-162
10	Land Acquisition and R&R	
10.1	Details about the land proposed for mining activities	Existing Leases.

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	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.	Page 62
10.2	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.	No R&R involved. Page 67
11	Socio-economic Environment	
11.1	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.	Page 153
11.2	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.	Pages 147-153
11.3	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 on completion of Public Hearing
11.4	Activity-wise time-bound action plan on the issues raised and commitment made during public hearing to be submitted as part of the final EMP Report in compliance of the Ministry's OM F.No.22-65/2017-IA.III dated 30th September, 2020.	To be complied on completion of Public Hearing
12	Environmental Monitoring and Management	
12.1	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 noncompliances / violations of environmental norms to the Board of Directors of the	DCBL has well laid Environmental Policy approved by its Board of Directors. Pages 53-54

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	Company and/or shareholders or stakeholders at large, may also be detailed in the proposed safeguard measures in each case should also be provided.	
12.2	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.	Pages 182-187
13	Critically Polluted Areas, Aravalli & CRZ	
13.1	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.	Project area does not fall in Critically Polluted Industrial Clusters listed by CPCB. Page 87
13.2	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	As Bay of Bengal is at 100 km from the Lease, Coastal Regulation Zone (CRZ) applicability is not there. Page 87
14	Risk Assessment & Disaster Management	
14.1	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.	Pages 176-180
14.2	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.	Page 173
14.3	A Disaster Management Plan shall be prepared and included in the EIA/EMP Report.	Pages 177-180
15	Miscellaneous	
15.1	The general points are also to be followed: - a) All documents to be properly referenced with index and continuous page numbering. b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated. c) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available	Complied. Complied. Complied.

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	during appraisal of the Project. d) Where the documents provided are in a language other than English, an English translation should be provided. e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed. g) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC/SEIAA-TN with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation. h) As per the circular no. J-11011/618/2010-IA.II (I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable. i) The EIA report should also include i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Complied. Complied (Form-1). Complied. Pages 8-9 No change of Scope, as such. Page 74 Pages 75-76 Nil
	SEAC Standard Conditions	
1	In the case of existing/operating mines, a letter obtained from the concerned AD (Mines) shall be submitted and it shall include the following: (i) Original pit dimension (ii) Quantity achieved Vs EC Approved Quantity (iii) Balance Quantity as per Mineable Reserve calculated. (iv) Mined out Depth as on date Vs EC Permitted depth (v) Details of illegal/illicit mining	Submitted. Page 67 Pit-1 : 668x482x23 m Pit-2 : 408x206.6x25 m Pit-3 : 954x380.9x21 m Pit-4 : 124.5x56.5x8 m 10,99,716 T against 1.1 MTPA EC Quantity 9.97 Million Tonnes 25 m BGL against permitted depth of 27.8 m BGL in EC Nil

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	(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.	Nil Nil Safe & Stable Submitted
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.	VAO Certificates submitted Pages 10-11
3	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.	DFO Recommendation Letter submitted Pages 12-13
4	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.	The Department of Mining Engineering, Anna University conducted the Pit Slope Stability study in May 2024 and submitted the Report. The stability of slope in the mine is evaluated in term of critical SRF value which is in the range of 1.512 - 1.681 . Thus, the Pit is stable. Page No. 155
5	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.	Existing Lease.
6	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.	The Mine is being operated with the required Statutory Officials and Competent Persons mandatorily appointed as per the provisions of Mines Act 1952 and Metalliferous Mines Regulations 1961. Page 83
7	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.	Page 158
8	The EIA Coordinators shall obtain and furnish the details of quarry/quarries operated by the proponent in the past,	Page 55

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	either in the same location or elsewhere in the State with video and photographic evidences.	
9	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,	Existing Mine and there was no violation.
10	What was the period of the operation and stoppage of the earlier mines with last work permit issued by the AD/DD mines?	Mining Lease is in operation since 1970 with all statutory approvals.
11	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.	10,99,716 T in 2022-23 against 1.1 MTPA EC Quantity 25 m BGL against permitted depth of 27.8 m BGL in EC Nil Submitted as Documents 2 & 4 for operating Lease GO 86 Yes. There is no violation.
12	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).	Page 68
13	The PP shall carry out Drone video survey covering the cluster, green belt, fencing, etc.,	Pages 63-64
14	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.	Page 65
15	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.	Pages 51-52
16	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.	Page 54 Page 83
17	The Project Proponent shall conduct the hydro-geological study considering the contour map of the	The Department of Mining Engineering, Anna

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	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.	University conducted the Study and Report submitted. Pages 121-123 Pages 167-171
18	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.	Baseline Data (BLD) has been collected during December 2023-February 2024 (Winter Season) for the EIA Study. Pages 87-153
19	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.	Pages 154-155
20	Rain water harvesting management with recharging details along with water balance (both monsoon & non-monsoon) be submitted.	Page 158
21	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.	Page 131-133 Page 84-85
22	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.	Page 84 No R&R involved. Page 67
23	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.	Project area does not fall in Critically Polluted Industrial Clusters listed by CPCB. Page 87
24	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.	Page 158
25	Impact on local transport infrastructure due to the Project	Pages 160-162

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	should be indicated.	
26	A tree survey study shall be carried out (nos., name of the species, age, diameter etc.,) both within the mining lease applied area & 300 m buffer zone and its management during mining activity.	Page 172
27	A detailed mine closure plan for the proposed project shall be included in EIA/EMP report which should be site-specific.	Pages 84-85
28	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.	Complied.
29	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.	Page 86
30	Taller/oneyear old Saplings raised in appropriate size of bags, preferably ecofriendly bags should be planted as per the advice of local forest authorities/botanist/Horticulturist with regard to site specific choices. The proponent shall earmark the greenbelt area with GPS coordinates all along the boundary of the project site with at least 3 meters wide and in between blocks in an organized manner	Page 86
31	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.	Pages 177-180
32	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.	Pages 176-180
33	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.	Page 173
34	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.	Page 153
35	The Socio-economic studies should be carried out within	Pages 147-153

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	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.	
36	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 Page 67
37	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.	Page 181
38	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.	CCR is given as Document-3 Pages 226-244
39	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.	Pages 184-187
40	Concealing any factual information or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this Terms of Conditions besides attracting penal provisions in the Environment (Protection) Act, 1986.	Agreed to comply.

Amalgamated Lease Details

Sl. No.	Project Detail		AK Mine under GO 86 (95.345 Ha) (Lease-I)	Aminabad Mine under GO 106 (0.845 Ha) (Lease-II)	Amalgamated AK Mine under GO 50 (96.190 Ha)
1	Land	Own Patta	0	0	0
		Govt. Poramboke	95.345	0.845	96.190
		Total	95.345	0.845	96.190
		Village	Aminabad & Khairulabad	Aminabad	Aminabad & Khairulabad
2	Initial Mining Lease Grant		GO Ms. No. 874 dated 15.04.1970 & GO Ms. No. 2 dt. 05.01.1993	GO Ms. No. 106 dated 12.05.2015	GO Ms. No. 50 dated 27.02.2023
3	Lease Deed/ Sup. Lease Deeds Registered on		16.10.1970 02.07.1993 11.10.2019	10.01.2017	To be executed after EC
4	ML Validity under MMDR Amendment Act, 2015		2 nd Extn. 03.10.2000 – 31.03.2030	50 Years 09.01.2067	31.03.2030
5	Environmental Clearance obtained		1. MoEF Ltr. J-11015/398/2005 IA.II(M) dt. 13.01.2006 (0.3 MTPA) 2. MoEF Ltr. J-11015/104/2009-IA.II(M) dt. 09.05.2011 (Expn 0.3 to 1.10 MTPA) over an extent of 95.345 Ha	EC Application to SEIAA No. 23831 dated: 08.04.2018 111 th SEAC Meeting on 17.04.2018 & 309 th SEIAA Meeting on 01.06.2018	Applied now
6	Present Approved Mining Plan/Scheme		IBM Ltr. TN/ALR/LST/ROMP-1700.MDS dt. 15.12.2022 valid till 31.03.2028	IBM Ltr. TN/ALR/LST/ROMP-1623.MDS dt. 22.12.2020 valid till 31.03.2026	IBM Ltr. TN/ALR/LST/MP-2098.MDS dt. 05.10.2023 - valid till 31.03.2028
7	Existing Consent to Operate		2108136651580 (W) & 2108236651580 (A) dated 01.06.2021 Valid till 31.03.2026	Nil	-
8	Consented Quantity		1.1 MTPA	0	1.1 MTPA
9	Proved Reserves		-	-	99,66,108 Tonnes
10	Method of Mining		Opencast both Conventional & Non-Conventional Method	Opencast both Conventional & Non-Conventional Method	Opencast both Conventional & Non-Conventional Method
11	Existing Pit Dimensions		Pit-1 : 668x482x23 m Pit-2 : 408x206.6x25 m Pit-3 : 954x380.9x21 m Pit-4 : 124.5x56.5x8 m	0	-
12	Life of the Mine		-	-	9 Years

1.0 Introduction

1.1 Purpose of the Report

M/s. Dalmia Cement (Bharat) Limited (DCBL) are operating Cement Plants at Dalmiapuram & Ariyalur in Tamil Nadu, Kadapa in Andhra Pradesh, Belgaum in Karnataka and Cement Units across Northeast & Eastern Regions. DCBL's Cement manufacturing capacity is now about 46.6 Million Tonnes per Annum (MTPA). DCBL had established Dalmiapuram Cement Plant in the Year 1939 (Pre-Independence period). Dalmiapuram Plant (with Lines I & II) is now being operated for 3.23 MTPA Clinker and 5.00 MTPA Cement. DCBL is also running its Ariyalur Cement Plant at Govindapuram & Ottakovil at a distance of 35 km from Dalmiapuram. Dalmia Ariyalur Plant is now being operated for 2.50 MTPA Clinker and 4.00 MTPA Cement. The limestone requirement of both Cement Plants is being met from Captive Limestone Mines in Ariyalur and Trichy Districts viz. Kallakudi-Kovandakurichi (KLK-KVK) Mines, Periyathirukonam (PTK) Mines and amalgamated Periyanalur, Aminabad & Khairulabad (PNR Group) Mines.

PNR Group Mines are being operated in 3 Leases over an extent of 167.605 Ha under GO No. 179 (now GO 126) over an extent of 70.01 Ha in Periyanalur; under GO No. 2 (now GO 86) over an extent of 95.345 Ha in Aminabad & Khairulabad Villages and under Rc No. 17783 over an extent of 2.25 Ha in Khairulabad Village for the total Production of 1.90 MTPA Limestone. DCBL has also obtained another Lease over an extent of 0.845 Ha in Aminabad village under GO Ms. No. 106 dated 12.05.2015. The State Government has amalgamated two Leases viz. GO Ms. No. 86 over an extent of 95.345 Ha & GO Ms. No.106 over an extent of 0.845 Ha - under GO Ms. No. 50 dated 27.02.2023 for a total extent of 96.190 Ha with its validity till 31.03.2030.

Amalgamated Lease GO Ms. No. 50 over an extent of 96.190 Ha falls in SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu. The mine is situated at a distance of about 6.8 km in east from Ariyalur Town. It is accessible by Ariyalur – V Kaikatti SH-139 which runs about 0.9 km in the south. There is **no Rehabilitation & Resettlement** issue due to the Proposal. Also, there is **no litigation/pending case** against the Proposal.

The Regional Controller of Mines, Indian Bureau of Mines (IBM), Chennai has approved the Mining Plan for GO 50 for the Block 2023-24 to 2027-28 vide Letter No. TN/ALR/LST/MP-2098.MDS dated 05.10.2023 which is valid till 31.03.2028. Mineable Reserves ('111' Category) assed in the Lease is 9.97 Million Tonnes as on 01.04.2023 over an extent of 96.19 Ha. No Top Soil or Over Burden (OB) generation will be there till Conceptual Stage. The mining operation will be carried out by both Opencast Conventional Mining with controlled Drilling & Blasting and Non-Conventional Mining Method with Rock Breakers. Conventional mining operation method will be involving deep hole blasting techniques. Blasting is being done with slurry explosives and ANFO

and Non-Electric shock tubes for controlling ground vibration and noise level. Fragmented limestone will be loaded by Hydraulic Excavators into Tippers. No Beneficiation/Screening is required. The Tippers transport limestone to Cement Plants by road - 19 km (Ariyalur Plant) and 40 km (Dalmiapuram Plant) respectively.

The production during the Plan period will be 73,33,330 Tonnes @ 14,66,666 TPA ROM (1.467 MTPA ROM). The Life of the Mine is 9 years. Conceptual Stage Ultimate Pit depth will be 42 m BGL. As Ground Water-table in the vicinity is ranging between 45-50 m BGL, mining will not intersect the ground water-table. At the Conceptual Stage, about 69.79 Ha will be opened out Pit Area which will be converted as water reservoir.

Mine Profile :

Mineable Reserves	:	9.97 Million Tonnes
Proposed Production	:	1.467 MTPA ROM & 1.10 MTPA Clean
No. of working days/annum	:	330 (3 shifts)
Life of the Mine	:	9 years
Ore:Waste Ratio	:	1:0
Bench height	:	6 m
Bench width	:	8-10 m
Bench slope	:	40-45°
Ultimate Pit Limit	:	42 m (BGL); Top RL 80 m Bottom RL 38 m
Ground Water-table at	:	45 m (Post-Mon)-50 m BGL(Pre-Mon)

Mining will not intersect the ground water-table.

The Limestone to be mined out from this Lease is Major Mineral in an extent of <250 Ha and falls in Category 'B' of Sl. No. 1(a) of EIA Notification 2006 (as amended) for prior Environmental Clearance (EC) from the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu. Accordingly, DCBL submitted the TOR Application vide Online Proposal No. SIA/TN/MIN/465337/2024 on 08.03.2024. The Proposal was deliberated by the State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 457th Meeting held on 03.04.2024 (Sl. No. 11) and in SEIAA-TN Meeting held on 03.05.2024. Terms of Reference (TOR) has been awarded vide TOR Identification No. TO24B0000TN5124077N dated 15.05.2024 for preparing Environmental Impact Assessment (EIA) Report with Public Hearing.

Baseline Data (BLD) has been collected during December 2023-February 2024 (**Winter Season**) for the EIA Study in compliance with MoEF&CC Office Memorandum No. J-11013/41/2006-IA-II(I)(Part) dated 29.08.2017. 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. 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 dated 29.10.2024).

1.2 Project Proponent

M/s. Dalmia Cement (Bharat) Limited (DCBL) is one of the leading cement producers of India. It was founded in 1935 by Shri Jaidayal Dalmia. First Cement Plant of DCBL was established in 1939 at Dalmiapuram in Tamil Nadu. DCBL is enjoying a heritage of over 8 decades of expertise in Cement Manufacturing. DCBL operates for manufacturing capacity of 46.6 Million Tonnes per Annum (**Million TPA or MTPA**) by 15 Cement Plants and Grinding Units which are spread across 23 States. DCBL currently operates cement plants in Tamil Nadu (Dalmiapuram & Ariyalur), Andhra Pradesh (Kadapa), Meghalaya (Thangskai), Assam (Umrangso, Lanka & Jagir Road), Karnataka (Belgaum), Jharkhand (Bokaro), Odisha (Rajgangpur & Kapilas), Bihar (Kalyanpur), West Bengal (Medinipur) and Maharashtra (Chandrapur). DCBL has also recently established 2.50 MTPA Cement Grinding Unit near Sattur in Virudhunagar District.

With recent Modernization & Expansion on NIPL Mode, Dalmiapuram Plant (with Lines I & II) is now being operated for 3.23 MTPA Clinker and 5.00 MTPA Cement. DCBL had also established the green field Cement Plant at Govindapuram & Ottakovil near Ariyalur during 2009-10 and is at a distance of 35 km from Dalmiapuram. With recent Modernization & Expansion, Ariyalur Cement Plant Clinker production will be 2.50 MTPA and Cement production will be 4.00 MTPA (**Table 1.1**). Cement dispatch from these two Cement Plants is fulfilling about 55-60% of the local demand of Tamil Nadu and balance 40-45% is marketed in others States of India.

Table : 1.1 DCBL Cement Plants & EC Details

DCBL Plant at	Cement Production Capacity	Modernization and Expansion under NIPL Certification from TNPCB
Dalmiapuram	4.02 MTPA vide MoEF&CC EC F. No. J-11011/ 68/2004-IA II (I) dt. 27.04.2005	Clinker 3.23 MTPA & Cement 5.00 MTPA vide TNPCB Order
Ariyalur	3.00 MTPA Vide MoEF&CC EC F. No. J-11011/ 751/2007-IA II (I) dt. 19.06.2008	Clinker 2.50 MTPA & Cement 4.00 MTPA vide TNPCB Order

Presently, there are 800 Direct Employees and 3,000 Contract Employees working in Cement & Power Plants and Mines. Dalmiapuram Plant and Captive Mines are under the Administration of Unit Head, Dalmiapuram. The communication address is as follows :

Sri. K.Vinayagamurthi,
Unit Head,
 Dalmia Cement Bharat Limited,
 Dalmiapuram, Lalgudi Taluk,
 Tiruchirapalli District, Tamil Nadu-621 651.
 Telephone Nos. : 04329-235123; Fax : 04329-235111
 e-mail : k.vinayagamurthi@dalmiacement.com

DCBL has well laid Environmental Policy approved by its Board of Directors. Any **non-compliance/violations of environmental norms and the corrective actions taken will be reported** by the Unit Head to CEO, Managing Director and the Board of Directors of DCBL. Periodic Internal Audits is being done to identify the non-compliances as part of Integrated Management System (IMS). Auditors findings are classified as Non-Conformance (NC) or Compliance & Findings. Auditee implements the corrective actions & preventive action against the Non-Conformities and follows up with the same Auditor to close the NCs. Non-conformities observed (if any) will be addressed by 'Senior General Manager- Environment, IE & PH' in consultation with Department Head who in turn reports the same to the Plant Head for necessary direction and action.

DCBL has obtained **ISO:9001, ISO:14001, ISO:45000 and ISO:50001 Certifications** for its products, and always stood for the highest quality cements for over seven decades. Recognizing DCBL as Centre of Excellence for transfer of technology, World Bank and Danish International Development Agency (DANIDA) Team sponsored a **Regional Training Centre** at Dalmiapuram to cater the needs of South Indian Cement Industries since 1991. DCBL has also bagged various National Awards as detailed below:

- ❖ Best Improvement in Electrical Energy Performance-**National Award for Energy Efficiency** in Indian Cement Industry by National Council for Cement and Building Materials - **1999 & 2002**.
- ❖ **Best Improvement in Thermal Energy Performance (2002)** and National Award for **Best Electrical Energy Performance in Indian Cement Industry (2003)** by National Council for Cement and Building Materials.
- ❖ Chosen by Confederation of Indian Industry (CII) as a **Model Plant for Energy Efficiency** in Year **2003**.
- ❖ **Leadership & Excellence Award in Safety, Health & Environment**-Awarded by CII in the Years **2003 & 2004** - Commendation in SHE Performance.
- ❖ A National Award for **Second Best Environmental Excellence in Plant Operation** in Indian Cement Industries (**2003-04**) by NCCBM.
- ❖ FIMI Awards 21-22, **FIMI** (Federations of Indian Mineral Industries)-KLK Mines.
- ❖ **Tamil Nadu Green Champion Award** by TNPCB – 2022.
- ❖ Manufacturing Today Award 2023-Excellence in Supply Chain (Large) – Runnerup
- ❖ Amalgamated PTK Mines has Won the Overall Performance Second Prize in Conventional Category of Mines operating in Ariyalur District – 2023.
- ❖ Excellence Award 2023 for the Cement Plants involve in Co-processing of Wastes - 13th IconSWM-CE & IPLA Global Forum 2023 - Platinum Award - TSR achieved in 2023.
- ❖ 3rd Edition of National Awards for Cement Industry and Conclave on Sustainability Excellence of Indian Cement and Concrete Industry and its vision of Net Zero'-2024-Dalmiapuram Unit.
- ❖ **5-Star Award for the Mine Operations** at Dalmiapuram.
- ❖ Mines Environment & Mineral Conservation Council & Indian Bureau of Mines Awards-2024:
 - *Non conventional category***
 - ✓ Mineral Conservation- 2nd Prize(KLK)
 - ✓ Waste Dump Management – 3rd Prize(KLK)
 - ✓ Publicity & Propaganda-1st PNR & 3rd (KVK)

- ✓ Mineral beneficiation- 1st (KVK)
- *Conventional category***
- ✓ Overall 2nd PRIZE -PNR Mines
- ✓ Afforestation- 3rd Prize(PTK)
- ✓ Systematic & Scientific Development- 3rd (PNR)
- ✓ Reclamation-3rd (PNR)
- ✓ Sustainable Development -1st (PNR).
- ❖ CII Southern Region 5S Excellence Awards 2024.
- ❖ “National Energy Leader” Award & Excellent Energy Efficient Unit Award” by CII -2024.

1.3 Captive Mines

The limestone requirement of both Cement Plants is being met from Captive Limestone Mines in Ariyalur and Trichy Districts viz. Kallakudi-Kovandakurichi (KLK-KVK) Mines, Periyathirukonam (PTK) Mines and amalgamated Periyannagalur, Aminabad & Khairulabad (PNR Group) Mines (Regional Map as **Plate I**) (**Table 1.2**).

Table : 1.2 DCBL Captive Limestone Mines

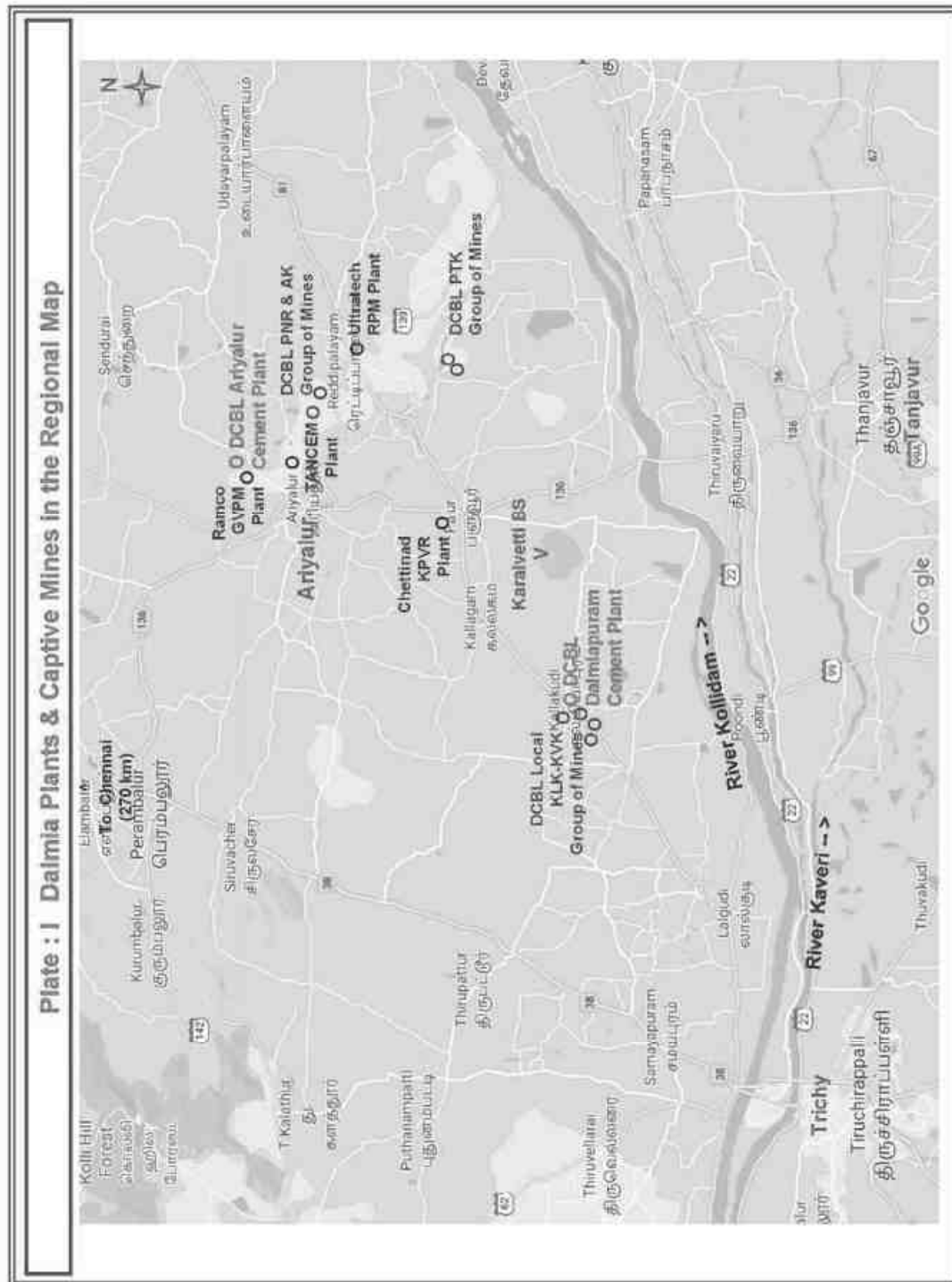
Mine Group	Extent, Ha	Consented Production Capacity, MTPA	Percentage of Supply
Kallakudi & Kovandakurichi – Local Mines Group (5 Leases)	191.265	7.94	45-65%
Periyannagalur, Aminabad & Khairulabad Mines (PNR & AK Group) (3 Leases)	167.605	1.96	15-30%
Periyathirukonam Mines (PTK Group; 2 Leases)	106.070	2.20	20-25%
Total	464.940	12.10	100%

DCBL is having four Mining Leases in PNR Group viz. Periyannagalur Mines and Aminabad & Khairulabad (A&K) Mines as detailed in **Table 1.3**.

Table : 1.3 PNR-A&K Group of Mines

Sl. No.	Name of the Lease	Villages	Extent, Ha	Production, MTPA
1	Periyannagalur ML-1	Periyannagalur & Khairulabad	70.010	0.80
2	Aminabad & Khairulabad ML-1	Aminabad & Khairulabad	95.345	1.10
3	Khairulabad Mine	Khairulabad	2.250	0.06
Total			167.605	1.96

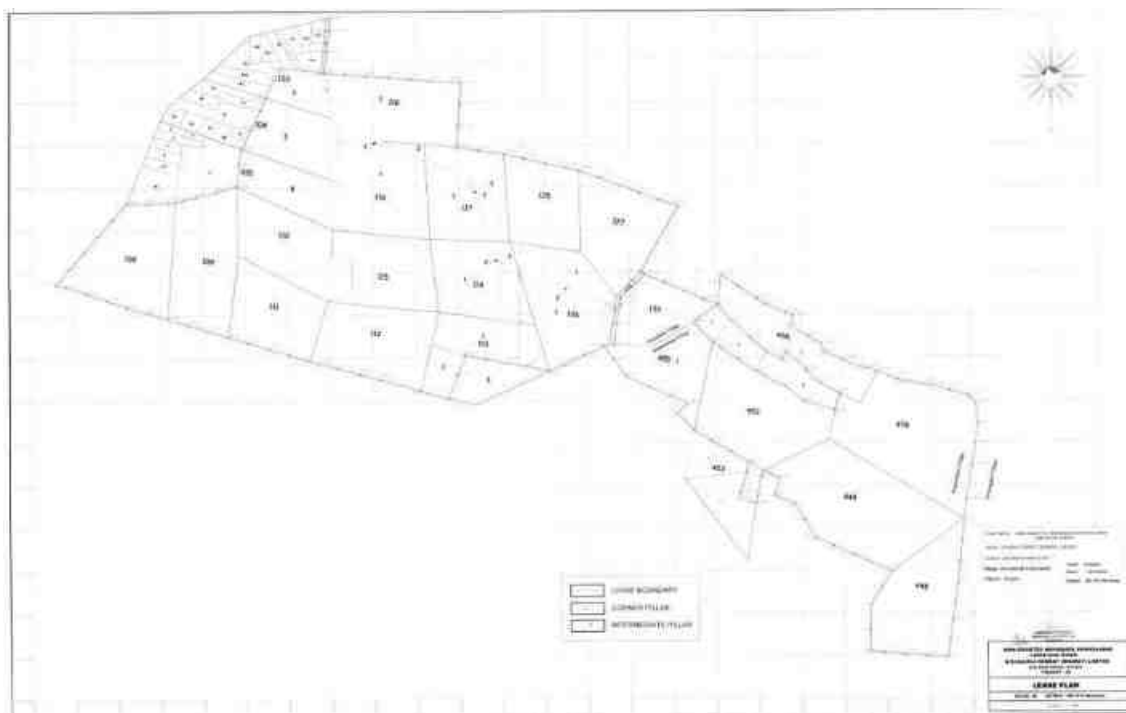
Note : PNR ML-II (15.48 Ha) & AK Mines ML-II Lease (26.940 Ha) are not in operation.



1.4 Aminabad & Khairulabad ML-1 under GO Ms. No. 86

Aminabad & Khairulabad ML-1 was granted to DCBL, over an extent of 95.345 Ha in Aminabad and Khairulabad Villages. The ML area of 95.345 Ha falls under the Government Waste Land. The land extents fall in SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad village and SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad villages.

GO 86 Lease Plan



ML Grant : The Lease was initially granted under GO Ms. No. 874 dated 15.04.1970 for 20 Years from 03.10.1970 to 02.10.1990. First Extension was given under GO No. 2 dated 05.01.1993 for 10 Years from 03.10.1990 to 02.10.2000. Second Extension was given under GO No. 58 dated 16.10.2006 for 20 years from 03.10.2000 to 02.10.2020. The ML Grant has been validated under MMDR Amendment Act 2015 vide **GO Ms. No. 86** dated 20.08.2018 with **validity till 31.03.2030 (Doc-1)**. The Lease is covered in **4 Pits**.

Environmental Clearances : A&K Mines are in operation since Year 1970. The Ministry of Environment and Forests (MoEF) accorded the Environmental Clearance vide its Letter J-11015/398/2005.IA.II(M) dated 13.01.2006 for the production capacity of 0.30 MTPA. EC for Enhancement in Limestone Production Quantity from 0.30 MTPA to 1.10 MTPA over an Extent of 95.345 Ha was accorded vide MoEF Ltr. J-11015/ 104/2009-IA.II(M) dated **09.05.2011 (Doc-2)**.

Copy of Certified Compliance Report (CCCR) for existing EC : The Integrated Regional Office of MoEF&CC, Chennai has issued the Copy of the Certified Compliance Report (CCCR) for existing AK Mines vide its Letter F. No. EP/12.1/2011-12/1/TN/918 dated 26.08.2022 (**Doc-3**). All the conditions of ECs are satisfactorily complied.

Approved Mining Plans/Schemes : The Mining Plans/Schemes approved for the Mine by Indian Bureau of Mines (IBM), Chennai so far are listed in **Table 1.4**. The present Review of Mining Plan (**ROMP**) & Progressive Mine Closure Plan has been approved by IBM, Chennai vide Letter No. TN/ALR/LST/ROMP-1700.MDS dated 15.12.2022 for the Period 2023-24 to **2027-28**.

Table : 1.4 IBM Approved Plans/Schemes – GO 86

Sl. No.	MP/MMP/ROMP	Approval Letter No. & Date	Validity Period
1	Mining Plan	TN/PBR/MP/LST/1170 /SZ dated 20.04.2000	01/04/1999 to 31/03/2003
2	Scheme of Mining	TN/PBR/LST/MS/192/SZ dated 31.12.2003	01/04/2003 to 31/03/2008
3	Scheme of Mining	N/PBR/LST/MS/463/SZ dated 18.03.2008	01/04/2008 to 31/03/2013
4	Scheme of Mining	TN/ALR/LST/MS/799/SZ/957 dated 07.08.2013	01/04/2013 to 31/03/2018
5	Review of Mining Plan (ROMP)	TN/ALR/LST/ROMP-1444.MDS dated 10.11.2017	01/04/2018 to 31/03/2023
6	Review of Mining Plan (ROMP)	TN/ALR/LST/ROMP-1700.MDS dated 15.12.2022	01/04/2023 to 31/03/2028

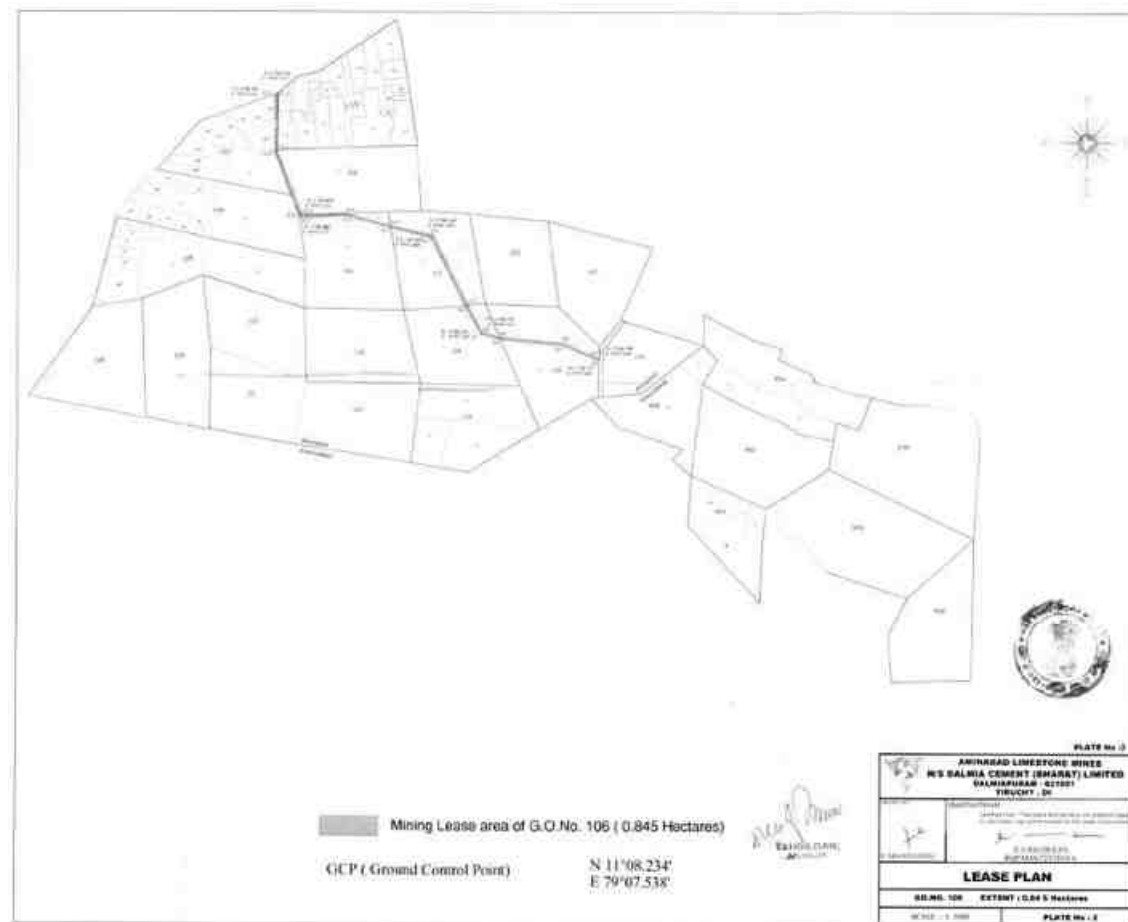
Consents to Operate (RCTOs) : Tamil Nadu Pollution Control Board (TNPCB) has also given its Consents to Operate of A&K Mines. The Consents are periodically renewed by the Board and present CTO Orders 2108136651580 (Water) & 2108236651580 (Air) dated 01.06.2021 for the production quantity of 1.1 MTPA Limestone are valid till 31.03.2026 (**Doc-4**)

Production : This Mining Lease is in operation since 1970 with all statutory approvals by adopting **Opencast Conventional Method of Mining (with Drilling & Blasting)**. The consented production of the Mine now is **1.10 MTPA Limestone**. The recent EC was accorded vide MoEF Ltr. J-11015/ 104/2009-IA.II(M) dated 09.05.2011 and the production from the Mine since then are within the consented quantity of 1.10 MTPA only.

1.5 Aminabad Lease under GO Ms. No. 106

DCBL has also obtained another Lease under MMDR Amendment Act 2015 vide **GO Ms. No.106** dated 12.05.2015 over an extent of **0.845 Ha** in Aminabad village for a period of 50 years from 10.1.2017 to 09.01.2067 (**Doc-5**). GO 106 is a small stretch of Govt. Poramboke Land (width of 7-8 m for a length of 1.2 km-**'Z' Road**) and is lying in-between two blocks of GO 86 Lease. The Lease Plan is appended.

GO 106 Lease Plan



Environmental Clearances : DCBL filed the EC Application to SEIAA vide File No. 23831 dated 08.04.2018. The Proposal was deliberated in 111th SEAC Meeting held on 17.04.2018 & 309th SEIAA Meeting held on 01.06.2018. It was not considered as approved MP was without any production quantity.

Approved Mining Plans/Schemes : The Mining Plans/Schemes approved for the Mine by Indian Bureau of Mines (IBM), Chennai so far are listed in **Table 1.5**. The present Review of Mining Plan (**ROMP**) has been approved by IBM, Chennai vide Letter No. TN/ALR/LST/ROMP-1623.MDS dated 22.12.2020 for the Period 2021-22 to **2025-26**.

Table : 1.5 IBM Approved Plans/Schemes – GO 106

Sl. No.	MP/MMP/ROMP	Approval Letter No. & Date	Validity Period
1	Mining Plan	TN/ALR/MP/LST-2009-MDS dated 15.12.2016	11/01/2017 to 31/03/2021
2	Review of Mining Plan (ROMP)	TN/ALR/LST/ROMP-1623.MDS dated 22.12.2020	01/04/2021 to 31/03/2026

Consents to Operate (RCTOs) : As no EC awarded for the Lease, CTOs were also not obtained.

Production : Nil as on date. The Lease is yet to be commenced.

1.6 Need for Amalgamation

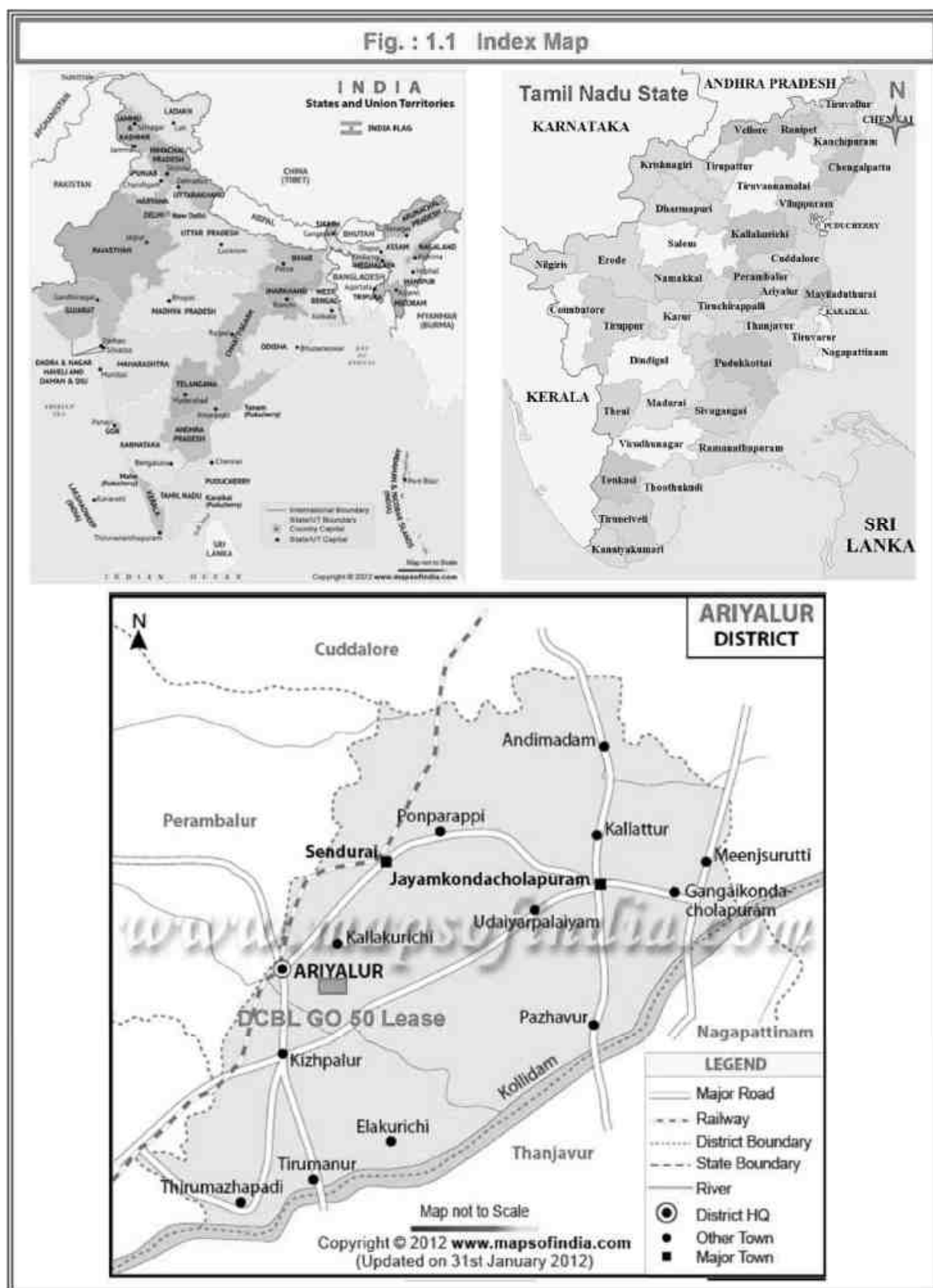
Aminabad & Khairulabad ML-1 granted in 1970 has been validated under MMDR Amendment Act 2015 vide **GO Ms. No. 86** dated 20.08.2018 with **validity till 31.03.2030**. It is one of the Leases in PNR-A&K Group with an extent of 95.345 Ha covered in 4 Pits. This Mining Lease is in operation since 1970 with all statutory approvals by adopting **Opencast Conventional Method of Mining (with Drilling & Blasting)**. The consented production of the Mine now is **1.10 MTPA Limestone**. DCBL has also obtained another Lease under MMDR Amendment Act 2015 vide **GO Ms. No.106** dated 12.05.2015 over an extent of 0.845 Ha in Aminabad village for 50 Years. GO 106 is a small stretch of Govt. Poramboke Land (width of 7-8 m for a length of 1.2 km) and is lying in-between two blocks of GO 86 Lease. The Lease can be operated only in conjunction with GO 86. Accordingly, DCBL has applied for amalgamation of these two Leases on 13.01.2020.

1.7 Amalgamated Aminabad Kairulabad Mining Lease under GO No. 50

The State Government has amalgamated the two Leases (GO Ms. No. 86-95.345 Ha & GO No.106-0.845 Ha) under **GO Ms. No. 50 dated 27.02.2023** for a total extent of **96.190 Ha with validity till 31.03.2030 (Doc-6)**. As per the conditions stipulated, the Environmental Clearance (EC) for the amalgamated Lease has to be submitted before the execution of 'Supplementary Lease Deed'.

The Regional Controller of Mines, Indian Bureau of Mines (IBM), Chennai has approved the Mining Plan for GO Ms. 50 for the Block 2023-24 to 2027-28 vide Letter No. TN/ALR/LST/MP-2098.MDS dated 05.10.2023 which is valid till **31.03.2028 (Doc-7)**. Approved Mining Plan has been submitted to the Authority.

Lease Area : Amalgamated Lease GO 50 over an extent of 96.190 Ha falls in SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu (**Fig. 1.1**).



Lease Area in High Resolution Google Earth Imagery & Photographs are given in **Plates II-III**. Existing infrastructures & developed Green Belt are shown in **Plate IV**. The land details & Land Use are given in **Table 1.6**. VAO Certificates obtained from Aminabad & Kairulabad VAOs are appended. **There is no habitation within 300 m from the Lease boundary.**

Table : 1.6 Land Details

Village	Khasara number	Area (Ha)	Nature of land
Aminabad	103/3	1.115	Kallankuthu land
Aminabad	104/3	2.780	Govt Waste land
Aminabad	105/8	2.310	Govt Waste land
Aminabad	108	4.680	Govt Waste land
Aminabad	109	4.650	Govt Waste land
Aminabad	110	3.670	Govt Waste land
Aminabad	111	3.520	Govt Waste land
Aminabad	112	4.340	Govt Waste land
Aminabad	113/1	2.265	Govt Waste land
Aminabad	113/2	0.800	Govt Waste land
Aminabad	114/1	3.410	Govt Waste land
Aminabad	114/3	0.255	Govt Waste land
Aminabad	115	4.110	Govt Waste land
Aminabad	116/2	0.140	Govt Waste land
Aminabad	116/3	4.365	Govt Waste land
Aminabad	117/1	1.875	Govt Waste land
Aminabad	117/3	1.985	Govt Waste land
Aminabad	118/2	4.560	Govt Waste land
Aminabad	125	3.440	Govt Waste land
Aminabad	126/1	1.665	Govt Waste land
Aminabad	126/3	2.790	Govt Waste land
Aminabad	127	4.055	Govt Waste land
Aminabad	133	2.390	Govt Waste land
Aminabad	103 / 2	0.095	Govt - Poramboke
Aminabad	114 / 2	0.085	Govt - Poramboke
Aminabad	116 / 1	0.160	Govt - Poramboke
Aminabad	117 / 2	0.205	Govt - Poramboke
Aminabad	118 / 1	0.125	Govt - Poramboke
Aminabad	126 / 2	0.175	Govt Waste land
Khairulabad	448	4.33	Govt Waste land
Khairulabad	449	7.165	Govt Waste land
Khairulabad	452	5.285	Govt Waste land
Khairulabad	453/5	0.33	Govt Waste land
Khairulabad	455/2	2.74	Govt Waste land
Khairulabad	456/1	3.18	Govt Waste land
Khairulabad	478	7.145	Govt Waste land
Total Extent		96.19	-

Plate : II Lease Area in Google Earth Imagery



Plate : III Lease Area

Plate : IV Photographs of Lease Area & Green Belt Developed



The salient features of Amalgamated Leases are given in Table 1.7.

Table : 1.7 Amalgamated Lease Details

Sl. No.	Project Detail		AK Mine under GO 86 (95.345 Ha) (Lease-I)	Aminabad Mine under GO 106 (0.845 Ha) (Lease-II)	Amalgamated AK Mine under GO 50 (96.190 Ha)
1	Land	Own Patta	0	0	0
		Govt. Poramboke	95.345	0.845	96.190
		Total	95.345	0.845	96.190
		Village	Aminabad & Khairulabad	Aminabad	Aminabad & Khairulabad
2	Initial Mining Lease Grant		GO Ms. No. 874 dated 15.04.1970 & GO Ms. No. 2 dt. 05.01.1993	GO Ms. No. 106 dated 12.05.2015	GO Ms. No. 50 dated 27.02.2023
3	Lease Deed/ Sup. Lease Deeds Registered on		16.10.1970 02.07.1993 11.10.2019	10.01.2017	To be executed after EC
4	ML Validity under MMDR Amendment Act, 2015		2 nd Extn. 03.10.2000 – 31.03.2030	50 Years 09.01.2067	31.03.2030
5	Environmental Clearance obtained		1. MoEF Ltr. J-11015/398/2005 IA.II(M) dt. 13.01.2006 (0.3 MTPA) 2. MoEF Ltr. J-11015/104/2009-IA.II(M) dt. 09.05.2011 (Expn 0.3 to 1.10 MTPA) over an extent of 95.345 Ha	EC Application to SEIAA No. 23831 dated: 08.04.2018 111 th SEAC Meeting on 17.04.2018 & 309 th SEIAA Meeting on 01.06.2018	Applied now
6	Present Approved Mining Plan/Scheme		IBM Ltr. TN/ALR/LST/ROMP-1700.MDS dt. 15.12.2022 valid till 31.03.2028	IBM Ltr. TN/ALR/LST/ROMP-1623.MDS dt. 22.12.2020 valid till 31.03.2026	IBM Ltr. TN/ALR/LST/MP-2098.MDS dt. 05.10.2023 - valid till 31.03.2028
7	Existing Consent to Operate		2108136651580 (W) & 2108236651580 (A) dated 01.06.2021 Valid till 31.03.2026	Nil	-
8	Consented Quantity		1.1 MTPA	0	1.1 MTPA
9	Reserves & Resources as on 01.04.2023		-	-	-
	1. Proved ('111')		-	-	99,66,108 Tonnes
	2. Prefeasible('221')		-	-	96,53,690 Tonnes
	2. Total		-	-	196,19,798 T
10	Method of Mining		Opencast both Conventional & Non-Conventional Method	Opencast both Conventional & Non-Conventional Method	Opencast both Conventional & Non-Conventional Method

Sl. No.	Project Detail	AK Mine under GO 86 (95.345 Ha) (Lease-I)	Aminabad Mine under GO 106 (0.845 Ha) (Lease-II)	Amalgamated AK Mine under GO 50 (96.190 Ha)
11	Proposed Production	-	-	1.47 MTPA ROM 1.1 MTPA (Clean)
12	No. of Working Days	-	-	330 days & 3 Shifts
13	Mineral Reject Quantity for consumption for Cement Mfg. during this Plan Period	-	-	Dump-1 Qty. : 56,85,998 Tonnes 2023-2028 : 18,33,330 Tonnes Total : 75,19,328 Tonnes
14	Existing Pit Dimensions	Pit-1 : 668x482x23 m Pit-2 : 408x206.6x25 m Pit-3 : 954x380.9x21 m Pit-4 : 124.5x56.5x8 m	0	-
15	Life of the Mine	-	-	9 Years

1.8 The Proposal

The mining operation will be carried out by **both Opencast Conventional Mining with controlled Drilling & Blasting and Non-Conventional Mining Method with Rock Breakers**. Fragmented limestone will be loaded by Hydraulic Excavators into Tippers. The Tippers transport limestone to the Cement Plants at a road distance of 19 km (Ariyalur Plant) and 40 km (Dalmiapuram Plant) respectively. The maximum production during the Plan period will be **1.467 MTPA ROM or 1.10 MTPA Clean Limestone**. The Life of the Mine is 9 years. Conceptual Stage Ultimate Pit depth will be 42 m BGL. As Ground Water-table in the vicinity is ranging between 45-50 m BGL, mining will not intersect the ground water-table.

Mine Profile :

Mineable Reserves	:	9.97 Million Tonnes
Proposed Production	:	1.467 MTPA ROM & 1.10 MTPA Clean
No. of working days/annum	:	330 (3 shifts)
Life of the Mine	:	9 years
Ore:Waste Ratio	:	1:0
Bench height	:	6 m
Bench width	:	8-10 m
Bench slope	:	40-45°
Ultimate Pit Limit	:	42 m (BGL); Top RL 80 m Bottom RL 38 m
Ground Water-table at	:	45 m (Post-Mon)-50 m BGL(Pre-Mon)

Mining will not intersect the ground water-table.

There is **no Rehabilitation & Resettlement** issue due to the Proposal. Also, **there is no litigation/pending case against the Proposal.**

1.9 Environmental Setting

The mine is situated at a distance of about 2.8 km in east from Ariyalur Town. It is accessible by Ariyalur – V Kaikatti SH-139 which runs about 0.9 km in the south. The ML area falls in Topo Sheet No. 58 M/4 and the coordinates are : 11°07'44.75" to 11°08'33.42" N Latitude & 79°06'57.96" to 79°08'09.13" E Longitude (Fig. 1.2). Environmental Setting is given in Table 1.8. There is **no Forest Land involved and no Reserved Forest (RF) exists within 1 km of the Mine. No grazing land exist in the study area.**

There are no eco sensitive areas National Parks, Wildlife Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar Sites, Tiger/Elephant Reserves, etc. (existing as well as proposed) within 10 km from the Mine. Karaivetti Bird Sanctuary is at 17.0 km in SW direction. There is an Archaeological/Fossil Museum at Varanavasi (8.5 km in SW). Recommendation has been obtained from DFO, Ariyalur vide C. No. 3678/2023/D dated 30.08.2023. The following Reserve Forests (RFs) exist in the Study area :

- ❖ Vannankurichi RF (mixed jungle) - 7.3 km in northeast.
- ❖ Managethi RF – 9.1 km (ENE).
- ❖ Vilangudi Extension RF-8.2 km (ESE)
- ❖ Vilangudi RF (Cashew Plantation) – 8.5 km (SE).
- ❖ Sundareswarapuram RF – 9.9 km (ESE).

Kallankurichi Kaliyuga Varadharaja Perumal Temple is at 0.8 km in the north from the Lease. There is no perennial river in the study area. Seasonal River Marudaiyar drains the region which flows southwest to southeast at a distance of 5.4 km from the Lease. Kallar River flows adjacent to the lease (0.06 km in west). Uppu Odai at 3.8 km (ESE), Vilangudi Odai at 4.8 km (E) and Vanchiyam Odai at 7.0 km (WNW).

The nearest village Kallankurichi is at 0.8 km in the north. Periyanaagalur is about 2.3 km in east. Kattupirangiyum (1.2 km in SW), Manakudi (1.1 km in NW) and Kovilankudikadu (2.7 km in NNE) are the other nearby villages. V.Kaikatti Junction is at 4.0 km distance in southeast. Taluk and District Headquarters Ariyalur Town is at a distance of 3.5 km in west.

Trichy-Chidambaram National Highway NH-81 runs at 4.0 km in the southeast, Thanjavur-Ariyalur BP-Athur NH-138 runs at 3.5 km in the west and Kumbakonam-Ariyalur-Sendurai SH-139 runs at a distance of 1.7 km in the south. Southern Railway BG Line connecting Chennai Egmore-Trichy-Kanyakumari runs through Ariyalur at a distance of 5.3 km in the west. The nearest Airport is Trichy at a distance of 58.5 km in the southwest. The nearest Ports are at Karaikkal (82 km in southeast) and Cuddalore (95 km in northeast). State Head Quarters Chennai is at a distance of 220 km in the northeast.



Table : 1.8 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 - 7.3 km (NE). Managethi RF – 9.1 km (ENE). Vilangudi Extension RF-8.2 km (ESE) Vilangudi RF (Cashew) – 8.5 km (SE). Sundareswarapuram RF – 9.9 km (ESE).
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	Nil
4	Inland, coastal, marine or underground waters	Seasonal Kallar River-0.06 km (W) Seasonal River Marudaiyar-5.4 km (S) Uppu Odai - 3.8 km (ESE) Vilangudi Odai - 4.8 km (E) Vanchiyam Odai -7.0 km (WNW)
5	State, National boundaries	Nil
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	Kallankurichi Kaliyuga Varadharaj Perumal Temple is at 0.8 km (N)
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 is at a distance of 3.5 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. (<i>those where existing legal environmental standards are exceeded</i>)	Nil
12	Areas susceptible to natural hazard which could cause the project to present environmental problems	The region falls in Seismic Zone III. Seasonal Kallar River flows at 0.06 km (W).

None of the followings are also located in the Study Area :

- ❖ **Protected areas** notified under the Wild life (Protection) Act, 1972,
- ❖ **Critically polluted area** as notified by the Central Pollution Control Board constituted under Water (Prevention and Control of Pollution) Act, 1974,
- ❖ **Eco -Sensitive areas** as notified,
- ❖ **Interstate boundaries** within 5 km radius from the boundary of the proposed site.
- ❖ Coastal Regulation Zone (**CRZ**) Area.

Other than DCBL Dalmiapuram Plant (40 km away), there are five Cement Plants in the Region viz. Dalmia Cement Ariyalur Plant (4.0 MTPA; 4.9 km in NW), Ramco Cement Govindapuram Plant (5.5 MTPA; 4.2 km in NW), TN State Govt. owned TANCEM Plant near Kallankurichi (1.5 MTPA; 2.2 km in west), UltraTech Plant at Reddippalaiyam (1.2 MTPA; 4.2 km in the southeast) and Chettinad Cement Kilapaluvur Plant (5.5 MTPA; 10.0 km in the southwest). These Cement Plants and others have their Limestone Mines in the Region.

From the Lease Area, Dalmia PNR Mine Pit is at 15 m (East), Ramco PNR-A Pit at 0.8 km (SE) and TANCEM, UltraTech PNR, Khairulabad & Kallankurichi Mines at 0.015-0.8 km are located. Ramco Usenabad Mine is at 1.5 km (WNW). Ramco Kattupirangium, Pudupalayam & Reddipalayam Mines are at 2.9, 4.3 & 7.0 km (in SE) respectively, Ultratech Vellipirangiyum Mine at 6.5 (SE) & Ottakovil Mine at 7.5 km (NNW), ICL Periyathirukonam & Chettinad Periyathirukonam Mines at 7.0 km (SSE) & 9.3 km (SE), Dalmia Periyathirukonam Mines 10.0 km (SSE), etc. along with other Mines in the Study area.

1.10 Project Cost

The Project Cost is Rs.3.00 Crores. About **Rs.6.00 Lakhs** has been allotted as **Corporate Environmental Responsibility (CER) Budget** in compliance with MoEF&CC OM dated 01.05.2018

1.11 EIA Study

The Limestone to be mined out from this Lease is Major Mineral in an extent of <250 Ha and falls in Category 'B' of Sl. No. 1(a) of EIA Notification 2006 (as amended) for prior Environmental Clearance (EC) from the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu. Accordingly, DCBL submitted the TOR Application vide Online Proposal No. SIA/TN/MIN/465337/2024 on 08.03.2024. The Proposal was deliberated by the State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 457th Meeting held on 03.04.2024 (Sl. No. 11) and in SEIAA-TN Meeting held on 03.05.2024. Terms of Reference (TOR) has been awarded vide TOR Identification No. TO24B0000TN5124077N dated 15.05.2024 for preparing Environmental Impact Assessment (EIA) Report with Public Hearing.

Baseline Data (BLD) has been collected during **December 2023-February 2024 (Winter Season)** for the EIA Study in compliance with MoEF&CC Office Memorandum No. J-11013/41/2006-IA-II(I)(Part) dated 29.08.2017. 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 is submitted along with Summary EIA Reports (both in English and Tamil versions) for Public Consultation & 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 dated 29.10.2024). 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.

2.0 Project Description

2.1 Type of the Project

The Limestone to be mined out from this Lease is Major Mineral in an extent of <250 Ha and falls in Category 'B' of Sl. No. 1(a) of EIA Notification 2006 for prior EC from SEIAA-TN. Accordingly, DCBL submitted TOR Application vide Online Proposal No. SIA/TN/MIN/465337/2024 on 08.03.2024. The Proposal was deliberated by SEAC-TN in its 457th Meeting held on 03.04.2024 (Sl. No. 11) and in SEIAA-TN Meeting held on 03.05.2024. TOR has been awarded vide TOR Identification No. TO24B0000TN5124077N dated 15.05.2024 for preparing EIA Report.

2.2 Magnitude of Operation

Mineable Reserves ('111' Category) assed in the Lease is 9.97 Million Tonnes as on 01.04.2023 over an extent of 96.19 Ha. No Top Soil or Over Burden (OB) generation will be there till Conceptual Stage. The mining operation will be carried out by both Opencast Conventional Mining with controlled Drilling & Blasting and Non-Conventional Mining Method with Rock Breakers. Conventional mining operation method will be involving deep hole blasting techniques. Blasting is being done with slurry explosives and ANFO and Non-Electric shock tubes for controlling ground vibration and noise level. Fragmented limestone will be loaded by Hydraulic Excavators into Tippers. No Beneficiation/Screening is required. The Tippers transport limestone to Cement Plants by road - 19 km (Ariyalur Plant) and 40 km (Dalmiapuram Plant).

The production during the Plan period will be 73,33,330 Tonnes @ 14,66,666 TPA ROM (1.467 MTPA ROM) upto a depth of 42 m BGL (**Table 2.1**). The Life of the Mine is 9 years. The Mine Layout/Surface Plan & Geological Plans, Geological Sections, Production Plan sand Conceptual Plan (from approved Mining Plan) are given as **Figs. 2.1-2.6**.

Table : 2.1 Production during Plan Period & Subsequent Periods

Year	Period	Top Soil, Tons	OB, Tons	ROM, Tonnes	Mineral Rejects, T	Clean Limestone, T	ROM:OB Ratio
I	Plan Period:						
1	2023-24	0	0	14,66,666	3,66,666	11,00,000	1:0
2	2024-25	0	0	14,66,666	3,66,666	11,00,000	1:0
3	2025-26	0	0	14,66,666	3,66,666	11,00,000	1:0
4	2026-27	0	0	14,66,666	3,66,666	11,00,000	1:0
5	2027-28	0	0	14,66,666	3,66,666	11,00,000	1:0
	Sub Total	0	0	73,33,330	18,33,330	55,00,000	-
II	Lease Period:						
6	2028-29	0	0	14,66,666	3,66,666	11,00,000	1:0
7	2029-30	0	0	14,66,666	3,66,666	11,00,000	1:0
	Sub Total	0	0	102,66,662	25,66,662	77,00,000	-
III	Residual Period						
8	After 31.03.2030	0	0	-	-	22,66,108	1:0
	Grand Total	0	0	-	-	99,66,108	-

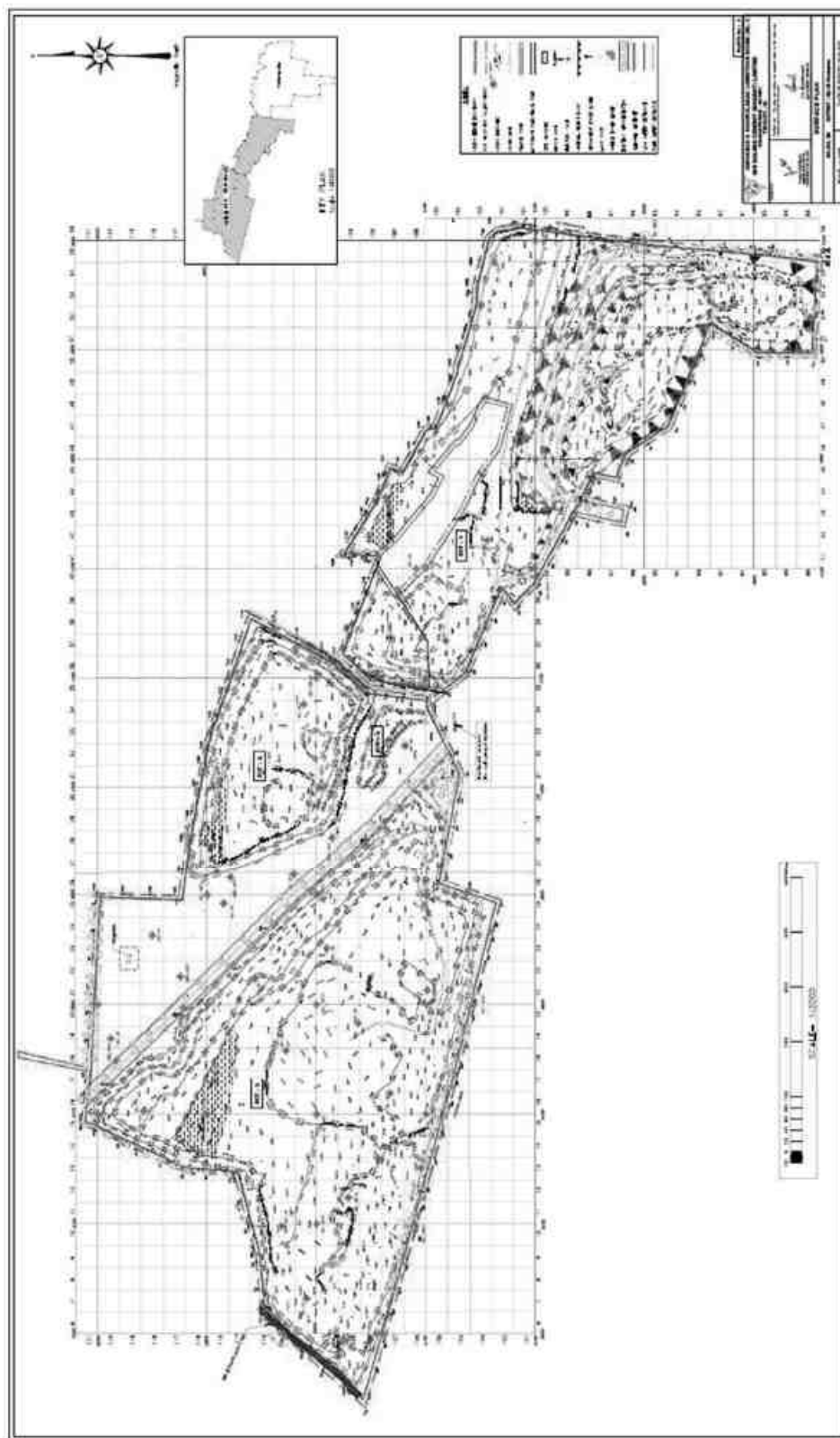
Fig. : 2.1 Surface Plan

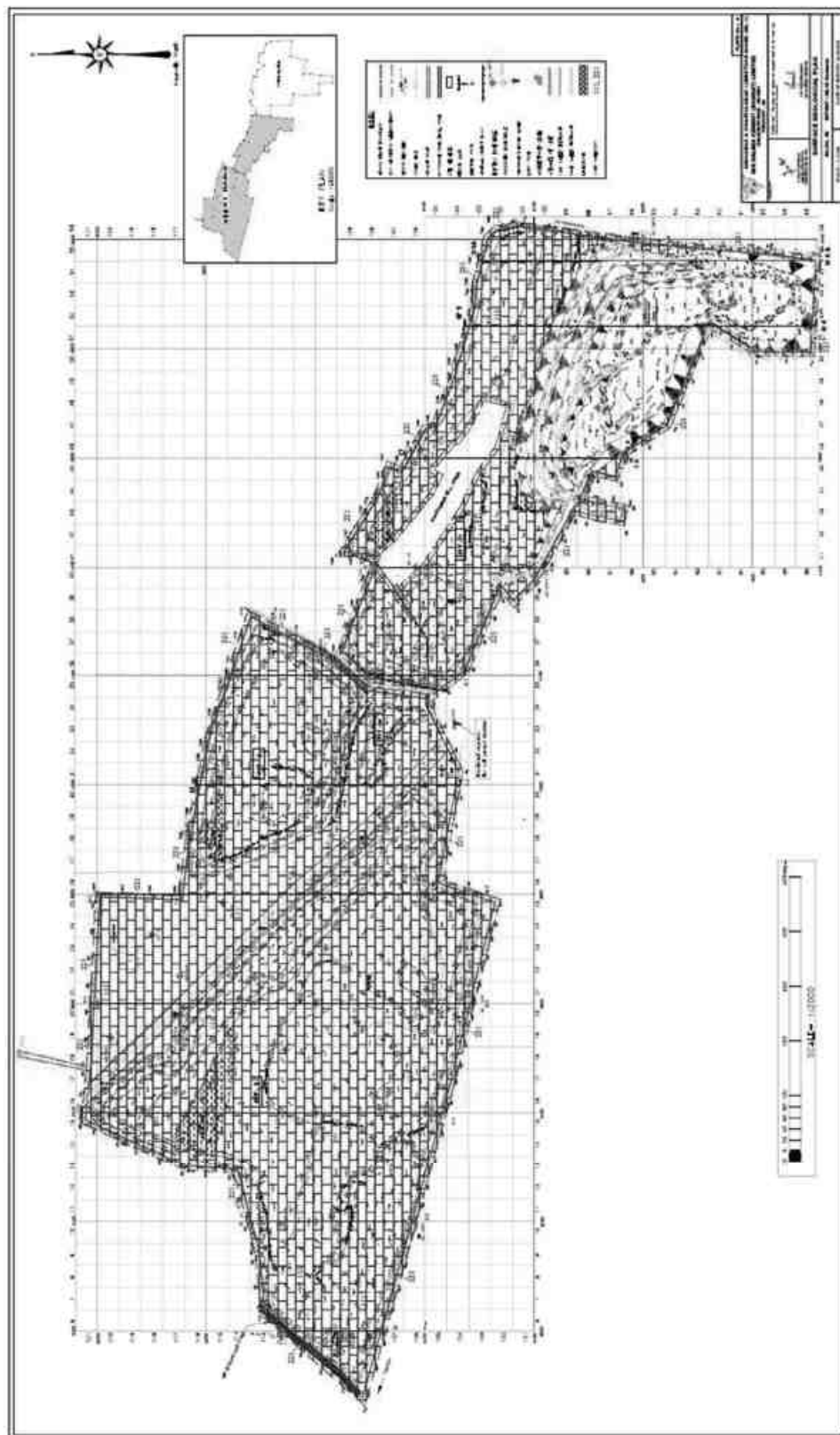
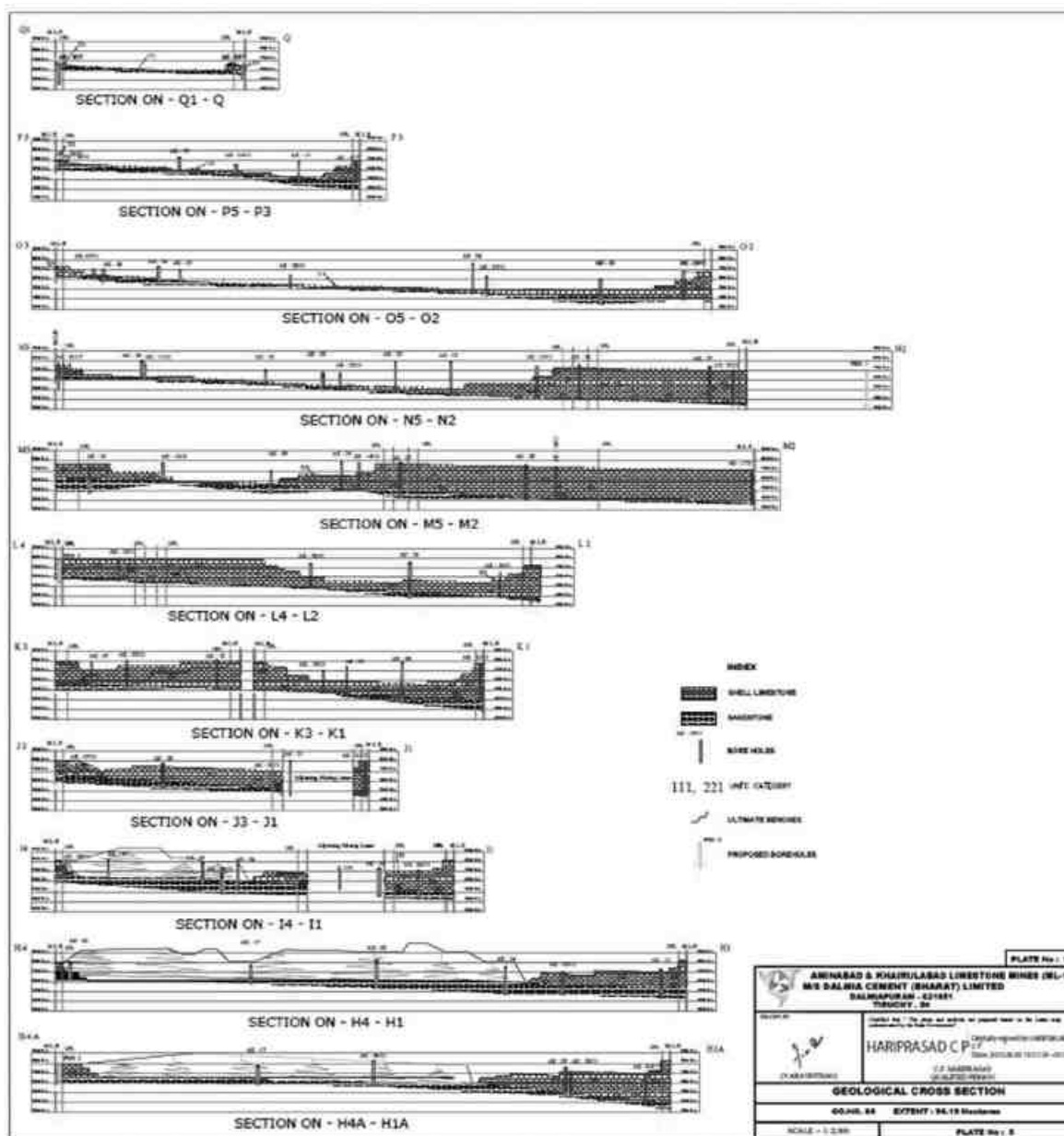
Fig. : 2.2 Geological Plan

Fig. : 2.3 Geological Sections



2.3 Technology & Project Description

2.3.1 Regional Geology

"The limestone deposit in this area is of sedimentary origin and is placed in the middle Ariyalur stage of the Upper Cretaceous formations of the Indian Stratigraphy, which was formed, in Marine Transgressional environment. The rocks in these region form part of the marine sedimentary formation of cretaceous age and referred to Kallankurichi formation of Ariyalur stage. The Kallankurichi formation is overlain by Kallamedu formation and under lained by Sillakkudi formation. A massive rudist bivalve carbonate shell bank underlain by conglomerate bed at the base, is approximately aligned in North- South direction with a maximum thickness of 40 m .The limestone are hard and compact having large Gryphea, Terebratulids, Alectryonia and a host of other brachiopod species were identified. Regional Geology showing the Lithology / age / succession of formation. KANKAR / SUB SOIL Upper Cretaceous NALLAMEDU KALLANKURICHI SILLUKUDI FORMATION TIRUCHIRAPALLI SERIES PARAVAI LIMESTONE MARUVATHUR CLAY Lower Cretaceous KARAI CLAY UPPER GONDWANA Archaean PURE SANDSTONE ".

Regional Geology showing the Lithology / age / succession of Formation

Upper Cretaceous	KANKAR / SUB SOIL NALLAMEDU KALLANKURICHI SILLUKUDI	↑
<u>FORMATION</u>	TIRUCHIRAPALLI SERIES PARAVAI LIMESTONE MARUVATHUR CLAY	
Lower Cretaceous	KARAI CLAY UPPER GONDWANA PURE SANDSTONE	
Archaean		

2.3.2 Local Geology

The deposits of Kallankurichchi Formation could be broadly classified in to five major lithological types viz., basal conglomerate, grypcean limestone, inoceramus limestone, fragmental shell limestone and dolomitic limestone. These five major categories are distinguishable in the field and also in hand specimens by their faunal composition, lithological and bedding characteristics and the nature of bioclasts contained in them. The conglomerates mark the base of Kallankurichchi Formation that could be traced all over the study area. The grypcean limestone contains thick walled gryphea forming about 70% by volume of the deposit.

It appears that the grypheans lived in thick populations . These limestones are divided into lower and upper grypcean limestone deposits. The lower one is pale pink to pink in color, arenaceous and ferruginous in nature and shows a simple gradational contact with the basal conglomerate deposits,

Age and Stage

Upper Cretaceous

Gondwana

Archeans

Rock Type

Kankar / Ordinary Clay

Shell Limestone

Ferruginous Limestone

Conglomerate / Calcareous sand stone

Light Grey sand-sandstone basement



The upper grypcean limestone is yellow in color and contains minor amounts of ferruginous materials, variable amounts of quartz sand and silt. Lithology of Aminabad & Khairulabad consists of Limestone , Ferruginous limestone and Sandstone. Limestone & Ferruginous limestone are lying over the sandstone which is the basement rock. The color of limestone is Yellowish and the chemical composition consists of SiO_2 - 7.12%, Al_2O_3 -3.31%, Fe_2O_3 -3.04% & CaO -47.26%. The color of Ferruginous limestone is Brownish Yellow and the chemical composition consists of SiO_2 - 6.27%, Al_2O_3 --2.04%, Fe_2O_3 -8.57% & CaO -45.70%. They contain local concentrations of bryozoa, exogyra, alectryonia and terebratula. Admixture of finer siliciclastics and shell fragments becomes significant towards top of these deposits. This is the widespread lithological type of this formation and shows hard ground characteristics. The rocks are well-cemented, thick-very thick-bedded showing, parallel and uniform bedding characteristics and a pronounced nondepositional.

The detailed exploration in the adjacent major lease hold of the company has been taken and completed. The mineral reserves and resources related to G1, F1, E1 Axis of United Nations Framework Classification (UNFC) System are assessed by cross sections method.

Mineable Reserves ('111' Category) as on 01.04.2023 is 99,66,108 Tonnes (9.967 Million Tonnes) Limestone and Prefeasibility Mineral Resource (221) is 96,53,690 Tonnes, thus, total Mineral Reserves & Resources 19.62 Million Tonnes (**Table 2.2**).

Table : 2.2 Mineral Reserves and Resources as on 01.04.2023

Sl. No.	Description & UNFC Category	Limestone, Tonnes
1	Proved Mineral Reserves (111)	99,66,108
2	Prefeasibility Mineral Resource (221)	96,53,690
Total Reserves & Resources		196,19,798

2.3.4 Ore Quality

The entire estimated reserves falls within the threshold limit of CaO % as prescribed by Indian Bureau of Mines (CaO +35%) (**Table 2.3**). The entire limestone from this lease area, will be captive use.

Table : 2.3 Limestone Quality (Avg.)

Physical characteristics of Limestone

Hardness	3 to 4 on Moh's Scale
Density	2 Kg/cm ³
Compressive Strength	25 - 35 Mpa
Water Absorption	Less than 1%
Porosity	Low
Weather Impact	Resistant

Chemical characteristics of Limestone

Lime (CaO)	38-47%
Silica (SiO ₂)	7-12%
Alumina (Al ₂ O ₃)	1-4%
MgO	0.5 to 3%
Fe ₂ O ₃	2-9%
Alkalies	1-1.5%
Loss On Ignition (LOI)	30-32%

2.4 Mining Method

The mining operation will be carried out by both Opencast Conventional Mining with controlled Drilling & Blasting and Non-Conventional Mining Method with Rock Breakers. Conventional mining operation method is involving deep hole blasting techniques and deployment of heavy earth moving equipment following systematic benching from top. The mining operations are being carried out by fully mechanized method with the help of Excavators and Tipping Taurus combination. Blasting is being done with slurry explosives and ANFO and Non-Electric shock tubes are used for controlling ground vibration and noise level. **No Top Soil or Over Burden (OB) generation** will be there till Conceptual Stage. **No Beneficiation/Screening** is required.

A system of deep hole blasting with multi row drilling and use of milli second delay detonation system is in practice in the present mining operation of DCBL. The same practice shall be continued in this scheme period also. The broad blasting parameters are given below:

Blasting Parameters :

Blast hole depth	6.6 m
Dia.of Hole	115 mm
Max. No. of Holes in a Round	60
Burden	3.0 m
Spacing	3.5 m
Charging	2.0 kg/hole
Booster	8 %
Bulk loading (ANFO)	92%

The average quantity of material per blast : 4000 Tonnes.

The average Powder factor 6 tons/kg of explosive.

The explosives required for blast 26145 kg/month

There is no secondary blasting in our mines. Rock breakers are used for breaking the boulders.

Life of the Mine is 9 years. Ultimate Pit Depth will be **42 m BGL**.

No Mineral Beneficiation is required as the mined out Limestone will be used for Cement manufacturing in Dalmia Cement Plants.

2.5 Yearwise Development & Production Plan

The yearwise Development & Production programme is given in **Table 2.4**. The Yearwise Plans are given as **Figs. 2.4-2.5**.

Table : 2.4 Yearwise Development & Production Programme – Plan Period

Year	Period	Top Soil, Tons	OB, Tons	ROM, Tonnes	Mineral Rejects, Tons	Clean Limestone, Tonnes	ROM:OB Ratio
I	Plan Period:						
1	2023-24	0	0	14,66,666	3,66,666	11,00,000	1:0
2	2024-25	0	0	14,66,666	3,66,666	11,00,000	1:0
3	2025-26	0	0	14,66,666	3,66,666	11,00,000	1:0
4	2026-27	0	0	14,66,666	3,66,666	11,00,000	1:0
5	2027-28	0	0	14,66,666	3,66,666	11,00,000	1:0
	Total	0	0	73,33,330	18,33,330	55,00,000	-

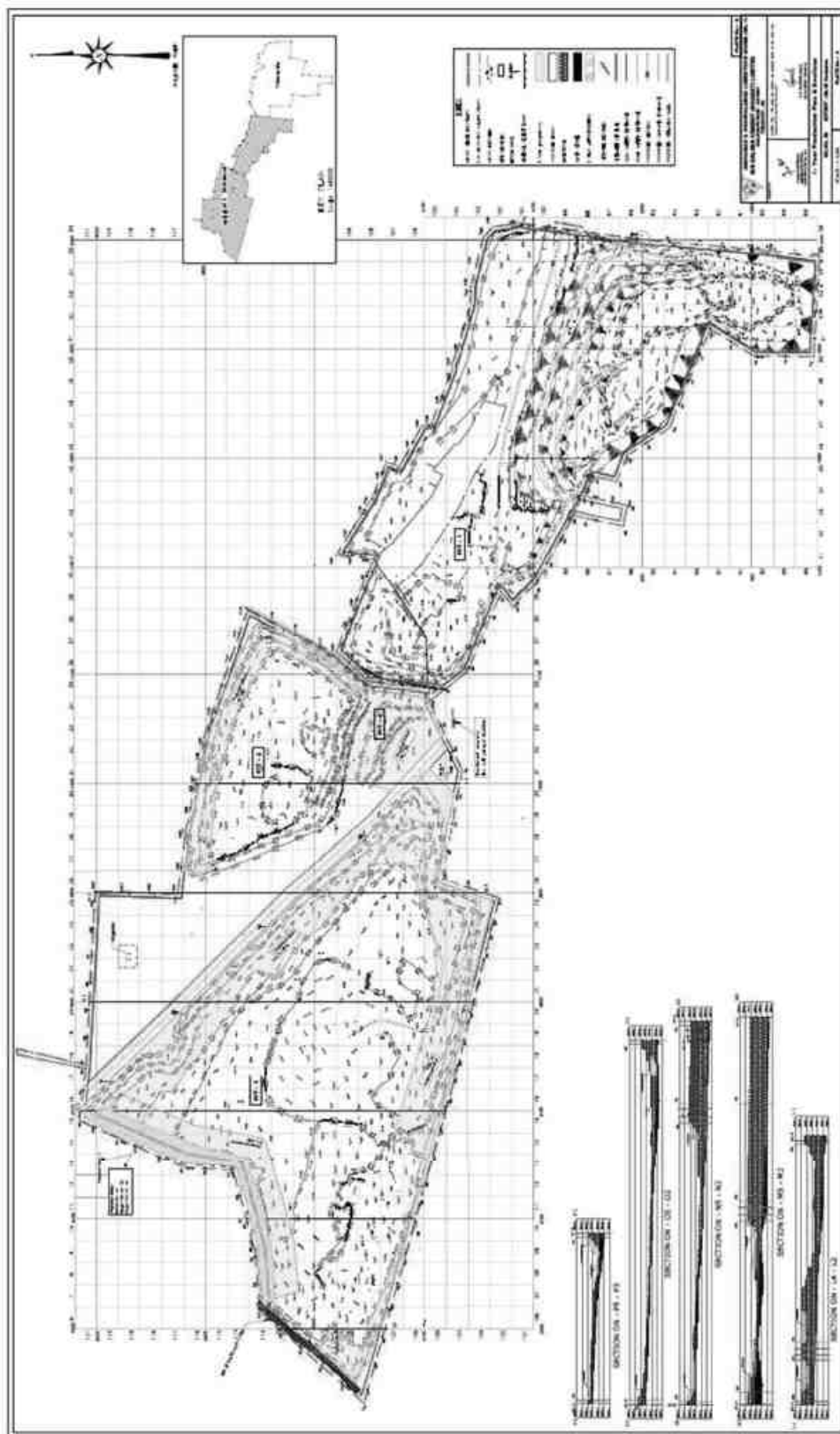
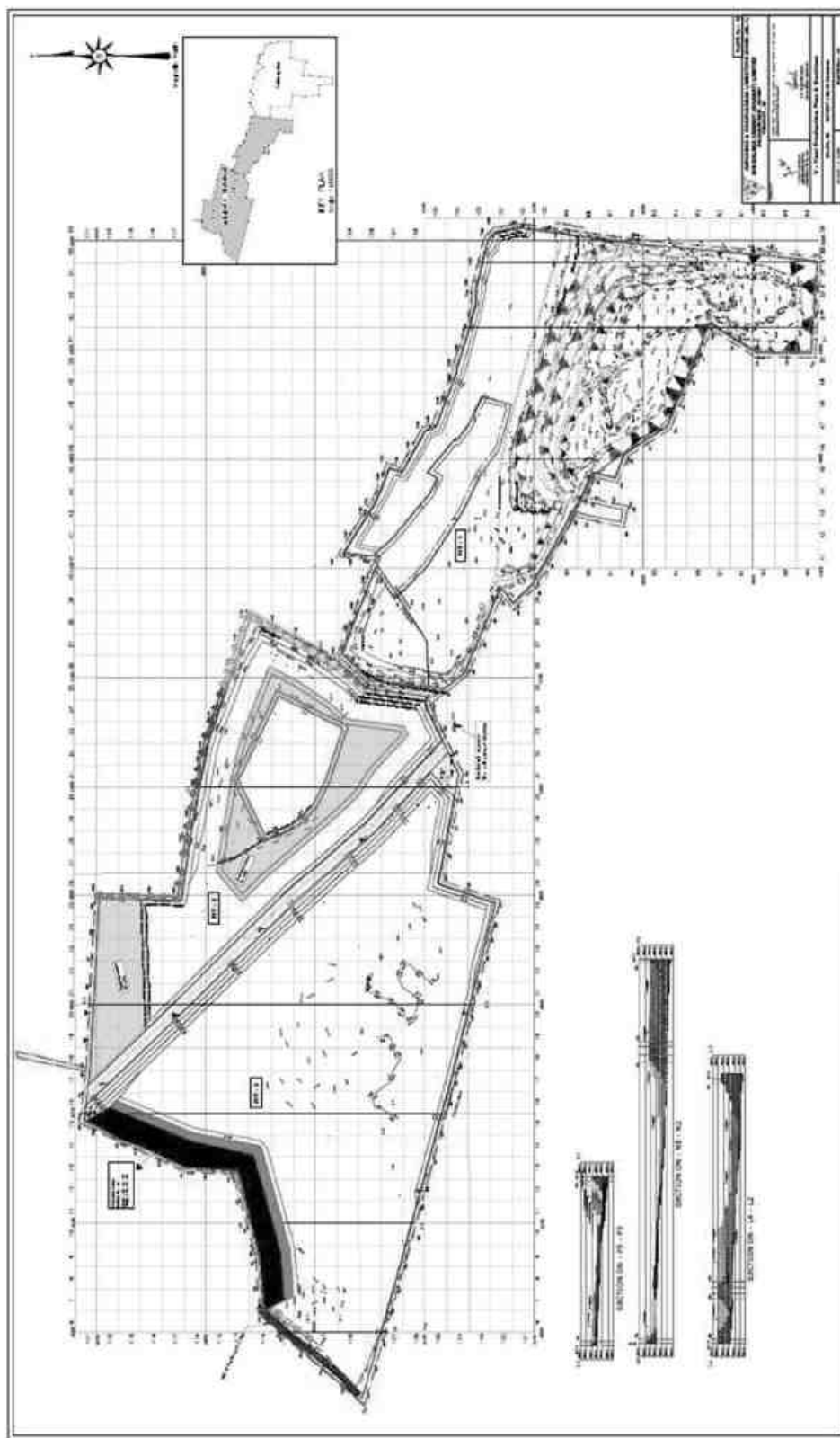
Fig. : 2.4 First Year Production Plan

Fig : 2.5 Fifth Year Production Plan

2.6 Mining Machineries with Justification

The List of Machineries proposed are given in **Table 2.5**. To facilitate the maintenance of all equipments, there is a central workshop available at Factory for electrical, mechanical and instrumentation repairs.

Table : 2.5 Mine Machineries

Sl. No.	Name of Machinery	Capacity	Nos.
1	Hydraulic Excavator of 2.1-2.7 cu.m capacity	Kobelco SK380, L&T Komatsu PC450, L&T Komatsu PC300	3
2	Wheel Loaders-4.0 cu.m capacity & 1.7 cu.m capacity	Caterpillar CAT972H & HM2021	2
3	Dozer-177 HP	Komatsu	1
4	Wagon Drill / Compressor	Atlas Copco – 445 T	1
5	Crawler – 300 T	Ingesoll Rand ICM260	1
6	Tippers – 30 T	Tarus	18
7	Dumpers – 30 T	Tarus	8
8	Portable Lighting Towers-2x5 KVA	Aska, Sigma	2
9	Diesel Water Pump -50 HP	Kirloskar	1

2.7 Competent Mining Personnel

The Mine is being 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 2.6**).

Table : 2.6 Mining Personnel

Sl. No	Post	Qualification/ Experience	Numbers		Category
			Direct	Indirect	
1	Mines Manager	I Class Manager's Certificate of Competency.	1	Nil	Skilled
2	Geologist	Master Degree in Geology	1	Nil	Skilled
3	Asst. Manager cum Mining Engineer	II class Manager Certificate holder	3	Nil	Skilled
4	Foreman	Foreman's Certificate of Competency	3	Nil	Skilled
5	Minemate	Certificate holder	3	Nil	Skilled
6	Blaster	Certificate holder	1	Nil	Skilled
7	HEMM Operators	Having heavy & Light vehicles license holders	42	25	Skilled
8	Workers : Skilled/Semi Skilled	-	22	25	-
Total			76	50	

2.8 Other Facilities

The mine is operated throughout the year. The operation is carried out in **3 shifts**. All the services like site office, drinking water and other necessary amenities is being provided. The requisite services like first aid kit, rest shelter, drinking water and mobile sanitation facilities are being provided at the mining site. **No workshop** will be provided within the lease area and all the machineries are being outsourced. No Stores will be available at mine premises. **No fuel storage** tank is proposed as most of the machineries are being outsourced. Fire tending arrangement is provided at the mines site office, with different types of extinguishers to deal with all kinds of fire electrical, maintenance workshop and HEMM operations. First aid kit in the rest shelter and close to the workings are provided.

2.9 Solid Wastes, Dumps & Dump Mining

There is **no Top Soil** available at the mine as entire Top Soil generated i.e, 144285 cu.m was fully utilised for Green Belt development. Mineral Rejects to the extent of 18,33,333 will be generated and dumped as Dump-2 in the western side of the Lease (**Table 2.7**). The material available in the dump shall judiciously mined out (**Dump Mining**) and blended as per raw mix requirement and Review of Mining Plan modified at appropriate time later.

Table : 2.7 Existing Dump Details

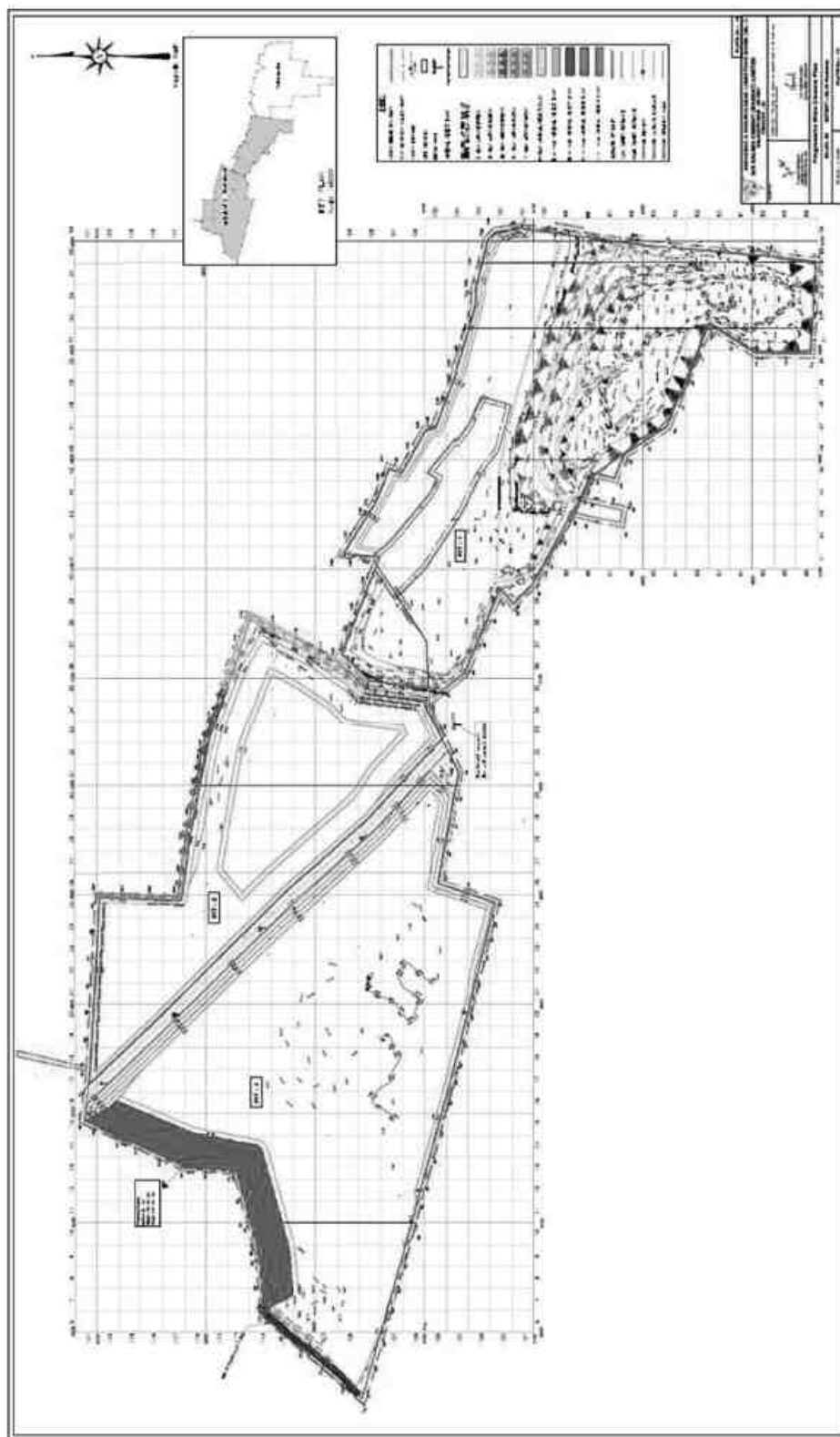
Sl. No.	Dump ID	Dump Material	Height, m	Quantity, cu. m	Location of the Dump
1	Dump-1	Mineral Rejects	24	28,42,999	Southeast
2	Dump-2	Mineral Rejects	10	25,66,662	West
Total				54,09,661	-

2.10 Conceptual Plan & Land Use Pattern

At the Conceptual Stage, about 69.79 Ha will be opened out Pit Area which will be converted as water reservoir, 18.58 Ha will be under OB dump, 1.56 Ha under Utilities, 6.26 Ha under Green Belt (**6.5% Coverage**) - **Table 2.8 & Fig. 2.6**.

Table : 2.8 Proposed Land Use

Activities	Existing Land Use, Ha	At the End of MP Period, Ha	At Conceptual Stage, Ha
Mine Pit Area	62.58	74.14	69.79
Storage for top soil	0	0	0
Reject Dump	14.22	14.22	18.58
Infrastructures : Buildings, etc.	0.44	0.44	1.38
Roads	0.95	0.95	0.18
Green Belt Area	4.28	4.28	6.26
Others to specify-Undisturbed	13.72	2.16	0
Total	96.19	96.19	96.19

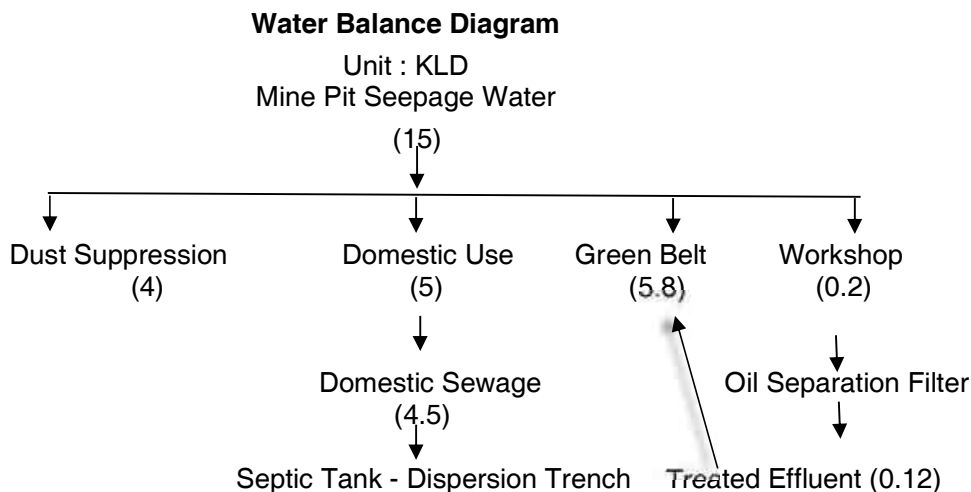
Fig : 2.6 Conceptual Plan

2.11 Power Demand & Source

About 100 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 @ 7,000 Liters/day. There will be no standby DG set.

2.12 Water Demand & Source

The Lease requires about 15 KLD towards domestic consumption (5 KLD), and Dust Control Measures & Green Belt (10 KLD) which is met from mine pit seepage water. As per the State Ground Water Board (SGWB), the area falls in **Safe Category**. Domestic sewage generation will be about 4.5 KLD which will be biologically treated in a Septic Tank followed by a Dispersion Trench. About 0.12 KLD effluent generation from the small Workshop which is treated in a Oil Separation Filter and treated effluent is used for Green Belt. 'Zero Effluent Discharge' will be adopted. The **Water Balance Diagram** is appended.



2.13 Mine Drainage

Ultimate Pit Limit will be 42 m BGL (from Top RL 80 m upto 38.0 m RL). Water table is found at 45 m (Postmonsoon) to 50 m BGL (Premonsoon). Thus, **Mining will not intersect the ground water table**. To pump out excess seepage water from the Pits to Kallar River, a 50 HP Pump will be used. Dewatering will be done @ 50 KLD during summer season and 125 KLD during rainy season.

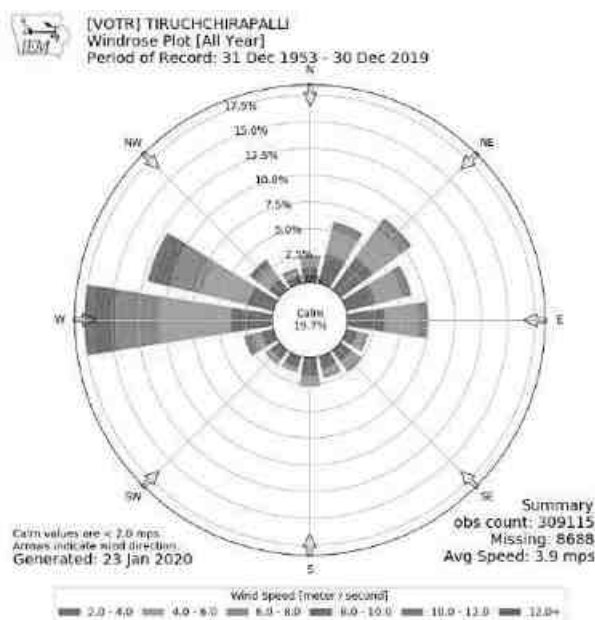
2.14 Green Belt

About 3.78 Ha is under Green Belt (4536 Trees @ 1500 Trees/Ha) of native Species like Neem, Pungan, Teak, etc. with 85-90% Survival Rate. At the end of mine period, 6.26 Ha (6.5% Coverage) will be under Green Belt (9390 Trees @ 1500 Trees/Ha) with 85-90% Survival Rate.

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 for the Period 1953 to 2019 (Source IEM Website) is referred while fixing the Monitoring Stations. The Department of Geology, **Anna University**, Chennai conducted the Hydrogeological Study including a Pumping Test during 10-11.05.2024. Some of the Monitoring Stations are shown in **Plates V-VI**.



Physiography : The minimum and maximum elevation of the study area is 30 m and <120 m aMSL respectively (Fig. 3.2). Mine area has the elevation of **65-80 m aMSL**. 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 nallah/stream crossing** at the Mine. There is no perennial river in the study area. Seasonal River Marudaiyar drains the region which flows southwest to southeast at a distance of 5.4 km from the Lease. Kallar River flows adjacent to the lease (0.06 km in west). Uppu Odai at 3.8 km (ESE), Vilangudi Odai at 4.8 km (E) and Vanchiyam Odai at 7.0 km (WNW). (Fig. 3.3). The overall drainage pattern of the region appears to be dendritic. There are also rainfed irrigation tanks and ponds in the study area.

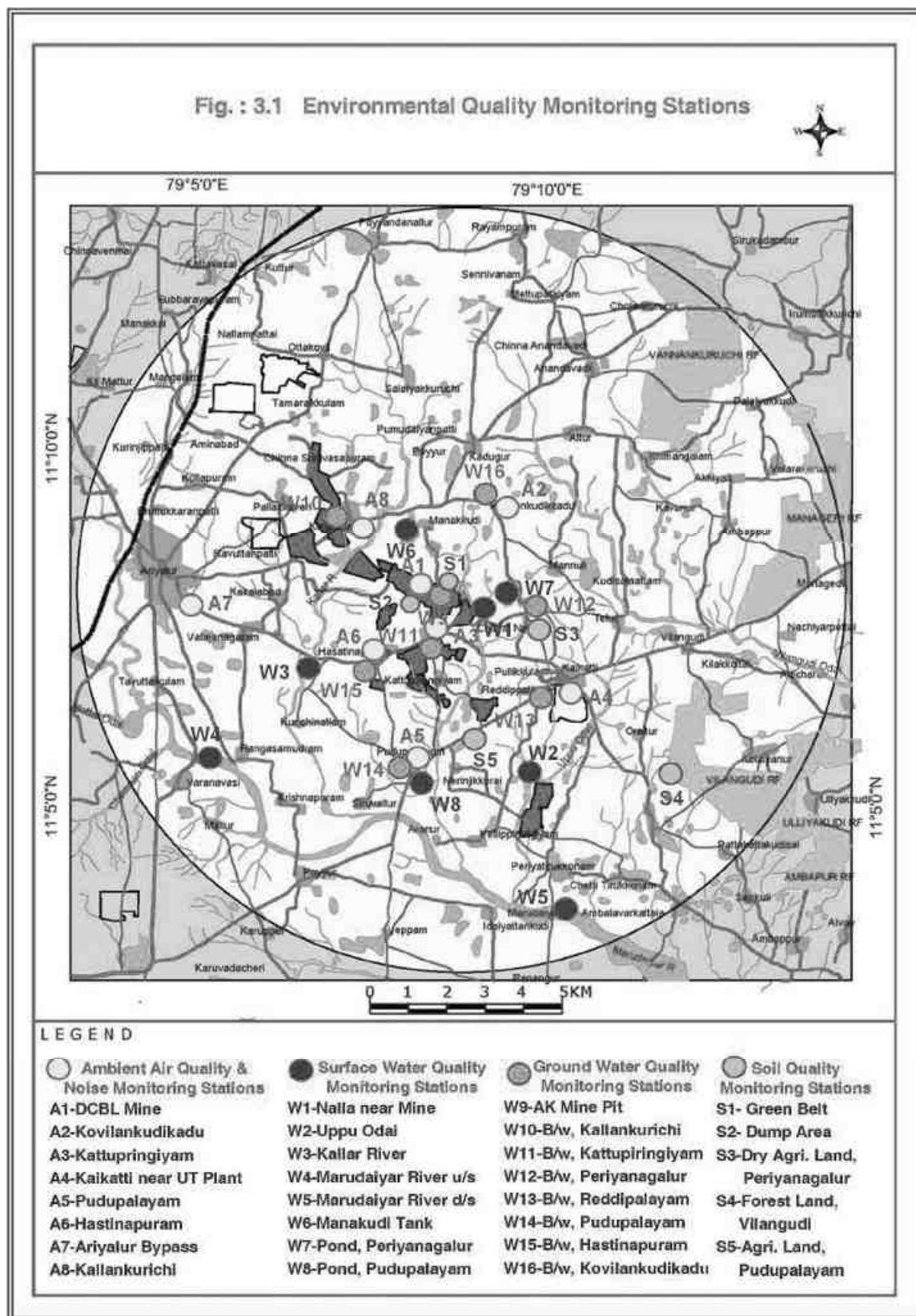


Plate : V EQM Photographs dated 03.12.2023



44FQ+FRW, Ariyalur, Kattupperingiam,
Tamil Nadu 621729, India

Latitude 11.12401666666 Longitude 79.14041833333
6668° 334°

Local 05:17:13 PM Altitude -29.6 meters



5542+862, Kovilankudikkadu, Tamil Nadu 621705, India

Latitude 11.155225° Longitude 79.14793333333334°

Local 09:26:01 AM

Altitude 87 meters



4556+RQ4, Reddipalayam, Tamil Nadu 621704, India

Latitude 11.110196666666665° Longitude 79.16215166666666°

Local 10:12:51 AM

Altitude 67 meters

Local 10:12:51 AM

Altitude 67 meters



North St, Hasthinapuram, Valajanagaram, Tamil Nadu 621729, India

Latitude 11.119358333333333° Longitude 79.12521166666667°

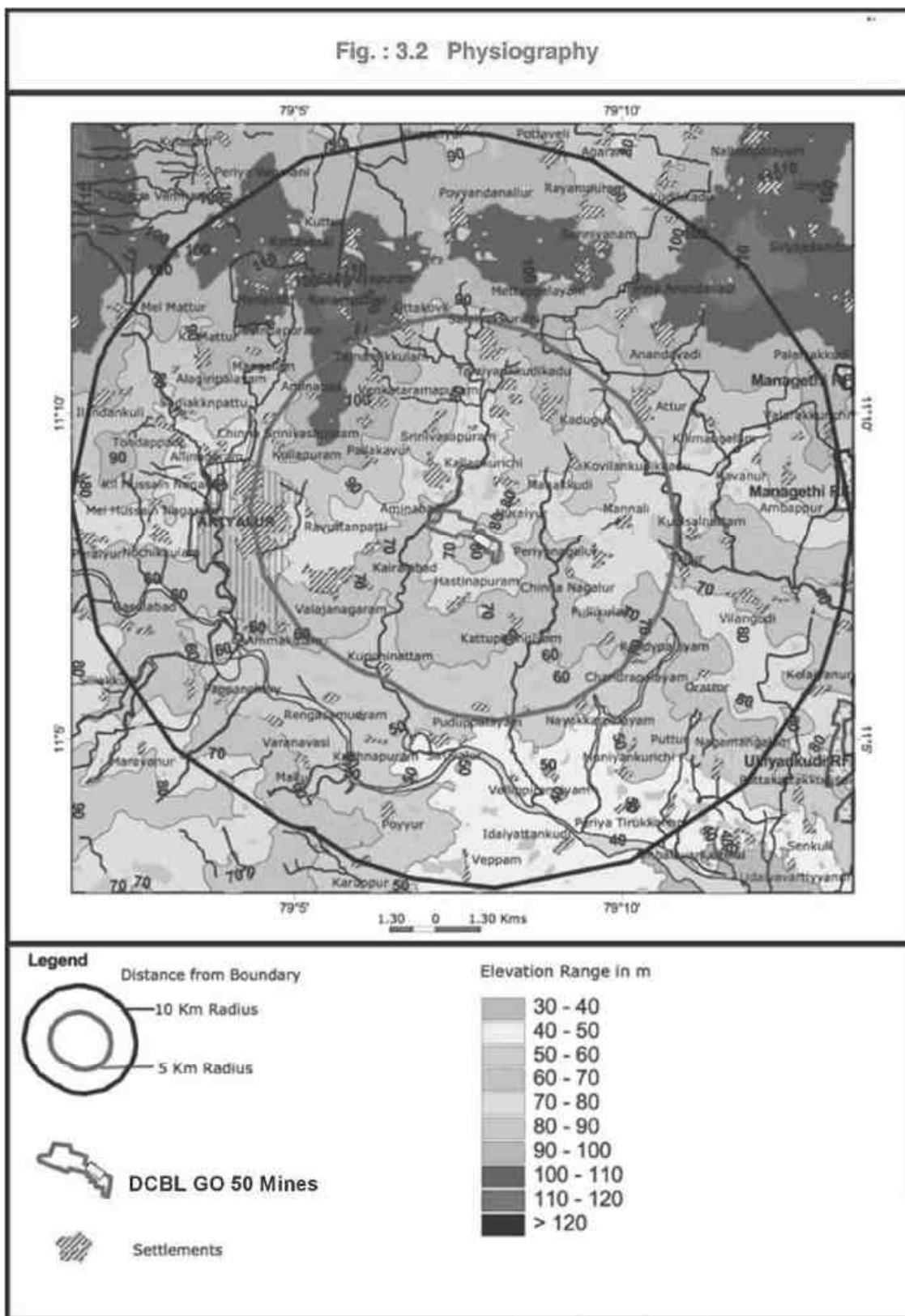
Local 08:54:39 AM

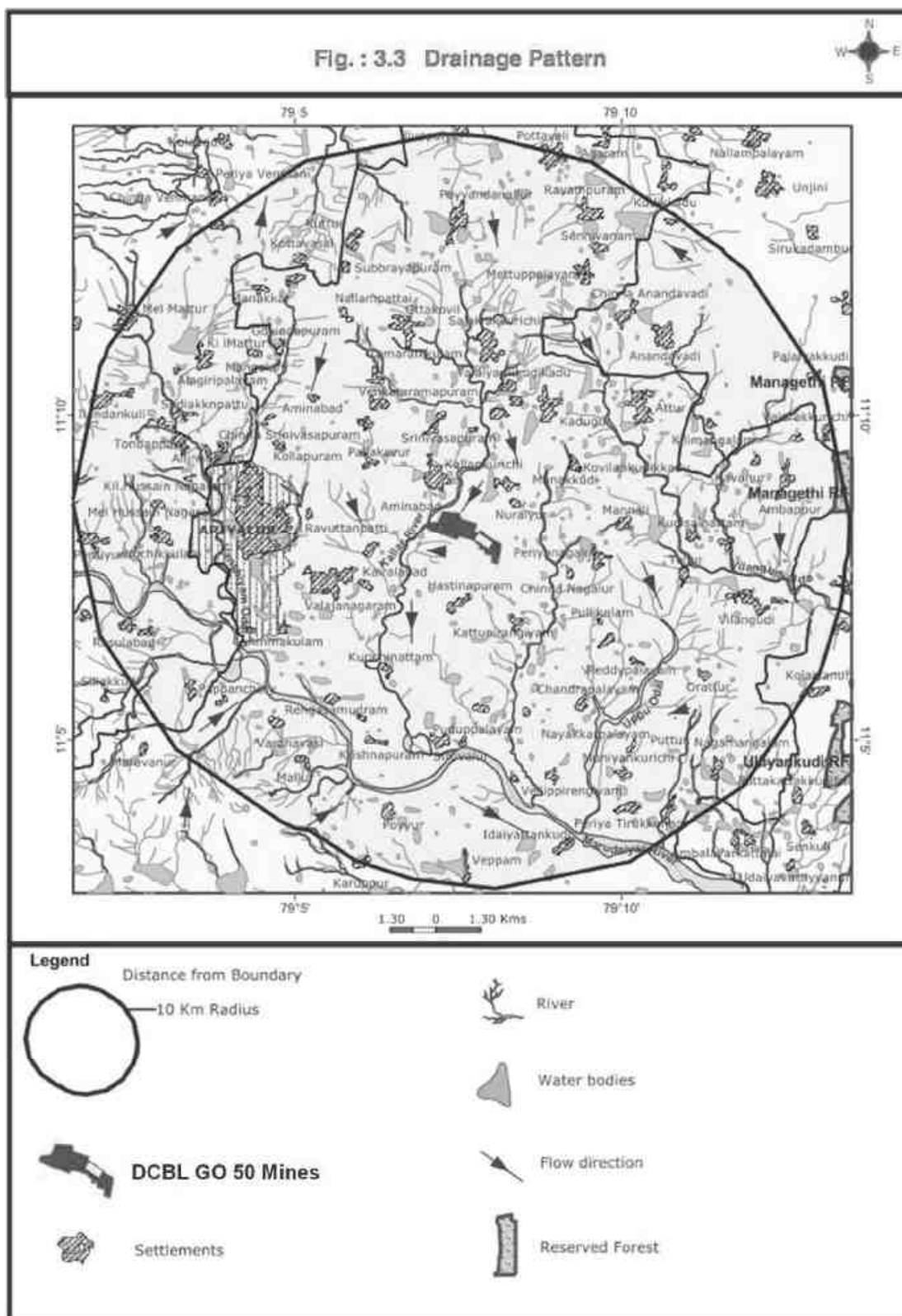
Altitude 74 meters

Plate : VI Anna University Survey – 10-11.05.2024



Fig : 3.2 Physiography





3.2 Environmental Components

Considering the environmental setting of the project, project activities and their interaction, environmental regulations and standards, the Environmental Attributes covered for the EIA Study is given in **Table 3.1**.

Table : 3.1 Baseline Data Collection – Monitoring Locations

Attributes		Sampling		Remarks
		No. of Locations	Frequency	
Air	Meteorological Parameters	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		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, once in the study period for: Total Population / Household Size, Gender Composition, S.C / S.T Population, Literacy Levels, Occupational Structure, etc.

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. 3.4**.

December 2023 : Predominant winds were from NE & NNE directions. Mean Wind velocity was 6.0 kmph. Temperature values were ranging from 21.3 °C to 36.0 °C with mean value of 27.3 °C. Mean maximum relative humidity value was 80.3%. Mean atmospheric pressure value was computed as 759.4 mm of mercury. There were 9 rainy days with total rainfall of 20.4 mm.

January 2024 : Predominant winds were from NE & ENE directions. Mean Wind velocity was 5.2 kmph. Temperature values were ranging from 21.0 °C to 35.0 °C with mean value of 26.8 °C. Mean maximum relative humidity value was 77.4%. Mean atmospheric pressure value was computed as 760.3 mm of mercury. There were 3 rainy days with total rainfall of 12.4 mm.

February 2024 : Predominant winds were from NE & ENE directions. Mean Wind velocity was 6.0 kmph. Temperature values were ranging from 20.1 °C to 38.0 °C with mean value of 28.5 °C. Mean maximum relative humidity value was 70.2%. Mean atmospheric pressure value was computed as 760.4 mm of mercury. There was one rainy day with total rainfall of 0.6 mm in this month.

Winter Season 2023-24 :

- ❖ Predominant winds were from NE directions.
- ❖ Mean Wind velocity was 5.7 kmph.
- ❖ Temperature values were ranging from 20.1 °C to 38.0 °C with mean value of 27.5 °C.
- ❖ Mean maximum relative humidity value was 76.0%.
- ❖ Mean atmospheric pressure value was computed as 760.0 mm of mercury.
- ❖ There were 13 rainy days with total rainfall of 33.4 mm.

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

Table : 3.4 Micrometeorological Data – December 2023

Location : Mine Area

Date	Mean Wind Velocity, kmph	Pred. Wind Direction, ° (from)	Temperature, °C			Relative Humidity (Mean), %	Cloud Cover, oktas	Atm. Pressure (Mean), mm of Hg	Rain-fall, mm
			Min.	Max.	Mean				
01.12.2023	4.1	10.5	24.8	33.0	28.0	80	5	757.9	0
02.12.2023	4.6	348.9	25.0	33.0	28.1	77	7	756.8	0
03.12.2023	4.0	294.1	25.0	31.0	27.8	82	7	756.3	0.2
04.12.2023	7.7	274.3	23.9	34.0	28.9	75	7	755.2	0
05.12.2023	6.2	252.5	24.9	36.0	29.8	76	6	755.6	0
06.12.2023	5.1	191.7	24.9	36.0	29.4	80	5	756.9	4.0
07.12.2023	4.1	103.4	26.0	36.0	29.2	82	4	757.9	0
08.12.2023	4.1	67.9	26.0	34.0	28.9	84	5	758.7	5.0
09.12.2023	5.1	54.2	25.8	33.6	28.5	83	5	759.3	0
10.12.2023	6.2	44.9	24.9	33.0	28.2	80	6	758.8	0
11.12.2023	6.2	42.4	24.8	31.0	27.6	80	5	759.3	0
12.12.2023	6.2	51.1	24.0	32.0	26.8	82	4	758.8	0
13.12.2023	7.2	45.5	23.0	32.0	26.6	77	4	759.3	0
14.12.2023	6.7	29.7	22.5	32.0	26.8	75	4	760.2	0
15.12.2023	7.2	26.0	24.9	29.2	26.5	80	6	760.2	0
16.12.2023	5.1	23.6	22.7	30.0	25.6	89	6	759.6	9.0
17.12.2023	7.2	38.3	24.8	30.1	26.3	88	7	759.0	0.6
18.12.2023	6.2	36.7	24.0	28.0	26.1	85	7	760.2	0
19.12.2023	7.2	34.7	24.8	30.0	26.8	77	7	760.3	0
20.12.2023	6.3	30.6	23.2	29.0	26.2	80	7	760.3	0.2
21.12.2023	5.6	34.9	24.0	29.0	25.5	89	7	760.4	1.0
22.12.2023	4.6	50.3	22.2	31.0	26.3	80	3	760.6	0
23.12.2023	6.2	48.7	22.0	32.0	26.1	73	3	761.3	0
24.12.2023	6.2	38.8	22.2	30.0	25.8	77	6	761.7	0
25.12.2023	6.0	45.9	24.0	33.0	27.4	81	5	760.8	0
26.12.2023	6.2	43.3	21.3	32.0	26.9	77	4	761.4	0
27.12.2023	7.7	42.4	22.6	33.0	27.1	77	4	761.2	0.2
28.12.2023	6.2	42.4	24.0	32.0	27.3	80	6	760.4	0.2
29.12.2023	7.7	44.1	24.0	31.0	27.1	82	6	760.7	0
30.12.2023	6.2	48.4	24.0	31.0	27.1	82	5	760.6	0
31.12.2023	6.2	48.3	23.0	32.0	26.7	78	4	760.2	0
Monthly Abstract	6.0	80.3	21.3	36.0	27.3	80.3	5.4	759.4	20.4

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 – January 2024

Location : Mine Area

Date	Mean Wind Velocity, kmph	Pred. Wind Direction, ° (from)	Temperature, °C			Relative Humidity (Mean), %	Cloud Cover, oktas	Atm. Pressure (Mean), mm of Hg	Rain-fall, mm
			Min.	Max.	Mean				
01.01.2024	5.1	49.3	22.0	32.0	26.6	77	4	760.5	0
02.01.2024	5.7	47.4	23.8	31.1	26.6	78	6	759.9	0
03.01.2024	5.1	57.3	23.0	32.0	26.8	77	5	759.6	0
04.01.2024	5.1	54.9	22.5	30.5	26.8	81	6	759.3	0
05.01.2024	4.6	49.5	24.0	30.0	26.9	82	7	759.4	0
06.01.2024	5.7	41.6	24.8	32.0	27.6	80	6	759.1	0
07.01.2024	5.7	43.5	24.1	30.0	26.8	84	7	759.4	3
08.01.2024	4.1	39.1	23.8	28.0	25.4	92	8	760.1	1
09.01.2024	5.3	39.2	24.6	28.0	26.0	89	7	759.9	8.4
10.01.2024	6.2	35.8	24.0	30.0	26.7	81	7	759.9	0
11.01.2024	6.7	45.2	24.0	31.4	27.0	77	4	760.4	0
12.01.2024	6.2	43.9	23.9	32.0	26.8	76	4	760.4	0
13.01.2024	4.1	48.2	22.0	32.0	26.5	80	4	760.8	0
14.01.2024	4.6	61.5	22.0	32.0	26.4	79	3	760.2	0
15.01.2024	5.1	56.8	21.3	32.0	26.2	77	3	760.0	0
16.01.2024	4.6	67.5	22.0	32.0	26.3	75	3	759.3	0
17.01.2024	3.1	67.9	21.0	33.0	26.0	72	3	758.9	0
18.01.2024	5.1	55.3	22.0	33.0	27.1	78	5	759.1	0
19.01.2024	6.2	66.5	23.8	32.0	26.7	83	6	759.4	0
20.01.2024	4.1	50.5	25.0	31.2	27.6	77	7	760.1	0
21.01.2024	5.1	60.6	24.3	33.3	28.0	76	5	760.2	0
22.01.2024	5.7	63.5	22.0	33.0	27.0	75	2	760.9	0
23.01.2024	4.1	68.8	21.0	32.0	26.4	76	3	761.0	0
24.01.2024	3.3	72.5	21.9	33.0	26.7	73	3	760.5	0
25.01.2024	5.1	75.2	21.8	33.0	26.8	72	3	761.1	0
26.01.2024	6.2	55.0	22.0	33.0	26.9	72	3	762.1	0
27.01.2024	6.2	51.8	22.8	33.0	27.2	70	4	762.3	0
28.01.2024	5.6	52.9	22.9	33.0	27.3	74	4	761.8	0
29.01.2024	6.2	53.0	23.0	31.9	26.7	74	4	761.4	0
30.01.2024	6.7	51.3	22.9	35.0	27.3	70	3	760.8	0
31.01.2024	5.7	58.3	23.0	34.0	28.0	73	3	760.8	0
Monthly Abstract	5.2	54.3	21.0	35.0	26.8	77.4	4.6	760.3	12.4

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 – February 2024

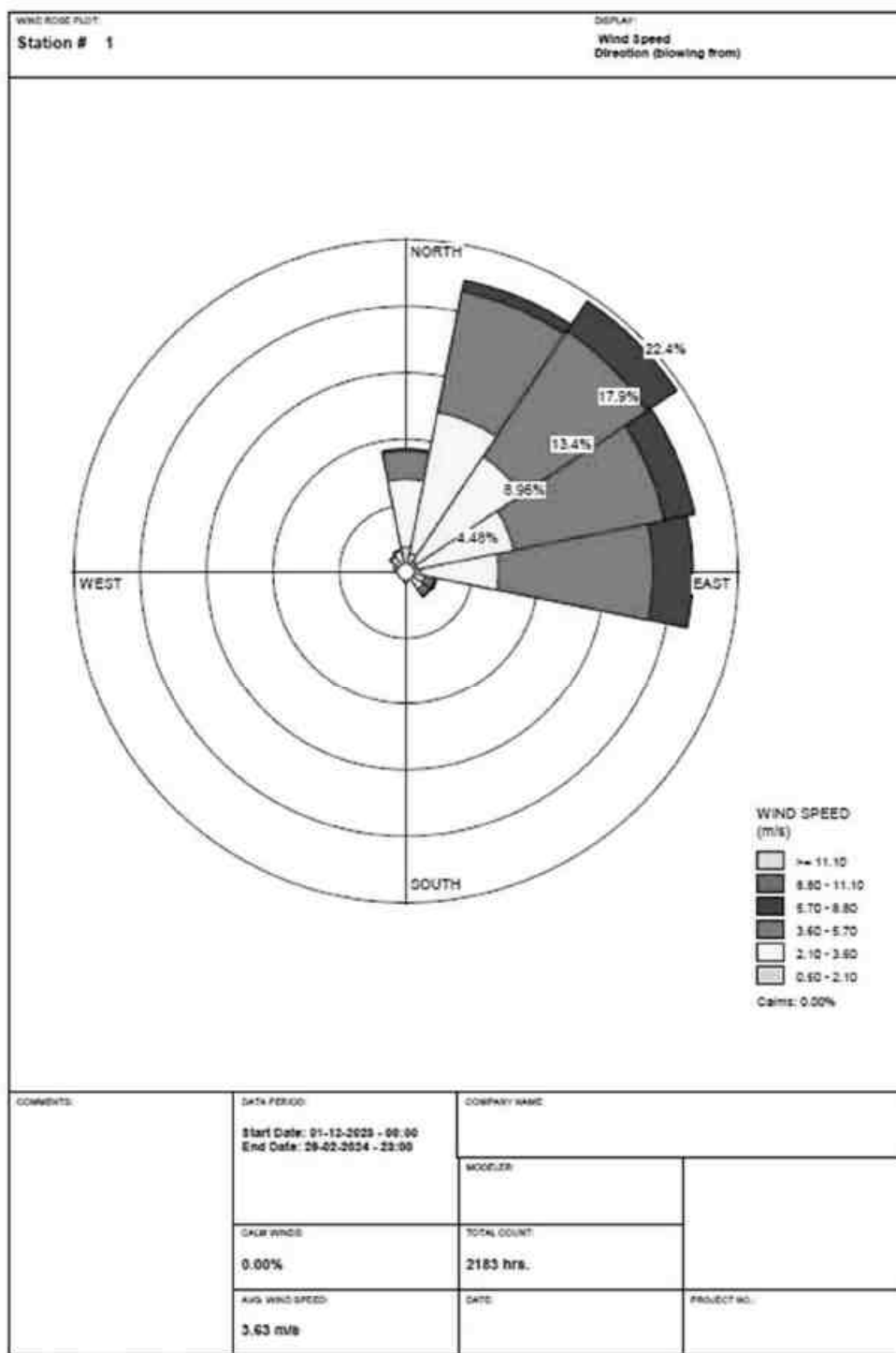
Location : Mine Area

Date	Mean Wind Velocity, kmph	Pred. Wind Direction, ° (from)	Temperature, °C			Relative Humidity (Mean), %	Cloud Cover, oktas	Atm. Pressure (Mean), mm of Hg	Rain-fall, mm
			Min.	Max.	Mean				
01.02.2024	4.1	63.6	25.0	35.0	29.1	76	5	760.8	0
02.02.2024	5.1	73.7	25.0	35.0	29.3	76	4	760.5	0
03.02.2024	5.1	68.8	24.9	34.0	28.6	74	4	760.8	0
04.02.2024	6.2	48.6	23.0	34.0	27.8	73	3	762.1	0
05.02.2024	5.7	53.6	21.1	33.0	27.3	73	3	762.4	0
06.02.2024	5.1	52.7	21.0	33.0	27.1	74	3	761.9	0
07.02.2024	5.1	62.4	21.0	34.0	27.0	72	2	761.6	0
08.02.2024	5.7	62.5	20.3	35.0	27.2	71	4	760.8	0
09.02.2024	5.4	65.4	22.8	34.0	27.8	74	3	761.2	0
10.02.2024	7.4	52.0	23.2	34.0	28.0	73	4	762.2	0
11.02.2024	6.9	54.5	24.0	34.0	27.8	74	3	762.3	0.6
12.02.2024	6.2	49.2	20.1	34.0	27.4	71	3	762.0	0
13.02.2024	7.2	45.7	23.0	34.0	28.0	75	3	761.3	0
14.02.2024	7.5	51.2	25.0	34.5	28.6	72	3	760.9	0
15.02.2024	6.4	53.1	23.3	35.0	28.0	73	3	760.8	0
16.02.2024	5.7	48.6	23.8	34.0	28.2	71	3	761.1	0
17.02.2024	6.4	51.2	24.0	34.4	28.5	71	2	760.2	0
18.02.2024	6.2	66.8	22.0	35.4	28.3	71	3	759.7	0
19.02.2024	5.1	59.7	24.0	35.0	28.9	72	3	759.9	0
20.02.2024	5.1	70.6	23.8	36.0	28.9	70	3	759.9	0
21.02.2024	5.4	89.0	24.0	37.0	29.4	68	3	759.0	0
22.02.2024	5.1	153.9	24.8	37.0	30.3	67	4	758.8	0
23.02.2024	6.1	137.4	25.8	38.0	30.8	68	3	758.3	0
24.02.2024	6.2	115.7	27.0	36.1	30.4	71	4	758.5	0
25.02.2024	6.2	66.5	24.5	35.0	29.0	70	4	758.4	0
26.02.2024	8.2	57.2	24.9	35.0	29.0	71	3	758.9	0
27.02.2024	6.7	54.5	24.9	35.0	28.9	72	3	759.5	0
28.02.2024	6.7	60.4	23.8	36.0	29.2	69	3	758.9	0
29.02.2024	6.7	61.3	24.0	36.0	29.0	66	3	759.2	0
Monthly Abstract	6.0	67.2	20.1	38.0	28.5	71.7	3.2	760.4	0.6

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

Period : Dec. 2023-Feb. 2024
(Winter Season)



3.5 Ambient Air Quality

3.5.1 Monitoring Locations

AAQ Monitoring Stations were selected based on **Upwind & Downwind directions** for the Season (Table 3.7) and covering 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**. Abstract of those monitored data is given as **Table 3.16** and ambient air quality status in **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-AK Mine Office	11°08'07.6"	79°07'35.9"	-	-	Core zone
2	A2-Kovilankudikadu	11°09'10.6"	79°09'13.1"	NE	2.2	Upwind
3	A3-Kattupirangiyam	11°07'25.1"	79°08'22.4"	SW	0.9	Downwind
4	A4- Kaikatti near UT Cement Plant	11°06'28.3"	79°10'29.2"	SE	4.0	Crosswind
5	A5-Pudupalayam	11°05'28.8"	79°08'05.3"	SSW	4.7	Downwind
6	A6-Hastinapuram	11°07'10.4"	79°07'43.6"	SW	2.3	Downwind
7	A7-Ariyalur Bypass	11°07'40.7"	79°05'03.8"	WSW	6.7	Downwind
8	A8-Kallankurichi	11°08'52.8"	79°07'13.6"	NW	3.0	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 10-46 microgram/cu.m (**ug/m³**) in the Study Area with **mean value of 25.1 ug/m³** against NAAQ Norm value of **60 ug/m³** (24 hours Time Weighted).

PM₁₀ values were monitored in the range between 20-74 ug/m³ with **mean value of 44.6 ug/m³** against NAAQ Norm value of **100 ug/m³** (24 hours Time Weighted).

SO₂ values were monitored in the range between 6-22 ug/m³ with **mean value of 10.9 ug/m³** against NAAQ limit value of **80 ug/m³** (24 hours Time Weighted).

NO_x values were monitored in the range between 6-26 ug/m³ with **mean value of 13.3 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 <10-38.4 ug/m³ with **mean value of 23.7 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	25.1	60	0.42	Low
PM10, ug/m ³	44.6	100	0.45	Moderate
SO ₂ , ug/m ³	10.9	80	0.14	Low
NO ₂ , ug/m ³	13.3	80	0.17	Low

Recent **TNPCB Survey Report** is appended.

Table : 3.8 Ambient Air Quality Data at A1- AK Mine Office

Season : Winter 2023-24

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	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	18	35	12	16	<5	16.3	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	23	42	9	11	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	27	51	10	13	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	22	40	10	12	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	20	37	9	11	<5	20.1	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	22	40	12	15	<5	16.8	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	26	48	11	14	<5	14.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	20	37	10	13	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	25	46	11	15	<5	12.8	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	23	41	10	12	<5	15.7	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	27	52	12	14	<5	13.8	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	24	45	14	18	<5	11.8	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	30	55	10	12	<5	10.7	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	24	44	12	16	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	33	57	11	14	<5	14.2	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	28	51	10	13	<5	15.7	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	24	43	13	17	<5	16.3	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	22	41	10	14	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	28	54	11	13	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	25	47	10	12	<5	13.8	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	21	44	10	13	<5	12.4	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	26	48	9	12	<5	16.1	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	32	57	11	14	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	28	51	10	12	<5	17.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		18-33	35-57	9-14	11-18	<5	<10-20.1	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		24.9	46.1	10.7	13.6	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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-Kovilankudikadu

Season : Winter 2023-24

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	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	10	21	6	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	12	22	9	11	<5	12.4	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	14	25	7	8	<5	11.6	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	11	20	8	10	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	13	23	8	9	<5	11.7	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	12	25	6	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	17	30	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	15	27	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	17	32	7	7	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	12	23	8	8	<5	17.3	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	15	28	7	8	<5	15.6	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	15	34	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	12	21	8	10	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	13	24	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	14	25	8	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	12	22	7	9	<5	14.5	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	12	28	6	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	10	20	7	8	<5	21.2	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	12	23	8	10	<5	15.7	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	15	31	7	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	12	20	7	7	<5	11.4	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	15	23	7	9	<5	15.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	11	21	6	6	<5	13.7	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	13	24	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		10-17	20-34	6-9	6-11	<5	<10-21.2	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		13.1	24.7	7.3	8.3	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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-Kattupirangiyam (on SH-139)

Season : Winter 2023-24

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	NOx	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	16	34	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	23	38	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	20	36	10	12	<5	13.8	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	25	41	9	10	<5	17.2	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	24	37	9	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	18	38	9	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	22	40	11	15	<5	26.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	24	44	9	12	<5	25.2	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	15	31	7	8	<5	24.1	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	22	45	10	12	<5	25.3	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	26	49	8	10	<5	23.7	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	19	40	7	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	27	49	9	10	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	31	52	11	13	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	28	43	8	10	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	33	54	10	13	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	17	38	8	9	<5	13.6	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	27	50	10	14	<5	11.2	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	30	52	8	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	19	42	7	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	26	47	13	15	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	27	50	10	13	<5	21.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	32	53	9	11	<5	20.7	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	26	45	11	13	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		15-33	31-54	7-13	8-15	<5	<10-27.9	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		24.0	43.7	9.1	11.2	<5	20.8	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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; **NOx**-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 : Winter 2023-24

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	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	26	50	11	13	<5	28.0	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	19	40	9	11	<5	29.6	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	30	55	11	14	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	28	51	12	14	<5	33.5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	34	57	14	16	<5	30.3	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	21	44	9	11	<5	32.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	30	52	9	11	<5	31.8	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	26	44	11	12	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	22	45	9	12	<5	29.3	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	30	53	11	15	<5	21.4	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	25	47	9	11	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	25	48	10	13	<5	21.7	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	28	50	14	18	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	31	53	11	14	<5	25.1	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	34	58	10	12	<5	28.3	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	27	51	9	11	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	23	48	9	13	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	26	45	10	12	<5	19.0	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	28	48	14	18	<5	23.6	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	27	51	10	13	<5	27.1	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	32	57	10	13	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	24	41	10	12	<5	25.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	35	58	12	15	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	30	54	13	15	<5	30.1	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		19-35	40-58	9-14	11-18	<5	18.2-33.5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		27.5	50.0	10.7	13.3	<5	25.6	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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 : Winter 2023-24

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	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	36	64	11	14	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	21	43	9	13	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	29	53	12	14	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	33	61	13	15	<5	28.8	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	25	52	16	18	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	23	48	10	13	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	28	52	15	18	<5	33.8	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	31	55	14	17	<5	34.0	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	25	57	11	13	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	37	63	11	15	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	41	68	13	18	<5	20.9	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	28	52	12	15	<5	28.1	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	31	57	12	15	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	27	51	14	18	<5	24.2	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	34	63	11	14	<5	21.37	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	32	57	12	16	<5	22.4	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	27	55	12	15	<5	20.65	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	35	62	12	15	<5	25.1	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	31	57	10	13	<5	27.2	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	29	59	12	16	<5	22.6	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	35	66	16	20	<5	20.7	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	33	58	13	15	<5	28.5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	42	71	12	14	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	34	61	10	13	<5	24.6	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		21-42	43-71	9-16	13-20	<5	20.4-28.5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		31.1	57.7	12.2	15.3	<5	30.9	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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 : Winter 2023-24

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	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	26	45	11	12	<5	23.5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	18	38	9	11	<5	29.4	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	27	45	12	14	<5	21.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	31	48	14	18	<5	27.8	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	35	60	14	16	<5	32.5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	30	54	13	15	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	21	43	8	11	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	25	43	13	15	<5	28.2	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	22	46	9	11	<5	25.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	24	40	12	13	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	31	44	15	18	<5	22.1	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	25	42	14	15	<5	28.9	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	20	37	9	11	<5	32.2	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	24	40	12	15	<5	30.7	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	27	43	14	18	<5	27.6	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	31	45	13	16	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	26	44	9	12	<5	28.1	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	34	59	13	16	<5	25.9	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	32	47	12	15	<5	30.2	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	27	45	14	18	<5	32.3	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	23	44	9	11	<5	34.7	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	25	38	15	18	<5	30.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	20	36	14	16	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	22	39	12	15	<5	25.3	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		18-35	36-60	8-15	11-18	<5	21.2-34.7	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		26.1	44.4	12.1	14.6	<5	28.6	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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 : Winter 2023-24

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	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	36	60	21	24	<5	38.4	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	32	55	18	21	<5	30.1	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	34	58	19	23	<5	32.5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	33	53	17	20	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	37	62	18	23	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	46	74	15	18	<5	32.0	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	41	70	18	22	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	38	67	14	18	<5	29.1	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	40	71	16	20	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	35	64	18	23	<5	29.5	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	37	68	21	24	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	43	72	22	26	<5	33.4	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	36	65	17	19	<5	30.8	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	39	68	18	23	<5	36.1	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	25	48	11	14	<5	29.1	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	41	64	14	19	<5	27.2	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	38	61	16	21	<5	29.0	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	36	55	18	23	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	22	45	11	13	<5	32.0	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	34	55	14	17	<5	30.5	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	39	59	16	20	<5	28.9	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	27	56	12	15	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	40	63	13	17	<5	31.7	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	37	57	15	19	<5	33.5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		22-46	45-74	11-22	13-26	<5	27.2-38.4	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		36.1	61.3	16.3	20.1	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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 : Winter 2023-24

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	NH ₃	O ₃ (8-hly.)	CO (8-hly.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2023	06:00-06:00	12	26	7	7	<5	18.7	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2023	06:00-06:00	18	31	12	15	<5	17.3	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2023	06:00-06:00	15	27	12	14	<5	15.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.12.2023	06:00-06:00	13	22	10	12	<5	18.6	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2023	06:00-06:00	16	28	10	13	<5	20.6	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.12.2023	06:00-06:00	14	30	7	9	<5	11.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2023	06:00-06:00	15	27	9	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2023	06:00-06:00	12	22	11	13	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
01-02.01.2024	06:00-06:00	20	39	7	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.01.2024	06:00-06:00	18	30	13	15	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
14-15.01.2024	06:00-06:00	22	36	11	12	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
15-16.01.2024	06:00-06:00	23	44	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.01.2024	06:00-06:00	24	41	10	12	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.01.2024	06:00-06:00	20	38	14	16	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1
29-30.01.2024	06:00-06:00	23	37	11	13	<5	11.6	<1000	<0.1	<1	<1	<0.01	<0.1
30-31.01.2024	06:00-06:00	21	34	10	12	<5	15.9	<1000	<0.1	<1	<1	<0.01	<0.1
05-06.02.2024	06:00-06:00	19	37	7	8	<5	10.5	<1000	<0.1	<1	<1	<0.01	<0.1
06-07.02.2024	06:00-06:00	28	45	11	13	<5	17.1	<1000	<0.1	<1	<1	<0.01	<0.1
16-17.02.2024	06:00-06:00	32	48	12	14	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.02.2024	06:00-06:00	21	41	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22.02.2024	06:00-06:00	23	38	13	15	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
22-23.02.2024	06:00-06:00	20	33	10	12	<5	18.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2024	06:00-06:00	22	35	12	14	<5	10.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.02.2024	06:00-06:00	27	42	11	13	<5	11.5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		12-32	22-48	7-14	7-16	<5	<10-20.6	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		19.9	34.6	10.3	12.1	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		60 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 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	NOx	PM2.5	PM10	SO ₂	NOx
		A1- AK Mine Office				A2-Kovilankudikadu			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	18	35	9	11	10	20	6	6
3	10 th Percentile Value	20	38	9	12	11	20	6	7
4	20 th Percentile Value	22	41	10	12	12	21	7	7
5	30 th Percentile Value	23	42	10	12	12	22	7	8
6	40 th Percentile Value	24	44	10	13	12	23	7	8
7	50 th Percentile Value	25	46	10	13	13	24	7	8
8	60 th Percentile Value	26	48	11	14	13	25	7	8
9	70 th Percentile Value	27	51	11	14	14	25	8	9
10	80 th Percentile Value	28	51	12	15	15	28	8	9
11	90 th Percentile Value	29	55	12	16	15	31	8	10
12	95 th Percentile Value	32	57	13	17	17	32	8	10
13	98 th Percentile Value	33	57	14	18	17	33	9	11
14	Maximum	33	57	14	18	17	34	9	11
15	Arithmetic Mean	24.9	46.1	10.7	13.6	13.1	24.7	7.3	8.3
16	Geometric Mean	24.6	45.7	10.6	13.5	12.9	24.4	7.2	8.2
17	Standard Deviation	3.8	6.4	1.3	1.8	2.0	4.0	0.8	1.2
18	NAAQ Norms*	60	100	80	80	60	100	80	80
19	% Values exceeding Norms*	0	0	0	0	0	0	0	0
		A3-Kattupirangiyam				A4-Kaikatti/UT Cement Plant			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	15	31	7	8	19	40	9	11
3	10 th Percentile Value	17	36	7	9	22	44	9	11
4	20 th Percentile Value	19	38	8	9	25	45	9	12
5	30 th Percentile Value	22	40	8	10	26	48	10	12
6	40 th Percentile Value	23	41	9	10	26	48	10	12
7	50 th Percentile Value	25	44	9	11	28	51	10	13
8	60 th Percentile Value	26	45	9	12	28	51	11	13
9	70 th Percentile Value	27	49	10	12	30	53	11	14
10	80 th Percentile Value	27	50	10	13	30	54	12	15
11	90 th Percentile Value	31	52	11	14	33	57	14	16
12	95 th Percentile Value	32	53	11	15	34	58	14	18
13	98 th Percentile Value	33	54	12	15	35	58	14	18
14	Maximum	33	54	13	15	35	58	14	18
15	Arithmetic Mean	24.0	43.7	9.1	11.2	27.5	50.0	10.7	13.3
16	Geometric Mean	23.5	43.2	9.0	11.0	27.2	49.7	10.6	13.1
17	Standard Deviation	5.1	6.5	1.5	2.1	4.1	5.2	1.7	2.1
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 : 3.16 (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	21	43	9	13	18	36	8	11
3	10 th Percentile Value	25	51	10	13	20	38	9	11
4	20 th Percentile Value	27	52	11	14	22	40	9	12
5	30 th Percentile Value	28	55	11	14	24	42	12	13
6	40 th Percentile Value	29	57	12	15	25	43	12	15
7	50 th Percentile Value	31	57	12	15	26	44	13	15
8	60 th Percentile Value	33	59	12	15	27	45	13	15
9	70 th Percentile Value	34	61	13	16	27	45	14	16
10	80 th Percentile Value	35	63	13	17	31	46	14	17
11	90 th Percentile Value	37	65	15	18	32	52	14	18
12	95 th Percentile Value	40	68	16	18	34	58	15	18
13	98 th Percentile Value	42	70	16	19	35	60	15	18
14	Maximum	42	71	16	20	35	60	15	18
15	Arithmetic Mean	31.1	57.7	12.2	15.3	26.1	44.4	12.1	14.6
16	Geometric Mean	30.7	57.3	12.1	15.2	25.7	44.0	11.9	14.4
17	Standard Deviation	5.3	6.5	1.8	2.0	4.6	6.1	2.2	2.5
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	22	45	11	13	12	22	7	7
3	10 th Percentile Value	29	54	12	16	13	26	7	9
4	20 th Percentile Value	34	55	14	18	15	28	8	9
5	30 th Percentile Value	35	57	15	19	18	30	10	12
6	40 th Percentile Value	36	59	16	19	19	33	10	12
7	50 th Percentile Value	37	62	17	20	20	36	11	13
8	60 th Percentile Value	38	64	18	21	21	37	11	13
9	70 th Percentile Value	39	65	18	23	22	38	11	13
10	80 th Percentile Value	40	68	18	23	23	41	12	14
11	90 th Percentile Value	41	71	20	24	26	43	13	15
12	95 th Percentile Value	43	72	21	24	28	45	13	15
13	98 th Percentile Value	45	73	22	25	30	47	14	16
14	Maximum	46	74	22	26	32	48	14	16
15	Arithmetic Mean	36.1	61.3	16.3	20.1	19.9	34.6	10.3	12.1
16	Geometric Mean	35.6	60.8	16.1	19.8	19.3	33.9	10.0	11.8
17	Standard Deviation	5.5	7.5	3.0	3.3	5.1	7.2	2.1	2.4
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 : Winter 2023-24
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	10	20	6	6
3	10 th Percentile Value	14	26	7	9
4	20 th Percentile Value	18	35	8	10
5	30 th Percentile Value	22	40	9	12
6	40 th Percentile Value	23	43	10	12
7	50 th Percentile Value	25	45	11	13
8	60 th Percentile Value	27	49	11	14
9	70 th Percentile Value	30	52	12	15
10	80 th Percentile Value	32	57	13	16
11	90 th Percentile Value	36	61	15	18
12	95 th Percentile Value	38	65	17	21
13	98 th Percentile Value	41	70	18	23
14	Maximum	46	74	22	26
15	Arithmetic Mean	25.3	45.3	11.1	13.5
16	Geometric Mean	24.0	43.3	10.7	13.0
17	Standard Deviation	7.9	12.7	3.1	3.9
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.



Tamil Nadu Pollution Control Board

Ambient Air Quality Survey Report

Report No:23/AAQS/2024-2025 Dated:01.07.2024

- 1.Name and Address of the Industry :M/s.Dalmia Cement (Bharat)
Limited,Aminabad & Kairulabad Limes Stone
Mine, Aminabad Village,
Ariyalur TK,
Ariyalur District.
- 2.Date of Survey :19.06.2024
- 3.Duration of Survey : Eight Hours
- 4.Category : Red/Small
- 5.Consent Order No. : 2108236651580

Ambient Temperature (°C)	Min	Max	Relative Humidity (%)	Min	Max
	26	35		59	89
Weather Condition	Clear		Rain Fall (mm)	Nil	
Predominant Wind Direction	SW to NE		Mean Wind Speed (Km/hr)	9.0 Km/hr	

Sl. No	Location of Sampling Stations	From Source			Pollutants in $\mu\text{g}/\text{m}^3$			
		Dire.	Dist. (m)	Ht. from gl (m)	PM ₁₀	PM _{2.5}	SO ₂	NO ₂
1.	On the top of scaffolding near NE boundary of the mines	NE	400	3.0	74	25	13.3	17.1
2.	On the top of scaffolding at SE corner of mines	SE	360	3.0	65	-	10.7	13.4
3.	On top of scaffolding at SW corner of the mines	SW	375	3.0	61	18	10.1	12.7
4.	On top of scaffolding near NW boundary of mines	NW	400	3.0	69	-	12.0	15.3


 Environmental Scientist,


 Deputy Chief Scientific Officer,
 AEL, TNPCB, Trichy-15.

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 A2)	Downwind Direction (Location A6)
Loss on Ignition	18.4	18.1
Iron oxides (Fe ₂ O ₃)	7.8	7.4
Calcium oxide (CaO)	19.6	20.8
Magnesium oxide (MgO)	14.4	14.6
Sodium oxide (Na ₂ O)	0.32	0.34
Potassium oxide (K ₂ O)	0.20	0.22
Aluminium oxide (Al ₂ O ₃)	17.7	18.2
Titanium oxide (TiO ₂)	0.04	0.05

3.6 Noise Levels

3.6.1 Ambient 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 101.2 dB(A) during day times and from 32.1 dB(A) to 102.4 dB(A) during night times on the monitoring days. Day Equivalent Noise (Leq-d) level was found to be 45.0 dB(A) and Night Equivalent Noise (Leq-n) level was 42.1 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. Recent **TNPCB Noise Survey Report** is appended.

3.6.2 Workzone Noise Levels

Workzone Noise Levels (**Table 2.20**) within the Mines at a distance of 1.0-1.5 m from the source is maintained at **<85 db(A)** well within **OSHA Standard** of 85 dB(A) for **8-hours exposure**. However, Leq Noise levels at the boundaries were <55 dB(A) during day times and <45 dB(A) during night times.

Table : 3.19 Ambient Noise Level Data (Abstract)

Monitoring Dates : 19-20.01.2024

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- AK Mine Office	Industrial	34.1	98.1	44.5	33.7	90.4	42.8
2	A2-Kovilankudikadu	Residential	32.5	85.9	40.4	32.1	78.7	38.2
3	A3-Kattupirangiyam	Residential	34.3	98.4	42.8	33.4	96.7	36.2
4	A4- Kaikatti near UT Cement Plant	Industrial	37.4	100.2	49.3	34.7	97.8	46.4
5	A5-Pudupalayam	Residential	34.4	92.6	43.9	33.9	96.8	42.2
6	A6-Hastinapuram	Residential	34.2	100.1	46.9	34.6	93.9	42.4
7	A7-Ariyalur (Bypass)	Commercial	35.4	101.2	48.1	34.9	102.4	46.8
8	A8-Kallankurichi	Residential	32.9	85.7	44.4	32.1	81.9	42.0
Study Area			32.5	101.2	45.0	32.1	102.4	42.1
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.

Table : 3.20 Work Noise Level Data

Monitoring Dates : 19-20.01.2024

Equipment	Location	Noise Level (Leq), dB(A)	DGMS/ OSHA Norm for 8-hours Exposure
Rock Breakers, Operating	Operator's Position	80.7	<85 dB(A)
Loading Area	1.0 m away	81.4	
Tipper, operating	1.0 m away	83.5	

3.6.3 Ground Vibration during Blasting

Vibration levels are monitored with Minimate instruments whenever blastings are done and records are maintained as per DGMS requirement. Vibration Parameters viz. Peak Particle Velocity (PPV) at 300 m distance and Noise Levels during Blastings were in compliance with DGMS Norms for Residential Areas.

An Event Report, recent, is appended.



Tamil Nadu Pollution Control Board
Ambient Noise Level Survey Report of Analysis

Report No: 23/AAQS/2024-2025 Dated:01.07.2024

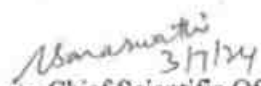
1	Name of the Industry	M/s.Dalmia Cement (Bharat) Limited,
2.	Address of the Industry	Aminabad & Kairulabad Limes Stone Mine, Aminabad Village, Ariyalur TK, Ariyalur District.
3.	Date of Survey	19.06.2024
4.	Consent Order No.	2108236651580
5.	Category	Red/Small
Type of Survey		Ambient
Time of Survey		Day
Meteorological Conditions		Calm

Logging Parameters

Instrument Used	Casella	Serial No.	0499485
Logging Interval	10 Minutes in each Point	Measuring Range	50-110dB(A)
Weighting	"A"	Time Weighting	Fast
Sound Incidence	Random	Time of Survey in Hrs.	15.00 to 16.00 hrs

SI No	Location	Duration (m)	Distance (m)	Direction	Sound Level -dB(A)		
					L _{eq}	L _{Min}	L _{Max}
1.	Near NE boundary of mines	10	400	NE	49.5	39.4	64.9
2.	Near SE corner of mines	10	360	SE	41.7	38.9	46.7
3.	Near SW corner of mines	10	375	SW	45.5	38.2	62.0
4.	Near NW boundary of mines	10	400	NW	48.0	41.5	59.4


 Environmental Scientist,


 Deputy Chief Scientific Officer,
 AEL, TNPCB, Trichy-15.



Event Report

Date/Time Long at 11:35:16 November 9, 2024
 Trigger Source Geo: 0.700 mm/s, Mic: 103.0 dB(A)
 Range Geo: 254.0 mm/s
 Record Time 22.25 sec (Auto=6Sec) at 1024 sps
 Job Number: 26
 Operator/Setup: MANI/PR MINES.mmb

Serial Number UM17867 V 10-90 Micromate ISEE
 Battery Level 3.5 Volts
 Unit Calibration June 21, 2024 by UES New Delhi
 File Name TEMP.EVT
 Scaled Distance 90.2 (611.9 m, 46.0 kg)

Notes

Location: PAK
 Client: DCBL
 User Name: DALMIA
 General: Blasting Monitoring

Extended Notes

No of holes- 40
 Location- E block
 TOTAL EXPOSIVE- 320 KgP
 P.F= 10.5
 CHARGE /HOLE -8
 ANFO-93.7%
 BOOSTER - 6.3%
 TOTAL METERS - 160 mtrs
 Distance from face - 500 m

Microphone 'A' Weight - Fast

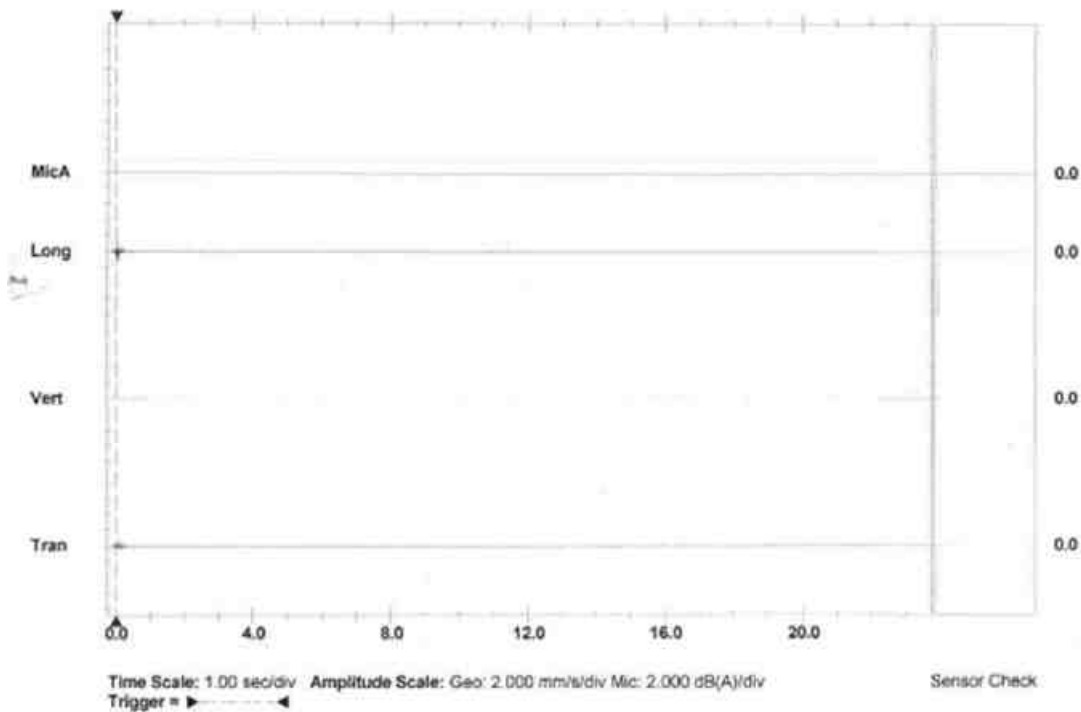
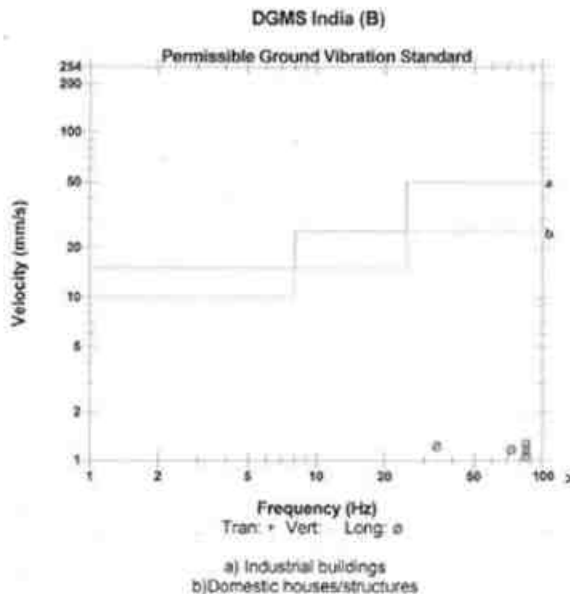
LMax <30 dB(A)

Sound (dB) LMin 1.5 L10 29 L50 29 Leq 1.5

Channel Test Check (Amp = 3255 mv)

	Tran	Vert	Long	
PPV	0.725	0.497	1.269	mm/s
> Freq	64	34	85	Hz
Time (Rel. to Trig)	0.058	0.036	0.065	sec
Peak Acceleration	0.051	0.025	0.109	g
Peak Displacement	0.002	0.005	0.004	mm
Sensor Check	Passed	Passed	Passed	
Frequency	7.3	7.5	7.3	Hz
Overswing Ratio	4.6	4.1	4.7	

Peak Vector Sum 1.326 mm/s at 0.065 sec



3.7 Water Environment

3.7.1 Ground Water Levels

The Department of Geology, **Anna University**, Chennai conducted the Hydrogeological Study including a Pumping Test during 10-11.05.2024 and submitted the Report. The EIA Coordinator and Officials of M/s. Thrust Geo-consultants Private Limited, an Accredited Ground Water Professionals were also involved in the Pumping Test.

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 mine vicinity is at **45 m BGL during Postmonsoon & 50 m BGL during Premonsoon periods**. On the monitoring day, the water levels observed at 10 Borewells in the Mine vicinity (within 5 km) are given in **Table 3.21** The levels were found to be in the range 4.19 m BGL (Koppilankudikadu) to 33.70 m BGL (Aminabad).

Table : 3.21 Monitored Ground Water Level Data

Sl. No.	Borewell at	Coordinates	Distance from the Mine, km	Water Level Readings, m BGL
1	Periyagalur	11° 8'8.20"N - 79° 9'19.94"E	2.8	18.84
2	Chinnanagalur	11° 7'31.73"N- 79° 9'20.04"E	2.5	17.17
3	PNR Mine Area	11° 7'27.85"N- 79° 8'33.59"E	1.0	15.50
4	Pump Test Borewell	11° 7'11.45"N- 79° 8'49.24"E	1.7	15.90
5	Kattupiringiyam	11° 6'50.37"N- 79° 8'22.30"E	1.6	8.14
6	Hastinapuram	11° 7'3.97"N- 79° 7'19.98"E	1.6	18.93
7	Usenabad	11° 9'1.51"N- 79° 6'9.29"E	2.3	17.20
8	Aminabad	11°10'5.34"N- 79° 5'37.04"E	4.3	33.70
9	Koppilankudikadu	11° 9'18.35"N- 79° 9'7.12"E	3.1	4.19

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 appended as **Plate VII**.

Plate : VII Ground Water-table Contours



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. The **Stage of Development of Ariyalur Block is Safe (<70%) Category**.

Aquifer Parameters	<u>Alluvium</u>	<u>Sedimentary</u>	<u>Hard Rock</u>
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 3.23**). 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 about the Surface Water Quality in the Study Area.

Table : 3.23 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 3.24-3.25** and the abstract of those data is given as **Table 3.26**.

The **Surface Water** samples were monitored with pH in the range 7.43-7.83 against the Limit value of 6.5-9.0. DO levels were in the range 4.8-5.6 mg/l against the minimum requirement value of 4.0 mg/l. TDS values were monitored in the range of 320-500 mg/l. Chloride values ranging from 82 mg/l to 148 mg/l. Iron content was found to be in the range 0.06-0.12 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 4-18 mg/l respectively. The surface water quality were found to be within the prescribed CPCB Norms.

The pH of **Ground Water** samples were ranging from 7.61-7.82 against the BIS Norm of 6.5-8.5. TDS and Chloride values were found to be in the range 360-550 mg/l (Norm 500 mg/l or 2,000 mg/l in the absence of alternate source) and 93-156 mg/l (Norm 250/1000 mg/l) respectively. Iron content was found to be in the range 0.06-0.14 mg/l.

Table : 3.24 Surface Water Quality Data

Monitoring Dates : 09.01.2024
(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	7.83	7.47	7.43	7.61	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	26.4	26.8	26.6	27.1	-
4	Turbidity, NTU	0.8	1.2	1.5	1.8	-
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	4.8	5.3	5.6	5.4	4.0-6.0
7	Total Suspended Solids, mg/l	13	24	29	36	-
8	Electrical Conductivity, umhos/cm	590	580	630	700	-
9	Total Dissolved Solids, mg/l	380	370	400	440	500-2100
10	Total Hardness (as CaCO ₃), mg/l	190	160	170	190	-
11	Calcium Hardness, mg/l	110	90	90	100	-
12	Magnesium Hardness, mg/l	80	70	80	90	-
13	Calcium (as Ca), mg/l	44	36	36	40	-
14	Magnesium (as Mg), mg/l	19	17	19	22	-
15	Sodium (as Na), mg/l	28	39	45	49	-
16	Potassium (as K), mg/l	2	3	5	6	-
17	Chlorides (as Cl), mg/l	88	110	119	127	250-600
18	Sulphates (as SO ₄), mg/l	26	23	27	32	400-1000
19	Total Alkalinity (as CaCO ₃), mg/l	90	70	80	100	-
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	8	11	13	-
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	0.06	0.09	0.11	0.09	0.3-5.0
24	Fluorides (as F), mg/l	0.11	0.16	0.21	0.18	1.5
25	Nitrates (as NO ₃), mg/l	0.10	0.12	0.16	0.15	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, %	24.0	34.1	35.7	35.0	-
42	Total Coliforms, MPN/100 ml	8	41	47	56	50-5000
43	Faecal Coliforms, MPN/100 ml	4	22	28	32	-
44	E. Coli, MPN/100 ml	2	17	20	23	-

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

- : Not included/Not available.

Table : 3.24 (Contn.) Surface Water Quality Data

Monitoring Dates : 09.01.2024
(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	7.68	7.74	7.68	7.69	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	27.2	27.0	26.8	26.4	-
4	Turbidity, NTU	1.6	2.1	1.7	1.9	-
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	5.5	5.1	5.3	4.8	4.0-6.0
7	Total Suspended Solids, mg/l	22	23	18	41	-
8	Electrical Conductivity, umhos/cm	700	560	500	790	-
9	Total Dissolved Solids, mg/l	450	350	320	500	500-2100
10	Total Hardness (as CaCO ₃), mg/l	210	140	130	220	-
11	Calcium Hardness, mg/l	110	80	70	120	-
12	Magnesium Hardness, mg/l	100	60	60	100	-
13	Calcium (as Ca), mg/l	44	32	28	48	-
14	Magnesium (as Mg), mg/l	24	14	14	24	-
15	Sodium (as Na), mg/l	44	32	24	54	-
16	Potassium (as K), mg/l	4	2	2	8	-
17	Chlorides (as Cl), mg/l	130	88	82	148	250-600
18	Sulphates (as SO ₄), mg/l	28	24	20	42	400-1000
19	Total Alkalinity (as CaCO ₃), mg/l	90	80	60	110	-
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	8	6	4	18	-
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	0.12	0.06	0.11	0.3-5.0
24	Fluorides (as F), mg/l	0.21	0.21	0.13	0.26	1.5
25	Nitrates (as NO ₃), mg/l	0.18	0.18	0.11	0.21	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, %	30.8	32.8	28.2	33.8	-
42	Total Coliforms, MPN/100 ml	47	26	12	72	50-5000
43	Faecal Coliforms, MPN/100 ml	26	17	8	35	-
44	E. Coli, MPN/100 ml	17	11	4	25	-

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

- : Not included/Not available.

Table : 3.25 Ground Water Quality Data

Monitoring Dates : 09.01.2024
(Worst case & Mean values are reported)

Sl. No.	Parameter	W9 Mine Pit	W10 Borewell, Kallankurichi	W11 Borewell, Kattupirin- giyam	W12 Borewell, Periya- nagalur	IS:10500 Norms*
1	pH	7.76	7.67	7.78	7.68	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	27.4	27.2	26.9	27.0	-
4	Turbidity, NTU	1.4	0.7	0.9	0.9	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	4.2	3.8	4.4	4.7	-
7	Total Suspended Solids, mg/l	18	10	19	11	-
8	Electrical Conductivity, umhos/cm	960	670	840	730	-
9	Total Dissolved Solids, mg/l	620	440	530	460	500/2000
10	Total Hardness (as CaCO ₃), mg/l	300	210	250	220	200/600
11	Calcium Hardness, mg/l	160	110	140	120	-
12	Magnesium Hardness, mg/l	140	100	110	100	-
13	Calcium (as Ca), mg/l	64	44	56	48	75/200
14	Magnesium (as Mg), mg/l	34	24	26	24	30/100
15	Sodium (as Na), mg/l	54	36	46	39	-
16	Potassium (as K), mg/l	6	2	5	2	-
17	Chlorides (as Cl), mg/l	140	124	156	132	250/1000
18	Sulphates (as SO ₄), mg/l	42	36	52	41	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	150	100	120	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	2	4	5	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	0.10	0.08	0.13	0.10	0.3
24	Fluorides (as F), mg/l	0.14	0.14	0.27	0.17	1.0/1.5
25	Nitrates (as NO ₃), mg/l	0.15	0.15	0.26	0.23	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, %	27.6	26.9	28.1	27.6	-
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 : 3.25 (Contn.) Ground Water Quality Data

Monitoring Dates : 09.01.2024
(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	7.75	7.82	7.61	7.66	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	27.3	27.1	27.0	27.3	-
4	Turbidity, NTU	1.0	1.1	0.9	1.0	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	4.5	4.4	4.9	4.4	-
7	Total Suspended Solids, mg/l	14	17	12	14	-
8	Electrical Conductivity, umhos/cm	820	870	650	570	-
9	Total Dissolved Solids, mg/l	520	550	410	360	500/2000
10	Total Hardness (as CaCO ₃), mg/l	260	270	200	170	200/600
11	Calcium Hardness, mg/l	140	150	110	90	-
12	Magnesium Hardness, mg/l	120	120	90	80	-
13	Calcium (as Ca), mg/l	56	60	44	36	75/200
14	Magnesium (as Mg), mg/l	29	29	22	19	30/100
15	Sodium (as Na), mg/l	47	54	42	35	-
16	Potassium (as K), mg/l	4	6	3	2	-
17	Chlorides (as Cl), mg/l	148	154	114	93	250/1000
18	Sulphates (as SO ₄), mg/l	49	49	29	21	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	120	130	90	80	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	6	5	2	3	-
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	0.10	0.14	0.10	0.06	0.3
24	Fluorides (as F), mg/l	0.21	0.28	0.22	0.16	1.0/1.5
25	Nitrates (as NO ₃), mg/l	0.28	0.31	0.25	0.12	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, %	27.8	29.7	30.9	30.6	-
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 Water Quality Status

Monitoring Dates : 09.01.2024

Sl. No.	Parameter	Concentration Range & Norms			
		Surface Waters	CPCB Norms* for Surface Waters	Ground Waters	IS:10500 Norms** for Drinking Waters
1	pH	7.43-7.83	6.5-8.5	7.61-7.82	6.5-8.5
2	Total Dissolved Solids, mg/l	320-500	-	360-550	500-2000*
3	Dissolved Oxygen, mg/l	4.8-5.6	4.0-6.0	3.8-4.9	-
4	BOD (3 days @ 27 °C), mg/l	BDL(DL:2.0)	<3	BDL(DL:2.0)	-
5	COD, mg/l	4-18	-	2-8	-
6	Oil & Grease, mg/l	BDL(DL:1.0)	-	BDL(DL:1.0)	-
7	Chlorides (as Cl), mg/l	82-148	250-600	93-156	250-1000
8	Iron (as Fe), mg/l	0.06-0.12	0.3-5.0	0.06-0.14	0.3
9	Trace Metals, mg/l	<0.01	-	<0.01	<0.001-<0.01
10	Total Coliforms, MPN/100 ml	8-72	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.

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 were found to be within the prescribed IS 10500:2012 Norms for Drinking in the absence of an alternative source.

The pH value of **Mine Pit water** was found to be 7.74. TDS value was 620 mg/l. Chloride value was 140 mg/l. Iron content was found to be 0.10 mg/l. BOD and COD values were monitored in lower levels. Oil & Grease value was found to be Nil. In general, mine pit water quality was found to be within the prescribed **TNPCB Norms** for Onland irrigation.

3.8 Land Environment

3.8.1 Soil Status

Land of Limestone Ferruginous red loam occurs in Ariyalur district. The collected soil quality data are given as **Table 3.27**. Soils with medium compaction and silty loam texture were predominant in the study area. Soil pH values (7.59-7.81) were found to be in alkaline range and Electrical Conductivity values were in the range 1.50-1.79 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 1.37-2.79 (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.

Table : 3.27 Soil Status
Monitoring Date : 09.01.2024

Sl. No.	Parameter	S1	S2	S3	S4	S5	S6	Desirable Range*
i	Colour	Brown	Brown	Grey	Reddish Brown	Brown	Brown	-
ii	Compaction	Medium	Low	Medium	Medium	Medium	Medium	-
1	pH (10% Solution)	7.73	7.81	7.59	7.74	7.59	7.59	5.5-9.0
2	Electrical Conductivity, mmhos/cm	1.72	1.79	1.53	1.50	1.74	1.69	0.2-0.5
3	Natural Moisture Content, %	11.5	9.6	10.2	9.4	12.6	14.9	-
4	Organic Carbon, %	0.98	0.91	1.09	1.14	1.10	1.04	>0.75
5	Nitrogen (as N), %	0.010	0.007	0.013	0.016	0.012	0.012	0.01-0.02
6	Phosphorus (as P), %	0.006	0.003	0.009	0.010	0.009	0.008	0.002-0.004
7	Potassium (as K), %	0.012	0.009	0.010	0.008	0.014	0.009	>0.01
8	Sodium (as Na), ppm	110	140	90	110	110	70	-
9	Calcium (as Ca), ppm	70	90	60	80	80	80	-
10	Magnesium (as Mg), ppm	60	60	60	70	60	70	-
11	Chlorides (as Cl), ppm	210	230	180	160	210	230	-
12	Sulphates (as SO ₄), ppm	120	150	110	90	130	160	-
13	Cation Exchange Capacity, meq/100 g	23.1	21.7	22.6	24.1	23.6	21.5	10-30
14	Grain Size Distribution : i. Sand, %	33.7	31.9	62.4	28.6	31.8	35.1	-
ii	Silt, %	60.9	63.4	31.5	63.4	60.4	60.6	-
iii	Clay, %	5.4	4.7	6.1	8.0	7.8	4.3	-
15	Textural Class	Silty loam	Silty loam	Sandy loam	Silty loam	Silty loam	Silty loam	Loam
16	Bulk Density, g/cc	1.34	1.33	1.32	1.35	1.37	1.38	-
17	Infiltration Rate, cm/hr	3.7	4.4	3.5	3.8	3.6	3.5	-
18	Field Capacity, %	21.7	20.3	19.4	25.1	21.4	21.4	-
19	Wilting Coefficient, %	0.4	0.6	0.4	0.8	0.4	0.7	>0.4
20	Available Water Storage Capacity, %	21.4	19.6	22.3	24.3	21.9	20.7	-
21	Sodium Absorbing Ratio	2.32	2.79	1.96	2.16	2.25	1.37	<5

* : Desirable Range for High Production Soil.

Legend : S1-Green Belt; S2-Dump Area; S3-Dry Agri. Land, Periyanaagalur; S4-Forrest Land, Vilangudi; S5-Agri. Land, Pudupalayam & S6-Agri. Land, Kallankurichi.

3.8.2 Land Use Pattern

For Land use study of the Study Area, IRS P6 LISS-III **Satellite Imagery**/data (dated 14.03.2022) 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 3.28**. Fallow land occupies majority of the study area viz. 43.41%. Crop land occupies about 29.97%. Water body occupies about 3.91%. Only 4.88% of the study area is covered by built-up land.

Table : 3.28 Land Use Pattern

Land Use	Area, sq.km	Coverage, %
Agricultural Crop Land	94.28	29.97
Fallow Land	138.52	43.41
Barren/Unculturable/Scrub	27.54	8.78
Other Mine/Quarry/Industry	10.13	3.22
Forest	18.34	5.83
Built-up Land	15.33	4.88
Water bodies	12.29	3.91
Total	320.72	100

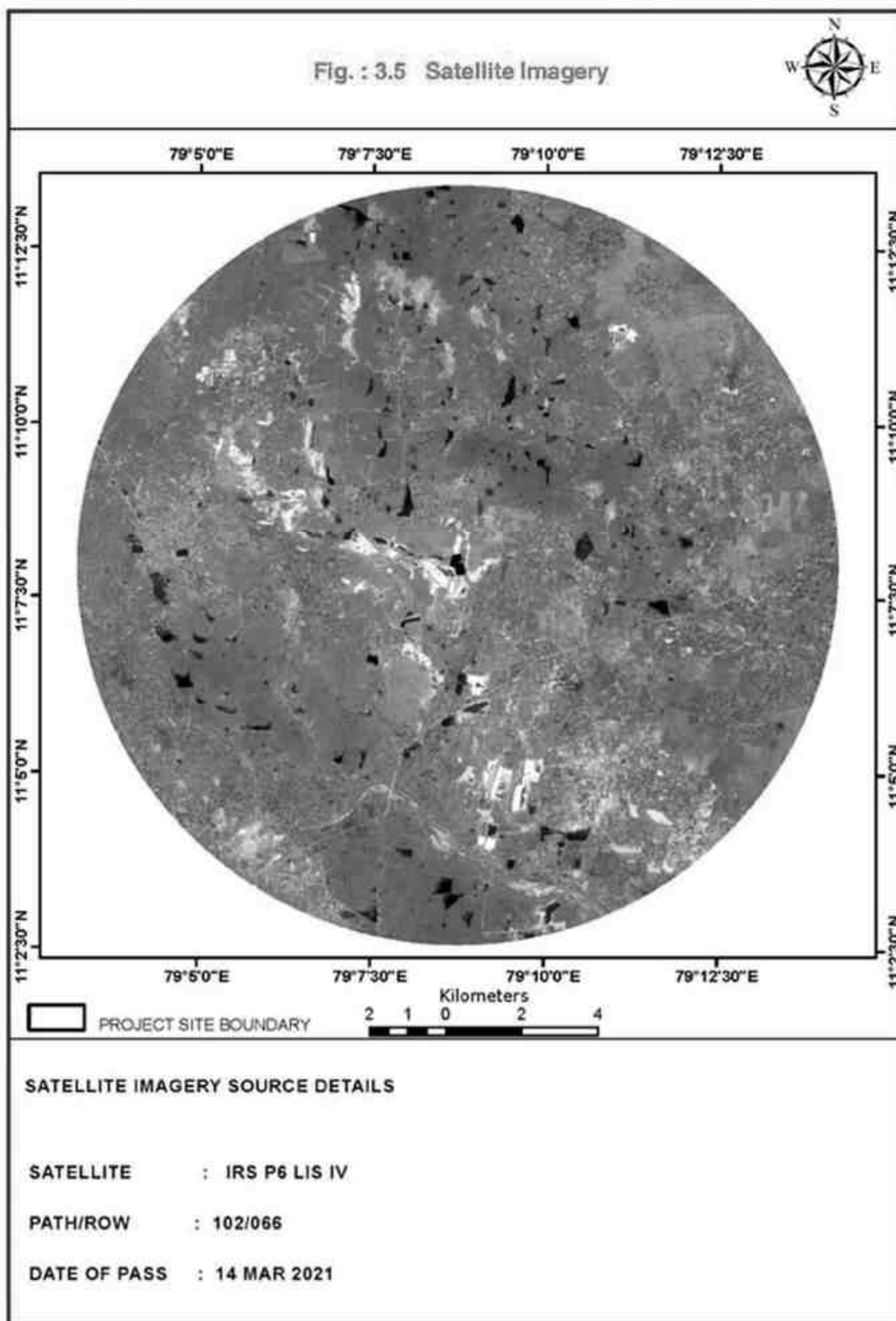
3.9 Flora and Fauna

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 3.29**. The list of plant species in the Core and Buffer Zones are presented in **Table 3.30 & Table 3.31** respectively.

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.

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.



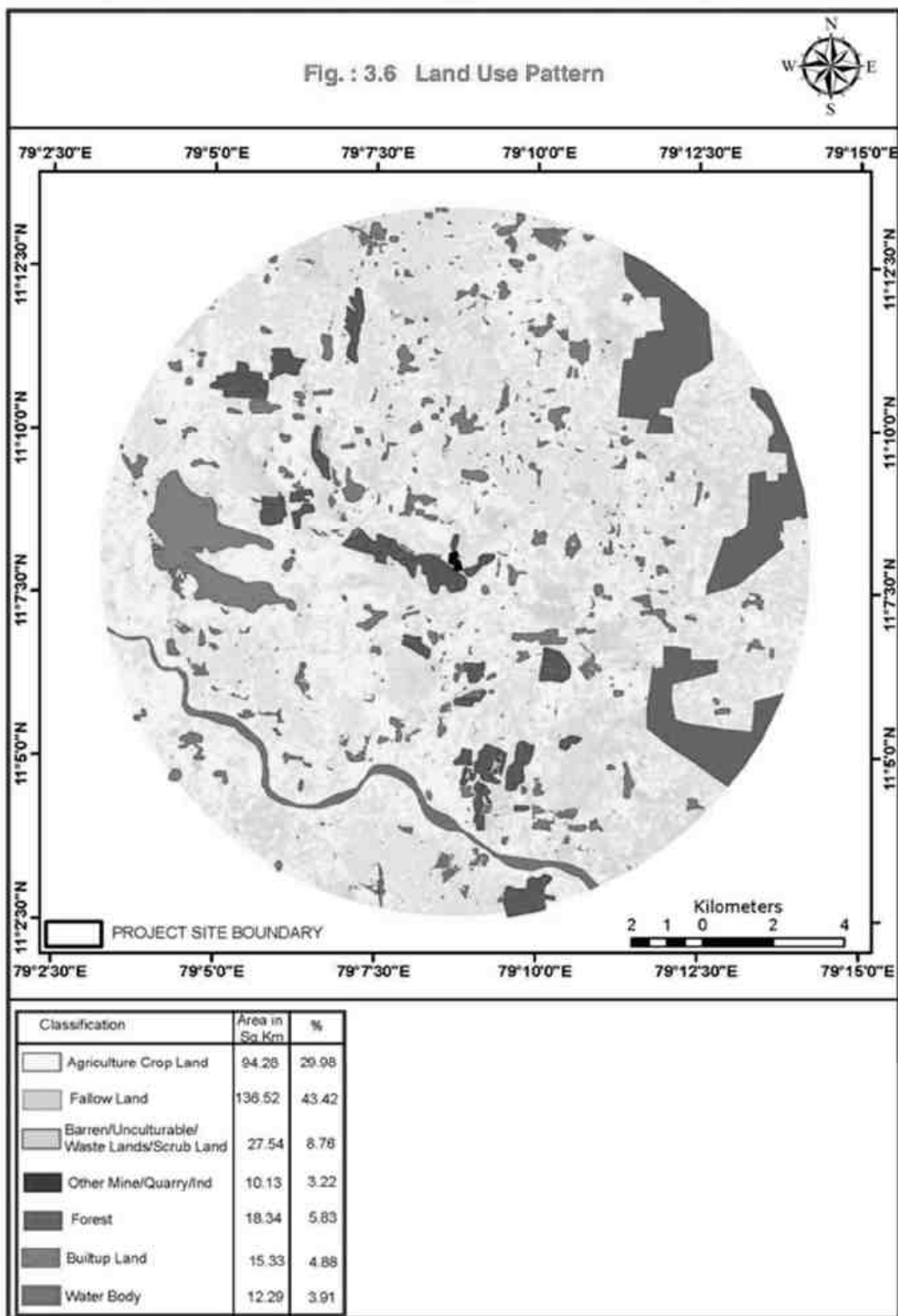


Table : 3.29 List of Flora in the Reserve Forests

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	Caesaipinaceae	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	-

Table : 3.30 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	Majarali, Yellow Bells	Bignoniaceae	Shrub
16	Vitex negundo	Lamiaceae	Nochi	Shrub

Table : 3.31 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
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

Sl. No.	Scientific Name	Family Name	Common Name	Habit
14	<i>Ailanthus excelsa</i>	Simaroubaceae	Indian Tree of Heaven, Perumaram	Tree
15	<i>Alangium salviifolium</i>	Cornaceae	Alingi	Tree
16	<i>Albizia amara</i>	Mimosaceae	Usilamaram	Tree
17	<i>Albizia lebbek</i>	Mimosaceae	Siris Tree, Vagai	Tree
18	<i>Aloe vera</i>	Liliaceae	Kathalai	Herb
19	<i>Alternanthera sessilis</i>	Amaranthaceae	Dwarf Copperleaf, Ponnanganni	Herb
20	<i>Amaranthus spinosus</i>	Amaranthaceae	Mullukkirai	Herb
21	<i>Amaranthus viridis</i>	Amaranthaceae	Kuppaikerai	Herb
22	<i>Ammannia baccifera</i>	Lythraceae	Acrid weed, Kalluruvi	Herb
23	<i>Anacardium occidentale</i>	Anacardiaceae	Cashew	Tree
24	<i>Anisomeles malabarica</i>	Lamiaceae	Malabar Catmint/ Peimiratti	Shrub
25	<i>Anona squamosa</i>	Anonaceae	Custard apple	Tree
26	<i>Apluda mutica</i>	Poaceae	Mauritian Grass	Herb
27	<i>Arachis hypogea</i>	Faboideae	Ground nut	Herb
28	<i>Argemone mexicana</i>	Papaveraceae	Prickly poppy, Kudiyotti	Shrub
29	<i>Aristida adscensionis</i>	Poaceae	Coomon Needle grass	Herb
30	<i>Artocarpus heterophyllus</i>	Moraceae	Jackfruit	Tree
31	<i>Azadirachta indica</i>	Meliaceae	Neem, Vembu	Tree
32	<i>Bambusa arundanacea</i>	Poaceae	Bamboo	Tree
33	<i>Barleria buxifolia</i> L.	Acanthaceae	Box-leaved Barleria/ Rosemullipoondur	Herb
34	<i>Barleria prionitis</i>	Acanthaceae	Porcupine flower, Kundan	Herb
35	<i>Bassia latifolia</i>	Sapotaceae	Iluppai	Tree
36	<i>Blumea lacera</i>	Asteraceae	Kattumullangi, Narakkarandai	Herb
37	<i>Boerhaavia diffusa</i>	Nyctaginaceae	Pig weed, Mukkarattai Keerai	Herb
38	<i>Borassus flabellifer</i>	Arecaceae	Palmyra Palm	Tree
39	<i>Bougainvillea spectabilis</i>	Nyctaginaceae	Kaakithapoo	Shrub
40	<i>Bulbostylis barbatta</i>	Cyperaceae	Mukkutikorei	Herb
41	<i>Butea monosperma</i>	Fabaceae	Flame of Forest	Tree
42	<i>Caesalpinia pulcherrima</i>	Caesalpiniaceae	Peacock Flower, Mayurkondrai	Tree
43	<i>Calendula officinalis</i>	Asteraceae	Marigold	Herb
44	<i>Calophyllum inophyllum</i>	Clusiaceae	Punnai	Tree
45	<i>Calotropis gigantea</i>	Asclepiadaceae	Crown Flower, Erukku	Shrub
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

Sl. No.	Scientific Name	Family Name	Common Name	Habit
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/ Railpoondu	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 lickstoop	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
96	<i>Eichhornia crassipes</i>	Pontederiaceae	Water hyacinth	Aquatic
97	<i>Emblica 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

Sl. No.	Scientific Name	Family Name	Common Name	Habit
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	Kaatuamanakku	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
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, Araikkeera	Herb
152	<i>Melia azadirachta</i>	Meliaceae	Indian Liliac, Malaivembu	Tree
153	<i>Merremia emarginata</i>	Convolvulaceae	Kidney Leaf Morning Glory, Elikkadhukeera	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

Sl. No.	Scientific Name	Family Name	Common Name	Habit
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, Kattukkaralai	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
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, Malaitaekku	Tree
200	<i>Prosopis glandulosa</i>	Mimosodeae	Vaelikkaruvi	Tree
201	<i>Prosopis juliflora</i>	Fabaceae	Algaroba, Seemaikaruvel	Tree
202	<i>Psidium guajava</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/Sarakkottini	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

Sl. No.	Scientific Name	Family Name	Common Name	Habit
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, Puliyamaram	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	Black 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
Medicinal species				
1	<i>Abrus precatorius</i>	Fabaceae	Coral bead vine, Rosary pea,	Creeper
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	Kuppaikerai	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

Sl. No.	Scientific Name	Family Name	Common Name	Habit
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 **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 keerai), *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 guajava (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 3.32-3.34**.

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

Table : 3.32 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.	Oryctolagus cuniculus	Leporidae	Rabbit
4.	Paradoxurus henmaphroditurs	Viverridae	Civit
5.	Ratturs rattus	Muridae	Rat
Reptiles			
1.	Bungaruscaeruleus	Elapidae	Krait
2.	Lygosomapunctata	Scincidae	Spotted supple skink
3.	Ptyasmuscosa	Colubridae	Indian rat snake
4.	Xenochrophispiscator	Colubridae	Checkered keel back
Birds			
1.	Ardea alba	Ardeidae	Large egret
2.	Ardeola grayli	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 : 3.33 List of Fauna in the Study Area

Sl. No.	Scientific Name	Common Name	WPA Schedule
Insects			
1	<i>Apis cerana indica</i>	Indian Honey Bee	II
Butterflies			
1	<i>Pachliopta aristolochiae</i>	Common Rose	II
2	<i>Pachliopta hector</i>	Crimson Rose	II
3	<i>Papilio polytes</i>	Common Mormon	II
Mammals			
1	<i>Funambulus palmarum</i>	Three-striped Palm Squirrel	II
2	<i>Lepus nigricollis</i>	Indian Hare, Black-naped Hare	II
3	<i>Pteropus giganteus</i>	Indian Flying Fox	II
Birds			
1	<i>Alcedo atthis</i>	Common kingfisher	II
2	<i>Acridotheres tristis</i>	Common myna	II
3	<i>Actitis hypoleucos</i>	Common sandpiper	II
4	<i>Anhinga melanogaster</i>	Oriental Darter	II
5	<i>Ardea cinerea</i>	Grey heron	II
6	<i>Ardea purpurea</i>	Purple heron	II
7	<i>Ardeola grayii</i>	Indian pond heron	II
8	<i>Athene brama</i>	Spotted owlet	II
9	<i>Bubulcus ibis</i>	Cattle egret	II
10	<i>Centropus sinensis</i>	Southern coucal	II
11	<i>Cinnyris asiaticus</i>	Purple sunbird	II
12	<i>Columba pallumbus</i>	Common Wood Pigeon	II
13	<i>Corvus macrorhynchos</i>	Large-billed crow	II
14	<i>Cypsiurus balasensis</i>	Asian palm swift	II
15	<i>Dendrocitta vagabunda</i>	Rufous treepie	II
16	<i>Dicurus macrocercus</i>	Black drongo	II
17	<i>Egretta garzetta</i>	Little egret	II
18	<i>Eudynamis scolopacea</i>	Asian koel	II
19	<i>Gallinula chloropus</i>	Common moorhen	II
20	<i>Halycon smyrensis</i>	White-throated kingfisher	II
21	<i>Hierococcyx varius</i>	Common hawk cuckoo	II
22	<i>Himantopus himantopus</i>	Black-winged stilt	II
23	<i>Hirundo rustica</i>	Barn swallow	II
24	<i>Lanchura punctulata</i>	Scaly-breasted munia	II
25	<i>Leptocoma zeylonica</i>	Purple-rumped sunbird	II
26	<i>Mesophoyx intermedia</i>	Intermediate egret	II
27	<i>Milvus migrans</i>	Black kite	II
28	<i>Passer domesticus</i>	House sparrow	II
29	<i>Phalacrocorax niger</i>	Little cormorant	II
30	<i>Psittacula krameri</i>	Rose-ringed parakeet	II
31	<i>Streptopelia chinensis</i>	Spotted dove	II
32	<i>Turdoides affinis</i>	Yellow-billed babbler	II
33	<i>Vanellus indicus</i>	Red-wattled lapwing	II
Reptiles			

Sl. No.	Scientific Name	Common Name	WPA Schedule
1	Ahaetulla nasuta	Common vine snake	II
2	Amphiesma stolatum	Striped keelback	II
3	Boiga trigonata	Common cat snake	II
4	Dendrelaphis tristis	Common bronzeback	II
5	Gongylophis conicus	Rough tailed Sand boa, Pudaiyan	II
6	Hemidactylus flaviviridis	House gecko	II
7	Lissemys punctata	Indian mud turtle	II
8	Mabuya carinata	Brahminy Skink	II
9	Passerita mycterizaris	Common Green Snake	II

Table : 3.34 Other Fauna found in the Study Area

Sl. No.	Scientific Name	Common Name
Insects		
1	Acrida exaltata	Toothpick grasshopper
2	Aedes sp.	Mosquito
3	Aiolopus thalassinus tumulus	Green grass hopper
4	Apis florea	Flower Bee
5	Argiope pulchella	Signature spider
6	Asemonea sp.	Green leaf spider
7	Attacus selene	Indian Lunar Moth
8	Camponotus compressus	Black Ant
9	Carrhotus viduus	Jumping spider
10	Cheilomenes sexmaculata	Ladybird Beetle
11	Chrysilla sp.	Spider
12	Creobroter sp.	Praying mantis
13	Culex sp.	Mosquito
14	Dysdercus sp.	Red Silk Cotton Bug
15	Episyrphus sp.	Hoverfly
16	Gryllodes sigillatus	Tropical house cricket
17	Heterometrus sp.	Black scorpion
18	Hippasa sp.	Tunnel sheet spider
19	Hyllus semicuperus	Jumping spider
20	Limnogonus nitidus	Water Strider
21	Musca domestica	Housefly
22	Myrmarachne plateloides	Ant mimicking jumping spider
23	Pardosa sp.	Wolf Spider
24	Trigoniulus sp.	Millipede
Butterflies		
1	Anaphaeis aurota	Pioneer
2	Catopsilia pomona	Common Emigrant
3	Catopsilia pyranthe	Mottled Emigrant
4	Cepora nerissa	Common Gull
5	Chilades lajus	Lime Blue
6	Danaus chrysippus	Plain Tiger
7	Danaus genutia	Striped Tiger
8	Delias eucharis	Common Jezebel

Sl. No.	Scientific Name	Common Name
9	Euploea core Cramer	Common Crow
10	Eurema brigitta	Small Grass Yellow
11	Eurema hecabe	Common Grass Yellow
12	Freyeria trochylus	Grass Jewel
13	Graphium agamemnon	Tailed Jay
14	Graphium doson	Common Jay
15	Hasora chromus Cramer	Common Banded Awl
16	Hypolimnas bolina	Great Egg fly
17	Hypolimnas misippus	Danaid Eggfly
18	Jamides celeno Cramer	Common Cerulean
19	Melanitis leda	Common Evening Brown
20	Papilio demoleus	Lime Butterfly
21	Papilio polymnestor Cramer	Blue Mormon
22	Tirumala limniace Cramer	Blue Tiger
23	Tirumala septentrionis	Dark Blue Tiger
24	Zizula hylax	Tiny Grass Blue
Mammals		
1	Bandicota indica	Large (Greater) Bandicoot-rat
2	Bos indicus	Cow
3	Bubalus bubalis	Buffalo
4	Canis familiaris	Dog
5	Capra hircus	Goat
6	Cynopterus sphinx	Short-nosed Fruit Bat
7	Mus booduga	Indian Field Mouse
8	Mus musculus	House Mouse
9	Ovis aries	Sheep
10	Rattus norvegicus	Field mouse
11	Rattus rattus	House (Roof, Black) Rat
12	Sauria lacertidae	Lizard
13	Sorex caerulescens	Common mush shrew
14	Suncus murinus	House (Grey Musk) Shrew
Birds		
1	Corvus splendens	House crow
2	Fulica atra	Common coot
Reptiles		
1	Bangarus caeruleus	Common Indian Krait
2	Calotes versicolor	Indian garden lizard
3	Sauria lacertidae	Lizard

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. The analysis of Phyto and Zoo-plankton was carried out as per the procedures of APHA (Table 3.35).

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 of Ariyalur District

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

YEAR : 2019-2020					
Sl. No. (1)	Industrial Category (2)	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	

The available **Health Infrastructures** in the District are :

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 3.39-3.44**.

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. 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.

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.

Table : 3.39 Demographic Profile- 2011 Census

Sl. No.	Name of the Village	No. of House-holds	Population			Scheduled Castes			Scheduled Tribes			Literates			Illiterates		
			Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1	Ammabappur	3199	1594	1566	1103	556	547	48	26	23	2050	1168	892	1099	426	673	3159
2	Ammenabath	654	315	339	122	59	63	0	0	0	349	218	131	305	97	208	654
3	Anandavadi	4262	2108	2154	1436	731	705	132	61	71	2481	1437	1024	1801	671	113	4262
4	Ariyalur (TP)	28902	14349	14553	3254	1620	1634	8	5	3	21977	11564	1041	6925	2785	414	28902
5	Edayathankudi	2191	1135	1056	109	52	57	81	43	38	1251	776	483	930	357	573	2191
6	Govindapuram	4996	2502	2494	1347	674	673	0	0	0	3250	1871	1389	1736	631	110	4996
7	Kadugur	3217	1627	1590	493	253	240	1	1	0	1893	1172	721	1324	455	899	3217
8	Kallankurichi	5385	2663	2722	1383	699	684	1	1	0	3392	1957	1435	1993	706	128	5385
9	Karuppur	4773	2385	2388	1031	530	501	120	53	67	2680	1516	1164	2093	869	122	4773
10	Kavayur	3242	1634	1608	594	307	287	11	7	4	1790	1092	698	1452	542	910	3242
11	Kavayabath	5215	2602	2613	881	451	430	5	3	2	3937	2128	1809	1278	474	804	5215
12	Kilimangalam	2926	1481	1445	640	326	314	0	0	0	1777	1077	700	1149	404	745	2926
13	Mallur	2956	1500	1456	956	493	463	0	0	0	1602	979	683	1294	521	773	2956
14	Managethi	3916	1998	1918	1209	604	605	74	37	37	2423	1427	996	1490	571	922	3916
15	Nagamangalam	3360	1716	1644	1295	652	643	90	40	50	1878	1143	735	1482	573	909	3360
16	Ottakottai	4703	2344	2359	1769	899	870	0	0	0	2748	1640	1108	1955	704	125	4703
17	Papanacheri	1492	736	756	342	171	171	0	0	0	1036	592	444	456	144	312	1492
18	Periyannagalur	3538	1762	1776	692	347	345	0	0	0	1975	1175	800	1563	587	976	3538
19	Periyathirukonam	2708	1320	1388	593	291	302	0	0	0	1639	963	676	1069	357	712	2708
20	Pudupalayam	3535	1750	1785	1072	536	536	3	2	1	2009	1187	822	1526	563	963	3535
21	Rayampuram	3718	1846	1872	1456	726	730	0	0	0	2095	1229	866	1623	617	100	3718
22	Reddipalayam	4126	2095	2031	510	260	250	5	3	2	2457	1432	1025	1069	663	100	4126
23	Sennivanam	1870	932	938	1179	586	593	0	0	0	1257	711	546	613	221	392	1870
24	Sinnalur	2156	1043	1112	453	230	223	0	0	0	1261	743	518	894	300	594	2156
25	Theiur	4215	2136	2079	794	400	394	4	3	1	2407	1423	984	1808	713	109	4215
26	Valaikurichi	2210	1144	1066	912	471	441	0	0	0	1833	886	737	587	258	329	2210
27	Valajiangaram	7355	3702	3653	1550	805	745	0	0	0	5078	2873	2205	2277	829	144	7355
28	Varanavasi	4087	1947	2140	1412	651	701	0	0	0	2521	1359	1162	1590	588	978	4087
29	Vilangudi	2635	1312	1323	1058	533	525	128	64	64	1526	860	666	1109	452	557	2635
Total		33198	127501	63678	63623	29651	14513	14738	711	348	363	82432	4560	35832	45069	1707	27991
Percentage		-	-	49.9	50.1	23.3	11.7	11.6	0.6	0.3	0.3	64.7	36.5	28.1	35.3	13.4	22.0

Table : 3.40 Occupation of Population and Work Forces- 2011 Census

Sl. No.	Name of the Census Village	Total Population	Workers			Non-Workers			Main Workers				Marginal Workers			
			Total	Male	Female	Total	Male	Female	Cultivators	Agriculture Labourers	Household Industries	Other workers	Cultivators	Agriculture Labourers	Household Industries	Other workers
1	Ammabacur	1594	1447	980	467	1712	514	1098	232	572	8	272	5	330	1	27
2	Ammenabath	315	243	167	76	411	148	263	32	0	0	19	0	15	1	178
3	Anandavadi	2108	1931	1130	801	2331	978	1353	712	648	31	201	30	212	12	86
4	Ariyalur (TP)	14349	10283	7815	2468	18619	8534	10085	315	670	298	2165	159	175	150	1351
5	Edayathankudi	1135	1321	698	623	870	437	433	656	419	19	154	5	61	0	7
6	Govindapuram	2502	2399	1486	913	2597	1016	1581	600	843	28	712	26	79	10	101
7	Kadugur	1627	1977	1018	959	1240	609	631	862	570	33	79	74	329	9	21
8	Kallankurichi	2663	2335	1480	855	3050	1183	1867	649	500	71	713	25	274	9	94
9	Karuppur	2385	2716	1518	1198	2067	967	1100	853	1337	64	179	29	247	3	14
10	Kavayur	1634	1806	970	838	1434	664	770	1080	299	13	133	39	165	9	70
11	Kavayabath	2602	1878	1414	464	3337	1188	2149	238	351	34	1089	17	108	5	66
12	Kilimangalam	1481	1451	850	601	1475	631	844	251	1041	7	124	3	22	0	3
13	Mallur	1500	1500	910	590	1456	590	866	829	423	22	184	8	13	9	15
14	Managethi	1996	2225	1296	929	1991	702	989	529	834	12	153	306	363	14	24
15	Nagamangalam	1716	1629	984	645	1731	732	999	743	570	1	128	3	167	1	15
16	Ottakottai	2344	2543	1396	1147	2160	948	1212	704	541	40	425	215	553	18	47
17	Papanacheri	736	936	467	469	556	269	287	339	363	3	94	16	67	6	48
18	Periyannagalur	1762	1805	1021	784	1733	741	992	756	331	62	431	4	195	1	25
19	Periyathirukonam	1320	1565	820	745	1143	500	643	899	86	28	169	5	342	2	34
20	Pudupalayam	1750	1691	1015	676	1844	735	1109	143	261	2	303	153	601	9	120
21	Rayampuram	1846	1969	1073	896	1749	773	976	678	260	36	210	50	502	14	219
22	Reddipalayam	2095	1946	1210	736	2160	885	1295	362	569	33	577	28	321	8	48
23	Sennivanam	932	1144	590	554	726	342	384	225	336	9	135	22	388	9	20
24	Sinnalur	1043	1125	629	496	1030	414	616	440	273	5	160	4	229	1	13
25	Theiur	2136	2077	1278	799	2138	858	1280	736	586	48	380	5	313	1	8
26	Valaikurichi	1144	1247	749	498	963	395	568	457	431	17	129	8	50	10	145
27	Valajiangaram	3702	3033	2017	1016	4322	1685	2637	528	475	44	1089	108	563	11	215
28	Varanavasi	1947	1802	1117	685	2285	930	1455	287	1010	17	447	4	14	0	23
29	Vilangudi	1312	1297	783	514	1338	529	809	258	616	17	349	0	24	1	32
Total		127501	59329	36881	22442	68178	26797	41381	15393	592	16173	1351	8802	321	3078	
Percentage			45.5	28.9	17.6	53.5	21.0	22.5	12.1	11.9	0.8	12.7	1.1	5.3	0.3	2.4

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

Table : 3.41 Educational Facilities in the Study Area

Sl. No.	Name of the Village	PPS*	PS*	MS*	SS*	SSS*	DC*	EC*	MC*	MI*	PT*	VTS*	SSD*
1	Aminabappur	1	1	1	1	1	c	c	c	c	c	c	c
2	Aminnabath	1	1	a	a	b	b	c	c	b	c	a	c
3	Anandavadi	1	1	1	1	1	c	c	c	c	c	b	c
4	Ariyalur (TP)	1	1	1	1	1	1	c	c	c	1	1	c
5	Edayathankudi	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	Kodugur	1	1	a	a	b	c	b	c	c	c	c	c
8	Kollankurichi	1	1	1	1	b	b	b	c	c	c	a	b
9	Koruppur	1	1	1	1	1	c	c	c	c	c	c	b
10	Kovanur	1	1	1	1	b	b	1	c	b	b	c	b
11	Kayalabath	1	1	1	1	1	a	c	c	a	c	a	b
12	Kolmangalam	1	1	1	b	b	c	c	c	c	c	c	c
13	Mallur	1	1	a	b	b	b	c	c	b	c	b	c
14	Managethi	1	1	1	1	0	a	a	c	a	a	a	c
15	Nagamangalam	1	1	1	1	a	c	b	c	b	b	c	b
16	Ottakol	1	1	b	1	b	b	c	c	c	c	a	c
17	Papanachen	1	1	1	1	b	b	c	c	b	c	b	b
18	Periyannagalur	1	1	1	1	b	b	b	c	c	c	b	1
19	Periyathirukonam	1	1	1	1	1	c	c	c	c	c	c	c
20	Putupalayam	1	1	1	b	b	b	c	c	b	c	b	a
21	Rayampuram	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	Sennivaham	1	1	1	a	a	c	c	c	c	c	b	c
24	Siruvallur	1	1	1	1	b	b	c	c	b	c	b	b
25	Theiur	1	1	1	a	c	c	b	c	b	b	c	a
26	Valaikurichi	1	1	1	b	b	c	c	c	c	c	c	c
27	Valajansagaram	1	1	1	a	a	a	c	c	a	a	1	c
28	Varanavasi	1	1	1	b	b	b	c	c	b	c	b	c
29	Vilangudi	1	1	1	1	b	b	a	c	b	b	c	b

PPS-Pre-Primary
PS-Primary School
MS-Middle School
SS-Secondary

SSS-Senior Secondary

DC-Degree College
EC-Engineering College
MC-Medical College
MI-Management College /

PT-Polytechnic
VTS-Vocational School/ITI
SSD-Special School for

*Numbers
a-Facility available at <5
b-Facility available at 5-10
c-Facility available at >10

Table : 3.42 Medical Facilities in the Study Area

Sl. No.	Name of the Village	CHC*	PHC*	PHSC*	MCW*	TBC*	HA*	HAM*	D*	VH*	MHC*	FWC*	NGM-VO*
1	Aminabappur	c	1	1	1	1	c	c	1	1	0	1	0
2	Aminnabath	a	a	a	b	b	b	b	a	b	0	a	0
3	Anandavadi	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	Edayathankudi	b	b	a	b	b	c	c	b	b	0	b	0
6	Govindapuram	b	1	1	1	1	b	b	1	b	0	1	0
7	Kodugur	1	1	1	1	1	c	c	1	b	0	1	0
8	Kollankurichi	b	b	1	b	b	b	b	b	b	0	b	0
9	Koruppur (Senopathy)	c	1	1	1	1	c	c	1	1	0	1	0
10	Kovanur	b	b	1	b	b	c	c	b	b	0	b	0
11	Kayalabath	b	b	1	a	a	a	a	b	a	0	b	1
12	Kolmangalam	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	Managethi	c	a	1	1	b	c	c	a	b	0	a	0
15	Nagamangalam	c	b	1	b	b	c	c	b	b	0	b	0
16	Ottakol	b	a	1	a	b	b	b	a	b	0	a	0
17	Papanachen	c	b	a	b	b	a	b	b	b	0	b	0
18	Periyannagalur	b	b	1	1	b	b	b	b	1	0	b	0
19	Periyathirukonam	c	b	1	b	c	c	c	b	c	0	b	0
20	Putupalayam	b	b	1	b	b	b	b	b	b	0	b	0
21	Rayampuram	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	Sennivaham	b	b	a	b	b	c	c	b	b	0	b	0
24	Siruvallur	c	b	a	b	b	b	b	b	b	0	b	0
25	Theiur	b	a	1	a	b	c	c	a	a	0	a	1
26	Valaikurichi	b	b	1	b	b	c	c	b	b	0	b	0
27	Valajansagaram	b	b	1	a	a	a	a	b	a	0	b	0
28	Varanavasi	c	0	1	b	b	b	b	0	0	0	b	0
29	Vilangudi	c	1	1	1	1	c	c	1	0	1	1	1

CHC-Community Health Centre

PHC-Primary Health Centre

PHSC-Primary Health Sub Centre

MCW- Maternity and Child Welfare Centre

TBC-TB Clinic

HA-Asiopathic Hospital

HAM- Alternative Medicine

D-Dispensary

VH-Veterinary Hospital

FWC-Family Welfare Centre

MH-Mobile Health Clinic

NGM-VO-Non Government Medical facilities In & Out

*Numbers

a-Facility available at <5

b-Facility available at 5-10

c-Facility available at >10

Table : 3.43 Communication & Transport Facilities in the Study Area

Sl. No.	Name of the Village	PO*	SFO*	P&T*	T*	PCO*	MP*	IC*	PCF*	BS*	FBS*	RS*	NH*	SH*	MDR*	BTR*	GR	AWR*
1	Ammabapur	1	b	1	1	1	1	a	b	1	1	a	b	b	1	1	1	1
2	Ammenabath	b	1	b	1	1	1	b	b	1	1	b	b	b	1	1	1	1
3	Anandavadi	a	1	a	1	b	1	b	b	1	1	b	c	c	b	1	1	1
4	Ariyalur (TP)	1	1	1	1	1	1	1	1	1	1	1	C	1	1	1	1	1
5	Edayathankudi	c	1	c	1	1	1	b	c	1	1	a	b	c	c	1	1	1
6	Govindapuram	b	1	b	1	1	1	b	b	1	1	b	b	b	b	1	1	1
7	Kadugur	b	1	b	1	1	1	a	c	1	1	a	c	a	a	1	1	1
8	Kallankurichi	1	1	1	1	1	1	1	b	1	1	b	b	b	1	1	1	1
9	Karuppur	b	1	c	1	b	1	b	b	1	1	a	1	1	1	1	1	1
10	Kavayur	a	1	a	1	1	1	a	a	1	1	a	c	b	b	1	1	1
11	Kayalabath	a	1	a	1	1	1	1	1	1	1	a	1	a	c	1	1	1
12	Kilimangalam	c	1	c	1	1	1	c	c	1	b	c	c	c	b	1	1	1
13	Mallur	b	1	b	1	1	1	b	b	1	a	b	a	a	a	1	1	1
14	Managethi	b	1	b	1	1	1	a	b	1	1	c	1	1	1	1	1	1
15	Nagamangala	b	1	b	1	1	1	c	c	1	1	c	a	1	1	1	1	1
16	Ottakol	b	1	b	1	1	1	1	1	1	1	1	b	b	b	1	1	1
17	Papanacheri	b	a	b	1	1	1	b	b	1	1	b	a	a	a	1	1	1
18	Periyannagalur	b	1	b	1	1	1	b	b	1	1	b	a	1	1	1	1	1
19	Periyathirukona	c	1	b	1	1	1	b	b	1	1	c	c	a	a	1	1	1
20	Pudupalayam	b	a	b	1	2	1	b	b	1	1	b	b	1	1	1	1	1
21	Rayampuram	1	1	1	1	1	1	b	b	1	1	b	c	b	b	1	1	1
22	Reddipalayam	c	1	c	1	1	1	1	1	1	1	c	c	1	1	1	1	1
23	Sennivanam	a	1	a	1	1	1	b	a	1	1	b	c	c	b	1	1	1
24	Siruvalur	b	1	b	1	1	1	b	1	1	b	b	a	1	1	1	1	1
25	Theiur	c	1	c	1	1	1	c	c	1	1	c	c	1	1	1	1	1
26	Vaikurichi	b	1	b	1	1	1	b	b	1	1	b	c	b	1	1	1	1
27	Valajonagaram	a	1	a	1	1	1	1	1	1	1	a	1	1	1	1	1	1
28	Varanavasi	b	1	b	1	1	1	b	b	b	b	b	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 (Kuchha) Roads

*Status

a-Facility available at <5 Kms

SFO-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 Cafes / Common Service Centre (CCC)

RO-Railway Station

MDR-Major District Road

2-Not Available

c-Facility available at >10 Kms

T-Telephones (landlines)

PCF-Private Courier Facility

NH-National Highways
OH-State Highways

BTR-Black Topped (Pucca) Roads

Table : 3.44 Other Facilities in the Study Area

Sl. No.	Name of the Village	ATM	CB	COB	ACS	SHG	PDS	RM	AMS	NC	NC-AC	CC	SF	PL	NP	APS	BDRO	PS
1	Ammabapur	b	b	a	1	1	1	a	c	1	1	1	b	1	1	1	1	1
2	Ammenabath	b	b	b	a	1	1	b	b	1	1	b	b	b	1	1	a	1
3	Anandavadi	b	1	b	1	1	1	c	c	1	1	b	1	b	a	1	1	1
4	Ariyalur (TP)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Edayathankudi	b	b	a	a	1	1	c	c	1	1	b	1	1	1	1	1	1
6	Govindapuram	b	b	b	1	1	1	b	b	1	1	1	1	b	1	1	1	1
7	Kadugur	c	c	a	a	1	1	c	c	1	1	c	1	1	1	1	1	1
8	Kallankurichi	b	b	b	b	1	1	b	b	1	1	1	1	a	1	1	1	1
9	Karuppur	b	b	1	1	1	1	c	c	1	1	b	b	1	1	1	1	1
10	Kavayur	b	b	c	b	1	1	c	c	1	1	b	1	1	1	1	1	1
11	Kayalabath	a	a	a	b	1	1	a	a	1	1	1	1	1	1	1	1	1
12	Kilimangalam	c	b	a	b	1	1	c	c	1	1	1	1	1	1	1	1	1
13	Mallur	b	b	b	b	1	1	b	b	1	1	1	a	a	1	1	1	1
14	Managethi	b	a	a	b	1	1	c	c	1	1	1	1	1	1	1	1	1
15	Nagamangalam	a	a	b	b	1	1	c	c	1	1	1	1	a	1	1	1	1
16	Ottakol	b	b	b	b	1	1	b	b	1	1	1	1	b	1	1	1	1
17	Papanacheri	b	b	b	a	1	1	b	b	1	1	a	1	1	1	1	1	1
18	Periyannagalur	b	b	b	1	1	1	b	b	1	1	a	b	b	1	1	1	1
19	Periyathirukonam	b	c	1	1	1	1	c	c	1	1	b	b	1	1	1	1	1
20	Pudupalayam	b	b	1	1	1	1	b	b	1	1	b	a	a	1	1	1	1
21	Rayampuram	b	b	b	1	1	1	c	c	1	1	1	1	1	1	1	1	1
22	Reddipalayam	1	1	1	b	1	1	c	c	1	1	a	a	1	1	1	1	1
23	Sennivanam	b	b	b	a	1	1	c	c	1	1	a	a	a	1	1	1	1
24	Siruvalur	b	b	a	a	1	1	b	b	1	1	a	1	1	1	1	1	1
25	Theiur	a	c	c	a	1	1	c	c	1	1	b	a	a	1	1	1	1
26	Vaikurichi	b	b	b	b	1	1	b	c	1	1	b	b	b	1	1	1	1
27	Valajonagaram	a	a	a	b	1	1	a	a	1	1	1	1	1	1	1	1	1
28	Varanavasi	b	b	1	b	1	1	b	b	1	1	1	b	b	1	1	1	1
29	Vilangudi	a	a	a	1	1	1	c	c	1	1	a	1	1	1	1	1	1

CB-Commercial Bank

PDS-Public Distribution System (Dhot)

NC-AC-Nutritional Centres- Anganwadi Centres

NP-Daily Newspaper Supply

ATM-Automatic Teller Machine

a-Facility available at <5 Kms

COB-Co-operative Bank

RM-Regular Market

CC-Community Centre with/without TV

APS-Assembly Polling Station

*Status

b-Facility available at 5-10 Kms

ACS-Agricultural Credit Societies

AMD-Agricultural Marketing Society

SF-Sports Field

BDRO-Birth and Death Registration Office

1-Available

c-Facility available at >10 Kms

SHG-Self Help Group

NC-Nutritional Centres-ICDS

PL-Public Library

PS-Power Supply

2-Not Available

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.

Public Health : Common diseases were only reported. 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.

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 the Project : Almost all villagers are aware about the DCBL Mines in the region and welcoming the Proposal.

3.11 Summary of Baseline Status

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 was found to be in compliance with the Revised National Ambient Air Quality (NAAQ) 24-hourly Norms for Industrial, Residential, Rural & 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 an existing Mines with all required infrastructures, it **does not involve any major establishment or construction**. Thus, Construction Phase Impacts are not there for Impact Assessment and Environmental Management Plan (EMP).

4.3 Impacts during 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. However, following industrial activities are considered for **Cumulative Impact Assessment** for assessing their contribution (**Table 4.1**). 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 following activities related to the Operational Phase of the Project are considered for the impact assessment :

- ❖ Slope Stability.
- ❖ Influence of Mining activity on Kallar River.
- ❖ Land Environment.
- ❖ Climate Change.
- ❖ Traffic Volume.
- ❖ Air Quality.
- ❖ Water Environment - Hydrogeological Impact.
- ❖ Noise Levels.
- ❖ Biological Environment.
- ❖ Socio-economics.

Table : 4.1 Industrial Activities considered for Cumulative Impact

Sl. No.	Industry / Mine	Extent & Consented Production	Bearing & Contribution during Study Period
1	Dalmia PeriyanaGalur & AK Limestone Mines	167.605 Ha (1.9 MTPA)	Study Lease
2	Ramco Amalgamated Mining Lease	53.320 Ha (3.00 MTPA)	Adjacent Lease in operation. Upwind side & contributing - Traffic Volume
3	UltraTech PeriyanaGalur Limestone Mine (ML5)	4.985 Ha (0.15 MTPA)	Adjacent Lease in Upwind side & not in operation.
4	TANCEM PeriyanaGalur & Khairulabad, Mines	194.165 Ha 66.110 Ha	Adjacent Lease; Not in operation. Downwind side & not contributing
5	TANCEM Kallankurichi Mine	240.610 Ha (expansion 0.2 to 0.7 MTPA)	Downwind side & not contributing
6	Ultratech Cement Plant, Reddipalayam	1.6 MTPA	Plant located near the Lease & not contributing other than Traffic Volume

4.3.1 Scientific Study on Slope Stability

The Department of Mining Engineering, Anna University conducted the Pit Slope Stability study in May 2024 and submitted the Report. This one of the oldest mining operations in South India. The mine was mechanized during the year 1977. Zero accidents have been reported since opening of the mine. Nearly 2.0 million safe man hours were recorded during the last 10 years.

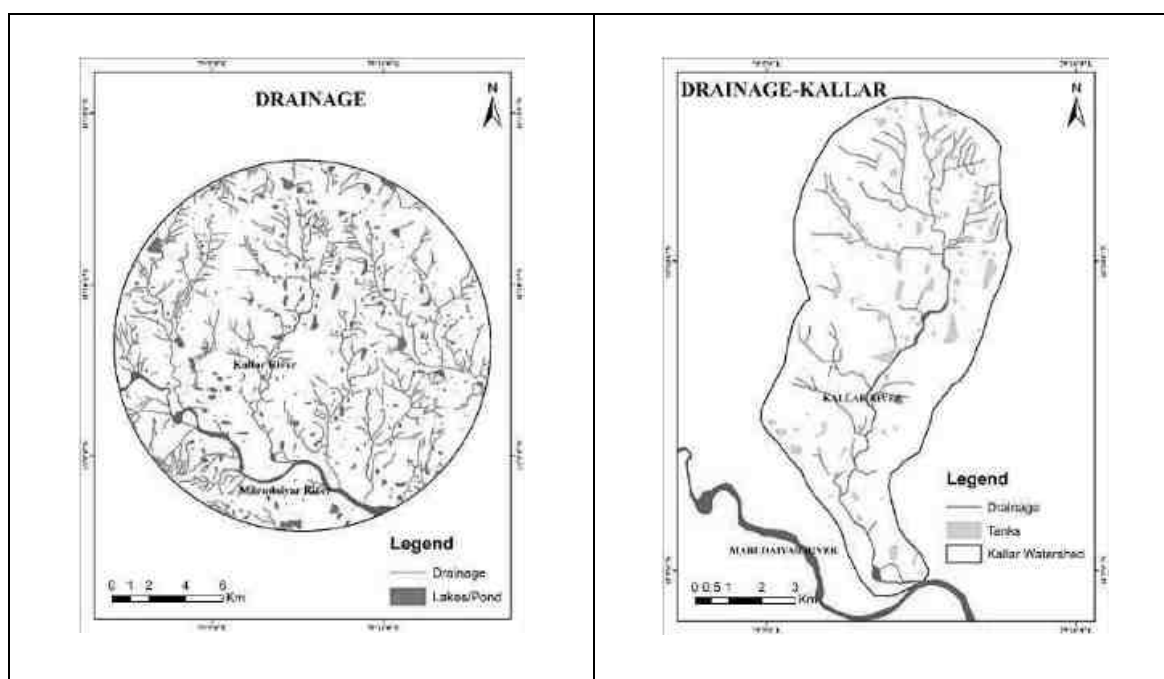
Mine in GE Imagery



Stability of slopes can be expressed in terms of factor of safety, strain, probability of failure, load and resistance factor design (LRFD). Out of these, factor of safety is an important and popularly used index for design of slopes. Factor of safety (FOS) of 1.3 will generally be adequate for mine slopes which are not required to remain stable for long periods of time. For critical slopes adjacent to haul roads or important installations, a **FOS of 1.5 is usually preferred**. The stability of slope in the mine is evaluated in term of critical SRF value which is in the range of **1.512 - 1.681**. Thus, the Pit is stable.

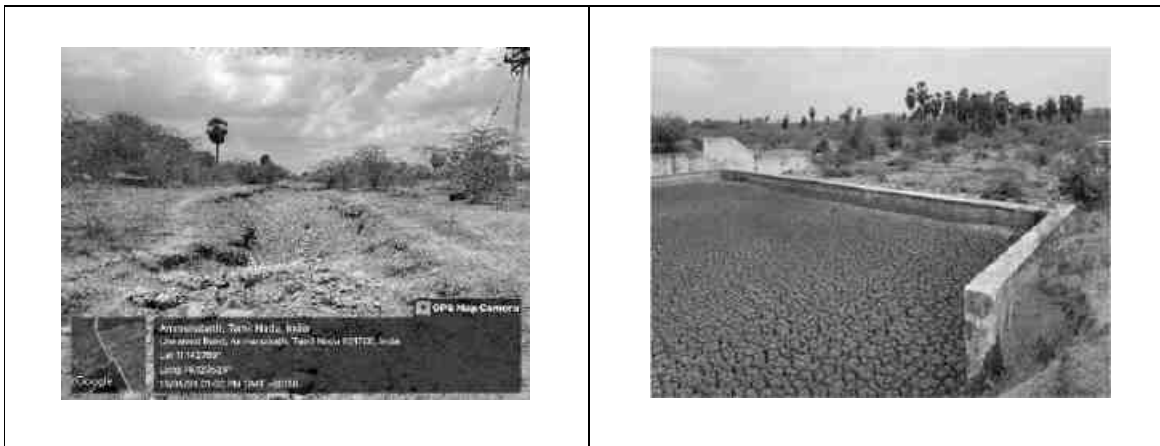
4.3.2 Influence of Mining Activity on Kallar River

Dalmia Limestone mines are located within the Cauvery river basin in peninsular India. The streams in the mining area generally show dendritic drainage patterns. The Kallar river flows adjacent to the mines and that drain in the Marudaiyar river which subsequently flows into the Cauvery River. Mostly the Kallar River is dry almost throughout year. Kallar watershed area is shown in the appended Figure.



Kallar River is a shallow and small stream which is of seasonal in nature. Thickness of sand bed in the river bed is very less i.e. less than a meter in most of the places. The sand available below the thin layer of mud (about 40 cm) is taken by the village people for construction purpose by putting small trenches here and there in the river bed. The river sand is not available everywhere in the river course. Since the thickness of sand bed is less (about 1 - 2 m), and flood plains are not significant near the proposed amalgamation site, influence of Kallar River on the mine and vice versa will be minimum.

A check dam has been constructed across Kallar River at Kallankurichi village by the Water Resource Department (WRD) of Public Works Department (PWD) in the upstream side of the proposed amalgamation mine.



Check Dam Profile :

Crest level of the Body Wall is 73.265 m.

Front Maximum Flood Level (FMFL) is 74.665 m.

Length of the check dam is 50 m.

Height is 1.2 m.

Maximum Flood Discharge (MFD) is 3600 Cusecs (m^3/Sec).

Maximum depth of occurrence of limestone in this area is about 30 m below ground level. One pit out of three pits has reached the depth of 22 m. Adjacent to this pit, an abundant pit of Chettinad Cements is available with stagnant water. This pit is located very close to the Kallar River. A bund with vegetation cover is separating the river and the abundant pit. So for negative impact is not evidenced by the pit on Kallar River and vice-versa.

Due to the water availability in the pit, seepage of water is taking place in the AK mines of Dalmia. Since the seepage is minimum, the seepage water is being pumped out using a pump of 50 HP capacity with 6" diameter pipe. The mine water pumped out from this pit is discharged into a small shallow drain on the surface. Eventually, this water is discharged into the Kallar River after the removal of silt by creating a barrier across the drain. This mine water is being utilized by the farmers to grow crops in their land located adjacent to the river course.

The regional flow direction of Kallar River is towards SSW, whereas the dip of beds is towards NE. Therefore, it is clearly observed that the beds are dipping against the flow direction of the Kallar River (nearly upstream dipping). This is one of the important reason that the seepage of river water into the mine is minimum. In addition, the formation is also not much permeable. The river has no significant command areas (fertile areas irrigated using river water) in either sides of the river banks. The area is mostly barren with pockets of non-ayacut areas (areas irrigated using

well/bore well water). Ayacut areas (areas irrigated using pond/lake water) are not significant in this region. Since the thickness of sand bed is less (about 1 to 2 m), and flood plains are not significant near the proposed amalgamation site, influence of Kallar River on the mine and vice versa will be minimum.

It is observed that agricultural fields are not seen around the check dams / recharge ponds located within 2 km radius since the soil is not much favorable to rise crops. Therefore, **agricultural activities are limited** in this area.

As per the records, the maximum flood discharge (MFD) of Kallar River is about 3600 Cusecs (m^3/sec) only, and Maximum Flood Level (MFL) is about 74.665 m above mean sea level. Therefore, flooding in Kallar River may not affect the mining activity.

4.3.3 Land Environment

Anticipated Impacts : Industrial/Mining activities are being carried out in an extent of **766.965 Ha** in the Impact Zone. **There is no additional Land requirement for the Proposal.** There is **Drilling and Blasting** proposed and thus, vibration impact will be there due to mining. However, as experienced during the Blastings, Peak Particle Velocity (PPV) levels reduced considerably from 100 m distance onwards from the blast site. There is no effect of ground vibrations and fly rock caused due to blasting operations carried out in the Mine, on the stability of village structures vis-à-vis the present distances.

There is no Top Soil available at the mine as entire Top Soil generated i.e., 1,44,285 cu.m was fully utilised for Green Belt development. Mineral Rejects to the extent of 25,66,662 Tons will be generated and dumped as Dump-2 in the western side of the Lease. At the Conceptual Stage, about 69.79 Ha will be opened out Pit Area which will be converted as water reservoir, 18.58 Ha will be under OB dump, 1.56 Ha under Utilities, 6.26 Ha under Green Belt (6.5% Coverage).

Mitigating Measures :-

- ❖ Earthen bunds are to be strengthened along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be maintained periodically around the Lease.
- ❖ Green Belt has to be developed and maintained along Lease boundary and Safety Barriers.
- ❖ No. of **trees planted shall be numbered** and referenced for review.
- ❖ No Blastings shall be carried out during night times and overcast conditions.
- ❖ Vibration Studies/Monitoring has to be carried out whenever Blastings carried out.
- ❖ Vibration Parameters viz. Peak Particle Velocity (PPV) and Noise Levels during Blastings shall comply with DGMS Norms for Residential Areas.
- ❖ The mined out Pits shall be converted into a Water Reservoirs to harvest Rain Water and to recharge the Ground Water-table in the vicinity.

4.3.4 Geothermal/Hydrothermal Effect

Land surface temperature (LST) is an important factor in many areas like climate change, urban land use/land cover, heat balance studies and also a key input for climate models. In this study, the LST has been estimated with respect to Normalized Difference Vegetation Index (NDVI) values determined from the Red and Near Infrared bands. Land Surface Emissivity (LSE) is retrieved directly from Thermal Infrared bands. This study focuses on Raster functions and Raster calculation in GIS environment using the LANDSAT 8, Thermal Bands (10 & 11).

The decrease of land surface temperature (LST) in reclaimed mining site can be taken as indication of environmental quality improvement. Remote sensing technology can be used to assess the effect of land-cover characteristic of mining-affected landscape on LST. The increase in the emission of carbon dioxide (CO₂) in the atmosphere has been identified as a driving cause of global climate change.

The LST and carbon stocks distribution over the mining region can be observed for different land use/land cover change patterns in the region. The results revealed that Ariyalur District has indeed experienced warming in both maximum and minimum temperatures over the last decade and distributions of carbon densities over the study area.

4.3.5 Carbon Emission & Climate Change

Greenhouse gases include carbon dioxide, methane, nitrous oxides, and water vapour. The proposed quarrying and transporting activities will utilise about 7,000 Litres HSD/day. By considering the Transport Emission Factors for Medium & Heavy Duty Trucks viz. 0.997 g 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 are computed and given.

HSD consumption	:	7,0500 LPD
Total CO ₂ Emissions	:	0.698 Tons/Annum
CO _{2-e} for CH ₄ Emissions	:	0.210 Tons/Annum
CO _{2-e} for N ₂ O Emissions	:	1.669 Tons/Annum.

Thus, total CO₂ Emission due to the Proposal will be **2.577 Tons/Annum**.

Mitigating Measures : -

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.

The primary way that carbon is stored in the soil is as *soil organic matter (SOM)*. 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 health**. **Bio remediation** using micro organisms will be carried out to restore the soil environment to enable carbon sequestration.

The Green Belt developed **will be a significant carbon sequestration step** to achieve climate goals in the Project vicinity. Also, DCBL has installed 11 MW Solar Plant in Ariyalur Plant and **utilising solar energy** for lighting purpose in the Mines.

4.3.6 Traffic Volume

Anticipated Impacts: Limestone Transportation of Ramco Mines, TANCEM Mines and partly Dalmia Mines (meant for Ariyalur Plant) is through SH-139 towards Ariyalur. Limestone Transportation of Dalmia Mines (meant for Dalmiapuram Plant) is through SH-139 towards V.Kaikatti on NH-81. The traffic volume due to other Mines in the vicinity is covered in the Baseline Status. For assessing the baseline status, the Traffic Survey based on Indian Road Congress-IRC: 64/106 Norms were carried out at Dalmia PNR Haulage Road-SH 139 Junction on a week day (24.01.2024; Wednesday) and week end (28.01.2024; Sunday). The existing traffic volume in the Project vicinity was found to be **5,251.1 Passenger Car Units (PCUs)/day (Table 4.2)**.

Table : 4.2 Existing Traffic Volume - Baseline Status

Type of Vehicle	Dalmia PNR Haulage Road - SH 139 Junction				
	No. of Vehicles/day			PCU Factor	PCU/day
	Week Day (24.01.2024; Wednesday)	Week End (28.01.2024; Sunday)	Avg. Traffic		
2-wheelers	468	514	474.6	0.5	237.3
Autos	42	36	41.1	1.0	41.1
Vans/Tempos	54	42	52.3	1.0	52.3
Cars	252	288	257.1	1.0	257.1
Buses	118	84	113.1	3.0	339.4
Trucks	1478	1104	1424.6	3.0	4273.7
Trailers	12	6	11.1	4.5	50.1
Total	2424	2074	2374.0	-	5251.1

In the Post-Project Scenario, there will be **no addition** from this Amalgamated Mine as the **existing Production will remain same**.

Level of Service (LOS) : Capacity Standards of Roads are fixed in relation with the LOS which is commonly designated from 'A' (best operating condition) to 'F' (forced or breakdown flow). Normally LOS-C will be adopted for smooth traffic flow in Urban/Rural Areas (**Table 4.3**). At this Level, traffic volume will be 0.7 times of the maximum capacity. Capacity/Design Service Volume is the maximum hourly volume at which a vehicle can be expected to transfer a point/section of a road at a given time period. Ratio of existing Volume of PCU on road (V) and its Capacity (C) with corresponding LOS and their performance is given in **Table 4.4**.

Table : 4.3 Level of Service & Performance of a Road (IRC:64-1990 Norms)

Volume/Capacity Ratio	Level of Service	Performance of the Road
0-0.2	A	Excellent
0.2-0.4	B	Very Good
0.4-0.6	C	Good/Average/Fair
0.6-0.8	D	Poor
0.8-1.0	E	Very Poor

Table : 4.4 Predicted Traffic Scenario at the Junction

Road	Volume, PCU/hr.	Capacity of the Road, PCU/hr.	V/C Ratio	Level of Service	Performance of the Road
Existing:-					
PNR Road-SH 139 Junction	218.8	3600	0.06	A	Excellent
Proposed :-					
PNR Road-SH 139 Junction	No change	-		A	Excellent

Thus, there will not be any impact on the existing baseline traffic volume due to the Proposal. Adequate parking area is provided in the Mine Area. Facilities for **drivers (rest room, toilet, etc.)** are also provided.

Mitigating Measures :

- ❖ Regular wetting of haul roads has to be undertaken to arrest the fugitive emissions.
- ❖ Tippers are to be fully covered with Tarpaulin to avoid any spillage on transportation.
- ❖ 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 for the Tippers which has to be checked periodically.

- ❖ Restriction of Truck parking in the Public Road has to be implemented.
- ❖ Regular and preventive maintenance of transport vehicles has to be ensured.
- ❖ Effective Green Belt with thick foliage has to be developed and maintained.
- ❖ Security Guards are to be placed at the Public Road-Mine Haulage Road Junction to handle the inward and outward vehicles.

4.3.7 Air Quality

The Drilling & Blasting, Excavating, Loading, Unloading and Transporting activities would generate both fugitive dust emissions and smoke from Heavy Earth Moving (HEM) Machineries and Transporting Tippers. Fugitive emissions are predicted by using standard equations given in 'Indian Mine and Engineering Journal' and suggested by USEPA (Emission Factors as referred in AP-42) for Mining and Allied activities.

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 :

<u>Activity</u>		<u>Emission Factor</u>
Drilling & Blastings	=	0.6 kg/hole
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.

Accordingly, the computed values for various activities are given in **Table 4.5**.

Table : 4.5 Emission Levels-Inputs

Activity	Emissions on Amalgamation, g/sec	
	PM2.5	PM10
Excavation	5.51814E-09	1.83938E-08
Drilling & Blasting	4.94291E-06	1.64764E-05
Loading	6.78077E-09	2.26026E-08
Rejects-Haulage	1.45336E-07	4.84454E-07
Ore transportation	1.2278E-06	4.09268E-06
Total	6.32835E-06	2.10945E-05

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 (Table 4.6).

Table : 4.6 Maximum Mixing Height (meter) with Standard Deviation over Indian Region

Name of Station	Seasons					
	Winter		Pre-monsoon		Post-monsoon	
	Mixing Ht.	Std. Dev.	Mixing Ht.	Std. Dev.	Mixing Ht.	Std. Dev.
Chennai	1063.75	153.92	1274.45	111.79	1010.5	109.39

Prediction Modelling : AERMOD View Software is used for Predicting the maximum Ground Level Concentrations (GLCs) including **Transportation Impact**. Model Inputs and Outputs are appended. The predicted GLCs are given in Table 4.7.

Model Input -PM2.5

Source Pathway - Source Inputs

AERMOD

Area Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s (x m ³ /s)]	Length of X Side [m]	Length of Y Side [m]	Orientation Angle from North [deg]	Initial Vertical Dis. [m]
AREA	GO50	295573.50	1231698.70	100.00	1.50	6.36E-7	50.00	50.00	0.00	
		Mine Pit - Cumulative								

Model Output -PM2.5

Results Summary

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PM2.5 - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.29008	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	02-12-2023, 24
24-HR	2ND	0.27110	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	23-01-2024, 24
24-HR	3RD	0.26078	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	26-12-2023, 24
24-HR	4TH	0.21626	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	25-12-2023, 24
24-HR	5TH	0.20277	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	08-12-2023, 24
24-HR	6TH	0.20169	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	22-01-2024, 24
24-HR	7TH	0.19471	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	07-12-2023, 24
24-HR	8TH	0.18396	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	27-12-2023, 24
24-HR	9TH	0.18116	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	21-01-2024, 24
24-HR	10TH	0.18113	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	24-01-2024, 24
PERIOD		0.10439	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	

Model Input -PM10

Source Pathway - Source Inputs

AERMOD

Area Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g (s-m ²)]	Length of X Side [m]	Length of Y Side [m]	Orientation Angle from North [deg]	Initial Vertical Dim. [m]
AREA	GO50	295573.50	1231698.70	100.00	1.50	2.00E-5	50.00	50.00	0.00	
		Mine Pit - Cumulative								

Model Output -PM10

Results Summary

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PM10 - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.91220	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	02-12-2023, 24
24-HR	2ND	0.85251	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	23-01-2024, 24
24-HR	3RD	0.82007	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	26-12-2023, 24
24-HR	4TH	0.68008	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	25-12-2023, 24
24-HR	5TH	0.63763	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	08-12-2023, 24
24-HR	6TH	0.63424	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	22-01-2024, 24
24-HR	7TH	0.61230	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	07-12-2023, 24
24-HR	8TH	0.57818	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	27-12-2023, 24
24-HR	9TH	0.56968	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	21-01-2024, 24
24-HR	10TH	0.56958	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	24-01-2024, 24
PERIOD		0.32825	ug/m ³	295498.59	1231648.82	10.00	0.00	10.00	

Table : 4.7 Predicted GLCs

Sl. No.	Pollutant	Background Concentration (24-hly. Avg.), ug/m ³	Max. Predicted Ground Level Concentration, ug/m ³	Distance from the Pit (max.), km	Total Concentration, ug/m ³	Revised NAAQ Norms, ug/m ³	Buffer Available in the Atmosphere
1	PM2.5	25.30	0.29	0.12	25.59	60	57.35%
2	PM10	45.30	0.91	0.12	46.21	100	53.79%

The **maximum incremental GLC** for PM2.5 is 0.29 ug/m³ & PM10 is 0.91 ug/m³. As per the prediction, **Adequate Buffer (53.79-57.35%) for PM exists** in the Air Environment for the proposed activity. The predicted GLCs are **superimposed on the baseline map** to arrive at the likely resultant concentrations due to the Proposal (**Figs. 4.1-4.2**). The cumulative impacts were found to be confined locally i.e. within 0.12 km radius. The predicted value will not have any significant impact on the Air Environment.

Pollutants SO₂ and NO_x emissions due to mining activities and their Predicted values are found to be low and are not reported.

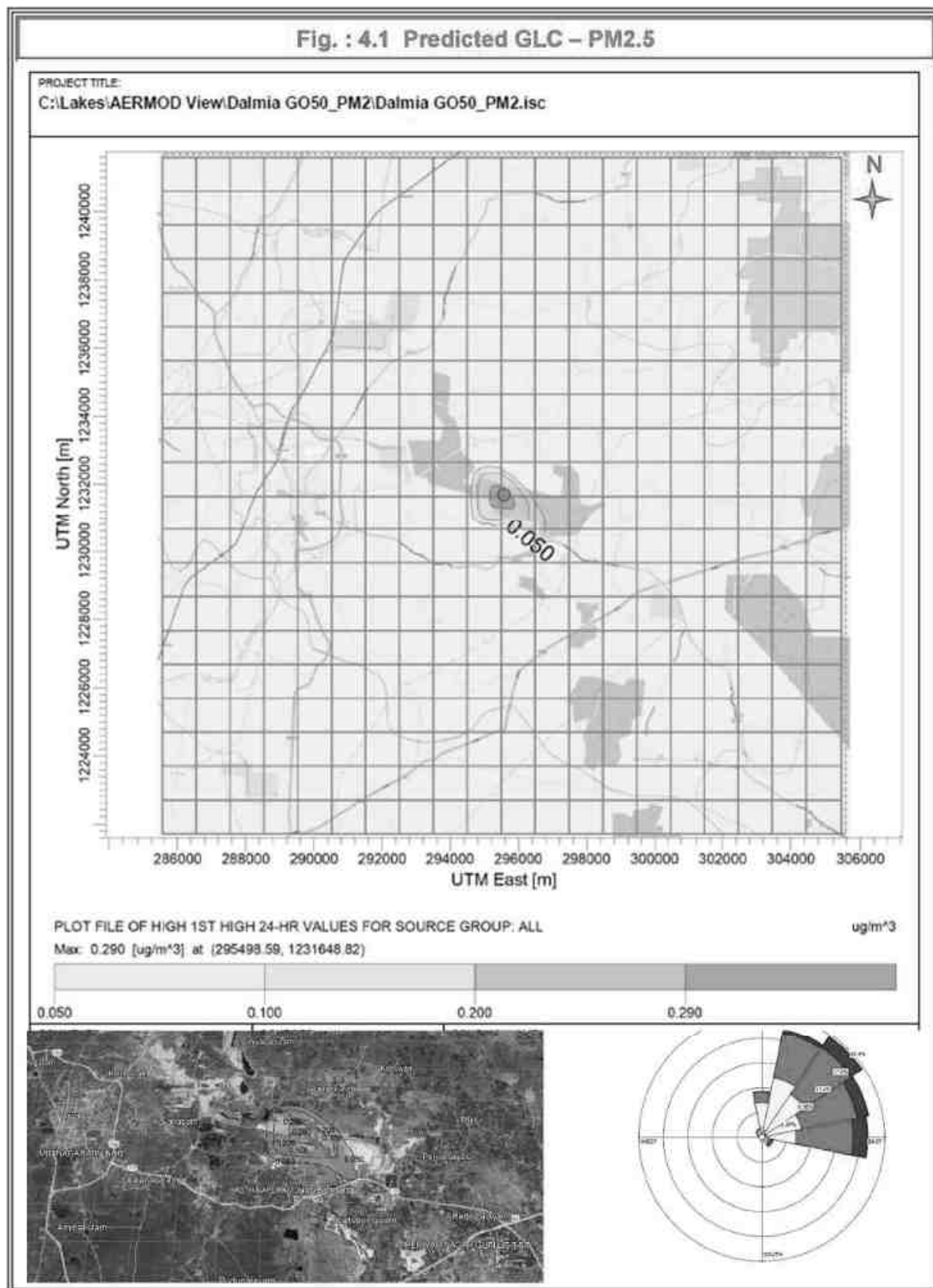
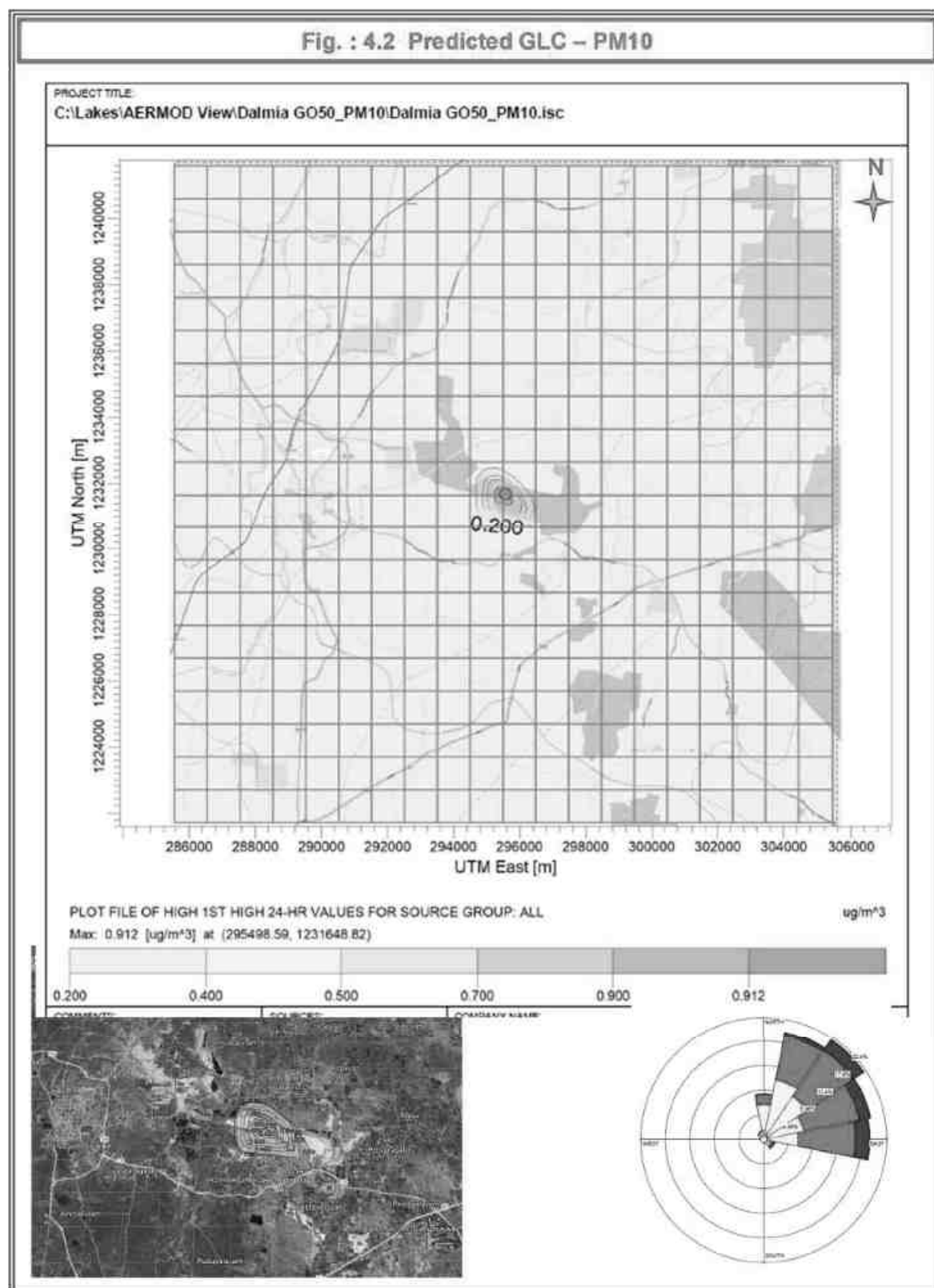


Fig. : 4.2 Predicted GLC – PM10



Mitigating Measures :

- ❖ Controlled Blasting has to be carried out and during day times only.
- ❖ No Blasting is carried out during overcast conditions.
- ❖ Water sprinkling on the Mining areas, loading point, haul roads, etc. has to be carried out.
- ❖ Covering of Trucks/Tippers with tarpaulin shall be ensured during Mineral transportation.
- ❖ Over loading of Tippers has to be avoided to control the spillages during transportation.
- ❖ Periodical maintenance and replacement of worn out accessories in the mine equipments.
- ❖ Tippers are to be maintained periodically.
- ❖ Periodical check up of vehicles for 'Emission Under Control' Certificate is to be ensured.
- ❖ Effective Green Belt with thick foliage has to be developed along boundaries and haul roads.
- ❖ Periodical Air Quality Monitoring shall be carried out and Reports submitted to the Authorities.

4.3.8 Noise Levels

The blast induced ground vibration is controlled and maintained within permissible limits by using milli second delay detonators (MSDD) and NONEL shock tubes. The peak particle velocity (PPV) and noise levels during the blasting will be periodically monitored through 'Minimate' Instrument. In general, the work force is exposed to <85 dB(A) levels during the 8-hours Shift. Noise level at the nearest Lease boundary will be <55 dB(A) during day times and <45 dB(A) during night times and which will be within the MoEF&CC Norms for Residential and Rural Areas.

Mitigating Measures :

- ❖ The noise and vibration generated due to the blasting operations shall be kept well within the limits by using milli-second delay electric detonators and by using Non-electric initiation system of blasting which completely eliminates air-blasts and thus reduces noise due to blasting.
- ❖ Deploying mining equipments shall be with in-built mechanism for reducing noise.
- ❖ Provision of silencers to modulate the noise generated by the machines.
- ❖ 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 along roads and around lease boundary as acoustic barriers.
- ❖ Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.

4.3.9 Water - Scientific Study on Hydrogeology

The Lease requires about 15 KLD towards domestic consumption (5 KLD), and Dust Control Measures & Green Belt (10 KLD) which is met from mine pit seepage water. As per the State Ground Water Board (SGWB), the area falls in '**Semi Critical**' Category. Domestic sewage generation will be about 4.5 KLD which will be biologically treated in a Septic Tank followed by a

Dispersion Trench. About 0.12 KLD effluent generation from the small Workshop which is treated in an Oil Separation Filter and treated effluent is used for Green Belt. 'Zero Effluent Discharge' will be adopted.

There will be **no Ground Water-table Intersection** due to the Mining and thus, no significant impact anticipated on the Ground Water regime. To pump out rain water collected in the Pit, a 7.5 HP Pump will be used. Dewatering will be @ 50 KLD during summer season and 125 KLD during the rainy periods.

Aquifer Characteristics : In order to find the aquifer characteristics, **Pumping Test** has been conducted in the Borewell near the Mine on 10.05.2024. The depth of the borewell is 90 m and is pumped with a 5 HP submersible pump. The average discharge of the pump was set for 13.4 cu.m per hour. Pumping was done for a total duration of 66 minutes and the recovery was monitored for about 93 minutes. The water level in the pumping well was monitored at regular intervals along with discharge. The drawdown of water levels in the well was measured and given in the **Table 4.8**.

The static water level was at 11.54 m before the starting of the test and went down upto 60.47m. The plot of Drawdown Vs Time and the plot of Residual Drawdown Vs t/t' was done using the pump test data and the draw down per log cycle was estimated in each plot. The transmissivity value is estimated using the formula :

$$T = \frac{2.30 \times Q}{4 \times \pi \times \Delta S}$$

Where T is Transmissivity in m²/day

Q is the pumping rate in m³/day

π is a 3.14 & ΔS is drawdown per log cycle.

The drawdown per log cycle estimated from drawdown data ie., Δ S = 22m. the estimated transmissivity value is

$$T = \frac{2.30 \times 312}{4 \times 3.14 \times 22} = 2.59 \text{ m}^2/\text{day}$$

The drawdown per log cycle estimated from recovery data ie., Δ S = 26m. the estimated transmissivity value is :

$$T = \frac{2.30 \times 312}{4 \times 3.14 \times 22} = 2.19 \text{ m}^2/\text{day}$$

Average "T" value of the Limestone aquifer is estimated to be 2.39 m²/ day

The limestone aquifer is observed to be very low in terms of transmissibility and hydraulic conductivity.

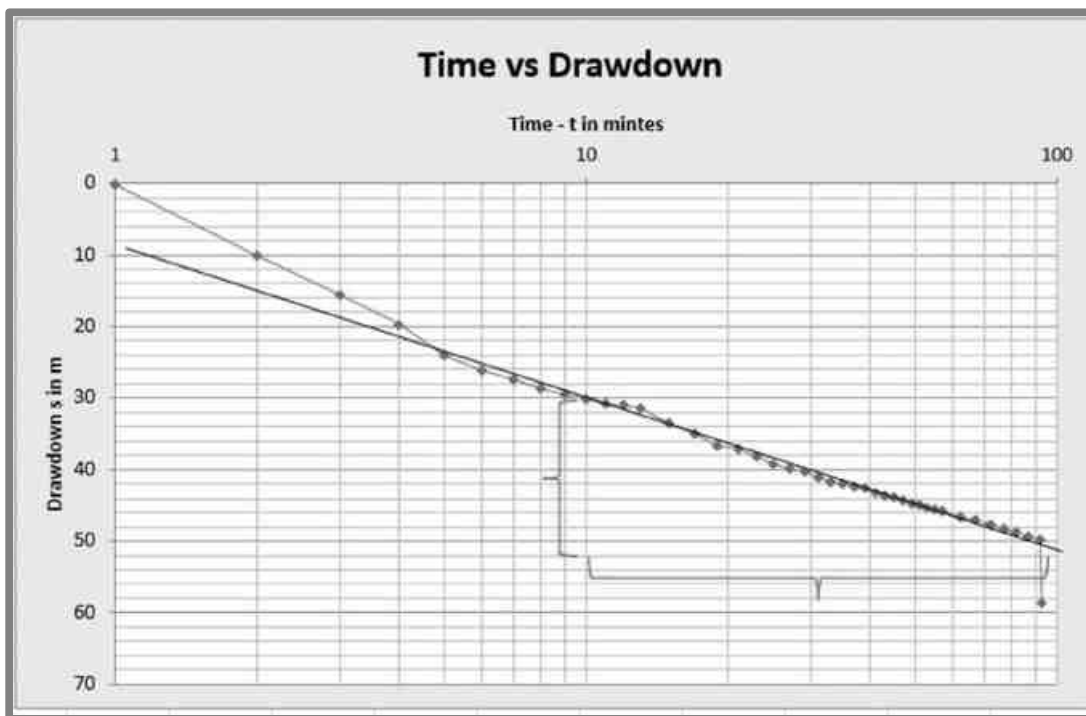
Table : 4.8 Pumping Test

Pumping Test Borewell ID Location - Near Mine Office Date : 10.05.2024	S.W.L = 11.54 m Q= 20 cum/hr.
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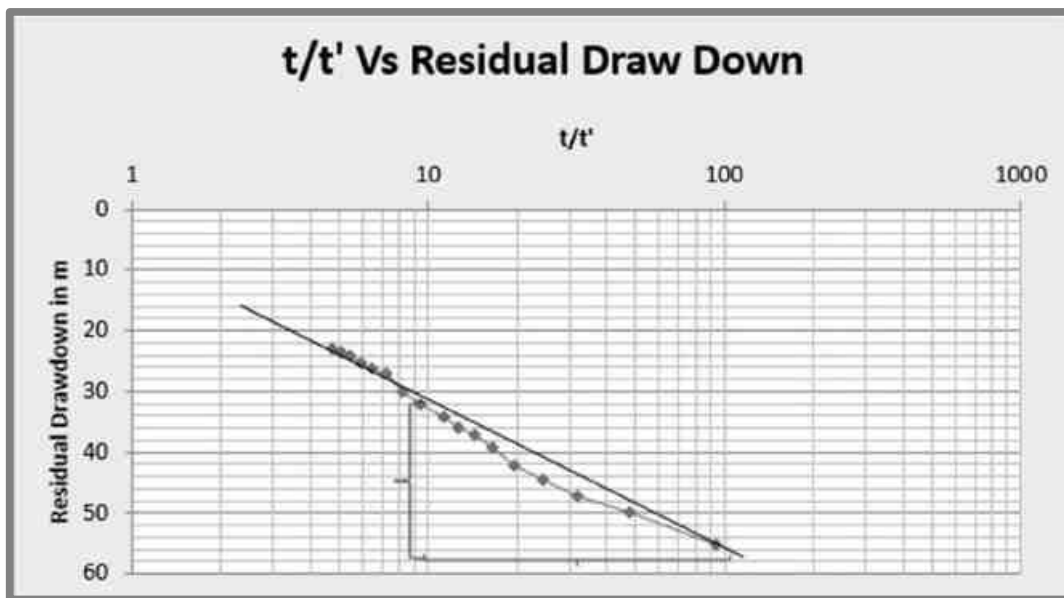
Time since Pump Start, minutes	Pumping Water Level in meter	Drawdown in meter	Discharge / Remarks
0	11.54	0.00	SWL
1	11.67	0.13	Pump Started
2	21.59	10.05	
3	27.13	15.59	
4	31.24	19.70	Yield : 14000 LPH
5	35.50	23.96	
6	37.58	26.04	
7	38.97	27.43	
8	40.30	28.76	
9	41.02	29.48	
10	41.70	30.16	
11	42.29	30.75	
12	42.57	31.03	
13	42.94	31.40	
15	45.04	33.50	
17	46.52	34.98	
19	48.13	36.59	
21	48.65	37.11	
23	49.64	38.10	
25	50.67	39.13	
27	51.32	39.78	Yield : 13400 LPH
29	51.83	40.29	
31	52.63	41.09	
33	53.26	41.72	
35	53.47	41.93	
37	53.88	42.34	
39	54.19	42.65	
41	54.77	43.23	Yield : 13200 LPH
43	55.12	43.58	
45	55.47	43.93	
47	55.89	44.35	
49	56.18	44.64	
51	56.46	44.92	
53	56.78	45.24	
55	57.07	45.53	
57	57.39	45.85	
62	58.17	46.63	
67	58.65	47.11	
72	59.18	47.64	
77	59.86	48.32	Yield : 12980 LPH
82	60.34	48.80	
87	60.84	49.30	
92	61.31	49.77	
93	60.47	58.65	Pump Stopped

Recovery Test

Time Since Pumping Started (Minutes) t'	Time Since Pumping Stopped (Minutes) t'	t/t'	Depth To Water Level (M)	Residual Draw Down (M)	Remarks
94	1	94.0	56.91	55.09	
95	2	47.5	51.56	49.74	
96	3	32.0	49.02	47.20	
97	4	24.3	46.46	44.64	
98	5	19.6	44.00	42.18	
99	6	16.5	41.09	39.27	
100	7	14.3	39.00	37.18	
101	8	12.6	37.79	35.97	
102	9	11.3	36.07	34.25	
104	11	9.5	33.81	31.99	
106	13	8.2	31.79	29.97	
108	15	7.2	28.74	26.92	
110	17	6.5	28.00	26.18	
112	19	5.9	27.00	25.18	
114	21	5.4	26.03	24.21	
116	23	5.0	25.36	23.54	
118	25	4.7	24.67	22.85	
123	30	4.1	23.49	21.67	
128	35	3.7	22.10	20.28	
133	40	3.3	21.72	19.9	
138	45	3.1	20.86	19.04	
143	50	2.9	20.30	18.48	
148	55	2.7	19.75	17.93	
153	60	2.6	19.23	17.41	
246	153	1.6	15.85	14.03	



Drawdown Curve of the Aquifer



Recovery Curve of the Aquifer

Mitigating Measures :

- ❖ The increased Mine Pit Water has to be utilized gainfully by increasing the supply to nearby Villages for Domestic Consumption as well as to agricultural activities nearby.
- ❖ Mine Pit Water shall not be directly discharged without ensuring its quality.
- ❖ Ground Water NOC for Dewatering has to be obtained/renewed from SGWA/CGWA Authority.
- ❖ Periodical Monitoring of Water Level Data from existing Piezometer and nearby Wells in the vicinity has to be carried out along with the water quality.
- ❖ Effective Afforestation in Backfilled Areas, with native species, is to be done.
- ❖ Garland Drains and Settling Tanks are to be maintained and desilted periodically.
- ❖ The de-silted quantity from the Garland Drains has to be used for Green Belt/Afforestation.
- ❖ Ground Water Levels and Water Quality are to be periodically monitored at the identified Borewells & Dugwells in the Mine vicinity.
- ❖ The monitored Water Quality data are to be periodically submitted to the IBM and with half-yearly Compliance Reports to SEIAA-TN & Regional Office, MoEF&CC, Chennai.

4.3.10 Biological Environment

There is no habitat fragmentation or blocking of migratory corridors due to Project activities since there is no wild life movement or migratory birds movement in the study area. Thus, there will not be any significant impact on the existing flora-fauna of the area. ML area is surrounded by Mines & Mineral bearing areas, barren lands and dry agricultural lands within 1.0 km area. As the baseline AAQ are in lower levels as well as Predicted GLC is very low/insignificant, there **will not be any impact on the surrounding dry agricultural lands** due to the Project.

Mitigating Measures :

- ❖ Effective Green Belt has to be developed and maintained, with the guidance of DFO, with about 90% Survival Rate.
 - ❖ Native species shall be preferred for Green Belt development.
 - ❖ Fruit bearing trees may also be preferred.
 - ❖ Afforestation in backfilled & reclaimed areas shall be undertaken.
 - ❖ 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. The primary way that carbon is stored in the soil is as **soil organic matter (SOM)**. 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. Carbon can remain stored in soils for millennia, or be quickly released back into the atmosphere. Climatic conditions, natural vegetation, soil texture, and drainage all affect the amount and length of time carbon is stored.
-

4.3.11 Socioeconomics

Based on the CSR Committee and declared CSR Policy of the Company, the following CSR activities will be covered and Reported :

- ❖ Eradicating extreme hunger and poverty.
- ❖ Promotion of education & vocational skills.
- ❖ Ensuring environmental sustainability.
- ❖ Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government or the State Governments for socioeconomic development and relief.

CSR activities shall be carried out by providing social and welfare measures for the local residents and nearby villages around the mine 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.

4.3.12 Occupational Health Measures

Occupational Health Centre (with qualified Occupational Health Specialist) is established at Dalmiapuram. The First Aid Box is made available for immediate treatment. First Aid Training is imparted to the selected employees regularly. Personal Protective Equipment (PPEs) are provided for all employees working in the Mines. Occupational health surveillance programme is being carried out for all the employees regularly. Adequate care will be exercised to detect early incidences of occupational diseases for prompt treatment and cure. Safety aspects are also ensured to reduce incidents, if any.

- ❖ All employees are to undergo Medical Check-up on recruitment and during employment. Maintenance of Pre, during & Post Employment Records are to be kept for periodical review.
- ❖ Standard operating procedures for all operations with respect to occupational safety and health are to be in place.
- ❖ Required Personal Protective Equipments for the Mine employees are to be provided.
- ❖ Provision of ergonomically designed seats for drivers/operators has to be ensured.
- ❖ Provision of illumination facilities are to be made at proper places of mines for ease of working during night times.
- ❖ Work comfort and its periodic review by a Committee is to be ensured.
- ❖ Provision of Rest Shelters at Mines has to be made.
- ❖ Provision of cool drinking water to employees has to be made.

5.0 Analysis of Alternatives (Technology & Site)

5.1 Technology

- ❖ The mining operation is carried out by adopting both conventional mining method involving deephole blasting techniques and non- conventional mining method using X-centric Rippers.
- ❖ The mining operations are being carried out by fully mechanized method with thehelp of Excavators and Tipping Taurus combination.
- ❖ Blasting is being done with slurry explosives and ANFO and Non-Electric shock tubes are used for controlling ground vibration and noise level.
- ❖ Mine development including mine planning is being practiced in the mines and will be continued in future also.
- ❖ The blast induced ground vibration is controlled & maintained within permissible limits by using milli second delay detonators (MSDD) and NONEL shock tubes.
- ❖ At Conceptual stage. it is proposed to utilise part of the Mine Pit to harvest the rain water so as to recharge the ground water-table.

5.2 Alternative Sites Considered

This is an existing 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

DCBLhas **EMP Monitoring Cell**. The quality of air, noise, water, soil, etc. are being monitored at the identified locations as per MoEF&CC, IBM &TNPCB Norms by appointing an accredited external agency.

6.2 Post Project Monitoring

For the Lease, periodical monitoring of Ambient Air Quality (3 locations), Fugitive emissions/Workzone Air Quality (4 locations), Ambient & Workzone Noise Levels (4 locations), Water (4 Surface & 4 Ground waters along with Mine Pit water) and Soil Quality (3 Locations) shall be undertaken and reported to Authorities. The monitoring details are given in **Table 6.1**.

Table : 6.1 Post Project Monitoring Schedule

	Environmental Component				
	Ambient Air Quality	Fugitive Emissions	Noise Levels & PPV	Water Quality	Soil Quality
No. of Locations	3 (in & around Mine-Upwind & Downwind directions)	4 (Excavation area, Loading Area, Haul Road & Pit Edge)	Ambient-3 Workzones-4	Surface waters-4 Ground waters-4 Mine Pit water-1	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 Vibration Survey during Blastings	Surface & Ground Waters-Once in a Season Mine Pit water-Monthly once	Once in a Season
No. of Samples	72	64	84	32+ 12	12
Parameters	All 12 Parameters	PM10, SPM, SO ₂ , NO _x & 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 Allotted	Rs.3,60,000	Rs.3,20,000	Rs.42,000	Rs.1,14,000	Rs.36,000

About **Rs.8.72 Lakhs/annum** 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 Mining Activities	Can occur at any time during the Mining.
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 Mining 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 Mining Operations are listed in **Table 7.3**.

Table : 7.3 DMP Measures

Sl. No.	Factors	Causes of risks	Control measures
1	Removal of Top Soil & O.B	a) Top soil bench may slide due to unconsolidation. b) Vibration due to movement of vehicles in the O.B benches.	Not Applicable for this Lease.
2	Drilling & Blasting	a) Due to high pressure of compressed air hoses may burst. b) Drill rod may broken due to improper maintenance of the rod. c) Fly rock, ground vibration and noise etc., d) Improper charging of explosives	PPV & Noise Levels will be monitored periodically and Reports submitted.
3	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.
4	Transportation of Ore	a) Operating the vehicle "nose to tail" b) Overloading of material c) While reversal & overtaking of vehicle d) Operator of Tipper 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
5	Fire due to electricity and Oil	a) Due to the short circuit of cables & other electrical parts b) Due to the leakage of inflammable liquid like diesel, oil, etc.	Not Applicable for this Lease.
6	Flooding	a) Sudden collapse of peripheral bund due to torrential pour. b) Unusual seepage of water from River side.	Periodical checkup by the Security Not Applicable for this Lease.
7	Other Natural Calamities	Unexpected happenings	The Management is capable to deal with the situation

The objective of on site disaster management plan for the captive mine is to be a state of perceptual readiness through training, development to immediately control and arrest any emergency situation so as to avert a full-fledged disaster and the consequence of human and property damage and in the event of a disaster still occurring, to manage the same so that the risk of the damage consequences to life and property is minimized.

DCBL has formulated a disaster management plan for Emergency Preparedness & Responses. The salient features are elaborated as below:

- ❖ Emergency response Organization.
- ❖ Communication System.
- ❖ Action on the site.
- ❖ Facilities available at site.

Emergency Response organization :

Following officers of the mines will be responsible for coordination in case of emergency situation in any section of the mine.

Person
Head of the department / Mines Manager
Shift In charge / Section In charge
Employee who gives the first information about the accident
P & A dept (HOD)

Key Personnel and their responsibility Site Controller :

The head of the department/Mine agent shall have overall responsibility for controlling the incident/accident and directing the personnel.

- ❖ To prepare fool proof plan for control of accident like, landslides, subsidence flood and other natural calamities
- ❖ To inform statutory bodies of the State and Central Government.
- ❖ To inform communication officer about the emergency, control centre and assembly point.
- ❖ To provide all assistance and call for Fire Squad, Security Officer and other services required for removing/control of danger.
- ❖ To ensure that all necessary personnel to be assembled at assembly point.

Accident Controller/Shift In charge :

- ❖ Mock rehearsal of plan prepared for accident.
- ❖ To withdraw men/machines from the affected area with priority for safety of personnel, minimize damage to the machines,
- ❖ environment and loss of material.
 - To act as accident controller to all the later arrived.
 - To make a report based on the facts and figure and submit to the Site Controller.

Primary Controller

- ❖ To inform the Accident Controller / shift in charge from the nearest means of communication about the location and the nature of accident.
- ❖ To assist in clearing any obstruction in relief of accident.
- ❖ To carry out all instructions of accident controller.

Capability of Lessee: Following facilities are available at DCBL Plant.

- ❖ Public addressing system
- ❖ Telephones/ Mobile handsets
- ❖ Runners/messenger
- ❖ Emergency alarm
- ❖ Firefighting equipments & accessories with trained manpower
- ❖ Full fledged dispensary
- ❖ Training center
- ❖ Fire tender, Ambulance.

Facilities available outside DCBL Government Hospital at Ariyalur.

As per Risk Assessment studies, the possibility of “Off site” emergency situation are ruled out as DCBL mine is not likely to pose any off site emergency and hence does not call for any preparation of an off-site emergency plan.

Further the residential quarters and living area are far from the mine. However, considering extreme situation, District authority including police would be informed about any off site emergency if situation arises.

Care and maintenance during temporary discontinuance:

When the mine is temporarily discontinued due to any unforeseen circumstances the following care and maintenance shall be carried out:

- ❖ Notice to be served to all concerned authorities
- ❖ The mining pit area shall be covered by temporary fencing
- ❖ All access roads / openings to the pit/face shall be closed by bund as per rule.
- ❖ Warning shall be displayed on "Notice Board" at appropriate places
- ❖ Security personnel shall be posted at every danger point.
- ❖ No unauthorized person shall be allowed to enter into the mine without prior permission of the management.
- ❖ All men and machinery shall be withdrawn from the mine and shall be kept in a compact and safe place.

All safety precautions shall be taken care of as per rule.

DCBL is able to deal with the situation efficiently and will be coordinating to restore the normalcy of the situation.

8.0 Project Benefits

Environmental Benefits : The proposal ensures the continuous limestone supply to the Cement Plants. Effective utilization of the Mineral for Cement manufacturing is a Mineral Conservation Measure.

Financial Benefits : Mineable Reserves from the Lease is 9.97 Million Tonnes. . As per MMDR Act 2015, 30% of Royalty Amount (about **Rs.23.93 Crores**) will be earmarked for District Mineral Foundation (DMF) and the amount will be spent for benefit of local villages in the Lease Area.

Social Benefits : Project employs 76 persons directly and 50 persons indirectly. The Project Cost is Rs.3.00 Crores. A budget of 2% of the Project Cost (Rs.60.00 Lakhs) will be allotted as CER Budget. DMF amount @ 30% Royalty will be spent for Aminabad & Kairulabad Villages. 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 forest land involved for the Project and also no TOR awarded during the Scoping Process.

10.0 Environmental Management Plan

Environmental Management Plan (EMP) is suggested to mitigate the possible negative impacts that may be caused to various attributes of environment due to the proposed mining operations.

10.1 EMP for Construction Phase

Being existing Mine, there will be **no Construction Phase** for the Project.

10.2 EMP for Operation Phase

Land Use :-

- ❖ Earthen bunds are to be strengthened along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be maintained periodically around the Lease.
- ❖ Green Belt has to be developed and maintained along Lease boundary and Safety Barriers.
- ❖ No. of **trees planted shall be numbered** and referenced for review.
- ❖ No Blastings shall be carried out during night times and overcast conditions.
- ❖ Vibration Studies/Monitoring has to be carried out whenever Blastings carried out.
- ❖ Vibration Parameters viz. Peak Particle Velocity (PPV) and Noise Levels during Blastings shall comply with DGMS Norms for Residential Areas.
- ❖ The mined out Pits shall be converted into a Water Reservoirs to harvest Rain Water and to recharge the Ground Water-table in the vicinity.

Traffic Impact :-

- ❖ Regular wetting of haul roads has to be undertaken to arrest the fugitive emissions.
- ❖ Tippers are to be fully covered with Tarpaulin to avoid any spillage on transportation.
- ❖ 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 for the Tippers which has to be checked periodically.
- ❖ Restriction of Truck parking in the Public Road has to be implemented.
- ❖ Regular and preventive maintenance of transport vehicles has to be ensured.
- ❖ Effective Green Belt with thick foliage has to be developed and maintained.
- ❖ Security Guards are to be placed at the Public Road-Mine Haulage Road Junction to handle the inward and outward vehicles.

Air Environment :-

- ❖ Controlled Blasting has to be carried out and during day times only.
- ❖ No Blasting is carried out during overcast conditions.
- ❖ Water sprinkling on the Mining areas, loading point, haul roads, etc. has to be carried out.
- ❖ Covering of Trucks/Tippers with tarpaulin shall be ensured during Mineral transportation.

-
- ❖ Over loading of Tippers has to be avoided to control the spillages during transportation.
 - ❖ Periodical maintenance and replacement of worn out accessories in the mine equipments.
 - ❖ Tippers are to be maintained periodically.
 - ❖ Periodical check up of vehicles for 'Emission Under Control' Certificate is to be ensured.
 - ❖ Effective Green Belt with thick foliage has to be developed along boundaries and haul roads.
 - ❖ Periodical Air Quality Monitoring shall be carried out and Reports submitted to the Authorities.

Noise Levels :-

- ❖ The noise and vibration generated due to the blasting operations shall be kept well within the limits by using milli-second delay electric detonators and by using Non-electric initiation system of blasting which completely eliminates air-blasts and thus reduces noise due to blasting.
- ❖ Deploying mining equipments shall be with in-built mechanism for reducing noise.
- ❖ Provision of silencers to modulate the noise generated by the machines.
- ❖ 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 along roads and around lease boundary as acoustic barriers.
- ❖ Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.

Water Environment :-

- ❖ The increased Mine Pit Water has to be utilized gainfully by increasing the supply to nearby Villages for Domestic Consumption as well as to agricultural activities nearby.
- ❖ Mine Pit Water shall not be directly discharged without ensuring its quality.
- ❖ Ground Water NOC for Dewatering has to be obtained/renewed from SGWA/CGWA Authority.
- ❖ Periodical Monitoring of Water Level Data from existing Piezometer and nearby Wells in the vicinity has to be carried out along with the water quality.
- ❖ Effective Afforestation in Backfilled Areas, with native species, is to be done.
- ❖ Garland Drains and Settling Tanks are to be maintained and desilted periodically.
- ❖ The de-silted quantity from the Garland Drains has to be used for Green Belt/Afforestation.
- ❖ Ground Water Levels and Water Quality are to be periodically monitored at the identified Borewells & Dugwells in the Mine vicinity.
- ❖ The monitored Water Quality data are to be periodically submitted to the IBM and with half-yearly Compliance Reports to SEIAA-TN & Regional Office, MoEF&CC, Chennai.

Biological Environment :-

- ❖ Effective Green Belt has to be developed and maintained, with the guidance of DFO, with about 90% Survival Rate.
 - ❖ Native species shall be preferred for Green Belt development.
 - ❖ Fruit bearing trees may also be preferred.
 - ❖ Afforestation in backfilled & reclaimed areas shall be undertaken.
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- ❖ 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. The primary way that carbon is stored in the soil is as **soil organic matter (SOM)**. 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. Carbon can remain stored in soils for millennia, or be quickly released back into the atmosphere. Climatic conditions, natural vegetation, soil texture, and drainage all affect the amount and length of time carbon is stored.

Social Measures :-

CSR activities shall be carried out by providing social and welfare measures for the local residents and nearby villages around the mine 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.

Occupational Health Measures :-

- ❖ 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.
- ❖ Standard operating procedures for all operations with respect to occupational safety and health are to be in place.
- ❖ Required Personal Protective Equipments for the Mine employees are to be provided.
- ❖ Provision of ergonomically designed seats for drivers/operators has to be ensured.
- ❖ Provision of illumination facilities are to be made at proper places of mines for ease of working during night times.
- ❖ Work comfort and its periodic review by a Committee is to be ensured.
- ❖ Provision of Rest Shelters at Mines has to be made.
- ❖ Provision of cool drinking water to employees has to be made.

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 : The Project Cost is Rs.3.00 Crores. An amount of Rs.9.70 Lakhs has been earmarked as Capital EMP Budget and Rs.21.57 Lakhs per Annum as Operating Cost towards EMP measures, Green Belt maintenance, Environmental Monitoring, etc. (**Tables 10.1-10.2**) Public Hearing issued will be addressed and the **Action Plan with Budget will be included** in the EMP Budget for executing the Physical Activities as per MoEF&CC OM dated 30.09.2020.

Table : 10.1 Proposed EMP Budget

Cost for	Capital Cost, Rs.	Recurring Cost, Rs.
EMP Budget as per SEAC Guidelines	9,70,000	21,57,000
For addressing PH Issues*		
Total	-	-

* - Budget for addressing PH Issues will also be included in the EMP.

Table : 10.2 EMP Budget

Mitigation Measure	Provision for Implementation	Capital Cost, Rs.	Recurring Cost, Rs.	Total for Quarrying Area in a Year	
				Capital Cost, Rs.	Recurring Cost, Rs.
Compaction, gradation and drainage on both sides for Haulage Road	Rental Dozer & drainage construction on haul road @ Rs. 10,000/- per hectare; and yearly maintenance @ Rs. 10,000/- per hectare	10,000	10,000	1,00,000	1,00,000
Fixed Water Sprinkling Arrangements + Water sprinkling by own water tankers	Fixed Sprinkler Installation and New Water Tanker Cost for Capital; and Water Sprinkling (thrice a day) Cost for recurring	8,00,000	50,000	Own Tanker available	50,000
Air Quality will be regularly monitored as per norms within ML area & Ambient Area	Yearly Compliance as per CPCB norms	0	50,000	0	2,00,000
No overloading of trucks/tippers/tractors	Manual Monitoring through Security guard	0	5,000	0	60,000
Stone carrying trucks will be covered by tarpaulin	Monitoring if trucks will be covered by tarpaulin	0	10,000	0	4,80,000
Enforcing speed limits of 20 km/hr within ML area	Installation of Speed Governors @ Rs. 5000/- per Tipper/Dumper deployed	5,000	0	0	0
Regular monitoring of exhaust fumes as per RTO norms	Monitoring of Exhaust Fumes by Manual Labour	0	5,000	0	5,000
Regular sweeping and maintenance of approach roads for at least about 200 m from ML Area	Provision for 2 labours @ Rs.10,000/labour (Contractual) per Hectare	0	20,000	0	0
Installing wheel wash system near gate of quarry	Installation + Maintenance + Supervision	50,000	20,000	0	0
Source of noise will be during operation of transportation vehicles, HEMM for this	Provision made in Operating Cost	0	0	0	0

Mitigation Measure	Provision for Implementation	Capital Cost, Rs.	Recurring Cost, Rs.	Total for Quarrying Area in a Year	
				Capital Cost, Rs.	Recurring Cost, Rs.
maintenance will be done at regular intervals.					
Oiling & greasing of Transport vehicles and HEMM at regular interval will be done	Provision made in Operating Cost	0	0	0	0
Adequate silencers will be provided in all the diesel engines of vehicles.	Provision made in Operating Cost	0	0	0	0
It will be ensured that all transportation vehicles carry a fitness certificate.	Provision made in Operating Cost	0	0	0	0
Safety tools and implements that are required will be kept adequately near blasting site at the time of charging.	Provision made in OHS part	0	0	0	0
Water management	Provision for garland drain @ Rs. 10,000/- per Hectare with maintenance of Rs. 5,000/- per annum	10,000	5,000	0	45,000
Waste management (Spent Oil, Grease etc.,)	Provision for domestic waste collection and disposal through authorized agency	25,000	20,000	25,000	20,000
	Installation of dust bins	5,000	2,000	5,000	2,000
Bio toilets will be made available outside mine lease on the land of owner itself	Provision made in Operating Cost	5,000	2,000	0	0
Size 6' X 5' with blue background and white letters as mentioned in MoM Appendix II by the SEAC TN	Fixed Display Board at the Quarry Entrance as permanent structure mentioning Environmental Conditions	10,000	1,000	0	0
Workers will be provided with Personal Protective Equipment's	Provision of PPE @ Rs. 4000/- per employee with recurring based on wear and tear (say, @ Rs. 1000/- per employee)	40,000	10,000	6,00,000	1,00,000
Health check up for workers will be provided	IME & PME Health check up @ Rs. 1000/- per employee	0	10,000	0	7,60,000
First aid facility will be provided	Provision of 2 Kits per Hectare @ Rs. 2000/-	5,000	4,000	0	0
Mine will have safety precaution signages, boards.	Provision for signages and boards made	10,000	2,000	0	0

Mitigation Measure	Provision for Implementation	Capital Cost, Rs.	Recurring Cost, Rs.	Total for Quarrying Area in a Year	
				Capital Cost, Rs.	Recurring Cost, Rs.
Barbed Wire Fencing to quarry area will be provisioned.	Per Hectare fencing Cost @ Rs. 2,00,000/- with Maintenance of Rs 10,000/- per annum	2,00,000	10,000	Fully fenced already	10,000
No parking will be provided on the transport routes. Separate provision on the south side of the hill will be made for vehicles /HEMMs. Flaggers will be deployed for traffic management	Parking area with shelter and flags @ Rs. 50,000/- per hectare project and Rs.10,000/- as maintenance cost	50,000	10,000	50,000	10,000
Installation of CCTV cameras in the mines and mine entrance	Camera 4 Nos, DVR, Monitor with internet facility	30,000	5,000	0	0
Implementation as per Mining Plan and ensure safe quarry working	Mines Manager (1 st Class / 2 nd Class / Mine Foreman) under regulation 34 / 34 (6) of MMR, 1961 and Mining Mate under regulation 116 of MMR,1961 @ 40,000/- for Manager & @ 25,000/- for Foreman / Mate	0	7,80,000	0	2,00,000
Green belt development - 500 trees per one hectare (200 Inside Lease Area & 300 Outside Lease Area)	Site clearance, preparation of land, digging of pits / trenches, soil amendments, transplantation of saplings @ 200 per plant (capital) for plantation inside the lease area and @ 30 per plant maintenance (recurring)	40,000	6,000	100000	25000
	Avenue Plantation @ 300 per plant (capital) for plantation outside the lease area and @ 30 per plant maintenance (recurring)	90,000	9,000	90,000	90,000
Total				9,70,000	21,57,000

Also, **Corporate Environmental Responsibility (CER) Budget** will be allotted in compliance with MoEF&CC OM dated 01.05.2018 for execution.

11.0 Summary Environmental Impact Assessment Report

1.0 Introduction

1.1 Project Proponent

M/s. Dalmia Cement (Bharat) Limited (DCBL) are operating Cement Plants at Dalmiapuram & Ariyalur in Tamil Nadu, Kadapa in Andhra Pradesh, Belgaum in Karnataka and Cement Units across Northeast & Eastern Regions. DCBL's Cement manufacturing capacity is now about 35.9 Million Tonnes per Annum (MTPA).

DCBL had established Dalmiapuram Cement Plant in the Year 1939 (Pre-Independence period). Dalmiapuram Plant (with Lines I & II) is now being operated for 3.23 MTPA Clinker and 5.00 MTPA Cement. DCBL is also running its Ariyalur Cement Plant at Govindapuram & Ottakovil at a distance of 35 km from Dalmiapuram. Dalmia Ariyalur Plant is now being operated for 2.50 MTPA Clinker and 4.00 MTPA Cement.

The limestone requirement of both Cement Plants is being met from Captive Limestone Mines in Ariyalur and Trichy Districts viz. Kallakudi-Kovandakurichi (KLK-KVK) Mines, Periyathirukonam (PTK) Mines and amalgamated Periyanaalur, Aminabad & Khairulabad (PNR Group) Mines.

Presently, there are 800 Direct Employees and 3,000 Contract Employees working in Cement & Power Plants and Mines. Dalmiapuram Plant and Captive Mines are under the Administration of Unit Head, Dalmiapuram. The communication address is as follows :

Sri. K.Vinayagamurthi,
Unit Head,
 Dalmia Cement Bharat Limited,
 Dalmiapuram, Lalgudi Taluk,
 Tiruchirapalli District, Tamil Nadu-621 651.
 Telephone Nos. : 04329-235123; Fax : 04329-235111
 e-mail : k.vinayagamurthi@dalmiacement.com

1.2 Project Profile

PNR Group Mines are being operated in 3 Leases over an extent of 167.605 Ha (under GO No. 179 over an extent of 70.01 Ha in Periyanaalur; under GO No. 2 over an extent of 95.345 Ha in Aminabad & Khairulabad Villages and under Rc No. 17783 over an extent of 2.25 Ha in Khairulabad Village for the total Production of 1.90 MTPA Limestone. DCBL has also obtained another Lease over an extent of 0.845 Ha in Aminabad village under GO Ms. No. 106 dated 12.05.2015. The State Government has amalgamated two Leases viz. GO Ms. No. 86 over an extent of 95.345 Ha & GO Ms. No.106 over an extent of 0.845 Ha - under GO Ms. No. 50 dated 27.02.2023 for a total extent of 96.190 Ha with its validity till 31.03.2030.

Amalgamated Lease GO Ms. No. 50 over an extent of 96.190 Ha falls in SF Nos. 103/2, 103/3, 104/3, 105/8, 108, 109, 110, 111, 112, 113/1, 113/2, 114/1, 114/2, 114/3, 115, 116/1, 116/2, 116/3, 117/1, 117/2, 117/3, 118/1, 118/2, 125, 126/1, 126/2, 126/3, 127, 133 of Aminabad Village & SF Nos. 448, 449, 452, 453/5, 455/2, 456/1, 478 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu (**Fig. 1.1**). The mine is situated at a distance of about 6.8 km in east from Ariyalur Town. It is accessible by Ariyalur – V Kaikatti SH-139 which runs about 0.9 km in the south. There is no Rehabilitation & Resettlement issue due to the Proposal. Also, there is no litigation/pending case against the Proposal. The Mine Layout/Surface Plan is given as **Fig. 2.1**.

The Regional Controller of Mines, Indian Bureau of Mines (IBM), Chennai has approved the Mining Plan for GO 50 for the Block 2023-24 to 2027-28 vide Letter No. TN/ALR/LST/MP-2098.MDS dated 05.10.2023 which is valid till 31.03.2028.

Mineable Reserves ('111' Category) assed in the Lease is 9.97 Million Tonnes as on 01.04.2023 over an extent of 96.19 Ha. No Top Soil or Over Burden (OB) generation will be there till Conceptual Stage. The mining operation will be carried out by both Opencast Conventional Mining with controlled Drilling & Blasting and Non-Conventional Mining Method with Rock Breakers. Conventional mining operation method will be involving deep hole blasting techniques. Blasting is being done with slurry explosives and ANFO and Non-Electric shock tubes for controlling ground vibration and noise level. Fragmented limestone will be loaded by Hydraulic Excavators into Tippers. No Beneficiation/Screening is required. The Tippers transport limestone to Cement Plants by road - 19 km (Ariyalur Plant) and 40 km (Dalmiapuram Plant) respectively.

The production during the Plan period will be 73,33,330 Tonnes @ 14,66,666 TPA ROM (1.467 MTPA ROM)-**Table 1.1**. The Life of the Mine is 9 years. Conceptual Stage Ultimate Pit depth will be 42 m BGL. As Ground Water-table in the vicinity is ranging between 45-50 m BGL, mining will not intersect the ground water-table. At the Conceptual Stage, about 69.79 Ha will be opened out Pit Area which will be converted as water reservoir.

Mine Profile :

Mineable Reserves	:	9.97 Million Tonnes
Proposed Production	:	1.467 MTPA ROM & 1.10 MTPA Clean
No. of working days/annum	:	330 (3 shifts)
Life of the Mine	:	9 years
Ore:Waste Ratio	:	1:0
Bench height	:	6 m
Bench width	:	8-10 m
Bench slope	:	40-45°
Ultimate Pit Limit	:	42 m (BGL); Top RL 80 m Bottom RL 38 m
Ground Water-table at	:	45 m (Post-Mon)-50 m BGL(Pre-Mon)

Mining will not intersect the ground water-table.

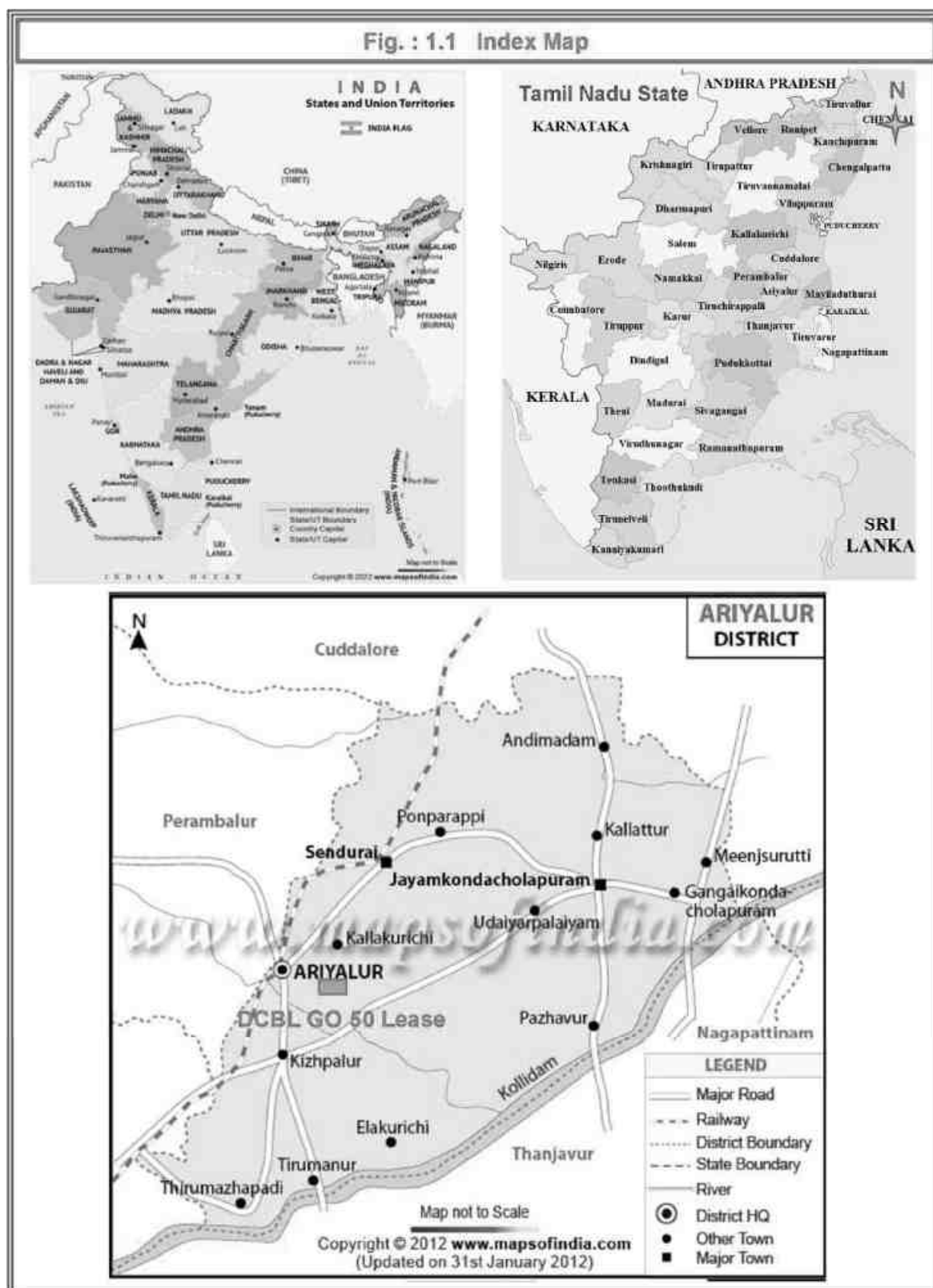


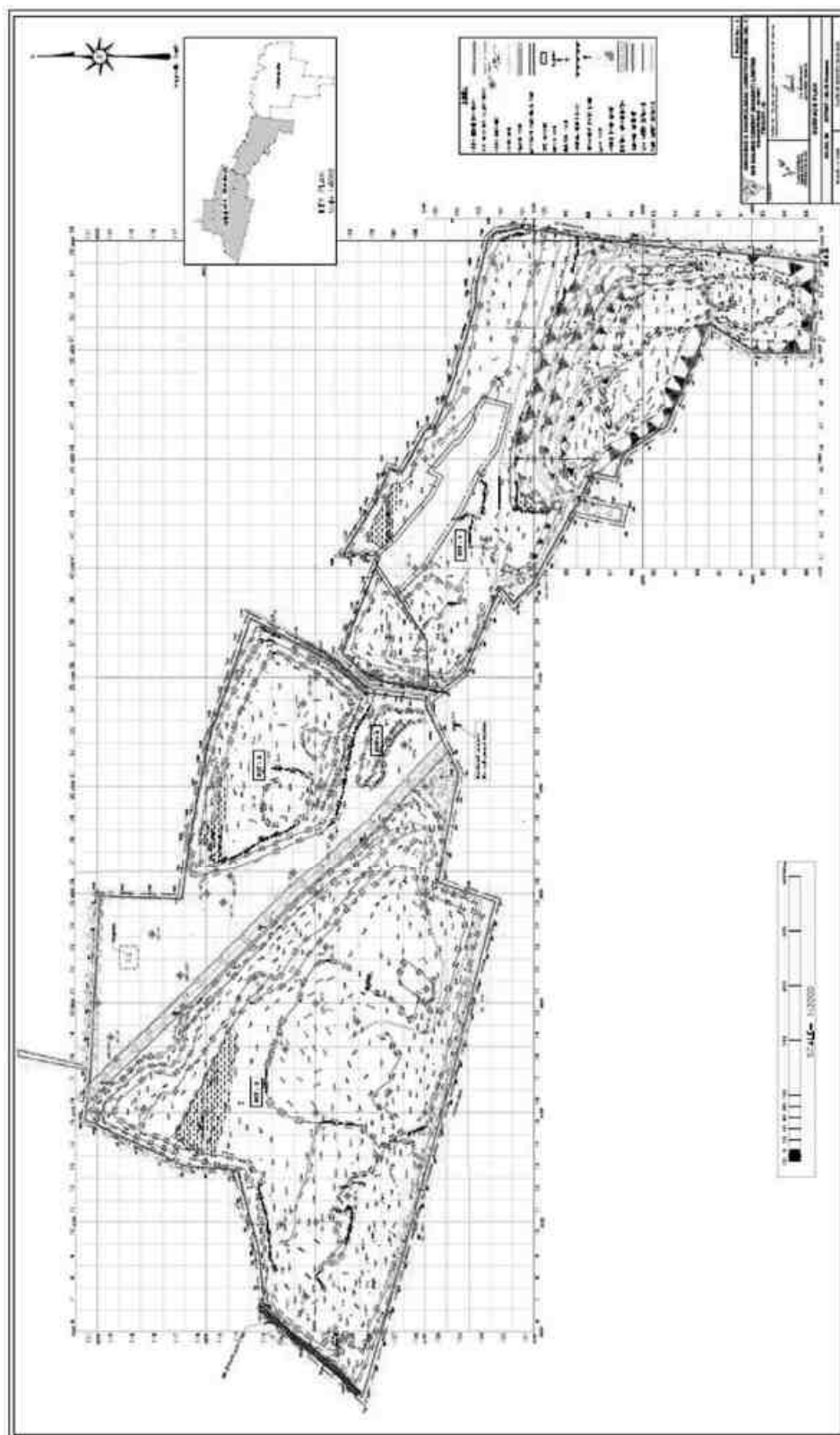
Fig. : 2.1 Surface Plan

Table : 1.1 Production during Plan Period & Subsequent Periods

Year	Period	Top Soil, Tons	OB, Tons	ROM, Tonnes	Mineral Rejects, Tons	Clean Limestone, Tonnes	ROM:OB Ratio
I	<u>Plan Period:</u>						
1	2023-24	0	0	14,66,666	3,66,666	11,00,000	1:0
2	2024-25	0	0	14,66,666	3,66,666	11,00,000	1:0
3	2025-26	0	0	14,66,666	3,66,666	11,00,000	1:0
4	2026-27	0	0	14,66,666	3,66,666	11,00,000	1:0
5	2027-28	0	0	14,66,666	3,66,666	11,00,000	1:0
	Sub Total	0	0	73,33,330	18,33,330	55,00,000	-
II	<u>Lease Period:</u>						
6	2028-29	0	0	14,66,666	3,66,666	11,00,000	1:0
7	2029-30	0	0	14,66,666	3,66,666	11,00,000	1:0
	Lease Period	0	0	102,66,662	25,66,662	77,00,000	-
III	<u>Residual Period</u>						
8	After 31.03.2030	0	0	-	-	22,66,108	1:0
	Grand Total	0	0	-	-	99,66,108	-

The Limestone to be mined out from this Lease is Major Mineral in an extent of <250 Ha and falls in Category 'B' of Sl. No. 1(a) of EIA Notification 2006 (as amended) for prior Environmental Clearance (EC) from the State Level Environmental Impact Assessment Authority (SEIAA), Tamil Nadu. Accordingly, DCBL submitted the TOR Application vide Online Proposal No. SIA/TN/MIN/465337/2024 on 08.03.2024.

The Proposal was deliberated by the State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 457th Meeting held on 03.04.2024 (Sl. No. 11) and in SEIAA-TN Meeting held on 03.05.2024. Terms of Reference (TOR) has been awarded vide TOR Identification No. TO24B0000TN5124077N dated 15.05.2024 for preparing Environmental Impact Assessment (EIA) Report with Public Hearing.

Baseline Data (BLD) has been collected during December 2023-February 2024 (Summer Season) for the EIA Study in compliance with MoEF&CC Office Memorandum No. J-11013/41/2006-IA-II(I)(Part) dated 29.08.2017. 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.

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 dated 03.09.2024). 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.

2.0 Description of the Environment

2.1 Environmental Setting

The mine is situated at a distance of about 6.8 km in east from Ariyalur Town. It is accessible by Ariyalur – V Kaikatti SH-139 which runs about 0.9 km in the south. The ML area falls in Topo Sheet No. 58 M/4 and the coordinates are : 11°07'44.75" to 11°08'33.42" N Latitude & 79°06'57.96" to 79°08'09.13" E Longitude (**Fig. 1.2**). There are no eco sensitive areas National Parks, Wildlife Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar Sites, Tiger/Elephant Reserves, etc. (existing as well as proposed) within 10 km from the Mine. Karaivetti Bird Sanctuary is at 17.0 km in SW direction. There is an Archaeological/Fossil Museum at Varanavasi (8.5 km in SW). The following Reserve Forests (RFs) exist in the Study area of 10 km radius:

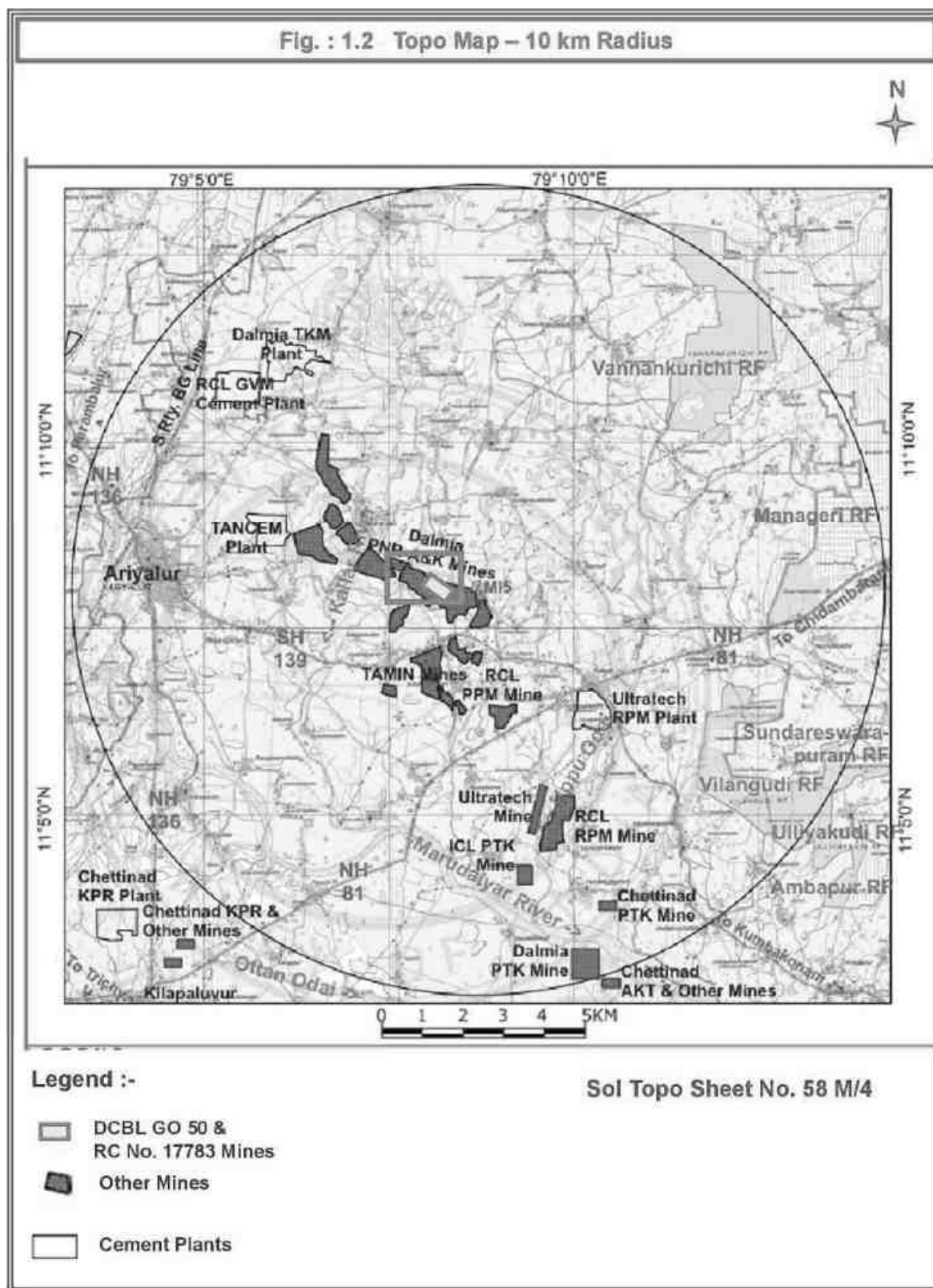
- ❖ Vannankurichi RF (mixed jungle) - 7.3 km in northeast.
- ❖ Managethi RF – 9.1 km (ENE).
- ❖ Vilangudi Extension RF-8.2 km (ESE)
- ❖ Vilangudi RF (Cashew Plantation) – 8.5 km (SE).
- ❖ Sundareswarapuram RF – 9.9 km (ESE).

Kallankurichi Kaliyuga Varadharaja Perumal Temple is at 0.8 km in the north from the Lease. There is no perennial river in the study area. Seasonal River Marudaiyar drains the region which flows southwest to southeast at a distance of 5.4 km from the Lease. Kallar River flows adjacent to the lease (0.06 km in west). Uppu Odai at 3.8 km (ESE), Vilangudi Odai at 4.8 km (E) and Vanchiyam Odai at 7.0 km (WNW).

Trichy-Chidambaram National Highway NH-81 runs at 4.0 km in the southeast, Thanjavur-Ariyalur BP-Athur NH-138 runs at 3.5 km in the west and Kumbakonam-Ariyalur-Sendurai SH-139 runs at a distance of 1.7 km in the south. Southern Railway BG Line connecting Chennai Egmore-Trichy-Kanyakumari runs through Ariyalur at a distance of 5.3 km in the west. The nearest Airport is Trichy at a distance of 58.5 km in the southwest. The nearest Ports are at Karaikkal (82 km in southeast) and Cuddalore (95 km in northeast). State Head Quarters Chennai is at a distance of 220 km in the northeast.

Other than DCBL Dalmiapuram Plant (40 km away), there are five Cement Plants in the Region viz. Dalmia Cement Ariyalur Plant (4.0 MTPA; 4.9 km in NW), Ramco Cement Govindapuram Plant (5.5 MTPA; 4.2 km in NW), TN State Govt. owned TANCEM Plant near Kallankurichi (1.5 MTPA; 2.2 km in west), UltraTech Plant at Reddippalaiyam (1.2 MTPA; 4.2 km in the southeast) and Chettinad Cement Kilapaluvur Plant (5.5 MTPA; 10.0 km in the southwest).

-From the Lease Area, Dalmia PNR Mine Pit is at 15 m (East), Ramco PNR-A Pit at 0.8 km (SE) and TANCEM, UltraTech PNR, Khairulabad & Kallankurichi Mines at 0.015-0.8 km are located.



Ramco Usenabad Mine is at 1.5 km (WNW). Ramco Kattupirangium, Pudupalayam & Reddipalayam Mines are at 2.9, 4.3 & 7.0 km (in SE) respectively, Ultratech Vellipirangiyum Mine at 6.5 (SE) & Ottakovil Mine at 7.5 km (NNW), ICL Periyathirukonam & Chettinad Periyathirukonam Mines at 7.0 km (SSE) & 9.3 km (SE), Dalmia Periyathirukonam Mines 10.0 km (SSE), etc. along with other Mines in the Study area.

The nearest village Kallankurichi is at 0.8 km in the north. Periyagalur is about 2.3 km in east. Kattupirangiyum (1.2 km in SW), Manakudi (1.1 km in NW) and Kovilankudikadu (2.7 km in NNE) are the other nearby villages. V.Kaikatti Junction is at 4.0 km distance in southeast. Taluk and District Headquarters Ariyalur Town is at a distance of 5.5 km in west.

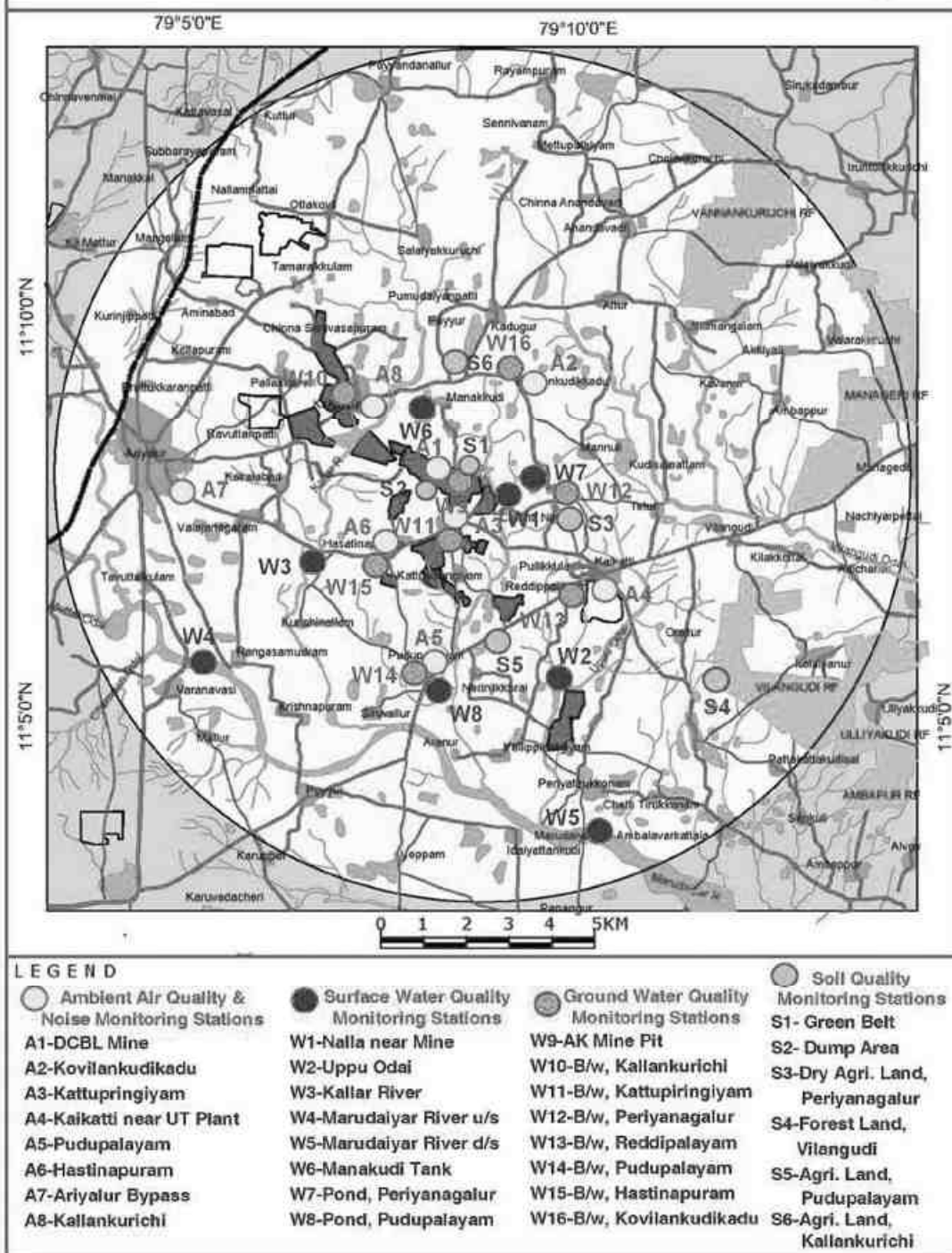
2.2 Baseline Environmental Status

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 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. 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	10	46	25.3	60
	PM10	20	74	45.3	100
	SO ₂	6	22	11.1	80
	NOx	6	26	13.5	80
Ambient Noise, dB(A)	Leq-Day	40.4	49.3	45.0	55
	Leq-Night	36.2	46.8	42.1	45
Surface Waters	TDS, mg/l	320	500	-	500/2100
Ground Waters	TDS, mg/l	360	550	-	500-2000
Soil Status	EC, mmhos/cm	1.50	1.79	-	0.2-0.5
	SAR	1.37	2.79	-	<5

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10- Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; NOx-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 physical, biological and edaphic environments of the study area.

3.0 Anticipated Environmental Impacts

Being an existing Mine, it does not involve any major establishment or construction. Thus, Construction Phase Impacts are not there for Impact Assessment and Environmental Management Plan (EMP). The impacts during Operation Phase have been divided into two categories, viz. Localised and Cumulative. There are Cement Plants and Limestone Mines in the Study Area. Existing industrial activities are considered for Cumulative Impact Assessment for assessing their contribution. 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.

Land Environment : Industrial/Mining activities are being carried out in an extent of 766.965 Ha in the Impact Zone. There is no additional Land requirement for the Proposal. There is Drilling & Blasting proposed and thus, vibration impact due to mining will be there. There is no Top Soil available at the mine as entire Top Soil generated ie, 144285 cu.m was fully utilised for Green Belt development. Mineral Rejects to the extent of 25,66,662 will be generated and dumped as Dump-2 in the western side of the Lease. At the Conceptual Stage, about 69.79 Ha will be opened out Pit Area which will be converted as water reservoir, 18.58 Ha will be under OB dump, 1.56 Ha under Utilities, 6.26 Ha under Green Belt (6.5% Coverage).

Traffic Impact : Limestone Transportation of Dalmia Mines (meant for Ariyalur Plant), Ramco Mines, TANCEM Mines and partly is through SH-139 towards Ariyalur Bypass. The existing traffic volume in the Project vicinity was found to be 5,251.1 Passenger Car Units (PCUs)/day. In the

Post-Project Scenario, there will be no addition of Vehicle from this amalgamated Mine as existing production will remain same. The existing Roads/SH are adequate to handle the proposed traffic volume due to the Project. Adequate parking area is provided in the Mine Area. Facilities for drivers (rest room, toilet, etc.) are also provided.

Air Pollution : Mining, Drilling & Blasting, 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 0.29 ug/m³ and GLC-PM₁₀ for cumulative activities is 0.91 ug/m³ and found to be confined locally i.e. within 0.12 km radius. Also, adequate Buffer Level available (53.79-57.35%) in the Air Environment for the Proposal. Other pollutants SO₂ and NO_x emissions due to mining activities and their Predicted values are found to be low and are not reported.

Noise Levels : The blast induced ground vibration is controlled and maintained within permissible limits by using milli second delay detonators (MSDD) and NONEL shock tubes. The peak particle velocity (PPV) and noise levels during the blasting will be periodically monitored through 'Minimate' Instrument. In general, the work force is exposed to <85 dB(A) levels during the 8-hours Shift. Noise level at the nearest Lease boundary will be <55 dB(A) during day times and <45 dB(A) during night times and which will be within the MoEF&CC Norms for Residential and Rural Areas.

Water - Hydrogeology : On the monitoring day, the water level was observed in 10 Borewells in the Mine vicinity (within 5 km). The levels were found to be in the range 4.19 m BGL to 33.70 m BGL. **Based on the mine workings**, the Ground water-table level in the mine vicinity is at **45 m BGL** during Postmonsoon & **50 m BGL** during Premonsoon periods. There will be no Ground Water-table Intersection due to the Mining. Thus, no impact on the ground water levels of nearby Borewells due to mining on account of poor transmissivity.

The Lease requires about 15 KLD towards domestic consumption (5 KLD), and Dust Control Measures & Green Belt (10 KLD) which is met from mine pit seepage water. As per the State Ground Water Board (SGWB), the area falls in '**Semi Critical**' Category. Domestic sewage generation will be about 4.5 KLD which will be biologically treated in a Septic Tank followed by a Dispersion Trench. About 0.12 KLD effluent generation from the small Workshop which is treated in a Oil Separation Filter and treated effluent is used for Green Belt. 'Zero Effluent Discharge' will be adopted.

To pump out rain water collected in the Pit, a 7.5 HP Pump will be used. Dewatering will be @ 50 KLD during summer season and 125 KLD during the rainy periods.

Biological Environment : There is no habitat fragmentation or blocking of migratory corridors due to Project activities since there is no wild life movement or migratory birds movement in the study area. Thus, there will not be any significant impact on the existing flora-fauna of the area. ML area is surrounded by Mines & Mineral bearing areas, barren lands and dry agricultural lands within 1.0 km area. As the baseline AAQ are in lower levels as well as Predicted GLC is very low/insignificant, there will not be any impact on the surrounding dry agricultural lands due to the Project.

Socioeconomics : Based on the CSR Committee and declared CSR Policy of the Company, the following CSR activities will be covered and Reported :

- ❖ Eradicating extreme hunger and poverty.
- ❖ Promotion of education & vocational skills.
- ❖ Ensuring environmental sustainability.
- ❖ Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government or the State Governments for socioeconomic development and relief.

Occupational Health : Occupational Health Centre (with qualified Occupational Health Specialist) is established at Dalmiapuram. The First Aid Box is made available for immediate treatment. First Aid Training is imparted to the selected employees regularly. Personal Protective Equipment (PPEs) are provided for all employees working in the Mines. Occupational health surveillance programme is being carried out for all the employees regularly. Adequate care will be exercised to detect early incidences of occupational diseases for prompt treatment and cure. Safety aspects are also ensured to reduce incidents, if any.

4.0 Environmental Monitoring Programme

DCBL has EMP Monitoring Cell. The quality of air, noise, water, soil, etc. are being monitored at the identified locations as per MoEF&CC, IBM & TNPCB Norms by appointing an accredited external agency. For the Lease, periodical monitoring of Ambient Air Quality (3 locations), Fugitive emissions/Workzone Air Quality (4 locations), Ambient & Workzone Noise Levels (4 locations), Water (4 Surface & 4 Ground waters along with Mine Pit water) and Soil Quality (3 Locations) shall be undertaken and reported to Authorities.

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. DCBL management is able to deal with the situation efficiently to reduce confusion keeping in view of the likely sources of danger in the mine. The possibility of 'Offsite Emergency' situation is ruled out as the mine is not likely to pose any offsite emergency.

6.0 Project Benefits

Environmental Benefits : The proposal ensures the continuous limestone supply to the Cement Plants. Effective utilization of the Mineral for Cement manufacturing is a Mineral Conservation Measure.

Financial Benefits : Mineable Reserves from the Lease is 9.97 Million Tonnes. . As per MMDR Act 2015, 30% of Royalty Amount (about **Rs.23.93 Crores**) will be earmarked for District Mineral Foundation (DMF) and the amount will be spent for benefit of local villages in the Lease Area.

Social Benefits : Project employs 76 persons directly and 50 persons indirectly. The Project Cost is Rs.3.00 Crores. Adequate CER budget will be allotted. DMF amount @ 30% Royalty will be spent for Aminabad & Kairulabad Villages. 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

Environmental Management Plan (EMP) is suggested to mitigate the possible negative impacts that may be caused to various attributes of environment due to the proposed mining operations.

7.1 EMP for Construction Phase

Being existing Mine, there will be **no Construction Phase** for the Project.

7.2 EMP for Operation Phase

Land Use :-

- ❖ Earthen bunds are to be strengthened along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be maintained periodically around the Lease.
- ❖ Green Belt has to be developed and maintained along Lease boundary and Safety Barriers.
- ❖ No. of **trees planted shall be numbered** and referenced for review.
- ❖ No Blastings shall be carried out during night times and overcast conditions.
- ❖ Vibration Studies/Monitoring has to be carried out whenever Blastings carried out.
- ❖ Vibration Parameters viz. Peak Particle Velocity (PPV) and Noise Levels during Blastings shall comply with DGMS Norms for Residential Areas.
- ❖ The mined out Pits shall be converted into a Water Reservoirs to harvest Rain Water and to recharge the Ground Water-table in the vicinity.

Traffic Impact :-

- ❖ Regular wetting of haul roads has to be undertaken to arrest the fugitive emissions.
- ❖ Tippers are to be fully covered with Tarpaulin to avoid any spillage on transportation.
- ❖ 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 for the Tippers which has to be checked periodically.
- ❖ Restriction of Truck parking in the Public Road has to be implemented.
- ❖ Regular and preventive maintenance of transport vehicles has to be ensured.
- ❖ Effective Green Belt with thick foliage has to be developed and maintained.
- ❖ Security Guards are to be placed at the Public Road-Mine Haulage Road Junction to handle the inward and outward vehicles.

Air Environment :-

- ❖ Controlled Blasting has to be carried out and during day times only.
- ❖ No Blasting is carried out during overcast conditions.
- ❖ Water sprinkling on the Mining areas, loading point, haul roads, etc. has to be carried out.
- ❖ Covering of Trucks/Tippers with tarpaulin shall be ensured during Mineral transportation.
- ❖ Over loading of Tippers has to be avoided to control the spillages during transportation.
- ❖ Periodical maintenance and replacement of worn out accessories in the mine equipments.
- ❖ Tippers are to be maintained periodically.
- ❖ Periodical check up of vehicles for 'Emission Under Control' Certificate is to be ensured.
- ❖ Effective Green Belt with thick foliage has to be developed along boundaries and haul roads.
- ❖ Periodical Air Quality Monitoring shall be carried out and Reports submitted to the Authorities.

Noise Levels :-

- ❖ The noise and vibration generated due to the blasting operations shall be kept well within the limits by using milli-second delay electric detonators and by using Non-electric initiation system of blasting which completely eliminates air-blasts and thus reduces noise due to blasting.
- ❖ Deploying mining equipments shall be with in-built mechanism for reducing noise.
- ❖ Provision of silencers to modulate the noise generated by the machines.
- ❖ 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 along roads and around lease boundary as acoustic barriers.
- ❖ Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.

Water Environment :-

- ❖ The increased Mine Pit Water has to be utilized gainfully by increasing the supply to nearby Villages for Domestic Consumption as well as to agricultural activities nearby.
 - ❖ Mine Pit Water shall not be directly discharged without ensuring its quality.
-

-
- ❖ Ground Water NOC for Dewatering has to be obtained/renewed from SGWA/CGWA Authority.
 - ❖ Periodical Monitoring of Water Level Data from existing Piezometer and nearby Wells in the vicinity has to be carried out along with the water quality.
 - ❖ Effective Afforestation in Backfilled Areas, with native species, is to be done.
 - ❖ Garland Drains and Settling Tanks are to be maintained and desilted periodically.
 - ❖ The de-silted quantity from the Garland Drains has to be used for Green Belt/Afforestation.
 - ❖ Ground Water Levels and Water Quality are to be periodically monitored at the identified Borewells & Dugwells in the Mine vicinity.
 - ❖ The monitored Water Quality data are to be periodically submitted to the IBM and with half-yearly Compliance Reports to SEIAA-TN & Regional Office, MoEF&CC, Chennai.

Biological Environment :-

- ❖ Effective Green Belt has to be developed and maintained, with the guidance of DFO, with about 90% Survival Rate.
- ❖ Native species shall be preferred for Green Belt development.
- ❖ Fruit bearing trees may also be preferred.
- ❖ Afforestation in backfilled & reclaimed areas shall be undertaken.
- ❖ 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. The primary way that carbon is stored in the soil is as **soil organic matter (SOM)**. 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. Carbon can remain stored in soils for millennia, or be quickly released back into the atmosphere. Climatic conditions, natural vegetation, soil texture, and drainage all affect the amount and length of time carbon is stored.

Social Measures :-

CSR activities shall be carried out by providing social and welfare measures for the local residents and nearby villages around the mine 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.

Occupational Health Measures :-

- ❖ 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.
 - ❖ Standard operating procedures for all operations with respect to occupational safety and health are to be in place.
-

- ❖ Required Personal Protective Equipments for the Mine employees are to be provided.
- ❖ Provision of ergonomically designed seats for drivers/operators has to be ensured.
- ❖ Provision of illumination facilities are to be made at proper places of mines for ease of working during night times.
- ❖ Work comfort and its periodic review by a Committee is to be ensured.
- ❖ Provision of Rest Shelters at Mines has to be made.
- ❖ Provision of cool drinking water to employees has to be made.

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 : The Project Cost is Rs.3.00 Crores. An amount of Rs.9.70 Lakhs has been earmarked as Capital EMP Budget and Rs.21.57 Lakhs per Annum as Operating Cost towards EMP measures, Green Belt maintenance, Environmental Monitoring, etc.

Public Hearing issued will be addressed and the **Action Plan with Budget will be included** in the EMP Budget for executing the Physical Activities as per MoEF&CC OM dated 30.09.2020.

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 dated 29.10.2024). 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. DCBL 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 Ecosystem 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 09, 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/ACO/23/2755 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.

List of Experts



SCHEME FOR ACCREDITATION OF EIA
CONSULTANT ORGANIZATIONS

NATIONAL ACCREDITATION BOARD FOR EDUCATION AND TRAINING



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tal for Scheme of Accreditation of EIA Consultant Organization || FAQ For Initial Accredita

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

S No	Name	Type	Designation	Sector	FA
1	Ratnakumar V Mudliar	Empanelled	EC,FAE	2(A),21(A),32(A),37(B),39(B)	SHW(A),SC(A),V
2	Abhik Saha	In House	EC,FAE	2(A),9(A),12(A),21(B),22(A)	WP(A),EB(A),AP
3	Dr. R. K Jayaseelan	In House	EC,FAE	1(B),31(B),39(B),21(A),37(B)	LU(A),WP(A),HG
4	Dr. R. Paramasivam	In House	EC,FAE	31(A),36(A)	WP(A),HG(A)
5	Dr.Mohit Kumar Ray	Empanelled	EC	10(A),18(A),4(a),20(A),27(A)	

S No	Name	Type	Designation	Sector	FA
6	Geetha S	In House	,FAE		SE(B)
7	Haneesh Paniker	Empanelled	EC,FAE	34(B),36(B),37(B),38(B),39(B)	AP(B),WP(B),NV
8	K Sekar	Empanelled	EC	1(A),7(A),9(A),31(A),33(A)	
9	Kavitha Zog	Empanelled	EC,FAE	3(A),4(B),22(A),25(B),39(B)	SHW(B),WP(B),I
10	M.S Bhaskar	Empanelled	EC,FAE	1(A),2(A),7(B),21(A)	Geo(A),HG(A),LI
11	Muthiah Mariappan	Empanelled	EC,FAE	4(A),10(A),15(A),16(A),29(A)	SHW(A),AP(A),V
12	P Swamiraj	Empanelled	EC	34(A)	
13	R Rajendran	Empanelled	EC,FAE	8(B),38(B),39(B),29(A)	SHW(B),AP(B),N

S No	Name	Type	Designation	Sector	FA
14	Shankar N Gajbhiye	Empanelled	EC	27(A),33(A)	
15	Sushil Mishram	In House	,FAE		SE(A)
16	Vaishnavi Dhinakaran	In House	,FAA		SHW,WP
17	Vijayalakshmi K	Empanelled	EC,FAE	28(B),39(B), 4(a),21(A)	NV(A),RH(A),AQ
18	Vinod Kumar Gautam	Empanelled	EC,FAE	29(A),38(B),28(B),21(A),34(A)	SHW(A),AQ(A),F
19	Vivek P Navare	Empanelled	EC,FAE	1(A)	NV(A)

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Abstract

Industries-Mines and Minerals _ Major Mineral – Limestone – Ariyalur District – Ariyalur Taluk – Ameenabad and Kairulabad Villages – 2nd renewal of mining lease granted over a total extent of 95.34.5 Hects. of Poramboke lands to Tvl. Dalmia Cement (B) Limited for a period of 20 years from 03.10.2000 to 02.10.2020 – Extension of Lease period as per Section 8A (5) of the MM(D&R) Amendment Act, 2015 up to 31.03.2030– Orders - Issued.

Industries (MMA.2) Department

G.O. (Ms) No. 86

Date:20.08.2018

விளம்பி வருடம், ஆவணி 4
திருவள்ளூர் ஆண்டு 2049

Read:

1. G.O.(Ms)No.874, Industries Department, dated 15.04.1970.
2. G.O.(Ms)No.2, Industries (MMA.2) Department, dated 05.01.1993.
3. G.O.(3D)No.58, Industries (MMA.1) Department, dated 16.10.2006
4. Proceedings of the District Collector, Perambalur in Rc.No.1918/G&M/2006, dated 17.03.2007
5. Revision Authority (GoI) Order No. 661/ 2011, Dated 20.10.2011
6. Interim Order of the Hon'ble High Court of Madras in W.P. No.11923 and 11924 of 2007 Dated:21.6.2007
7. Interim Order of the Hon'ble High Court of Madras in W.P. No.30561 to 30564 of 2012 filed by GoTN, Dated: 21.11.2012
8. Mines and Minerals (Development and Regulation) Amendment Act, 2015, dated 12.01.2015.
9. From Dalmia Cements (B) Ltd., Letter No. DP:GO:LL:24, Dated: 06.03.2015
10. District Collector, Ariyalur letter Rc.No. 1918/ G&M / 2006, dated 16.04.2018.
11. From the Director of Geology and Mining Letter Rc.No. 2889/ MM1/ 2018, dated 16.5.2018.

*****0

Order

The Government in G.O. 1st read above, had granted mining lease to Tvl. Dalmia Cement (Bharat) Ltd for mining limestone over a total extent of 95.34.5 Hect. of Poramboke lands which includes 65.17.0 Hect of Poramboke lands in S.F. Nos. 103/3, 104/3, etc., in Ameenabad Village and 30.17.5 Hect. of Poramboke lands in S.F.No. 448, 449, etc., in Kairulabad Village of Ariyalur Taluk and District for a period of 20 years. The lease period was from 03.10.1970 to 02.10.1990.

2. The Government in the G.O. 2nd read above, issued orders for renewal of the mining lease granted in the G.O. 1st read above, for a period of 10 years. The first renewal lease period was from 03.10.1990 to 02.10.2000.

3. In the G.O. 3rd read above, the Government issued orders for renewal of the above mining lease granted to Tvl. Dalmia Cement (B) Ltd for a further period of 20 years from 03.10.2000 to 02.10.2020.

4. In the meantime, the Government of India amended Mines and Minerals (Development and Regulation) Act, 1957 and the Amendment Act came into effect on 12.01.2015.

5. Accordingly the District Collector, Ariyalur forwarded a proposal through the Director of Geology and Mining under the above provision for extension of the mining lease granted in the reference 3rd read above to Tvl. Dalmia Cements (B) Ltd. up to 31.03.2030 vide reference 10th read above.

6. The following aspects have been examined for the grant of extension of lease period:

(a) Mining Plan and Scheme of Mining:

The lessee has obtained approval from the Indian Bureau of Mines for Review of Mining Plan vide TN/ALR/LST/ROMP-1444.MDS, dated 13.11.2017. The Review of Mining Plan is valid up to 12.11.2022.

(b) Environment Clearance:

The lessee has obtained Environmental Clearance from the Ministry of Environment & Forests vide order No. J-11015/104/2009-IA.II (M), Dated: 09.05.2011 under EIA Notification 2006. The Environmental Clearance is valid upto 08.05.2041.

(c) Consent To Operate from TNPCB:

The lessee is having valid Consent To Operate issued by the TNPCB vide its consent order No.160825552103 and 160815552103, dated 08.12.2016. The consent order is valid upto 31.3.2021.

(d) Surface Right Compensation and No Dues certificate

Subsequent to the grant of second renewal of mining lease in the G.O. 3rd read above, the District Collector, Perambalur in Proc.Rc.No.1918/G&M/2006, dated 17.03.2007 had fixed Rs.5,04,526/-per year as annual surface compensation for the poramboke lands granted for mining lease over a total extent of 95.34.5 Hects. in Ameenabad and Kairulabad Villages of Ariyalur Taluk and District under rule 72 of erstwhile Mineral Concession Rules,1960.

Further, the District Collector, Ariyalur had also raised demand for lease rent of Rs.98,91,090/- per year for the Government poramboke land leased out for mining limestone as per G.O.(Rt)No.460, Revenue Department, dated 04.06.1998.

- (1) Lease rent: Tvl. Dalmia Cement (B) Ltd filed W.P. nos. 11923 and 11924 of 2007 in the Hon'ble High Court of Madras against the lease rent demanded by the District Collector, Ariyalur wherein, the Hon'ble High Court of Madras granted interim stay for the proceedings of the District Collector, Ariyalur demanding lease rent and extended the stay till the final orders. The above W.P.s are pending for final disposal in the Hon'ble High Court of Madras.
- (2) Surface Right Compensation: Tvl. Dalmia Cement (B) Ltd had filed Revision Application before the Government of India against the demand of surface right compensation for the poramboke lands leased out to them. Government of India, in its final order 5th read above, had set aside the impugned order 3rd read above.

Against the above final orders of the Revision Authority (Govt. of India), the Govt. of Tamil Nadu has filed W.P. No.30561-30564 of 2012 in the Hon'ble High Court of Madras and the Hon'ble High Court in its order dated 28.02.2013 has extended the interim stay granted against the orders of the Govt. of India. Hence there was no impediment to collect surface right compensation from the lessee. Accordingly, the lessee remitted a sum of

Rs.90,81,468/- as annual compensation under protest and it is subject to the outcome of the final orders to be passed by the Hon'ble High Court of Madras in W.Ps. No. 30561-30564 of 2012 filed by the GoTN. The lessee is carrying out the mining operations. As the lease deed was not executed, the District Collector, Ariyalur has now requested the Government to consider extension of time for execution of lease deed.

(e) Captive Industry:

It has been informed by the District Collector, Ariyalur that the lessee is manufacturing cement in their cement plant located at Dalmiapuram Village of Tiruchy District and Tamaraikulam Village of Ariyalur District utilizing limestone as raw material mined from the subject area purely for its captive consumption.

(f) Compliance of lease deed conditions:

The District Collector, Ariyalur has stated that the lessee has complied with the lease deed conditions.

7. The District Collector, Ariyalur and the Director of Geology and Mining have recommended and forwarded the proposal for extension of lease period upto 31.03.2030 in respect of the mining lease granted to Tvl. Dalmia Cement (Bharat) Ltd for mining limestone over a total extent of 95.34.5 Hect. of Poramboke lands which includes 65.17.0 Hect of Poramboke lands in S.F. Nos. 103/3, 104/3, etc., in Ameenabad Village and 30.17.5 Hect. of Poramboke lands in S.F.No. 448, 449, etc., in Kairulabad Village of Ariyalur Taluk and District subject to certain conditions.

8. The Government, after careful examination, accept the proposal of the District Collector, Ariyalur as recommended by the Director of Geology and Mining and grant extension of lease period up to 31.03.2030 in respect of the mining lease granted to Tvl. Dalmia Cement (Bharat) Ltd for mining limestone over a total extent of 95.34.5 Hect. of Poramboke lands which includes 65.17.0 Hect. of Poramboke lands in S.F. Nos. 103/3, 104/3, et., in Ameenabad Village and 30.17.5 Hect. of Poramboke lands in S.F.No. 448, 449, etc., in Kairulabad Village of Ariyalur Taluk and District subject to the following conditions:

- i. The lease deed shall be executed for the period from 03.10.2000 to 31.03.2030 as per section 8A (5) of the MMDR, 1957 as amended on 12.01.2015 and the rules made there under

incorporating a specific condition that the lessee, viz., Tvl. Dalmia Cement (B) Ltd. shall abide by the final outcome of the W.P. Nos. 11923, 11924 of 2007 filed by the lessee and the W.P. Nos. 30561-30564 of 2012 filed by the Government which are pending before the Hon'ble High Court of Madras for final disposal.

- ii. The lessee should furnish an undertaking in the form of Affidavit stating all the dues related to the mining lease i.e., annual compensation, DMFT, NMET etc., will be paid whenever the demand is raised by the authority.
- iii. Submission of approved scheme of mining for every five years to the District Collector and to remove the minerals as per the quantum indicated in the approved mining plan.
- iv. The lessee has to produce latest mining dues certificate in respect of the leases held by them in various districts of the State before execution of lease deed.
- v. The District Collector should ensure that the mineral is utilized for captive industry.
- vi. The lessee has to abide by the terms and conditions of the mining lease stipulated in rule 12 of Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016.
- vii. The lessee has to comply with the provisions of the Mineral Conservation and Development Rules, 2017.
- viii. The District Collector to ensure compliance by the lessee with regard to the provisions of the Mineral conservation and Development Rules, 2017, Mines and Minerals (Development & Regulation) Amendment Act, 2015, Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 and other applicable Act and Rules and various directions issued by the Ministry of Mines, Government of India and the Hon'ble Supreme court of India, National Green Tribunal, Hon'ble High court and including Forest (Conservation) Act, 1980 and other related Acts before lease deed execution.

9. The District Collector, Ariyalur is directed to execute the lease deed to that effect as per the provisions under Mines and Minerals

(Development and Regulation) Act, 1957 as amended on 12.1.2015 and the rules framed there under.

(BY ORDER OF THE GOVERNOR)

K. GNANADESIKAN
ADDITIONAL CHIEF SECRETARY TO GOVERNMENT

To

✓ Tvl. Dalmia Cement (B) Limited,
Fagun Mansion, 4th Floor,
26, Ethiraj Salai, Egmore, Chennai - 600 008

The Director of Geology and Mining,
Guindy, Chennai - 600 032.

The District Collector, Ariyalur

The Regional Controller of Mines,
Indian Bureau of Mines, Chennai -600 090

Copy to:

Personal Assistant to Hon'ble Minister for Law, Courts and Prisons
Chennai -600 009
Industries (OP.II) Department, Chennai - 600 009
Sf/Scs.

// Forwarded / By Order //

S. P. Ramfonesethu
20/8/2018

SECTION OFFICER

20/8/2018

BY SPEED POST

No. J-11015/ 104/2009-IA,II (M)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110 003.



Dated the 9th May, 2011

To:

M/s. Dalmia Cement (Bharat) Limited
Dalmiapuram – 621 651
Distt. Tiruchirapalli, Tamil Nadu

Subject: Expansion of Aminabad & Khairulabad Limestone Mines (ML area 95.345 ha, production capacity 0.30 MTPA to 1.10 MTPA) of M/s Dalmia Cement (Bharat) Limited at Villages Aminabad & Khairulabad, in Ariyalur Taluka & District in Tamil Nadu – Environmental clearance regarding.

Sir,

This has reference to your letter No. DP: Mines: A&K:01/10 dated 27.1.2010 on the subject mentioned above. Subsequent letter dt. 20.11.2010 and 20.1.2011 were also considered.

2. The proposal is for expansion of limestone mining for enhancement of production capacity from 0.30 to 1.10 MTPA of M/s Dalmia Cement (Bharat) Ltd., at villages Aminabad & Khairulabad villages, in Ariyalur Taluk and Distt., in Tamil Nadu. Expansion will be carried out only vertically and no further horizontal excavation other than area already excavated of 49.10 ha for the present production capacity of 0.3 MTPA will be involved. Earlier environmental clearance for 0.30 MTPA productions was accorded on 13.01.2006. The lease area is 95.345 ha, which is a Government waste land. The land use break-up at the end of mining will be as area for excavation 86.0 ha; area for roads 0.35 ha; area for green belt 5.48 ha; and 3.515 ha will be unutilised. The Coordinates of the mine lease area are Latitude- 11° 07' 40" N to 11° 08' 28" N; Longitude- 79° 07' 00" E to 79° 08' 21" E. Method of mining will be open cast mechanised. Life of mine at proposed rate of production will be 14 years. Waste generation will be 1.08 Million tonnes in the form of ferrous limestone which will be backfilled. Present working depth is 17.3 m bgl and ultimate depth of mining will be at 53 m RL (27.8 m bgl). Ground water table varies from 45 m bgl to 35 m bgl (pre-

Dr. A&K
MM
14/6/11
15/6/11

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monsoon to post monsoon). Mining will not intersect ground water table. Water requirement will be 15 KLD, which will be met from ground and mine pit water. Seasonal Kallar river flows adjacent to the lease in west and seasonal Marudaiyar river flows 6.5 km away in the South. HFL of Kallar river is 65.39 m and RLS of Kallar river near the ML area is 64.53m and 63.67m. The lowest RL of the mine lease area is 65.39m. There will be no discharge of waste water outside the mine lease area. There are no wildlife sanctuaries/National Parks/ Tiger Reserves and Heritage Sites etc within 10 Km of the lease. The nearest habitation is at a distance of 600 m in the Northern portion of the mine. Mineral transportation will be by road. There is no R&P issue involved. It was reported that there is no court case pending against the project. Public hearing was held on 15.10.2010. Cost of EMP will be Rs. 0.05 crores per annum. CSR budget will be Rs. 0.08 crores per annum besides Rs. 0.05 crores for Occupational Health and safety measures. Cost of the project will be Rs. 1.0 Crore.

3. The terms of reference for the project were issued on 25.5.2009 for preparation of EIA and EMP. The Public hearing was held on 15.10.2010 at Grievance Day Petition Hall of Taluk Office, Ariyalur, Ariyalur district by Tamil Nadu Pollution Control Board. The Mining scheme was approved by IBM on 18.3.2008. Mine lease renewal was done for the period up to 02.10.2020 vide letter dt. 16.10.2000 by the Govt. of Tamil Nadu.

4. The proposal has been considered by the Expert Appraisal Committee for Mining based on the project documents and has recommended for the grant of environmental clearance for the said new Limestone mining project. Accordingly, the Ministry of Environment and Forests hereby accords environmental clearance to the said project under the provisions of Environment Impact Assessment Notification, 2006 subject to strict compliance of the terms and conditions as follows:-

A. SPECIFIC CONDITIONS:

- (i) The Company shall undertake regular desiltation of Kallar river flowing adjacent to the lease in West during the dry period to prevent inundation of mine during rainy season.
- (ii) The project proponent shall obtain Consent to Establish and Consent to Operate from the Tamil Nadu State Pollution Control Board and effectively implement all the conditions stipulated therein.

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- (iii) Measures for prevention and control of soil erosion and management of silt shall be undertaken. The de-silted material from the river should not be left near the river to avoid it from going back into the river and should be properly disposed of at appropriate site.
- (iv) The roads through which mineral transportation is undertaken outside the mine lease area should be maintained through the nodal agency in the State Government by making financial contribution for the same.
- (v) Trenches / garland drains shall be constructed at foot of dumps and coco filters installed at regular intervals to arrest silt from being carried to water bodies. Adequate number of Check Dams and Gully Plugs shall be constructed across seasonal/perennial nallahs (if any) flowing through the ML area and silts arrested. De-silting at regular intervals shall be carried out.
- (vi) The optimum charge for blasting shall be determined based on vibration study. Blasting operation shall be carried out only during the daytime. Controlled blasting shall be practiced. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented.
- (vii) Drills shall either be operated with dust extractors or equipped with water injection system.
- (viii) Mineral handling area shall be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements. These should be properly maintained and operated.
- (ix) ETP shall also be provided for the workshop and wastewater generated during the mining operation.
- (x) Fugitive dust generation shall be controlled. Fugitive dust emission shall be regularly monitored at locations of nearest human habitation (including

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schools and other public amenities located nearest to sources of dust generation as applicable) and records submitted to the Ministry.

- (xi) The project authority shall implement suitable conservation measures including suitable rain water harvesting measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.
- (xii) Regular monitoring of ground water level and quality including Arsenic shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The periodic monitoring [(at least four times in a year- pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January); once in each season)] shall be carried out in consultation with the State Ground Water Board/Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office, Bangalore, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity, necessary corrective measures shall be carried out.
- (xiii) Mineralogical composition of the dust to assess the silica content in the dust particle and particle size analysis shall be carried out periodically and records maintained. Personnel exposure monitoring for dust shall also be carried out for the workers.
- (xiv) Land-use pattern of the nearby villages shall be studied, including common property resources available for conversion into productive land. Action plan for abatement and compensation for damage to agricultural land / common property land (if any) in the nearby villages, due to mining activity shall be submitted to the Ministry within six months.
- (xv) Need based assessment for the nearby villages shall be conducted to study economic measures with action plan which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchards, vocational training etc. can form a part of such

-5-

programme. Company shall provide separate budget for community development activities and income generating programmes. This will be in addition to vocational training for individuals imparted to take up self employment and jobs.

- (xvi) Occupational Health Cell shall be created at the company under the charge of an officer of adequate seniority who is a qualified person in occupational health. Occupational health and safety measures for the workers including identification of work related health hazards, training on malaria eradication, HIV, and health effects on exposure to mineral dust etc. shall be carried out. The company shall engage a full time qualified doctor who is trained in occupational health. Periodic monitoring for exposure to respirable mineral dust on the workers shall be conducted and records maintained including health records of the workers. Awareness programme for workers on impact of mining on their health and precautionary measures like use of personal equipments etc. shall be carried out periodically. Review of impact of various health measures undertaken (at interval of five years or less) shall be conducted followed by follow up action wherever required.
- (xvii) The company shall stress upon the preventive aspects of occupational health. Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers should be drawn and followed accordingly.
- (xviii) Green belt shall be raised first in the northern portion of the mine where the nearest habitation is at a distance of 600m. The greenbelt plantation all around the mine lease should be completed within 5 years of grant of environmental clearance. Green belt development and selection of plant species shall be of native species. The density of the trees should be around 2000 plants per ha. Herbs and shrubs shall also form a part of afforestation programme besides tree plantation. Details of year wise afforestation programme including rehabilitation of mined out area shall be submitted to the Ministry within six months.

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- (xix) Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral within the lease up to the stockyard. The mineral transportation within the mine lease shall be carried out through the covered trucks only and the vehicles carrying the mineral shall not be overloaded. The mineral transportation outside the mine lease shall be carried out through the tarpaulin covered trucks only and the vehicles carrying the mineral shall not be overloaded. There shall be no spillage of mineral enroute up to the delivery point.
- (xx) Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche, etc. The housing may be in the form of temporary structures to be removed after the completion of the project.
- (xix) The critical parameters such as RSPM (Particulate matter with size less than 10micron i.e., PM_{10}) and NO_x in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [(TDS, DO, PH and Total Suspended Solids (TSS)). The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the Company in public domain. The Circular No. J-20012/1/2006-IA,II(M) dated 27.05.2009 issued by Ministry of Environment and Forests, which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.
- (xxii) A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.

B. General conditions

- (i) No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.

-6-

- (xix) Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral within the lease up to the stockyard. The mineral transportation within the mine lease shall be carried out through the covered trucks only and the vehicles carrying the mineral shall not be overloaded. The mineral transportation outside the mine lease shall be carried out through the tarpaulin covered trucks only and the vehicles carrying the mineral shall not be overloaded. There shall be no spillage of mineral enroute up to the delivery point.
- (xx) Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile-STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.
- (xxi) The critical parameters such as RSPM (Particulate matter with size less than 10micron i.e., PM_{10}) and NO_x in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [(TDS, DO, PH and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the Company in public domain. The Circular No. J-20012/1/2006-IA.II(M) dated 27.05.2009 issued by Ministry of Environment and Forests, which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.
- (xxii) A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.

B. General conditions

- (i) No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.

- (ii) No change in the calendar plan including excavation, quantum of mineral limestone and waste should be made.
- (iii) At least four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10micron i.e., PM_{10}) and NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.
- (iv) Data on ambient air quality [(RSPM (Particulate matter with size less than 10micron i.e., PM_{10}) and NO_x] should be regularly submitted to the Ministry including its Regional office located at Bangalore and the State Pollution Control Board / Central Pollution Control Board once in six months.
- (v) Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.
- (vi) Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.
- (vii) Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.
- (viii) Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.
- (ix) A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.
- (x) The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bangalore.

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- (xi) The project authorities should inform to the Regional Office located at Bangalore regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.
- (xii) The Regional Office of this Ministry located at Bangalore shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.
- (xiii) The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment and Forests, its Regional Office Bangalore, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board. The proponent shall upload the status of compliance of the environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment and Forests, Bangalore, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board.
- (xiv) A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/ Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.
- (xv) The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's office/ Tehsildar's Office for 30 days.
- (xvi) The project authorities should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment and Forests at <http://envfor.nic.in> and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bangalore.

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5. The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection.
6. Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of the Environment (Protection) Act, 1986.
7. The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/ High Court of Tamil Nadu and any other Court of Law relating to the subject matter.
8. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Office of the Ministry of Environment and Forests, Bangalore by e-mail.

(OM PRAKASH)
DEPUTY DIRECTOR

Copy to:

1. Secretary, Ministry of Mines, Government of India Shastri Bhawan, New Delhi.
2. Secretary, Department of Environment, Government of Tamil Nadu, Chennai.
3. Secretary, Department of Mines and Geology, Government of Tamil Nadu, Chennai.
4. Secretary, Department of Forests, Government of Tamilnadu, Chennai
5. The Secretary (Environment), Govt. of Tamil Nadu, Fort. St. George, Chennai-600009.
6. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.
7. The Chairman, Tamil Nadu Pollution Control Board, 76, Mount Road, Guindy, Chennai - 600032.

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8. The Chief Conservator of Forests (Central), Regional Office (SZ), Kendriya Sadan, IVth Floor, E&F Wings, 7th Main Road, IInd Block, Koramangala, Bangalore-560034.
9. Member Secretary, Central Ground Water Authority, A-2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.
10. Controller General, Indian Bureau of Mines, Indra Bhavan, Civil Lines, Nagpur-440 001.
11. District Collector, District Ariyalur, Tamil Nadu.
12. Monitoring File/Guard File/Record File.


9/5/2011
(OM PRAKASH)
DEPUTY DIRECTOR



भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

Integrated Regional Office, Chennai,
1st floor, Additional Office Block for GPOA, Shastri Bhawan, Haddows Road,
Nungambakkam, Chennai - 600006, Tel.No.044-2822 2325, Fax 28252536
E-Mail: roefccc@gmail.com / roefccc1@gmail.com



F.No. EP/12.1/2011-12/1/TN/ 9/8

Dated: 26th August, 2022

To

Shri. S.Makesh
Mines Agent & Asst. Executive Director (Mines)
M/s Dalmia Cement (Bharat) Ltd
Dalmiapuram, Trichy - 621 651

Subject: MoEF&CC - Environmental Clearance - Expansion of Aminabad and Khairulabad Limestone Mines (ML area 95.345 Ha, Production capacity 0.30 MTPA to 1.10 MTPA) in villages Aminabad and Khairulabad, in Ariyalur Taluk & District, Tamil Nadu by M/s Dalmia Cement (Bharat) Ltd - regarding.

Ref: (i) EC. No. J-11015/398/2005-1A,II (M), dated 13.01.2006
(ii) EC. No J-11015/104/2009-1 A, II (M) dated 09.05.2011.

Sir,

This has reference to the inspection carried out by the undersigned for the above mentioned project on 12.05.2022 and information submitted vide email dated 04.08.2022. In this regard, copy of monitoring report of above clearance is enclosed for reference.

This has the approval of the Competent Authority vide diary No.E-183189 dated 25.08.2022

Encl: as above

Yours faithfully,

Saranya

(Dr. Saranya. P)
Scientist 'D'

Email: saranya.p@gov.in

Dr. P. Saranya
Scientist 'D'

Government of India
Min. of Environment, Forest and Climate Change,
Integrated Regional Office,
1st Floor, Addl. Office Block for GPOA,
Shastri Bhawan, Haddows Road,
Nungambakkam, Chennai - 600 006.

o/c
DESPATCHED
Date: 29/8/22
Sj/Bj 30)

GOVERNMENT OF INDIA
Ministry of Environment, Forest & Climate Change
(Integrated Regional Office, Chennai)

MONITORING REPORT

PART I

DATA SHEET

1	Project Type River valley/Mining/Industry/Thermal/ Nuclear/Other Specify	Mining Project (Limestone)
2	Name of the project	1. Expansion of Aminabad and Khairulabad Limestone Mine (95.34.5 Ha; 0.30 MTPA) located in villages Aminabad and Khairulabad, in Ariyalur Taluk & District, Tamil Nadu 2. Expansion of Aminabad and Khairulabad Limestone Mines (ML area 95.345 Ha, Production capacity 0.30 MTPA to 1.10 MTPA) of M/s Dalmia Cement (Bharat) Ltd, located in villages Aminabad and Khairulabad, in Ariyalur Taluk & District, Tamil Nadu
3	Clearance letter(s)/OM No. and dated	1. EC. No. J-11015/398/2005-IA.II (M), dated 13.01.2006 2. EC. No J-11015/104/2009-I A. II (M) dated 09.05.2011.
4	Locations	
	a District (s)	Ariyalur
	b State (s)	Tamil Nadu
	c Latitudes	
	d Longitudes	
5	Address of correspondence	
	a Address of concerned project Head (with Pin Code & telephone/telex/fax numbers)	Shri. S.Makesh Mines Agent & Asst. Executive Director (Mines) M/s Dalmia Cement (Bharat) Ltd Dalmiapuram, Trichy - 621 651 Mob: 9865165326 Email: s.makesh@dalmiacement.com
6	Salient features	
	a of the project	Mining of Limestone mine of 1.10 MTPA in a lease area of 95.345 Ha
	b of the environmental management plans	(i) Green belt development

			(ii) Monitoring of environmental parameters (AAQ/Noise/Water quality) (iii) Water sprinkling for dust suppression (iv) Monitoring of ground vibration levels on regular basis, amongst others			
7	Breakup of the project area					
	a	Submergence area (forest & non-forests)	Nil			
	b	Others	93.345 Ha			
8	Break up of project affected population with enumeration of those losing houses/dwelling units only, agricultural land only, both dwelling units and agricultural land and landless labourers/artisans					
	a	SC,ST/Adivasis	NA			
	b	Others	NA			
9	Financial Details					
	a	Project cost as originally planned and subsequent revised estimates and the years of price reference	Rs.1 Crore (as per EC dated 2011)			
	b	Allocations made for environmental management plans, with item wise and year wise breakup	S.No	Year	Budget allocated (lakhs)	Actual expenditure (lakhs)
			1	2019-20	15	15.4
			2	2020-21	20	22.1
			3	2021-22	25	26.7
	c	Benefit cost ratio/internal rate of return and the years of assessment	---			
	d	Whether (c) includes the cost of environmental management as shown in (b) above	---			
	e	Total expenditure on the Project so far	Rs.0.95 Crores.			
	f	Actual expenditure incurred on the environmental management plans so far	S.No	Year	Budget allocated (lakhs)	Actual expenditure (lakhs)
			1	2019-20	15	15.4
			2	2020-21	20	22.1
			3	2021-22	25	26.7
10	Forest land requirement					
	a	The status of approval for a diversion of forest land for non-forestry use	NA			
	b	The status of compensatory	NA			

	afforestation, if any	
c	The status of clear felling	NA
d	Comments on the viability and sustainability of compensatory afforestation programme in the light of actual field experience so far	NA
11	The status of clear felling in non-forest area (such as submergence area of reservoir, approach road), if any, with quantitative information	NA
12	Status of construction	
a	Date of commencement	The project is in operation since 1970 as informed by PA.
b	Date of completion (actual and/or planned)	Presently the mine is in operation
13	Reasons for the delay if the project is yet to start.	
14	Date of site visit	
a	The dates on which the project was monitored by the Regional Office on previous occasions, if any	24.1.2013
b	Date of site visit for this monitoring report	12.05.2022

This has the approval of the Competent Authority vide diary No.E-183189 dated 25.08.2022


(Dr.Saranya.P)
Scientist'D'
Email: saranva.p@gov.in

Dr. P. Saranya
Scientist 'D'
 Government of India
 Min. of Environment, Forest and Climate Change
 Joint Secretary (EIA) Office
 E-202, 2nd Floor, Block-I, GPOA,
 Sector 14, Connaught Place,
 New Delhi-110028

MONITORING REPORT

Subject: MoEF&CC- Environmental Clearance - Expansion of Aminabad and Khairulabad Limestone Mines (ML area 95.345 Ha, Production capacity 0.30 MTPA to 1.10 MTPA) of M/s Dalmia Cement (Bharat) Ltd, located in villages Aminabad and Khairulabad, in Ariyalur Taluk & District, Tamil Nadu – Reg.

Reference: EC, No. J-11011/398/2005- IA, II(M), dated 13.01.2006
EC, No J-11015/104/2009-I A, II (M), dated 09.05.2011.

Present Status of the project:

Mine Details	
Name of the Mine	Amminabad & Khairulabad Limestone Mines
Name of the Owner	M/s Dalmia Cement
Name of the Project	Expansion of the Project
Name of the Manager	M/s Dalmia Cement (Bharat) Ltd
Name of the Mine	Limestone
Project Area	95.345 Hectares
Production Capacity	1.10 MTPA (Total)
Production	0.30 MTPA
Location	95° 12' 42" N 78° 11' 30" E
Longitude	78° 11' 30" E 78° 12' 30" E

The Ministry of Environment, Forest and Climate Change had accorded environmental clearance for Aminabad and Khairulabad Limestone Mines (ML area 95.345 Ha, Production capacity 0.30 MTPA) of M/s Dalmia Cement (Bharat) Ltd, located in villages Aminabad and Khairulabad, in Ariyalur vide letter dated 13.01.2006 under EIA Notification, 1994. Further, the Ministry had accorded environmental clearance for expansion of Aminabad and Khairulabad Limestone Mines (ML area 95.345 Ha, Production capacity from 0.30 MTPA to 1.10 MTPA) vide letter dated 09.05.2011 under EIA Notification, 2006.

The mine comprises of three leases which are compact and contiguous. The mining operations started in 1970 and **are currently operational**. For the operations of the mines, M/s Dalmia Cement (Bharat) Limited has obtained the latest Consent to Operate (CTO) from TNPCB under Air (Prevention and control of pollution) Act, 1981 and Water (Prevention and control of pollution) Act, 1974, vide proceedings No. F.0169ARY/RS/DEE/TNPCB/ARY/A/2021 and F.0169ARY/RS/DEE/TNPCB/ARY/W/2021, dated 01.06.2021 respectively, valid upto 31st March, 2026.

The mining plan was approved by the Indian Bureau of Mines vide letter No. TN/ALR/LST/ROMP-1444.MDS, dated 13.11.2017. Mining operation is being carried out by Opencast Non-Conventional Method of Mining using drilling and blasting. At present, the mining activity has not intersected the ground water table.

The above project was monitored on 12.05.2022 along with the representative of the Project authorities. The report is submitted on the basis of the field visit and as per the information provided by the PA. The status of compliance on the stipulated conditions contained in the EC cited above is given below.

Date of Monitoring: 12.05.2022

PART-III

A. SPECIFIC CONDITIONS (Environmental Clearance dated 09.05.2011)

S.No	Conditions	Compliance
i	The company shall undertake regular desiltation of kallar river flowing adjacent to the lease in west during the dry period to prevent inundation of mine during rainy season.	Refer below The PA informed that as and when requested by concerned authority, desiltation of kallar river flowing adjacent to the lease in west during the dry period was carried out to prevent inundation of mine during rainy season. The Kallar river was recently desilted on June 2021 as per the register submitted to this office.
ii	The project proponent shall obtain consent to Establish and consent to operate from the Tamil Nadu State Pollution Control Board and effectively implement all the conditions Stipulated therein.	Complied The mine is in operation since 1970 as informed by PA. The latest Consent to Operate (CTO) from TNPCB under Air (Prevention and control of pollution) Act, 1981 and Water (Prevention and control of pollution) Act, 1974, vide proceedings No. F.0169ARY/RS/DEE/TNPCB/ARY/A/2021 and F.0169ARY/RS/DEE/TNPCB/ARY/W/2021, dated 01.06.2021 respectively, valid upto 31st March, 2026.
iii	Measures for prevention and control of soil erosion and management of silt shall be undertaken. The de-silted material from the river should not be left near the river to avoid it from going back into the river and should be properly disposed of at appropriate site.	Refer below. The PA informed adequate measures are taken to control soil erosion and management of silt. Also, the desilted material from river is disposed at appropriate sites as directed by concerned authority.
iv	The roads through which	Reportedly complied.

	mineral transportation is undertaken outside the mine lease area should be maintained through the nodal agency in State Government by making financial contribution for the same.	The roads used for transportation are maintained by nodal agency in the State Government by making financial contribution for the same.
v	Trenches/Garland drains shall be constructed at foot of dumps and coco filters installed at regular intervals to arrest silt from being carried to water bodies. Adequate number of check dams and Gully Plugs Shall be constructed across seasonal/Perennial nullahs(if any) following through the ML area and silts arrested. De-silting at regular intervals shall be carried out.	Complied These mines are in operations since 1970. Garland drains are formed in the periphery of the mine pits and maintained. Regular desilting is carried out. The rain water collected in the garland drains, after Suspended Solids Settlement in a sump, joins the natural drains of the area. Sump capacity provides adequate retention period enabling proper settling of silt material.
vi	The optimum charge for blasting shall be determined based on vibration study. Blasting operation shall be carried out only during day time. Controlled blasting shall be practiced. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented.	Complied. Controlled Blasting is carried out with Milli – Second Delay Detonators & Non Electric Initiation System of Detonators to reduce the noise and ground vibrations. Blasting is carried out only during the day times only. As informed, adequate measures for control of ground vibrations to arrest the fly rocks and boulders are being implemented. License to store Ammonium Nitrate in store house has been obtained from Joint Chief Controller of Explosives vide letter dated A/SC/TN/P3/11(A318), dated 20.04.2022, valid upto 31.03.2026
vii	Drills shall either be operated with dust extractors or equipped with water injection system.	Complied Water Mist Dust suppression system is provided in all the drilling equipment and wet drilling is being practiced.
viii	Mineral handling area shall be provided with adequate	Complied

	number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements. These should properly maintained and operated.	Water Mist Dust suppression system and water sprinkling is being carried out to control dust and emission of fugitive emissions.
ix	ETP shall also be provided for the workshop and wastewater generated during the mining operation.	Complied There is no process effluent generated from the mine pit. The workshop effluent is being treated in Up flow Filter to trap oil and grease present and then the treated effluent is reused for green belt development.
x	Fugitive dust generation shall be controlled. Fugitive dust emission shall regularly monitored at locations of nearest human habitation (including school and other public amenities located nearest to sources of dust generation as applicable) and records submitted to the Ministry.	Complied. Periodical monitoring of fugitive emissions are being carried out through NABL recognized third party laboratory viz. M/s Interstellar Testing Centre Private Limited. The monitored data, as per report, shows that the values are within the limits. The status reports are also being submitted on half yearly basis to MoEF&CC, RO, Chennai
xi	The project authority shall implement suitable conservation measures including suitable rain water harvesting measures to augment ground resources in the area in consultation with Regional Director, Central Ground water Board.	Complied Rainwater harvesting pits are provided for recharging ground water. At the end of mine life, all the pits will be used for rain water collection which will recharge the water table in and around the ML area.
xii	Regular monitoring of ground water level and quality including Arsenic shall be carried out in and around the mine lease by establishing a network of existing wells and	Complied There are no bore wells/open wells within the ML area. Further, there is no extraction of ground water during the visit. At present, the mining activity has not intersected the ground water table.

	constructing new piezometers during the mining operation. The periodic monitoring [(at four times in a year-Premonsoon (April-May), monsoon (August), Post-monsoon(November) and winter(January); once in each season)] shall be carried out in consultation with the State Ground Water Board/Central Ground Water Authority and the data thus collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office, Bangalore, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the ground water table is getting depleted due to the mining activity; necessary corrective measures shall be carried out.	Periodical monitoring of surface water & ground water are being carried out through NABL recognized third party laboratory viz. M/s Interstellar Testing Centre Private Limited. The monitored data, as per report, shows that the values are within the limits. The status reports are also being submitted on half yearly basis to MoEF&CC, RO, Chennai
xiii	Mineralogical composition of the dust to assess the silica content in the dust particle and particle size analysis shall be carried out periodically and records are maintained. Personal exposure monitoring for dust shall also be carried out for the workers.	Complied. Personal dust samplers are used for monitoring the dust and records are maintained in this regard.
xiv	Land use pattern of the nearby village shall be studied, including common property resource available for conversion into	Complied Land use pattern of 10 km radius area was studied while carrying out the EIA studies.

	productive land. Action plan for abatement and compensation for damage to agricultural land/ common property land (if any) in the nearby villages, due to mining activity shall be submitted to the ministry within six months.	These existing mines are in operation since 1970 and there is no damage to any agriculture land or common property so far due to mining activities as informed.
xy	Need based assessment for the nearby villages shall be conducted to study economic measures with action plan which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchards, vocational training etc., can form a part of such programme. Company shall provide separate budget for community development activities and income generating programmes. This will be in addition to vocational training for individuals imparted to take up self-employment and jobs.	Complied. Need based assessment of the nearby villages was conducted by their CSR Team to study economic measures. Company has provided separate budget for community development activities every year and implemented. The PA informed that skill development programmes and livelihood initiatives are being done in the nearby villages. A skill training centre is established and local youths are trained, enabling them to get employment in various sectors. For Economic development of people in the project area, the following activities are done by company • Appointment of persons with suitable qualification for Electrical and Mechanical maintenance activities in Mines • Employment opportunities in Greenery development, Weighbridge operations and Pump operations • Skill development for local youth in DIKSHA skill development centre • Awarding contracts to local villagers for shift vehicles, water tankers etc • Aided in formation of Self Help groups and women from local villages are benefitted through Micro Loans scheme • Farmers Producers Organisation (FPOs) are formed in nearby villages which helps in agriculture growth and revenue generation for farmers • Dalmia supports in installation of Solar operated pumps for farmers, hand operated ploughing machines etc in various villages

xvi	Occupational health and safety measures for the workers including identification of work related health hazards, training on malaria eradication, HIV and health effects on exposure to mineral dust etc. shall be carried out. The company shall engage a full time qualified doctor who is trained in occupational health. Periodic monitoring for exposure to respirable mineral dust on the workers shall be conducted and records maintained including health records of the workers. Awareness programme for workers on impact of mining on their health and precautionary measures like use of personal equipments etc. shall be carried out periodically. Review of impact of various health measures undertaken (at interval of five years or less) shall be conducted followed by follow up action where wherever required.	Complied. All the employees are subjected to periodical medical examination as per the provisions of Mines Rules, 1955. A fully fledged Dispensary / occupational health centre with qualified doctor & required infrastructures are available at Dalmiapuram plant. All mine workers are provided with required personnel protective equipments for working in the mines. Mines workers are periodically undergoing medical surveillance once in 3 years for occupational health related diseases & periodically reviewed. As per the medical records there is no evidence of any occupational health related diseases among the mine workers. Awareness programme for workers on impact of mining on their health and precautionary measures like use of personal equipments etc. is carried out in Mines periodically.
xvii	The Company shall stress upon the preventive aspects of occupational health. Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers should be drawn	Refer below The pre-placement medical examination for the employees is being carried out by their corporate offices and periodical medical examination of the workers engaged in the project has been carried out and records are maintained.

	and followed accordingly.																														
xviii	Green belt shall be raised first in the northern portion of the mine where the nearest habitation is at distance of 600m. The greenbelt plantation all around the mine lease should be completed within 5 years of grant of environment clearance. Greenbelt development and selection of plant species shall be of native species. The density of the trees should be around 2000 plants per ha. Herbs and shrubs shall also form a part of afforestation programmes besides tree plantation. Details of year wise afforestation programme including rehabilitation of mined out area shall be submitted to the ministry within six months.	Refer below Green belt is developed at some places all along the ML boundary, roads and undisturbed areas including around the mine office etc. to an extent of 7.20 Ha <table><tr><th colspan="5">Details of Green Belt for Aminabad & Khairulabad Limestone Mines</th></tr><tr><th rowspan="2">Year</th><th colspan="2">No. of saplings</th><th colspan="2">Extent (ha)</th></tr><tr><th>Within lease</th><th>Outside lease</th><th>Within lease</th><th>Outside lease</th></tr><tr><td>Total as on 31.03.2021</td><td>7468</td><td>1308</td><td>6.10</td><td>1</td></tr><tr><td>Upto 31.12.2021</td><td>150</td><td>0</td><td>0.10</td><td>0</td></tr><tr><td>Total</td><td>7618</td><td>1308</td><td>6.20</td><td>1</td></tr></table> Greenery was also developed in the northern side of the lease area. But, due to the occurrence of hard stone in the top, growth is less. However, the PA assured they will continuously develop greenery in all available areas with new varieties of saplings which can grow in dry barren areas also.	Details of Green Belt for Aminabad & Khairulabad Limestone Mines					Year	No. of saplings		Extent (ha)		Within lease	Outside lease	Within lease	Outside lease	Total as on 31.03.2021	7468	1308	6.10	1	Upto 31.12.2021	150	0	0.10	0	Total	7618	1308	6.20	1
Details of Green Belt for Aminabad & Khairulabad Limestone Mines																															
Year	No. of saplings		Extent (ha)																												
	Within lease	Outside lease	Within lease	Outside lease																											
Total as on 31.03.2021	7468	1308	6.10	1																											
Upto 31.12.2021	150	0	0.10	0																											
Total	7618	1308	6.20	1																											
xix	Vehicular emission shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operation and in transportation of mineral within the lease up to the stockyard. The mineral transportation within the mine lease shall be carried out through the covered trucks only and the vehicles carrying the mineral shall not be overloaded. The mineral transportation outside the mine lease shall	Complied Vehicles with valid permissions are only used. Vehicles transporting limestone from mines to the factory are covered with tarpaulin properly so as to arrest the dust particles / fine matters escaping during the course of transportation. No overloading is done as informed. It is observed that all the vehicles which are used in the quarry area are having Pollution under Control (PUC) certificates.																													

	be carried out through the tarpaulin covered trucks only and the vehicles carrying the mineral shall not be overloaded. There shall be no spillage of mineral enroute up to the delivery point.	
xx	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Reportedly complied The existing mines are in operation since 1970. The PA informed that the employees of this mine are from the nearby villages and reporting to work. Safe drinking water and medical health facilities at work place are provided.
xxi	The critical parameters such as RSPM (Particulate matter with size less than 10 micron i.e. PM_{10}) and NO_x in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [(TDS, DO, PH and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the company in public domain. The Circular	Complied. Ambient air quality-monitoring stations are established in the core zone as well as in the buffer zone for RPM, SPM, SO_2, NO_x monitoring. Monitoring of ambient air quality is being carried out through NABL recognized third party laboratory viz. M/s Interstellar Testing Centre Private Limited. The monitored data, as per report, shows that the values are within the limits. TNPCB vide letter No.97/AAQS/2021-2022, dated 01.04.2022 has furnished report of analysis of Ambient air quality level in the vicinity of the mines and monitored data shows that the values are within the limits.

	No.J-20012/1/2006-1A.II(M) dated 27.05.2009 issued by Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.	
xxii	A Final Mine closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	Agreed to comply. The PA informed that final mine closure plan along with details of Corpus Fund will be submitted to the Regional office of the Ministry of Environment & Forests, 5 years in advance of final mine closure for approval.
B. General Conditions		
i	No change in technology and scope working should be made without prior approval of the Ministry of Environment & mining technology. Forests.	Complied Mechanized method of Mining is followed as per approved Mining plan/ schemes and there is no change in mining technology.
ii	No change in the calendar plan including excavation, quantum of limestone, waste/OB dumps should be made.	Complied. There is no change in the calendar plan including excavation, quantum of mineral made, as per records made available during the visit.
iii	At least four ambient air quality-monitoring stations should be established in the core zone as well as buffer zone for RSPM (Particulate matter with size less than 10 micron i.e. PM ₁₀) and NO _x monitoring. Location of the ambient air quality stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and the frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.	Complied. Ambient air quality-monitoring stations are established in the core zone as well as in the buffer zone for RPM, SPM, SO₂, NO_x monitoring. Monitoring of ambient air quality is being carried out through NABL recognized third party laboratory viz. M/s. Interstellar Testing Centre Private Limited. The monitored data, as per report, shows that the values are within the limits. TNPCB vide letter No.97/AAQS/2021-2022, dated 01.04.2022 has furnished report of analysis of Ambient air quality level in the vicinity of the mines and monitored data shows that the values are within the limits.

iv.	Data on ambient air quality [(RSPM (Particulate matter with size less than 10 micron i.e. PM ₁₀) and NO _x) should be regularly submitted to the Ministry including its Regional Office located at Bangalore and the State Pollution Control Board/ Central Pollution Control Board once in six months.	Complied. Data on ambient air quality (RPM, SPM, SO₂, NO_x) are submitted to the Ministry's Regional Office, Chennai as a part of six monthly compliance report. The PA further informed that the same is also submitted to Central Pollution Control Board once in six months and to the State Pollution Control Board once in a month.
v	Fugitive dust emissions from all sources should be controlled regularly water spraying arrangements on haul roads, loading and unloading points and transportation of minerals, etc.,	Complied. Water sprinkling is being done on haul roads, loading areas, etc. at frequent intervals to control fugitive dust emission.
vi	Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM etc., should be provided with ear plugs/muffs.	Complied. Monitoring of ambient noise levels is being carried out through NABL recognized third party laboratory viz. M/s Interstellar Testing Centre Private Limited. The monitored data, as per report, shows that the values are within the limits. TNPCB vide letter No.97/AAQS/2021-2022, dated 01.04.2022 has furnished report of analysis of Ambient Noise level in the vicinity of the mines and monitored data shows that the values are within the limits. Workers engaged in operations of HEMM etc., are provided with ear plugs/muffs. The heavy mining equipments were provided with sound proof cabin for operators.
vii	Industrial waste water (workshop and wastewater from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422(E) dated 19 th May	Complied. There is no process effluent generated from the mine pit. The workshop effluent is being treated in Up flow Filter to trap oil and grease present and then the treated effluent is reused for green belt development.

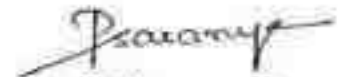
	1993 and 31 st December 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of Workshop effluents.																	
viii	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance programme of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.	Complied. During the visit, it was observed that the mine employees were provided with protective equipment like dust mask, shoes, helmets etc. The PA further informed that periodical medical examination is done for all mine employees. Adequate training on health and safety aspects is carried out as per Mines Vocational Training Rules, 1966.																
ix	A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report to the Head of the Organization.	Complied. A separate Environmental Management Cell is constituted vide their office order dated 06.04.2021 with qualified environmental engineer for monitoring the environmental parameters. Further, all the environmental parameters at the site are also being monitored by recognized third party laboratory.																
x	The funds earmarked for environmental protection measures should be kept in separate account and not diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bangalore.	Complied <table><tr><th>S.No</th><th>Year</th><th>Budget allocated (lakhs)</th><th>Actual expenditure (lakhs)</th></tr><tr><td>1</td><td>2019-20</td><td>15</td><td>15.4</td></tr><tr><td>2</td><td>2020-21</td><td>20</td><td>22.1</td></tr><tr><td>3</td><td>2021-22</td><td>25</td><td>26.7</td></tr></table> EMP budget for each financial year is being allotted and spent for the following activities amongst others : • Green belt development • Dust control measures • Environmental monitoring works	S.No	Year	Budget allocated (lakhs)	Actual expenditure (lakhs)	1	2019-20	15	15.4	2	2020-21	20	22.1	3	2021-22	25	26.7
S.No	Year	Budget allocated (lakhs)	Actual expenditure (lakhs)															
1	2019-20	15	15.4															
2	2020-21	20	22.1															
3	2021-22	25	26.7															

		CSR activities are handled by Dalmia Bharat Foundation centrally from Delhi. The CSR expenses pertaining to the different locations are being reflected in the respective plants. subsequently Reports are available in DCBL website https://www.dalmiacement.com/sustainability/#!next
xi	The project authorities should inform to the Regional Office located at Bangalore regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	Refer below These existing mines are in operation since 1970. The PA informed that the fund required for the project was managed from the resources internally from the company. Hence the date of financial closure is not applicable.
xii	The Regional Office of this Ministry located at Bangalore shall monitor compliance of the stipulated environmental conditions. The project authorities should extend full co-operation to the officer(s) of the Regional Office by furnishing the requisite data/information / monitoring reports.	Complied The PA has extended full cooperation during the visit to the undersigned. The requested documents are also submitted by the PA.
xiii	The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment and Forests, its Regional Office Bangalore, the respective Zonal Office of Central Pollution Control Board and the State Pollution Board. The Proponent shall upload the status of compliance of the	Complied The PA regularly submits the six monthly reports on the status of compliance of the stipulated environmental clearance conditions regularly to this office as per records available in the file. The copy of the compliance report is uploaded on their website https://www.dalmiacement.com/sustainability/#!next

	environmental clearance conditions including results of monitored data on their website and shall updated the same periodically. It Shall simultaneously be sent to the Regional Office of Ministry of Environment and Forests, Bangalore, the respective Zonal Officer of Central Pollution Control Board and the State Pollution Control Board.	
xiv	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad/Municipal Corporation, Urban Local Bodies and the /Local NGO, if any, from whom any suggestion/representation, if any, were received while processing the proposal. The clearance letter shall also be put on the Website of the company by the proponent.	Reportedly complied A copy of the Environmental Clearance letter was provided to local body/Panchayat in 2011 as informed. The copy of the EC is uploaded on their website https://www.dalmiacement.com/sustainability/#!next
xv	The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's/Tahsildar's office for 30 days.	Reportedly Complied
xvi	The Project authorities should advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within 7 days of issuance of the clearance letter informing that the project has been	Complied Advertisements were given in two local newspapers viz. The New Indian Express and Dinamani on 21.05.2011 and the copy of the same were submitted to Regional office on 25.05.2011

accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at web site of the Ministry of Environment & Forests at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bangalore.	
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This has the approval of the Competent Authority vide diary No.E-183189 dated 25.08.2022



(Dr.Saranya.P)

Scientist'D'

Email: saranya.p@gov.in

Dr. P. Saranya

Scientist 'D'

Government of India

Min. of Environment, Forest and Climate Change

Integrated Regional Office,

1st Floor, Adm. Office Block for GPOA,

Shanti Mission, Haldwara Road,

Bangalore, Chennai - 600 001

Category of the Industry :

RED

CONSENT ORDER NO. 2108136651580 DATED: 01/06/2021.

PROCEEDINGS NO.F.0169ARY/RS/DEE/TNPCB/ARY/W/2021 DATED: 01/06/2021

SUB: Tamil Nadu Pollution Control Board - RENEWAL OF CONSENT – M/s. DALMIA CEMENT(BHARAT) LIMITED AMINABAD &KHAIRULABAD LIMESTONE MINES , S.F.No. 103/3,104/3,105/8,108,109,110,111,112,113/1,2,114/1,3,115,116/2,3,117/1,3,118/2,125,126/1,3,127,133 of Aminabad Village and 448,449,452,453/5,455/2,456/1,478 of Kairulabad Village, AMEENABATH village, Ariyalur Taluk and Ariyalur District - Renewal of Consent for the operation of the plant and discharge of sewage and/or trade effluent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act 6 of 1974) – Issued- Reg.

REF: 1.CTO Expansion Board Proc.No.: T6/TNPCB/F.16067/ TRY/RS/W&A/2012 dated 09/11/2012
2.Latest renewal Proc.No. F.0169ARY/RS/DEE/TNPCB/ARY/W&A/2016 dated: 08/12/2016
3. Unit’s application for RCO dated 29/03/2021 and resubmitted on 13/04/2021
4. IR.No : F.0169ARY/RS/AE/ARY/2021 dated 28/05/2021

RENEWAL OF CONSENT is hereby granted under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988 (Central Act, 6 of 1974) (hereinafter referred to as “The Act”) and the rules and orders made there under to

DY.MANAGING DIRECTOR
M/s.DALMIA CEMENT(BHARAT) LIMITED AMINABAD &KHAIRULABAD LIMESTONE MINES, S.F.No. 103/3,104/3,105/8,108,109,110,111,112,113/1,2,114/1,3,115,116/2,3,117/1,3,118/2,125,126/1,3,127,133 of Aminabad Village and 448,449,452,453/5,455/2,456/1,478 of Kairulabad Village, AMEENABATH Village , Ariyalur Taluk , Ariyalur District .

Authorising the occupier to make discharge of sewage and /or trade effluent.

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This RENEWAL OF CONSENT is valid for the period ending March 31, 2026

District Environmental Engineer,
Tamil Nadu Pollution Control Board,
ARIYALUR

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products/byproducts (Col. 2) at the rate (Col 3) mentioned below. Any change in the product/byproduct and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
Product Details			
1.	Mining of Limestone over an extent of 95.34.5 Hect.	1.10	MTPA
By-Product Details			
1.	No by product	0	
Intermediate Product Details			
1.	No intermediate product	0	

2. This renewal of consent is valid for operating the facility with the below mentioned outlets for the discharge of sewage/trade effluent. Any change in the outlets and the quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Outlet No.	Description of Outlet	Maximum daily discharge in KLD	Point of disposal
Effluent Type : Sewage			
1.	Sewage	4.5	On Industrys own land
Effluent Type : Trade Effluent			
1.	Trade Effluent	0.12	On land for gardening

Additional Conditions:

1. The unit shall treat and dispose the sewage in septic tank and Dispersion trench arrangements.
2. The unit shall comply with all conditions mentioned in the EC issued by MOEF, New Delhi.
3. The unit shall adhere to the depth of mining mentioned in the EC.
4. The unit shall comply with Mines and Minerals (Development and Regulation) Amendment Act 2015.
5. The unit shall not use “use and throwaway plastics’ such as plastic sheets used for food wrapping , spreading on dining table etc., plastic plates , plastic coated tea cups, plastic tumbler , water pouches and packets, plastic straw, plastic carry bags and plastic flags irrespective of thickness, within the industry premises. Instead unit shall encourage use of eco friendly alternative such as banana leaf, arecanut palm, stainless steel, glass, porcelain plates/cups/cloth bag, jute bag etc.,
6. The unit shall comply with the E waste Management Rules 2016, E waste as listed in Schedule- I generated by them shall be channelized through collection centre or dealer of authorized producer or dismantlers or recycler or through the designated take back service provider of the producer to authorized dismantler or recycler. The unit shall maintain records of E- waste generated by them in Form- 2 and make such records available for scrutiny by the TNPCB. The unit shall file annual returns in Form -3, to the TNPCB on or before the 30 th day if June following the financial year.
7. The unit shall provide fence all around the periphery of quarrying area on or before 31.06.2021.
8. In case of revision of consent fee by the Government, the unit shall remit the difference in amount within one month from the date of notification. Failing to remit the consent fee, this consent will be withdrawn without any notice and further action will be initiated against the unit as per law.

**District Environmental Engineer,
Tamil Nadu Pollution Control Board,
ARIYALUR**

To
DY.MANAGING DIRECTOR,
M/s.DALMIA CEMENT(BHARAT) LIMITED AMINABAD &KHAIRULABAD LIMESTONE MINES,
DALMIA CEMENT(BHARAT) LIMITED,
DALMIAPURAM(POST)
TRICHY DT,
Pin: 621651

Copy to:

- 1.The Commissioner, ARIYALUR-Panchayat Union, Ariyalur Taluk, Ariyalur District .
 2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.
 3. Copy submitted to the JCEE-Monitoring, Tamil Nadu Pollution Control Board, Triuchirappalli for favour of kind information.
 4. File
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Category of the Industry :

RED

CONSENT ORDER NO. 2108236651580 DATED: 01/06/2021.

PROCEEDINGS NO.F.0169ARY/RS/DEE/TNPCB/ARY/A/2021 DATED: 01/06/2021

SUB: Tamil Nadu Pollution Control Board - RENEWAL OF CONSENT –M/s. DALMIA CEMENT(BHARAT) LIMITED AMINABAD &KHAIRULABAD LIMESTONE MINES , S.F.No. 103/3,104/3,105/8,108,109,110,111,112,113/1,2,114/1,3,115,116/2,3,117/1,3,118/2,125,126/1,3,127,133 of Aminabad Village and 448,449,452,453/5,455/2,456/1,478 of Kairulabad Village, AMEENABATH village, Ariyalur Taluk and Ariyalur District - Renewal of Consent for the operation of the plant and discharge of emissions under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) –Issued- Reg.

REF: 1.CTO Expansion Board Proc.No.: T6/TNPCB/F.16067/ TRY/RS/W&A/2012 dated 09/11/2012
2.Latest renewal Proc.No. F.0169ARY/RS/DEE/TNPCB/ARY/W&A/2016 dated: 08/12/2016
3. Unit’s application for RCO dated 29/03/2021 and resubmitted on 13/04/2021
4. IR.No : F.0169ARY/RS/AE/ARY/2021 dated 28/05/2021

RENEWAL OF CONSENT is hereby granted under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 (Central Act 14 of 1981) (hereinafter referred to as “The Act”) and the rules and orders made there under to

DY.MANAGING DIRECTOR
M/s.DALMIA CEMENT(BHARAT) LIMITED AMINABAD &KHAIRULABAD LIMESTONE MINES, S.F.No. 103/3,104/3,105/8,108,109,110,111,112,113/1,2,114/1,3,115,116/2,3,117/1,3,118/2,125,126/1,3,127,133 of Aminabad Village and 448,449,452,453/5,455/2,456/1,478 of Kairulabad Village, AMEENABATH village, Ariyalur Taluk, Ariyalur District.

Authorizing the occupier to operate the industrial plant in the Air Pollution Control Area as notified by the Government and to make discharge of emission from the stacks/chimneys.

This is subject to the provisions of the Act, the rules and the orders made there under and the terms and conditions incorporated under the Special and General conditions stipulated in the Consent Order issued earlier and subject to the special conditions annexed.

This RENEWAL OF CONSENT is valid for the period ending March 31, 2026

**District Environmental Engineer,
Tamil Nadu Pollution Control Board,
ARIYALUR**

SPECIAL CONDITIONS

1. This renewal of consent is valid for operating the facility for the manufacture of products (Col. 2) at the rate (Col. 3) mentioned below. Any change in the products and its quantity has to be brought to the notice of the Board and fresh consent has to be obtained.

Sl. No.	Description	Quantity	Unit
Product Details			
1.	Mining of Limestone over an extent of 95.34.5 Hect.	1.10	MTPA
By-Product Details			
1.	No by product	0	
Intermediate Product Details			
1.	No intermediate product	0	

2. This renewal of consent is valid for operating the facility with the below mentioned emission/noise sources along with the control measures and/or stack. Any change in the emission source/control measures/change in stack height has to be brought to the notice of the Board and fresh consent/Amendment has to be obtained.

I	Point source emission with stack :			
Stack No.	Point Emission Source	Air pollution Control measures	Stack height from Ground Level in m	Gaseous Discharge in Nm3/hr
II	Fugitive/Noise emission :			
Sl. No.	Fugitive or Noise Emission sources	Type of emission	Control measures	
1.	Mining area & Haulage Road	Fugitive	Water sprinkler system	
2.	Drilling	Fugitive	Dust extraction system	

Special Additional Conditions:

The unit shall install the approved retrofit emission control device/equipment with at least 70% Particulate matter reduction efficiency on all DG sets with capacity of 125 KVA and above or otherwise the unit shall be shift to gas based generators within the time frame prescribed in the notification No. TNPCB/Labs/DD(L)02151/2019 dated 10.06.2020 issued by TNPCB.

Additional Conditions:

1. The unit shall operate and maintain the Air Pollution Control measures efficiently and continuously so as to achieve the Ambient Air Quality / Emission standards prescribed by the Board.
2. The unit shall adhere to the ambient Noise level standards prescribed by the Board.
3. The unit shall operate the water sprinklers effectively to suppress the dust emission during mining and vehicle movements.
4. The haul roads in the mines shall be adequately water sprayed using water tankers at regular intervals.
5. The unit shall continue to develop more green belt in and around the premises.
6. The unit shall comply with Mines and Minerals (Development and Regulation) Amendment Act 2015.
7. The unit shall ensure that transport vehicle shall be leak proof and properly covered with tarpaulin so as to prevent dust from being air borne.
8. The unit shall comply with all conditions mentioned in the EC issued by MOEF, New Delhi .
9. The unit shall provide fence all around the periphery of quarrying area on or before 31.06.2021.

**District Environmental Engineer,
Tamil Nadu Pollution Control Board,
ARIYALUR**

To
DY.MANAGING DIRECTOR,
M/s.DALMIA CEMENT(BHARAT) LIMITED AMINABAD &KHAIRULABAD LIMESTONE MINES,
DALMIA CEMENT(BHARAT) LIMITED,
DALMIAPURAM(POST)
TRICHY DT,
Pin: 621651

Copy to:

- 1.The Commissioner, ARIYALUR-Panchayat Union, Ariyalur Taluk, Ariyalur District .
2. Copy submitted to the Member Secretary, Tamil Nadu Pollution Control Board, Chennai for favour of kind information.
3. Copy submitted to the JCEE-Monitoring, Tamil Nadu Pollution Control Board, Triuchirappalli for favour of kind information.
4. File



ABSTRACT

Industries Department – Mines and Minerals – Major Mineral – Limestone - Ariyalur District and Taluk – Aminabad Village - S.F. Nos. 103/2, 114/2, 116/1, 117/2, 118/2 and 126/2 – Over an extent of 0.84.5 hectares of poramboke land – Mining Lease Application of Tvl. Dalmia Cement (B) Ltd. – Grant of Mining Lease – Orders – Issued.

INDUSTRIES (MMA.2) DEPARTMENT

G.O. (Ms.) No.106

Dated: 12.05.2015

திருவள்ளூர் ஆண்டு 2045
மஸ்மத் வருடம், சித்திரை திங்கள் 29

Read:

1. Mining Lease Application of Tvl. Dalmia Cement (B) Ltd., dated: 19.9.2001.
2. From the District Collector, Ariyalur, Letter No. 185 /G&M / 2001, dated: 21.4.2003.
3. From the Commissioner of Geology and Mining, Letter Rc. No. 6583/MM4/2003, dated: 2.3.2004.
4. From the District Collector, Ariyalur, Letter No. 186 /G&M / 01, dated: 23.1.2012.
5. From the Commissioner of Geology and Mining, Letter Rc. No. 1968 / MM1/08, dated: 19.5.2012.
6. Government Letter No. 13313/MMA.2/2010-17, dated: 22.8.2012.
7. From Ministry of Mines, Government of India, New Delhi, Letter No.4/34/2012-M.IV, dated: 29.1.2015.

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ORDER:

In the reference first read above, Tvl. Dalmia Cement (B) Ltd. have applied for grant of Mining Lease for limestone over an extent of 0.84.5 hectares of poramboke lands in Aminabad Village, Ariyalur Taluk and District for a period of 30 years.

-2-

2. In the reference second and fourth read above, the District Collector, Ariyalur has forwarded and recommended the Mining Lease application preferred by Tvl. Dalmia Cement (B) Ltd. for grant of mining lease for limestone over an extent of 0.84.5 hecets in S.F. No.103/2, 114/2 etc. of Aminabad village, Ariyalur Taluk and District for a period of 20 years to Tvl. Dalmia Bharat Cement Ltd. subject to certain conditions.

3. In the reference fifth read above, the Commissioner of Geology and Mining has recommended that the area applied for Mining Lease is over an extent of 0.84.5 hectares which is less than one hectare and hence the Mining lease can be granted in this area only after relaxing Rule 22D of Mineral Concession Rules, 1960 by Ministry of Mines, Government of India.

4. In the reference sixth read above, the proposal was forwarded to Government of India, Ministry of Mines for relaxation of Rule 22D of Mineral Concession Rules, 1960. In the reference seventh read above, the Ministry of Mines, Government of India has conveyed the approval of the Central Government on 29.1.2015 i.e. (after the promulgation of Mines and Minerals (Development and Regulations) Ordinance, 2015) to relax the provision of Rule 22D of Mineral Concession Rules, 1960 and has stated that while executing the mining lease, State Government shall ensure compliance of the following by the lessee:

- (i) Compliance of the Mines and Minerals (Development and Regulations) Act, 1957 and Mines and Minerals (Development and Regulations) Amendment Ordinance, 2015 and Mineral Concession Rules, 1960 and other applicable Acts and Rules including Forest (Conservation) Act, 1980, Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Environmental Impact Assessment Notification dated: 14.9.2006 as issued and amended by the Ministry of Environment and Forests from time to time.
- (ii) That there are no orders of any court impacting the grant of instant mineral concession.
- (iii) If the subject area falls in the Fifth Schedule area of the State, it may be ensured that the lease is in compliant to relevant Central and State Laws/Rules/Regulations Court Cases, etc.

5. As per section 10(A)(2)(C) of the Mines and Minerals (Development and Regulations) Amendment Act, 2015:-

'where the Central Government has communicated previous approval as required under sub-section (1) of section 5 for grant of mining lease, or if a letter of intent (by whatever name called) has been issued by the State Government to grant a mining

-3-

lease, before the commencement of the Mines and Minerals (Development and Regulations) Amendment Act, 2015, the mining lease shall be granted subject to fulfilment of the conditions of the previous approval or of the letter of intent within a period of two years from the date of commencement of the said Ordinance"

As per section 8A (2) of the said Act

"On and from the date of the commencement of the Mines and Minerals (Development and Regulations) Amendment Act, 2015, all Mining Lease shall be granted for the period of fifty years"

6. The Government after careful examination accord sanction for the grant of Mining Lease in favour of Tvl. Dalmia Cement (B) Ltd., for mining limestone over an extent of 0.84.5 hectares in S.F. No. 103/2, 114/2 etc. in Aminabad Village, Ariyalur Taluk and District for a period of 50 years as per the provisions of section 10(A) (2) and (C) and section 8A (2) of Mines and Minerals (Development and Regulations) Amendment Act, 2015 subject to the usual and special conditions mentioned below and also subject to conditions mentioned in the Appendix.

- i. As agreed upon by the company, the pilgrims to Arulmigu Kaliyuga Varadharaja Perumal temple should not be prevented from using the existing road inside the lease area to reach the temple, during festival season.
- ii. Tvl.Dalmia Cements (Bharat) Limited have to provide safety margin of 10 metres on both sides of the existing road approach inside the mining lease area and the intersection point of both the existing road and the poramboke road now recommended should not be disturbed, during mining operations.
- iii. Tvl.Dalmia Cements (Bharat) Ltd., have to remit annual compensation amount to be determined by the District Collector, Ariyalur as stipulated under Rule 72 of Mineral Concession Rules, 1960 for surface rights over the poramboke lands.

7. The original Mining Lease application of Tvl. Dalmia Cement (B) Ltd. along with the connected records are returned to the District Collector, Ariyalur for necessary further action and to ensure compliance of the following by the applicant firm:-

- (i) Compliance of the Mines and Minerals (Development and Regulations) Act, 1957 and Mines and Minerals (Development and Regulations) Amendment Ordinance, 2015 and Mineral Concession Rules, 1960 and other applicable Acts and Rules including Forest (Conservation) Act, 1980, Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Environmental Impact Assessment Notification dated: 14.9.2006 as issued and amended by the Ministry of Environment and Forests from time to time.

-4-

- (ii) That there are no orders of any court impacting the grant of instant mineral concession.
- (iii) If the subject area falls in the Fifth Schedule area of the State, it may be ensured that the lease is in compliant to relevant Central and State Laws/ Rules/Regulations, Court Cases, etc.

(BY ORDER OF THE GOVERNOR)

**C.V. SANKAR
ADDITIONAL CHIEF SECRETARY TO GOVERNMENT**

To
The Commissioner of Geology and Mining, Guindy, (I/c) Chennai-32.
The District Collector, Ariyalur (w.e.)
Tvl. Dalmia Cement (B) Ltd., Dalmiyapuram, Lalgudi Taluk,
Tiruchirappalli District-621 651.
Copy to:
Office of the Hon'ble Minister (Industries), Chennai-600 009.
The Industries (OP.II) Department, Chennai-600 009.
SF/SCs.

// Forwarded / By order //

OWM
12-5-15
Section Officer

APPENDIX

G.O. (Ms.) No. 106 Industries (MMA.2) Department, dated 12.05.2015

The transport permit (with dispatch slip, if necessary in the case of bulk permits) may be issued at the request of the lessee on collection of royalty for the quantity of mineral mined from the leasehold area and ready to be transported. No bulk permit for larger quantity in anticipation of mining of the minerals should be issued, as this may lead to advance collection of royalty which was objected to by the Government of India, unless the lessee is willing to pay in advance for his own convenience. The accounts relating to the collection of actual royalty or dead rent should be reconciled at the end of the year before 10th January of the succeeding year.

2. The lessee shall pay before the expiry of the lease or its sooner determination by either part of amount equal to the annual dead rent or such high amount as may be fixed by the Collector of the District in his discretion as compensation for damage to the land covered by the lease.

3. The lessee shall not fell trees, if any, without the previous permission of the Collector and if it is found that he has fell any trees without such permission, he shall pay the value of the trees together with a compounding fee subject to a maximum of ten times the value of the said trees.

4. The lessee shall not operate on the surface of any area prohibited by any authority by laying out roads, erecting building, machinery etc. without the previous permission of such authority of the State Government.

5. The lessee shall not use land for surface occupation without giving proper notice to the Collector.

6. The lessee shall provide and shall keep at all times at or near the pit head full equipment of weighing machines or modern types to the satisfaction of the Collector for weighing the minerals collected by him.

7. The lessee will exercise the liberties and powers hereby granted in such manner as to offer no unnecessary or reasonable avoidable obstruction or interruption to the development and working of any minerals not included in this lease and will at all

-2-

times afford to the Governor and to the holder of prospecting licences or mining lease in respect of any such mineral or any minerals within any lands adjacent passage upon and across the said lands to such minerals for the purposes of getting, working, developing and carrying away the same.

8. The lessee shall take such precautions as are necessary to secure pits and shafts by putting up wire fencing or such other protection to the satisfaction of the Collector to prevent accidents.

9. That on the occurrence of any accident the lessee shall report such accident immediately to the nearest police station, the nearest factory Inspector and the Labour Commissioner.

10. The lessee shall execute an indemnity bond to Government against the claims of third parties.

11. The lessee will at the expiration or sooner determination of the said term deliver upto the Governor all mines pits, shafts including drifts, levels, waterways, airways and other work (now existing) thereafter to be sunk or made under the said lands (except such as may have been abandoned with the sanction of the Government or in any ordinary and fair course of working) and all (engine, machinery, plant buildings, structures and other work and conveniences which at the commencement of the said terms were upon or under the said lands) and all Engines, Machinery, Plant and Fixtures set by the lessee below ground level which cannot be removed without causing injury to any mines or works under the said lands (except such of the same as may with the sanction of the Governor have become discussed) and all buildings and structures of brick or stone executed by the lessee above ground level in good repair order and condition and fit in all respects for further working of the said minerals

12. If after the determination of the lease there shall remain in or upon the said lands any engines, machinery, plant, buildings, structures, transways, railways and other works, erections and conveniences of minerals or mineral ores other property which the lessee is entitled to remove from the land the same shall, if not removed by the lessee within one calendar month after notice in writing requiring their removal is given to the lessee by the Collector be deemed to become the property of the Government of

-3-

Tamil Nadu and may be sold in such manner as they shall deem fit without ability to pay and compensation or to account to the lessee in respect thereof.

13. In the event of existence of state of war or of grave national emergency (of which the President of India shall be the sole judge and a notification to this effect in the Gazette of India shall be conclusive proof the Governor after notice in writing to the lessee under the hand of any Secretary to Government of his intention so to do may forthwith taken possession of assume control of the works, plant and machinery and premises of the lessee at or in connection with the said mines and may pre-empt at prices fixed by the Governor all the minerals and all products thereof extracted from or lying upon the said mines during such possession or control and the lessee shall confirm and obey all directions given by or on behalf of the Governor regarding the use or employment of such works, plans premises provided that a fair compensation which shall be determined by the Governor and shall be paid to the lessee for all loss or damage sustained by reasons or in consequences of the exercise of the powers shall not determined the said terms hereby granted or affect the terms and provisions of these presents further than may be necessary to give effect to the provisions of this clause.

14.(a) the lessee shall not enter upon or commence prospecting of mining operations in any reserve forest situate upon the said land without thirty days previous notice in writing to the District Forest Officer nor without obtaining any written sanction of that officer nor otherwise than in accordance with such conditions as that officer may in his absolute discretion prescribed.

(b) the area within the reserved forest limits must be demarcated by a declared fire line of 40 feet width which will be cut and kept cleared by the Forest Department at the expense of the lessee;

(c) the lessee must at all times permit the Forest Department to enter upon the land for the purpose of maintaining or repairing existing boundary lines within the area, and must pay the cost of such maintenance of repair as determined by the District Forest Officer;

-4-

- (d) the lessee must take suitable precautions to prevent fire from spreading into the adjoining reserve forest from the land and if such fires accidentally occurs he must render all possible assistance in putting them out;
- (e) the lessee shall not cut any trees or growth on the area granted in excess of 20 percent of the number of trees on the whole area under the lease without the previous permission of the District Forest Officer and the value of such trees etc., shall be paid for by the lessee at rates to be fixed by the District Forest Officer, he must not deface or interfere with any boundary stone or marks, if any boundary mark is accidentally damaged, he must bring the matter immediately to the notice of the Range Officer.

15. The lessee shall keep the stock of beryl or any other prescribed substance under section 3 of the Atomic Energy Act No.XXIX of 1948, if they occur in the property covered by the lease with a view to making them available to the Government of India.

C.V. SANKAR
ADDITIONAL CHIEF SECRETARY TO GOVERNMENT

// True copy //


Section Officer

12-5-15

By e-mail

**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
OFFICE OF THE REGIONAL CONTROLLER OF MINES, CHENNAI**

No. TN/ALR/LST/MP-2098.MDS.

Dt : 05/10/2023

Shri/M/s. Dalmia Cement (Bharat) Limited ,
Dalmiapuram Main Road, Kallakudi Lalgudi

Aminabad and Khairulabad Limestone Mines 96dot190 Ha (63646406)

Sub Approval of Mining Plan (including Progressive Mine Closure Plan) for Aminabad & Kairulabad Limestone Mine over an extent of : 96.19 hectares in Aminabad Village, Ariyalur Taluk & District, Tamilnadu State submitted by M/s. Dalmia Cement (Bharat) Limited under Rule 16(1) of MCR, 2016.

Ref : (i) Your online submission of draft Mining Plan in MPAS portal on 29.07.2023 in respect of aforesaid M.L.Area.
(ii) This office letter of even no. dated 07.08.2023.
(iii) Your online submission of final Mining Plan document in MPAS portal on 27.09.2023 in respect of aforesaid M.L.Area.

Sir,

In exercise of the powers delegated to me under Rule 16 of Minerals (Other than Atomic & Hydro Carbon Energy Minerals) Concession Rules, 2016 vide Gazette Notification No. S.O. 1857(E) dated 18.5.2016, I hereby accord approval for the above said Mining Plan for **Limestone** mineral only. This approval is subject to the following conditions:

A. General Conditions:

- 1) That the Mining Plan (including Progressive Mine Closure Plan) is approved without prejudice to any other law applicable to the mine/area from time to time whether made by the Central Government, State Government or any other authority.
- 2) That this approval of the Mining Plan (including Progressive Mine Closure Plan) does not in any way imply the approval of the Government in terms of any other provision of the Mines & Mineral (Development & Regulation) Act, 2015 or the Mineral Concession Rules, 2016 or any other law including Forest (Conservation) Act, 1980, Environment Protection Act, 1986 and the rules made there under.
- 3) That this Mining Plan (including Progressive Mine Closure Plan) is approved without prejudice to any other order or direction from any court of competent jurisdiction.
- 4) Provisions of the Mines Act, 1952 and Rules & Regulations made thereunder including submission of notice of opening, appointment of manager and other statutory officials as required by the Mines Act, 1952 shall be complied with.
- 5) The Provisions made under MM(D&R) Act, 2015 (Amended) and Rules made thereunder shall be complied with.
- 6) The contents of circular No. 2/2010 issued by the Chief Controller of Mines, IBM, Nagpur vide his letter No. 11013/3/MP/90-CCOM Vol. VII dated 06.04.2010 shall be complied with.
- 7) The execution of Mining Plan / Review of Mining Plan shall be subjected to vacation of prohibitory orders / notices, if any.
- 8) This approval of mining operations and associated activities is restricted to the mining lease area only. The mining lease area is as shown on the statutory plans under rule 32 of Mineral Conservation and Development Rules, 2017, by the lessee. Indian Bureau of Mines does not take any responsibility regarding correctness of the boundaries of the lease shown on the ground with reference to the lease map and other plans furnished by the lessee.
- 9) The Environmental Monitoring Cell of the Company shall continue monitoring ambient air quality, dust fall rate, water quality, soil sample analysis and noise level measurements on various stations established for the purpose both in the core zone and buffer zone, as per Department of Environment guidelines and keeping in view IBM's Circular No.3/92, season-wise every year or by engaging preferably the services of an Environmental laboratory approved by MOEF/CPCB. The data so generated shall be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer on demand.

10) If anything is found to be concealed as required by the Mines Act in the contents of Mining Plan and proposal for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

11) Yearly report as required under Rule 26(2) of MCDR,2017 setting forth the extent of protection and rehabilitation works carried out as envisaged in the approved progressive mine closure plan and if there is any deviations, reasons thereof shall be submitted before 1st July of every year to the regional office, IBM , Chennai.

12) The Mining Plan is approved for the proposals contained therein and as applicable from the date of approval for the mining activities to be carried out within the mining leasehold. The earlier instances of irregular mining/illegal mining, if any, shall not be regularized through the approval of this document.

13) The Performance surety should be submitted to the State Government after obtaining Environmental Clearance and renewed before expiry of the same.

14) In case mining lease falls within a radius of 10 kms. of National Park/Sanctuary, recommendations of NBWL have to be obtained as per the orders of the Hon'ble Supreme Court in I.A. No. 460/2004.

15) This approval is subject to the mining operations as per the proposals shall be carried out only after obtaining necessary clearances from MOEF, Pollution Control Board, Forest Department etc.

16) This approval is subjected to the extension of the validity of the mining lease by the State government as per Section 8A(5) of MMDR Act, 2015 (Amended) and copy of the lease deed to be submitted within 6 months from the date of execution. Aminabad and Khairulabad Limestone Mines 96dot190 Ha (63646406)

17) This approval is subject to submission of DGPS Plan duly authenticated by the State Government and submission of modifications in the approved Mining Plan if, consequent to the authentication of DGPS Survey Plan, any change in mining lease area is accepted by the State Government.

18) This approval is subject to the conditions as per the directions given in W.P.(c) No. 114/2014 given by the Hon'ble Supreme Court of India should be taken care while implementing the proposals given in the PMCP part of the documents.

B. Special Conditions:

It shall be mandatory for the project proponent, abstracting ground water, to obtain **No Objection Certificate** from Central Ground Water Authority or, the concerned State/Union Territory Ground Water Authority, as the case may be.

Encl: Soft copy of approval letter of Mining Plan.

Yours faithfully,

(G.C. Sethi)

Regional Controller of Mines

Copy forwarded for information to Shri. C.P.Hariprasad, Qualified Person, H-33,JJ Nagar, Ariyalur-62170.

(G.C. Sethi)

Regional Controller of Mines

Not on first Two copies:

Copy forwarded for kind information to:

(i) The Controller of Mines (SZ), Indian Bureau of Mines, Bengaluru.

(ii) The Director of Mines Safety, DGMS, Chennai Region, Chennai.

(iii) The Commissioner, Department of Geology & Mining, Government of Tamilnadu, Guindy, Chennai - 600032.

(iv) QP file/Mine file/Guard file.

(G.C. Sethi)

Regional Controller of Mines

ABC Techno Labs™

India Private Limited
Quality Management

ABC Techno Labs India Private Limited

(An ISO : 9001, ISO : 14001, ISO : 45001 & ISO : 22000 Certified Company)

ABC TOWER #400, 13th Street, SIDCO Industrial Estate - North Phase,

Ambattur, Chennai - 600 098, Tamilnadu, INDIA.

Ph : +91-44-2625 7788 / 99, +91 94442 60000 / 95661 87777

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

Dalmia Cement (Bharat) Limited, Amalgamated AK Mines (GO SO), Anyatur

Ambient Air Quality Data at A1- AK Mine Office

Season : Winter 2023-24 & Sample Size : 24 hrs (otherwise mentioned)

Monitoring		Particulates, μgm^3		Gaseous Pollutants, μgm^3					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	O ₃ (8-hrly Avg.)	CO (8-hrly Avg.)	Pb, μgm^3	As, μgm^3	Ni, μgm^3	Cd, μgm^3	BaP, μgm^3
01-02-12-2023	06:00-06:00	18	35	12	16	<5	16.3	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-12-2023	06:00-06:00	23	42	9	11	<5	16.2	<1000	<0.1	<1	<1	<0.01	<0.1
10-11-12-2023	06:00-06:00	27	51	10	13	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
11-12-12-2023	06:00-06:00	23	40	10	12	<5	16.4	<1000	<0.1	<1	<1	<0.01	<0.1
18-19-12-2023	06:00-06:00	20	37	9	11	<5	20.1	<1000	<0.1	<1	<1	<0.01	<0.1
19-20-12-2023	06:00-06:00	22	40	12	15	<5	16.8	<1000	<0.1	<1	<1	<0.01	<0.1
26-27-12-2023	06:00-06:00	26	48	11	14	<5	16.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-12-2023	06:00-06:00	20	37	10	13	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
01-02-01-2024	06:00-06:00	25	46	11	15	<5	12.8	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-01-2024	06:00-06:00	23	41	10	12	<5	15.7	<1000	<0.1	<1	<1	<0.01	<0.1
14-15-01-2024	06:00-06:00	27	52	12	14	<5	13.8	<1000	<0.1	<1	<1	<0.01	<0.1
15-16-01-2024	06:00-06:00	24	45	14	18	<5	11.8	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-01-2024	06:00-06:00	30	55	10	12	<5	10.7	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-01-2024	06:00-06:00	24	44	12	16	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
29-30-01-2024	06:00-06:00	33	57	11	14	<5	14.2	<1000	<0.1	<1	<1	<0.01	<0.1
30-31-01-2024	06:00-06:00	29	51	10	10	<5	15.7	<1000	<0.1	<1	<1	<0.01	<0.1
05-06-02-2024	06:00-06:00	24	43	13	17	<5	16.3	<1000	<0.1	<1	<1	<0.01	<0.1
06-07-02-2024	06:00-06:00	22	41	10	14	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1
16-17-02-2024	06:00-06:00	28	54	11	13	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
17-18-02-2024	06:00-06:00	25	47	10	12	<5	13.8	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-02-2024	06:00-06:00	21	44	10	13	<5	12.4	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-02-2024	06:00-06:00	26	48	9	12	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-02-2024	06:00-06:00	32	57	11	14	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29-02-2024	06:00-06:00	28	51	10	12	<5	17.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		16-33	35-57	9-14	11-16	<5	10-20.1	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		24.9	46.1	10.7	13.6	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2000 (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 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; CdH-Benzene & BaP-Benzo (a) pyrene in particulate phase. us-microgram A ng-microgram. * : NAAQ Norms-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

Ambient Air Quality Data at A2-Kovilankudikadu

Season : Winter 2023-24

Sample Size : 24 hrs (otherwise mentioned)

Monitoring		Particulates, μgm^3		Gaseous Pollutants, μgm^3					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	O ₃ (8-hrly Avg.)	CO (8-hrly Avg.)	Pb, μgm^3	As, μgm^3	Ni, μgm^3	Cd, μgm^3	BaP, μgm^3
01-02-12-2023	06:00-06:00	10	21	6	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-12-2023	06:00-06:00	12	22	9	11	<5	12.4	<1000	<0.1	<1	<1	<0.01	<0.1
10-11-12-2023	06:00-06:00	14	25	7	8	<5	11.6	<1000	<0.1	<1	<1	<0.01	<0.1
11-12-12-2023	06:00-06:00	11	20	8	10	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
18-19-12-2023	06:00-06:00	13	23	8	9	<5	11.7	<1000	<0.1	<1	<1	<0.01	<0.1
19-20-12-2023	06:00-06:00	12	26	6	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
26-27-12-2023	06:00-06:00	17	30	5	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-12-2023	06:00-06:00	15	27	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
01-02-01-2024	06:00-06:00	17	32	7	7	<5	16.2	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-01-2024	06:00-06:00	12	23	8	8	<5	17.3	<1000	<0.1	<1	<1	<0.01	<0.1
14-15-01-2024	06:00-06:00	15	28	7	8	<5	15.6	<1000	<0.1	<1	<1	<0.01	<0.1
15-16-01-2024	06:00-06:00	15	34	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-01-2024	06:00-06:00	12	31	8	10	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-01-2024	06:00-06:00	13	34	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
29-30-01-2024	06:00-06:00	14	25	6	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
30-31-01-2024	06:00-06:00	12	22	7	9	<5	14.5	<1000	<0.1	<1	<1	<0.01	<0.1
05-06-02-2024	06:00-06:00	12	28	6	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
06-07-02-2024	06:00-06:00	10	20	7	8	<5	21.2	<1000	<0.1	<1	<1	<0.01	<0.1
16-17-02-2024	06:00-06:00	12	33	8	10	<5	15.7	<1000	<0.1	<1	<1	<0.01	<0.1
17-18-02-2024	06:00-06:00	15	31	7	7	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-02-2024	06:00-06:00	12	20	7	7	<5	11.4	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-02-2024	06:00-06:00	15	23	7	9	<5	15.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-02-2024	06:00-06:00	11	21	6	6	<5	13.7	<1000	<0.1	<1	<1	<0.01	<0.1
28-29-02-2024	06:00-06:00	13	24	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		10-17	20-34	6-9	6-11	<5	10-21.2	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		13.1	24.7	7.3	8.3	<5	15.1	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	400 (24 hrs.)	100 (8 hrs.)	2000 (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 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; CdH-Benzene & BaP-Benzo (a) pyrene in particulate phase. us-microgram A ng-microgram. * : NAAQ Norms-National Ambient Air Quality Norms-Revised as per GSR 826(E) dated 16.11.2009 for Industrial, Residential, Rural and other Areas.

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Season : Winter 2023-24

Ambient Air Quality Data at A3-Kattupirangiyam (on SH-139)

Sample Size : 24 hrs. (otherwise mentioned)

Monitoring		Particulates, $\mu\text{g}/\text{m}^3$		Gaseous Pollutants, $\mu\text{g}/\text{m}^3$					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	CO (8-hrly Avg.)	CO (24-hrly Avg.)	Pb, $\mu\text{g}/\text{m}^3$	As, ng/m^3	Ni, ng/m^3	Cd, ng/m^3	BaP, ng/m^3
01-02-12-2023	06:00-06:00	16	34	7	8	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-12-2023	06:00-06:00	23	38	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
10-11-12-2023	06:00-06:00	20	36	10	12	<5	13.8	<1000	<0.1	<1	<1	<0.01	<0.1
11-12-12-2023	06:00-06:00	25	41	9	10	<5	17.2	<1000	<0.1	<1	<1	<0.01	<0.1
18-19-12-2023	06:00-06:00	24	37	9	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
19-20-12-2023	06:00-06:00	19	38	9	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
26-27-12-2023	06:00-06:00	22	40	11	15	<5	26.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-12-2023	06:00-06:00	24	44	9	12	<5	25.2	<1000	<0.1	<1	<1	<0.01	<0.1
01-02-01-2024	06:00-06:00	15	31	7	8	<5	24.1	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-01-2024	06:00-06:00	22	45	10	12	<5	25.3	<1000	<0.1	<1	<1	<0.01	<0.1
14-15-01-2024	06:00-06:00	28	49	8	10	<5	23.7	<1000	<0.1	<1	<1	<0.01	<0.1
15-16-01-2024	06:00-06:00	19	40	7	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-01-2024	06:00-06:00	27	59	9	10	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-01-2024	06:00-06:00	31	52	11	13	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
29-30-01-2024	06:00-06:00	28	43	8	10	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
30-01-01-2024	06:00-06:00	33	54	10	13	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
05-06-02-2024	06:00-06:00	17	38	8	9	<5	13.6	<1000	<0.1	<1	<1	<0.01	<0.1
06-07-02-2024	06:00-06:00	27	50	10	14	<5	11.2	<1000	<0.1	<1	<1	<0.01	<0.1
16-17-02-2024	06:00-06:00	30	52	8	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
17-18-02-2024	06:00-06:00	19	42	7	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-02-2024	06:00-06:00	26	47	13	15	<5	26.4	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-02-2024	06:00-06:00	27	50	10	13	<5	21.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-02-2024	06:00-06:00	32	53	9	11	<5	20.7	<1000	<0.1	<1	<1	<0.01	<0.1
28-29-02-2024	06:00-06:00	26	45	11	13	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		15-33	31-54	7-13	8-15	<5	10-27.9	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		24.0	42.7	9.1	11.2	<5	20.5	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	300 (24 hrs.)	100 (8 hrs.)	2000 (8 hrs.)	1.0 (24 hrs.)	5.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : PM2.5-Particulate Matter size less than 2.5 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; CHH-Benzene & BaP- Benzene (a) pyrene in particulate phase. μg -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.

Season : Winter 2023-24

Ambient Air Quality Data at A4-Kolkattal near UT Cement Plant

Sample Size : 24 hrs. (otherwise mentioned)

Monitoring		Particulates, $\mu\text{g}/\text{m}^3$		Gaseous Pollutants, $\mu\text{g}/\text{m}^3$					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	CO (8-hrly Avg.)	CO (24-hrly Avg.)	Pb, $\mu\text{g}/\text{m}^3$	As, ng/m^3	Ni, ng/m^3	Cd, ng/m^3	BaP, ng/m^3
01-02-12-2023	06:00-06:00	26	50	11	13	<5	26.0	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-12-2023	06:00-06:00	19	40	9	11	<5	29.8	<1000	<0.1	<1	<1	<0.01	<0.1
10-11-12-2023	06:00-06:00	30	55	11	14	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12-12-2023	06:00-06:00	28	51	12	14	<5	33.5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19-12-2023	06:00-06:00	34	57	14	16	<5	30.3	<1000	<0.1	<1	<1	<0.01	<0.1
19-20-12-2023	06:00-06:00	21	44	9	11	<5	32.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27-12-2023	06:00-06:00	30	52	9	11	<5	31.8	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-12-2023	06:00-06:00	26	44	11	12	<5	29.2	<1000	<0.1	<1	<1	<0.01	<0.1
01-02-01-2024	06:00-06:00	22	45	9	12	<5	29.3	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-01-2024	06:00-06:00	30	53	11	15	<5	31.4	<1000	<0.1	<1	<1	<0.01	<0.1
14-15-01-2024	06:00-06:00	25	47	9	11	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
15-16-01-2024	06:00-06:00	25	48	10	13	<5	21.7	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-01-2024	06:00-06:00	28	50	14	18	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-01-2024	06:00-06:00	31	53	11	14	<5	25.1	<1000	<0.1	<1	<1	<0.01	<0.1
29-30-01-2024	06:00-06:00	34	58	10	12	<5	28.2	<1000	<0.1	<1	<1	<0.01	<0.1
30-01-01-2024	06:00-06:00	27	51	9	11	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
05-06-02-2024	06:00-06:00	23	48	9	12	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
06-07-02-2024	06:00-06:00	25	45	10	12	<5	19.0	<1000	<0.1	<1	<1	<0.01	<0.1
16-17-02-2024	06:00-06:00	28	48	14	18	<5	23.6	<1000	<0.1	<1	<1	<0.01	<0.1
17-18-02-2024	06:00-06:00	27	51	10	13	<5	27.1	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-02-2024	06:00-06:00	32	57	10	13	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-02-2024	06:00-06:00	34	41	10	12	<5	26.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-02-2024	06:00-06:00	35	58	12	15	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
28-29-02-2024	06:00-06:00	30	54	13	15	<5	30.1	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		19-35	40-58	9-14	11-18	<5	18.2-33.5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		27.5	50.0	10.7	13.3	<5	25.6	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	300 (24 hrs.)	100 (8 hrs.)	2000 (8 hrs.)	1.0 (24 hrs.)	5.0 (annual)	20 (annual)	5.0 (annual)	1.0 (annual)

Legend : PM2.5-Particulate Matter size less than 2.5 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; CHH-Benzene & BaP- Benzene (a) pyrene in particulate phase. μg -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.

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Season : Winter 2023-24

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

Sample Size : 24 hly (otherwise mentioned)

Monitoring		Particulates, $\mu\text{g}/\text{m}^3$		Gaseous Pollutants, $\mu\text{g}/\text{m}^3$					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	O ₃ (8-hly Avg.)	CO (8-hly Avg.)	Pb, $\mu\text{g}/\text{m}^3$	As, $\mu\text{g}/\text{m}^3$	Ni, $\mu\text{g}/\text{m}^3$	Cd, $\mu\text{g}/\text{m}^3$	BaP, $\mu\text{g}/\text{m}^3$
01-02-12-2023	06:00-06:00	36	64	11	14	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-12-2023	06:00-06:00	21	43	9	13	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
10-11-12-2023	06:00-06:00	29	53	12	14	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12-12-2023	06:00-06:00	33	61	13	15	<5	28.8	<1000	<0.1	<1	<1	<0.01	<0.1
18-19-12-2023	06:00-06:00	25	52	16	18	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
19-20-12-2023	06:00-06:00	23	48	10	13	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
26-27-12-2023	06:00-06:00	28	52	15	16	<5	33.8	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-12-2023	06:00-06:00	31	55	14	17	<5	34.0	<1000	<0.1	<1	<1	<0.01	<0.1
01-02-01-2024	06:00-06:00	25	57	11	13	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-01-2024	06:00-06:00	37	83	11	15	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
14-15-01-2024	06:00-06:00	41	68	13	18	<5	20.9	<1000	<0.1	<1	<1	<0.01	<0.1
15-16-01-2024	06:00-06:00	28	52	12	15	<5	26.1	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-01-2024	06:00-06:00	31	57	12	15	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-01-2024	06:00-06:00	27	51	14	16	<5	24.2	<1000	<0.1	<1	<1	<0.01	<0.1
29-30-01-2024	06:00-06:00	34	63	11	14	<5	21.57	<1000	<0.1	<1	<1	<0.01	<0.1
30-31-01-2024	06:00-06:00	32	57	12	15	<5	22.4	<1000	<0.1	<1	<1	<0.01	<0.1
05-06-02-2024	06:00-06:00	27	56	12	15	<5	20.68	<1000	<0.1	<1	<1	<0.01	<0.1
09-07-02-2024	06:00-06:00	35	62	12	15	<5	25.1	<1000	<0.1	<1	<1	<0.01	<0.1
16-17-02-2024	06:00-06:00	31	57	10	13	<5	27.2	<1000	<0.1	<1	<1	<0.01	<0.1
17-18-02-2024	06:00-06:00	29	59	12	16	<5	22.6	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-02-2024	06:00-06:00	35	66	16	20	<5	30.7	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-02-2024	06:00-06:00	39	68	13	15	<5	28.5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-02-2024	06:00-06:00	42	71	12	14	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29-02-2024	06:00-06:00	34	61	10	13	<5	24.6	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		21-42	43-71	9-16	13-20	<5	20.4-34.5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		31.1	57.3	12.2	15.3	<5	30.9	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	200 (24 hrs.)	100 (8 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	5.0 (annual)	30 (annual)	2.0 (annual)	1.0 (annual)

Legend : PM2.5-Particulate Matter size less than 2.5 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; Cd-Benzene & BaP- Benzene (a) pyrene in particulate phase, up-nitrogen & 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.

Ambient Air Quality Data at A6-Hastinapuram (on SH-135)

Season : Winter 2023-24

Sample Size : 24 hly (otherwise mentioned)

Monitoring		Particulates, $\mu\text{g}/\text{m}^3$		Gaseous Pollutants, $\mu\text{g}/\text{m}^3$					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	O ₃ (8-hly Avg.)	CO (8-hly Avg.)	Pb, $\mu\text{g}/\text{m}^3$	As, $\mu\text{g}/\text{m}^3$	Ni, $\mu\text{g}/\text{m}^3$	Cd, $\mu\text{g}/\text{m}^3$	BaP, $\mu\text{g}/\text{m}^3$
01-02-12-2023	06:00-06:00	26	45	11	12	<5	23.5	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-12-2023	06:00-06:00	18	38	9	11	<5	29.4	<1000	<0.1	<1	<1	<0.01	<0.1
10-11-12-2023	06:00-06:00	27	46	12	14	<5	21.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12-12-2023	06:00-06:00	31	48	14	18	<5	27.8	<1000	<0.1	<1	<1	<0.01	<0.1
18-19-12-2023	06:00-06:00	35	60	14	16	<5	32.6	<1000	<0.1	<1	<1	<0.01	<0.1
19-20-12-2023	06:00-06:00	30	54	13	15	<5	37.9	<1000	<0.1	<1	<1	<0.01	<0.1
26-27-12-2023	06:00-06:00	21	43	9	11	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-12-2023	06:00-06:00	25	49	13	15	<5	28.2	<1000	<0.1	<1	<1	<0.01	<0.1
01-02-01-2024	06:00-06:00	22	46	9	11	<5	25.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-01-2024	06:00-06:00	34	40	12	13	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
14-15-01-2024	06:00-06:00	31	44	15	18	<5	22.1	<1000	<0.1	<1	<1	<0.01	<0.1
15-16-01-2024	06:00-06:00	25	42	14	15	<5	26.9	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-01-2024	06:00-06:00	30	37	9	11	<5	32.2	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-01-2024	06:00-06:00	24	40	12	15	<5	30.7	<1000	<0.1	<1	<1	<0.01	<0.1
29-30-01-2024	06:00-06:00	27	43	14	16	<5	27.6	<1000	<0.1	<1	<1	<0.01	<0.1
30-31-01-2024	06:00-06:00	31	45	13	16	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
05-06-02-2024	06:00-06:00	26	44	9	12	<5	29.1	<1000	<0.1	<1	<1	<0.01	<0.1
09-07-02-2024	06:00-06:00	34	59	13	16	<5	35.9	<1000	<0.1	<1	<1	<0.01	<0.1
16-17-02-2024	06:00-06:00	32	47	12	15	<5	30.2	<1000	<0.1	<1	<1	<0.01	<0.1
17-18-02-2024	06:00-06:00	27	45	14	18	<5	32.3	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-02-2024	06:00-06:00	23	44	9	11	<5	34.7	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-02-2024	06:00-06:00	25	36	15	18	<5	30.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-02-2024	06:00-06:00	20	36	14	16	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29-02-2024	06:00-06:00	22	39	13	15	<5	25.3	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		18-35	36-60	9-15	11-18	<5	21.2-34.7	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		26.1	45.2	12.1	14.5	<5	28.6	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	200 (24 hrs.)	100 (8 hrs.)	2,000 (8 hrs.)	1.0 (24 hrs.)	5.0 (annual)	30 (annual)	2.0 (annual)	1.0 (annual)

Legend : PM2.5-Particulate Matter size less than 2.5 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; Cd-Benzene & BaP- Benzene (a) pyrene in particulate phase, up-nitrogen & 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.

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Season : Winter 2023-24

Ambient Air Quality Data at A7-Ariyalur Bypass

Sample Size : 24 hrs. (otherwise mentioned)

Monitoring		Particulates, $\mu\text{g}/\text{m}^3$		Gaseous Pollutants, $\mu\text{g}/\text{m}^3$					Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	O ₃ (8-hrly Avg.)	CO (8-hrly Avg.)	Pb, $\mu\text{g}/\text{m}^3$	As, $\mu\text{g}/\text{m}^3$	Ni, $\mu\text{g}/\text{m}^3$	Cd, $\mu\text{g}/\text{m}^3$	BaP, $\mu\text{g}/\text{m}^3$
01-02-12-2023	06:00-06:00	36	60	21	24	<5	38.4	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-12-2023	06:00-06:00	32	55	18	21	<5	30.1	<1000	<0.1	<1	<1	<0.01	<0.1
10-11-12-2023	06:00-06:00	34	58	19	23	<5	32.5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12-12-2023	06:00-06:00	33	53	17	20	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
15-19-12-2023	06:00-06:00	27	62	18	23	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
19-20-12-2023	06:00-06:00	46	74	16	18	<5	32.0	<1000	<0.1	<1	<1	<0.01	<0.1
26-27-12-2023	06:00-06:00	41	70	18	22	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-12-2023	06:00-06:00	38	67	14	18	<5	28.1	<1000	<0.1	<1	<1	<0.01	<0.1
01-02-01-2024	06:00-06:00	40	71	16	20	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
02-03-01-2024	06:00-06:00	35	64	18	23	<5	29.5	<1000	<0.1	<1	<1	<0.01	<0.1
14-15-01-2024	06:00-06:00	37	68	21	24	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
15-16-01-2024	06:00-06:00	43	72	22	26	<5	33.4	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-01-2024	06:00-06:00	36	65	17	19	<5	30.8	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-01-2024	06:00-06:00	39	68	18	23	<5	36.1	<1000	<0.1	<1	<1	<0.01	<0.1
29-30-01-2024	06:00-06:00	25	48	11	14	<5	29.1	<1000	<0.1	<1	<1	<0.01	<0.1
30-31-01-2024	06:00-06:00	41	64	14	19	<5	27.2	<1000	<0.1	<1	<1	<0.01	<0.1
05-06-02-2024	06:00-06:00	38	61	16	21	<5	29.0	<1000	<0.1	<1	<1	<0.01	<0.1
06-07-02-2024	06:00-06:00	36	55	18	23	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
16-17-02-2024	06:00-06:00	22	45	11	13	<5	32.0	<1000	<0.1	<1	<1	<0.01	<0.1
17-18-02-2024	06:00-06:00	34	55	14	17	<5	30.5	<1000	<0.1	<1	<1	<0.01	<0.1
21-22-02-2024	06:00-06:00	39	59	16	20	<5	28.9	<1000	<0.1	<1	<1	<0.01	<0.1
22-23-02-2024	06:00-06:00	27	56	12	15	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
27-28-02-2024	06:00-06:00	40	63	13	17	<5	31.7	<1000	<0.1	<1	<1	<0.01	<0.1
28-29-02-2024	06:00-06:00	37	57	15	19	<5	33.5	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		22-46	45-74	11-22	13-26	<5	27.2-38.4	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		36.1	61.3	16.3	20.1	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	200 (24 hrs.)	100 (8 hrs.)	2000 (8 hrs.)	1.0 (annual)	5.0 (annual)	30 (annual)	5.0 (annual)	1.0 (annual)

Legend : PM2.5-Particulate Matter size less than 2.5 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; Cd-Benzene & BaP-Benzo (a) pyrene in particulate phase; μg -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.

Season : Winter 2023-24

Ambient Air Quality Data at A8-Kallankurichi

Sample Size : 24 hrs. (otherwise mentioned)

Monitoring		Particulates, $\mu\text{g}/\text{m}^3$		Gaseous Pollutants, $\mu\text{g}/\text{m}^3$						Other Pollutants (Particulate Phase)				
Date	Period, hrs.	PM2.5	PM10	SO ₂	NOx	NH ₃	O ₃ (8-hrly Avg.)	CO (8-hrly Avg.)	Pb, $\mu\text{g}/\text{m}^3$	As, ng/m^3	Ni, ng/m^3	Cd, $\mu\text{g}/\text{m}^3$	BaP, ng/m^3	
01-02-12-2023	06:00-06:00	12	26	7	7	<5	18.7	<1000	<0.1	<1	<1	<0.01	<0.1	
02-03-12-2023	06:00-06:00	18	31	12	15	<5	17.3	<1000	<0.1	<1	<1	<0.01	<0.1	
10-11-12-2023	06:00-06:00	15	27	12	14	<5	15.2	<1000	<0.1	<1	<1	<0.01	<0.1	
11-12-12-2023	06:00-06:00	13	22	10	12	<5	18.6	<1000	<0.1	<1	<1	<0.01	<0.1	
18-19-12-2023	06:00-06:00	16	28	10	13	<5	20.6	<1000	<0.1	<1	<1	<0.01	<0.1	
19-20-12-2023	06:00-06:00	14	30	7	9	<5	11.4	<1000	<0.1	<1	<1	<0.01	<0.1	
26-27-12-2023	06:00-06:00	15	27	9	11	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
27-28-12-2023	06:00-06:00	12	22	11	13	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
01-02-01-2024	06:00-06:00	20	39	7	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
02-03-01-2024	06:00-06:00	18	30	10	15	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
14-15-01-2024	06:00-06:00	22	36	11	12	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
15-16-01-2024	06:00-06:00	23	44	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
21-22-01-2024	06:00-06:00	24	41	10	12	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
22-23-01-2024	06:00-06:00	20	38	14	16	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1	
29-30-01-2024	06:00-06:00	23	37	11	13	<5	11.6	<1000	<0.1	<1	<1	<0.01	<0.1	
30-31-01-2024	06:00-06:00	21	34	10	12	<5	15.9	<1000	<0.1	<1	<1	<0.01	<0.1	
05-06-02-2024	06:00-06:00	19	37	7	8	<5	10.5	<1000	<0.1	<1	<1	<0.01	<0.1	
06-07-02-2024	06:00-06:00	28	45	11	13	<5	17.1	<1000	<0.1	<1	<1	<0.01	<0.1	
16-17-02-2024	06:00-06:00	32	48	12	14	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
17-18-02-2024	06:00-06:00	21	41	8	9	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
21-22-02-2024	06:00-06:00	23	36	13	15	<5	<10	<1000	<0.1	<1	<1	<0.01	<0.1	
22-23-02-2024	06:00-06:00	20	33	10	12	<5	18.3	<1000	<0.1	<1	<1	<0.01	<0.1	
27-28-02-2024	06:00-06:00	22	35	12	14	<5	10.4	<1000	<0.1	<1	<1	<0.01	<0.1	
28-29-02-2024	06:00-06:00	27	42	11	13	<5	11.8	<1000	<0.1	<1	<1	<0.01	<0.1	
Range (Minimum-Maximum)		12-32	22-48	7-14	7-16	<5	10-20.6	<1000	<0.1	<1	<1	<0.01	<0.1	
Mean Value		19.9	34.5	10.3	12.1	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1	
NAAQ Norms*		50 (24 hrs.)	100 (24 hrs.)	80 (24 hrs.)	80 (24 hrs.)	200 (24 hrs.)	100 (8 hrs.)	2000 (8 hrs.)	1.0 (annual)	5.0 (annual)	30 (annual)	5.0 (annual)	1.0 (annual)	

Legend : PM2.5-Particulate Matter size less than 2.5 μm ; PM10-Respirable Particulate Matter size less than 10 μm ; SO₂-Sulphur dioxide; NOx-Oxides of Nitrogen; NH₃-Ammonia; O₃-Ozone; CO-Carbon monoxide; Pb-Particulate Lead; As-Particulate Arsenic; Ni-Particulate Nickel; Cd-Benzene & BaP-Benzo (a) pyrene in particulate phase; μg -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.

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Ambient Noise Level Data (Abstract)

Monitoring Dates : 19-20.01.2024

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- AK Mine Office	Industrial	34.1	98.1	44.5	33.7	90.4	42.8
2	A2-Kovilankudikadu	Residential	32.5	85.9	40.4	32.1	78.7	38.2
3	A3-Kattupirangiyam	Residential	34.3	98.4	42.8	33.4	96.7	36.2
4	A4- Kaikatti near UT Cement Plant	Industrial	37.4	100.2	49.3	34.7	97.8	46.4
5	A5-Pudupalayam	Residential	34.4	92.6	43.9	33.9	96.8	42.2
6	A6-Hastinapuram	Residential	34.2	100.1	46.9	34.6	93.9	42.4
7	A7-Ariyalur (Bypass)	Commercial	35.4	101.2	48.1	34.9	102.4	46.8
8	A8-Kallankurichi	Residential	32.9	85.7	44.4	32.1	81.9	42.0
Study Area			32.5	101.2	45.0	32.1	102.4	42.1
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.

Work Noise Level Data

Monitoring Dates : 19-20.01.2024

Equipment	Location	Noise Level (Leq), dB(A)	DGMS/ OSHA Norm for 8-hours Exposure
Rock Breakers, Operating	Operator's Position	80.7	<85 dB(A)
Loading Area	1.0 m away	81.4	
Tipper, operating	1.0 m away	83.5	

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Surface Water Quality Data

Monitoring Dates : 09.01.2024

(Worst case & Mean values are reported)

Sl. No.	Parameter	W1 Nalla near Mine	W2 Uppu Odai	W3 Kallar River	W4 Marudayar River Up stream	CPCB Norms*
1	pH	7.83	7.47	7.43	7.81	6.5-8.5
2	Colour, Hazen units	BDL/BL 5.0	BDL/BL 5.0	BDL/BL 5.0	BDL/BL 5.0	10-30
3	Temperature, °C	26.4	26.8	26.6	27.1	-
4	Turbidity, NTU	0.8	1.2	1.5	1.8	-
5	Residual Chlorine, mg/l	BDL/BL 1.0	BDL/BL 1.0	BDL/BL 1.0	BDL/BL 1.0	-
6	Dissolved Oxygen, mg/l	4.8	5.3	5.6	5.4	4.0-6.0
7	Total Suspended Solids, mg/l	13	24	29	36	-
8	Electrical Conductivity, $\mu\text{mhos/cm}$	590	580	630	700	-
9	Total Dissolved Solids, mg/l	350	370	400	440	500-2100
10	Total Hardness (as CaCO_3), mg/l	190	180	170	190	-
11	Calcium Hardness, mg/l	110	90	90	100	-
12	Magnesium Hardness, mg/l	80	70	80	90	-
13	Calcium (as Ca), mg/l	44	36	36	40	-
14	Magnesium (as Mg), mg/l	19	17	19	22	-
15	Sodium (as Na), mg/l	28	39	45	49	-
16	Potassium (as K), mg/l	2	3	5	6	-
17	Chlorides (as Cl), mg/l	88	110	119	127	250-600
18	Sulphates (as SO_4), mg/l	26	23	27	32	500-1000
19	Total Alkalinity (as CaCO_3), mg/l	90	70	80	100	-
20	BOD-5 days @ 27°C, mg/l	BDL/BL 2.0	BDL/BL 2.0	BDL/BL 2.0	BDL/BL 2.0	<3
21	COD, mg/l	6	8	11	13	-
22	Oil & Grease, mg/l	BDL/BL 1.0	BDL/BL 1.0	BDL/BL 1.0	BDL/BL 1.0	-
23	Iron (as Fe), mg/l	0.06	0.09	0.11	0.09	0.3-5.0
24	Fluorides (as F), mg/l	0.11	0.16	0.21	0.18	1.5
25	Nitrates (as NO_3), mg/l	0.10	0.12	0.16	0.15	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 $\text{C}_6\text{H}_5\text{OH}$), 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	Aluminum (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, %	24.0	34.1	35.7	35.0	-
42	Total Coliforms, MPN/100 ml	8	41	47	56	50-5000
43	Faecal Coliforms, MPN/100 ml	2	22	28	32	-
44	E. Coli, MPN/100 ml	2	17	20	23	-

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

- Not included/Not available

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Surface Water Quality Data (Contn.)

Monitoring Dates : 09.01.2024

(Worst case & Mean values are reported)

Sl. No.	Parameter	W5 Marudayar River Down stream	W6 Manakudi Tank	W7 Pond, Periyanaagalur	W8 Pond, Pudupalayam	CPCB Norms*
1	pH	7.68	7.74	7.68	7.69	6.5-8.5
2	Colour, Hazen units	SD(0.5.0)	SD(0.5.0)	SD(0.5.0)	SD(0.5.0)	10-30
3	Temperature, °C	27.2	27.0	26.8	26.4	-
4	Turbidity, NTU	1.6	2.1	1.7	1.9	-
5	Residual Chlorine, mg/l	SD(0.1.0)	SD(0.1.0)	SD(0.1.0)	SD(0.1.0)	-
6	Dissolved Oxygen, mg/l	5.5	5.1	5.3	4.8	4.0-6.0
7	Total Suspended Solids, mg/l	22	23	18	41	-
8	Electrical Conductivity, umhos/cm	700	560	500	790	-
9	Total Dissolved Solids, mg/l	450	350	320	500	500-2100
10	Total Hardness (as CaCO ₃), mg/l	210	140	130	220	-
11	Calcium Hardness, mg/l	110	80	70	120	-
12	Magnesium Hardness, mg/l	100	60	60	100	-
13	Calcium (as Ca), mg/l	44	32	28	48	-
14	Magnesium (as Mg), mg/l	24	14	14	24	-
15	Sodium (as Na), mg/l	44	32	24	64	-
16	Potassium (as K), mg/l	4	2	2	5	-
17	Chlorides (as Cl), mg/l	130	68	82	148	250-600
18	Sulphates (as SO ₄), mg/l	28	24	20	42	400-1000
19	Total Alkalinity (as CaCO ₃), mg/l	90	80	60	110	-
20	BOD-5 days @ 27°C, mg/l	SD(0.2.0)	SD(0.2.0)	SD(0.2.0)	SD(0.2.0)	<3
21	COD, mg/l	8	6	4	12	-
22	Oil & Grease, mg/l	SD(0.1.0)	SD(0.1.0)	SD(0.1.0)	SD(0.1.0)	-
23	Iron (as Fe), mg/l	0.08	0.12	0.06	0.11	0.3-5.0
24	Fluorides (as F), mg/l	0.21	0.21	0.13	0.26	1.5
25	Nitrates (as NO ₃), mg/l	0.18	0.18	0.11	0.21	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, %	30.8	32.8	28.2	35.8	-
42	Total Coliforms, MPN/100 ml	47	26	12	73	50-5000
43	Faecal Coliforms, MPN/100 ml	28	17	8	35	-
44	E. Coli, MPN/100 ml	17	11	4	25	-

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

- : Not included/Not available.

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Ground Water Quality Data

Monitoring Dates : 05.01.2024

(Worst case & Mean values are reported)

Sl. No.	Parameter	W9 Mine Pit	W10 Borewell, Kallankurichi	W11 Borewell, Kattupirih- guyam	W12 Borewell, Pettaya- nagatur	IS:10500 Norms*
1	pH	7.76	7.67	7.78	7.68	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	27.4	27.2	26.9	27.0	-
4	Turbidity, NTU	1.4	0.7	0.9	0.9	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	4.2	3.8	4.4	4.7	-
7	Total Suspended Solids, mg/l	18	10	19	11	-
8	Electrical Conductivity, umhos/cm	950	670	840	730	-
9	Total Dissolved Solids, mg/l	620	440	530	460	500/2000
10	Total Hardness (as CaCO ₃), mg/l	200	210	250	220	200/500
11	Calcium Hardness, mg/l	160	110	140	120	-
12	Magnesium Hardness, mg/l	140	100	110	100	-
13	Calcium (as Ca), mg/l	64	44	58	49	75/200
14	Magnesium (as Mg), mg/l	34	24	26	24	30/100
15	Sodium (as Na), mg/l	54	36	46	39	-
16	Potassium (as K), mg/l	6	2	5	2	-
17	Chlorides (as Cl), mg/l	140	124	156	132	250/1000
18	Sulphates (as SO ₄), mg/l	42	36	52	41	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	150	100	120	110	200/500
20	BOD-5 days @ 27°C, mg/l	BDL(DL:1.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	-
21	COD, mg/l	3	4	5	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	0.10	0.08	0.13	0.10	0.3
24	Fluorides (as F), mg/l	0.14	0.14	0.27	0.17	1.0/1.5
25	Nitrates (as NO ₃), mg/l	0.15	0.15	0.26	0.23	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	Abx.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, %	27.8	26.9	28.1	27.6	-
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

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Ground Water Quality Data (Contn.)

Monitoring Dates : 09.01.2024

(Worst case & Mean values are reported)

Sl. No.	Parameter	W13 Borewell, Reddipalayam	W14 Borewell, Pudupalayam	W15 Borewell, Hastinapuram	W15 Borewell, Kovilankudikadu	IS:10500 Norms*
1	pH	7.75	7.82	7.61	7.66	6.5-8.5
2	Colour, Hazen units	SO/DL5.0	SO/DL5.0	SO/DL5.0	SO/DL5.0	5/15*
3	Temperature, °C	27.3	27.1	27.0	27.3	-
4	Turbidity, NTU	1.0	1.1	0.9	1.0	1/5
5	Residual Chlorine, mg/l	SO/DL1.0	SO/DL1.0	SO/DL1.0	SO/DL1.0	0.2/1.0
6	Dissolved Oxygen, mg/l	4.5	4.4	4.9	4.4	-
7	Total Suspended Solids, mg/l	14	17	12	14	-
8	Electrical Conductivity, umhos/cm	820	870	850	570	-
9	Total Dissolved Solids, mg/l	520	550	410	280	500/2000
10	Total Hardness (as CaCO ₃), mg/l	260	270	200	170	200/500
11	Calcium Hardness, mg/l	140	150	110	90	-
12	Magnesium Hardness, mg/l	120	120	90	80	-
13	Calcium (as Ca), mg/l	56	60	44	36	75/200
14	Magnesium (as Mg), mg/l	29	29	22	19	30/100
15	Sodium (as Na), mg/l	47	54	42	35	-
16	Potassium (as K), mg/l	4	6	3	2	-
17	Chlorides (as Cl), mg/l	142	154	114	93	250/1000
18	Sulphates (as SO ₄), mg/l	49	49	29	21	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	120	130	90	80	200/500
20	BOD-5 days @ 27°C, mg/l	SO/DL2.0	SO/DL2.0	SO/DL2.0	SO/DL2.0	-
21	COD, mg/l	6	5	2	3	-
22	Oil & Grease, mg/l	SO/DL1.0	SO/DL1.0	SO/DL1.0	SO/DL1.0	-
23	Iron (as Fe), mg/l	0.10	0.14	0.10	0.06	0.3
24	Fluorides (as F), mg/l	0.21	0.28	0.22	0.16	1.0/1.5
25	Nitrates (as NO ₃), mg/l	0.28	0.31	0.25	0.12	45
26	Phosphates (as PO ₄), mg/l	<0.01	<0.01	<0.01	<0.01	-
27	Cyanides (as CN), mg/l	SO/DL0.02	SO/DL0.02	SO/DL0.02	SO/DL0.02	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	SO/DL0.001	SO/DL0.001	SO/DL0.001	SO/DL0.001	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 Cadmium, %	27.8	29.7	30.8	30.6	-
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 :2013 Drinking Water Standards; # : Requirements/Permissible Limit in the absence of alternate source.

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Soil Status

Monitoring Date : 09.01.2024

Sl. No.	Parameter	S1	S2	S3	S4	S5	S6	Desirable Range*
i	Colour	Brown	Brown	Grey	Reddish Brown	Brown	Brown	-
ii	Compaction	Medium	Low	Medium	Medium	Medium	Medium	-
1	pH (10% Solution)	7.73	7.81	7.59	7.74	7.59	7.59	5.5-9.0
2	Electrical Conductivity, mmhos/cm	1.72	1.79	1.53	1.50	1.74	1.69	0.2-0.5
3	Natural Moisture Content, %	11.5	9.6	10.2	9.4	12.6	14.9	-
4	Organic Carbon, %	0.98	0.91	1.09	1.14	1.10	1.04	>0.75
5	Nitrogen (as N), %	0.010	0.007	0.013	0.016	0.012	0.012	0.01-0.02
6	Phosphorus (as P), %	0.006	0.003	0.009	0.010	0.009	0.008	0.002-0.004
7	Potassium (as K), %	0.012	0.009	0.010	0.008	0.014	0.009	>0.01
8	Sodium (as Na), ppm	110	140	90	110	110	70	-
9	Calcium (as Ca), ppm	70	90	60	80	80	80	-
10	Magnesium (as Mg), ppm	60	60	60	70	60	70	-
11	Chlorides (as Cl), ppm	210	230	180	160	210	230	-
12	Sulphates (as SO ₄), ppm	120	150	110	90	130	160	-
13	Cation Exchange Capacity, meq/100 g	23.1	21.7	22.6	24.1	23.6	21.5	10-30
14	Grain Size Distribution % Sand, %	33.7	31.9	62.4	28.6	31.8	35.1	-
ii	Silt, %	60.9	63.4	31.5	63.4	60.4	60.6	-
iii	Clay, %	5.4	4.7	6.1	8.0	7.8	4.3	-
15	Textural Class	Silty loam	Silty loam	Sandy loam	Silty loam	Silty loam	Silty loam	Loam
16	Bulk Density, g/cc	1.34	1.33	1.32	1.35	1.37	1.38	-
17	Infiltration Rate, cm/hr	3.7	4.4	3.5	3.8	3.6	3.5	-
18	Field Capacity, %	21.7	20.3	19.4	25.1	21.4	21.4	-
19	Wilting Coefficient, %	0.4	0.6	0.4	0.8	0.4	0.7	>0.4
20	Available Water Storage Capacity, %	21.4	19.6	22.3	24.3	21.9	20.7	-
21	Sodium Absorbing Ratio	2.32	2.79	1.96	2.16	2.25	1.37	<5

* : Desirable Range for High Production Soil.

Legend : S1-Green Belt; S2-Dump Area; S3-Dry Agri. Land, Periyanganalur; S4-Forrest Land, Vilangudi; S5-Agri. Land, Pudupalayam & S6-Agri. Land, Kallankurichi.

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