



Dalmia Cement (Bharat) Limited

**Khairulabad Limestone Mine under Rc. No. 17783
(Captive Mine since 2004 & Not in Operation since Feb. 2017)**

Extent : 2.25 Ha

Minerals : Limestone & Ferruginous Limestone

Proposed Maximum Production : 6,028 Tonnes ROM per Annum

**S.F. Nos. 455/1, 456/2 and 456/3 of Khairulabad Village,
Ariyalur Taluk & District, Tamil Nadu**

**ML Validity : 13.08.2004 to 12.08.2034 (for 30 Years)
(Valid till 12.08.2054 as per MMDR Amendment Act, 2015)**

**Review of Mining Plan & Progressive Mine Closure Plan Approval by
IBM, Chennai vide Letter No. TN/ALR/LST/ROMP-1523.MDS dated 13.11.2018
(ROMP Period 2019-20 to 2023-24)**

**Environmental Clearance under EIA Notification 2006
Schedule Sl. No. 1(a); Category 'B1' (Mining in <250 Ha)
'Violation Proposal' (as operated the Mine after 15.01.2016 without EC)**

Draft Environmental Impact Assessment Report

(after TOR for Public Hearing)

Awarded TOR : SEIAA-TN/F.No. 6568/TOR-389/2018 dated 24.05.2018

April 2023

EIA Consultant

ABC Techno Labs India Private Limited, Chennai

Accreditation Certificate : NABET/EIA/1922/RA0155

Validity extended till 23.04.2023 vide Letter QCI/NABET/ENV/ACO/23/2646

(Sl. No. 4 of QCI/NABET List dated 04.04.2023)

NABL Certificate No. TC-5770 dated 03.04.2022 valid till 02.04.2024

Lab Recognition : MoEF&CC vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019

Content

<u>Sl. No.</u>	<u>Description</u>	<u>Page No.</u>
I	Content	2-3
II	List of Documents	4
III	List of Figures	5
IV	List of Tables	6
V	Project Proponent Declaration	8
VI	EIA Consultant Undertaking	9
VII	Awarded TORs	10
VIII	Compliance to Additional TOR to deal with Violation Aspects	33
IX	Annexure-I : Additional Information for considering EC	37
X	Standard TOR & their Incorporation in the EIA Report	46
1.0	Introduction	51
1.1	Purpose of the Report	51
1.2	Project Proponent	59
1.3	PNR Group of Mines	62
1.4	Khairulabad Limestone Mine under RC. No. 17783	62
1.5	Statutory Approvals	66
1.6	Development & Production of the Mine	67
1.7	Violation - Qualitative & Quantitative	68
1.8	Reserves & Proposed Production	69
1.9	The Proposal	69
1.10	Environmental Setting	70
1.11	EIA Study	72
2.0	Project Profile	74
2.1	Type of the Project	74
2.2	Technology & Magnitude of Operation	74
2.3	Project Description	75
2.4	Mining Method	77
2.5	Yearwise Production	84
2.6	Machineries	85
2.7	Competent Mining Personnel	85
2.8	Site Services	85
2.9	Solid Wastes	86
2.10	Proposed Land Use	86
2.11	Financial Closure Plan	86
2.12	Water Demand & Source	87
2.13	Mine Dewatering	87
2.14	Power Demand & Source	87
3.0	Description of the Environment (Baseline Status)	88
3.1	Study Area	88
3.2	Environmental Components	92
3.3	Methodology Adopted	92
3.4	Micrometeorology	96
3.5	Ambient Air Quality	101
3.6	Ambiebt Noise Levels	114
3.7	Water Environment	115
3.8	Land Environment	124

<u>Sl. No.</u>	<u>Description</u>	<u>Page No.</u>
3.9	Flora & Fauna	126
3.10	Socio-economic Environment	141
3.11	Summary of Baseline Status	151
4.0	Anticipated Environmental Impact and Mitigation Measures	152
4.1	Identification of Impacts	152
4.2	Construction Phase	152
4.3	Impacts during Operation Phase	152
4.4	Evaluation of Impacts	164
4.5	Impact Quantification	165
5.0	Analysis of Alternatives(Technology & Site)	166
5.1	Technology	166
5.2	Alternative Sites Considered	166
6.0	Environmental Monitoring Programme	167
6.1	Environment Cell and Compliances	167
6.2	Post Project Monitoring	167
7.0	Additional Studies	168
7.1	Hazards Identification & Risk Assessment	168
7.2	Emergency Preparedness Plan	168
7.3	Disaster Management Plan	169
8.0	Project Benefits	173
9.0	Environmental Cost Benefit Analysis	173
10.0	Environmental Management Plan	174
10.1	EMP for Construction Phase	174
10.2	EMP for Operation Phase	174
10.3	Plastic Waste Management	177
10.4	EMP Budget	177
11.0	Summary Environmental Impact Assessment	178-194
12.0	Disclosure of Consultants	195
13.0	Ecological Damage Assessment, Remediation Plan, Natural Resource Augmentation & Community Resource Augmentation Plan	203
13.1	Need & Objectives of the Study	203
13.2	Qualitative & Quantitative Assessment	203
13.3	Ecological/Environmental Damage Assessment	208
13.4	Ecological Damage Remediation Plan	211
13.5	Conclusion	213

List of Documents

Doc-1	Notice issued for Violation & Penalty Levied	55
Doc-2	Payment Remitted Challan	58
Doc-3	ML Grant	214
Doc-4	Miming Lease Deed	218
Doc-5	IBM Approval Letter	225
Doc-6	DD (Geology & Mines) Proceedings	227
Doc-7	Bank Guarantee	233

List of Figures

<u>Sl. No.</u>	<u>Description</u>	<u>Page No.</u>
Fig. 1.1	Index Map	52
Plate I	Dalmia Plants & Captive Mines in the Regional Map	60
Plate II	Lease Area Location – Key Map & FMB Sketch	63
Plate III	Lease in Google Earth Imagery-with Boundry Coordinates	64
Plate IV	Photographs of Lease Area & Green Belt Developed	65
Fig. 1.2	Topo Map - 10 km Radius	71
Fig. 2.1	Approved Surface & Geological Plans	78
Fig. 2.2	Geological Sections	79
Fig. 2.3	Yearwise Production Plans (Balance Periods)	80
Fig. 2.4	Conceptual Plan & Sections	81
Fig. 2.5	Financial Closure Plan & Environmental Plan	82
Fig. 3.1	Environmental Quality Monitoring Stations	89
Fig. 3.2	Physiography	90
Fig. 3.3	Drainage Pattern	91
Fig. 3.4	Seasonal Wind Rose	100
Fig. 3.5	Satellite Imagery	127
Fig. 3.6	Land Use Pattern	128
Fig. 4.1	Predicted GLC - PM10	159

List of Tables

<u>Sl. No.</u>	<u>Description</u>	<u>Page No.</u>
Table 1.1	DCBL Cement Plant & EC Details	59
Table 1.2	DCBL Captive Limestone Mines	61
Table 1.3	Mining Plans/Schemes	66
Table 1.4	Actual Production	67
Table 1.5	Planned Production till Lease Validity	69
Table 2.1	Proposed Production during ROMP Period	74
Table 2.2	Assessed Resources	77
Table 2.3	Mine Machineries	85
Table 2.4	Mining Personnel	85
Table 2.5	Land Use Pattern	86
Table 3.1	Micrometeorological Data – Dec. 2021	97
Table 3.2	Micrometeorological Data – Jan. 2022	98
Table 3.3	Micrometeorological Data – Feb. 2022	99
Table 3.4	Ambient Air Quality Monitoring Stations – Location & Bearing	101
Table 3.5-3.12	Ambient Air Quality Data	103-110
Table 3.13	Abstract of Ambient Air Quality Data	111-112
Table 3.14	Ambient Air Quality Status	113
Table 3.14(a)	RSPM Analytical Data	114
Table 3.15	Ambient Noise Level Data (Abstract)	115
Table 3.16	Rainfall Data (TWAD)	115
Table 3.17	Ground Water Level Data (TWAD)	116
Table 3.18	CPCB Criteria for Designated Best Use of Water	118
Table 3.19	Surface Water Quality Data	119-120
Table 3.20	Ground Water Quality Data	121-122
Table 3.21	Water Quality Status	123
Table 3.22	Soil Status	125
Table 3.23	Land Use Pattern	126
Table 3.24	List of Flora in the Reserved Forests	129
Table 3.25	List of Flora - Core Zone (Green Belt)	129
Table 3.26	List of Flora - Distribution of Vegetation in Buffer Zone	130
Table 3.27	List of Fauna in the Reserved Forests	136
Table 3.28	List of Fauna in the Study Area	137
Table 3.29	List of Planktons	140
Table 3.30	Diversity Index	140
Table 3.31	Population-Decennial Growth	141
Table 3.32	Khairulabad Village Profile	142
Table 3.33	Demographic Profile-2011 Census	144
Table 3.34	Occupation of Population and Work Forces	145
Table 3.35	Educational Facilities in the Study Area	146
Table 3.36	Medical Facilities in the Study Area	147
Table 3.37	Communication & Transport Facilities in the Study Area	148
Table 3.38	Water & Drainage Facilities in the Study Area	149
Table 3.39	Other Facilities in the Study Area	150
Table 4.1	Industrial Activities Considered for Cumulative Impact	153
Table 4.2	Existing traffic Volume - Baseline Status	154
Table 4.3	Projected Traffic Volume- Operation Phase	155
Table 4.4	Level of Service & Performance of a Road	155
Table 4.5	Predicted Traffic Scenario at the Junction	155
Table 4.6	Predicted GLCs - PM10	160

<u>Sl. No.</u>	<u>Description</u>	<u>Page No.</u>
Table 4.7	Source Noise Levels-Mine Machinerics	161
Table 4.8	EIA Matrix	164
Table 4.9	Coefficient Values	165
Table 4.10	Impact Quantification - Operation Phase	165
Table 6.1	Post Project Monitoring Schedule	167
Table 7.1	Potential Hazards due to Proposal	168
Table 7.2	Risk Matrix (R)	168
Table 7.3	DMP Measures	169
Table 13.1	Project Status – Before & during Violation Period	204
Table 13.2	Enumeration of Aspects of Violation	206
Table 13.3	Ecological Damage Assessment & its Cost	210
Table 13.4	Ecological Damage Remediation Plan	212
Table 13.5	Natural Resource Augmentation Plan	212
Table 13.6	Community Resource Augmentation Plan	212
Table 13.7	Summary of Remediation, Natural & Community Resource Augmentation Plan	213



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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 **Khairulabad Limestone Mine** under RC No. 17783 over an Extent 2.25 Ha in S.F. Nos. 455/1, 456/2 and 456/3 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu vide Online Proposal No. . **SIA/TN/MIN/24620/2018 on 12.04.2018..** The Proposal under Sl. No. 1(a), Category B1 was deliberated under Violation Category in State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 111th Meeting held on 17.05.2018 and in 306th SEIAA-TN Meeting held on 24.05.2018. Terms of Reference (TOR) has been awarded vide **Letter SEIAA-TN/F.No.6568/TOR-389/2018 dated 24.05.2018 with Public Hearing** 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**), Quality Council of India vide Certificate **NABET/EIA/1922/RA 0155** with validity extended till **23.04.2023** vide Letter **QCI/NABET/ENV/ACO/23/2646** (Sl. No. 4 of QCI/NABET List dated 04.04.2023). **ABC Techno Labs India Private Limited Laboratory** is accredited by the National Accreditation Board for Testing and Calibration Laboratories (**NABL**) vide Certificate No. **TC-5770** dated 03.04.2022 with validity till 02.04.2024. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (**MoEF&CC**) vide Letter F. No. **Q-15018/04/2019-CPW** dated 14.10.2019 with validity of 5 years.

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

For Dalmia Cement (Bharat) Limited

Date : 10.04.2023
Place : Dalmiapuram

sd./-
K.Vinayagamurthy
Unit-Head



EIA Consultant Undertaking

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

M/s. Dalmia Cement (Bharat) Limited (DCBL), have applied for Environmental Clearance of their Khairulabad Limestone Mine under RC No. 17783 over an Extent 2.25 Ha in S.F. Nos. 455/1, 456/2 and 456/3 of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu vide Online Proposal No. . SIA/TN/MIN/24620/2018 on 12.04.2018.. The Proposal under Sl. No. 1(a), Category B1 was deliberated under Violation Category in State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 111th Meeting held on 17.05.2018 and in 306th SEIAA-TN Meeting held on 24.05.2018. Terms of Reference (TOR) has been awarded vide Letter SEIAA-TN/F.No.6568/TOR-389/2018 dated 24.05.2018 with Public Hearing for preparing Environmental Impact Assessment (EIA) Report.

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For ABC Techno Labs India Private Limited

Date : 10.04.2023
Place : Chennai

Sd/-
Authorised Signatory



ABC TECHNO LABS INDIA PRIVATE LIMITED

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

ISO 9001:2007, ISO 14001:2004 & ISO 45001:2018 Certified Company

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MEMBER SECRETARY



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No.1 Jeenis Road, Saidapet, Chennai-15.
Phone No.044-24359973
Fax No. 044-24359975

TERMS OF REFERENCE (ToR)

Lr No. SEIAA-TN/E.No.6568TOR-389/2018, Dated: 24.05.2018

To

M/s. Dalmia Cement (Bharat) Limited
Hansalaya Building
11th 12th Floor, No 15
Barakhamba Road
New Delhi

Sir / Madam,

Sub: SEIAA, Tamilnadu – Terms of Reference (ToR) under violation for the Existing Limestone over an extent of 2.25.0 Ha at S.F. No. 455/1,456/2, 456/3 Khairulabad Village, Ariyalur Taluk, Ariyalur District by M/s. Dalmia Cement (Bharat) Limited, under project category – B1 and Schedule S.No. 1(a) – TOR issued for the preparation of EIA report, EMP report, ecological damage assessment, remediation plan, natural resource augmentation and community resource augmentation –Regarding.

- Ref:** 1. MoEF&CC Notification S.O. 804 (E) dated 14.03.2017
2. MoEF&CC Notification S.O.1030 (E) dated 08.03.2018
3. Your application Online No. SIA/TN/MIN/24620/2018, dated:12.04.2018
4. Minutes of the 111th SEAC Meeting held on 17.05.2018
5. Minutes of the 306th SEIAA Meeting held on 24.05.2018

Kindly refer to your proposal submitted to the State Level Impact Assessment Authority for Terms of Reference.

The proponent of M/s. Dalmia Cement (Bharat) Limited, submitted application for Terms of Reference on 12.04.2018, in Form-I, Pre- Feasibility report for the Limestone over an extent of 2.25.0 Ha at S.F. No. 455/1,456/2, 456/3 Khairulabad Village, Ariyalur Taluk, Ariyalur District , Tamil Nadu seeking ToR under the MoEF & CC Notification cited under reference 1st & 2nd.

Page | 1



MEMBER SECRETARY
SEIAA-TN

[Handwritten signature]
24/5/18
(5/5)

The proposal seeking ToR was placed before the 111th SEAC meeting held on 17.05.2018. Based on the document furnished, the Committee observed that the project falls under the category B1 and schedule 1(a) of the EIA Notification, 2006. The SEAC recommends the Terms of Reference for the project for assessment of Ecological damage, remediation plan and natural & community resource augmentation plan to be prepared as an independent chapter in the Environment Impact Assessment report by the Accredited consultant and also with collection and analysis of data for the assessment of ecological damage, preparation of remediation plan and natural & community resource augmentation plan to be done by an Environmental laboratory duly notified under the Environment (Protection) Act, 1986, accredited by NABET or a laboratory of council of Scientific and Industrial research Institutions working in the field of Environment. Three months data relating to the ecological parameters is to be submitted with analysis.

The project proponent besides above has to also submit the No Objection certificate (NOC) from State Mines and Geology Department. The NOC should also indicate whether the mine was operated.

- Without Environmental Clearance (EC) or in excess of quantity approved in EC.
- Without consent to Operate (CTO) or in excess of quantity approved in CTO.
- Without mining plan/scheme of mining or in excess of quantity approved in mining plan/scheme of mining.
- Without Forest clearance
- Any other violation such as excess quantity mined during the mining period to assess the ecological and other damages.

The proposal was considered as recommended by SEAC in 306th SEIAA meeting held on 24.05.2018 and after detailed discussion, the authority decided to issue ToR for considering the mining period from 2018-19 onwards only for the preparation of EIA report along with additional ToR. Excess quantity mined during the mining period shall be furnished to assess the ecological and other damages from the Department of Mining and Geology.



Additional TOR specified by the SEAC to deal with the violation aspects of the mining projects

SECTION A

As per the MoEF & CC Notification S.O. 1030 (E) dated: 08.03.2018,

1. "The cases of violations will be appraised by the Expert Appraisal Committee at the Central level or State or Union territory level Expert Appraisal Committee constituted under sub-section (3) of section 3 of the Environment (Protection) Act, 1986 with a view to assess that the project has been constructed at a site which under prevailing laws is permissible and expansion has been done which can run sustainably under compliance of environmental norms with adequate environmental safeguards, and in case, where the findings of Expert Appraisal Committee for projects under category A or State or Union territory level Expert Appraisal Committee for projects under category B is negative, closure of the project will be recommended along with other actions under the law.
2. In case, where the findings of the Expert Appraisal Committee or State or Union territory level Expert Appraisal Committee on point at sub-paragraph (4) above are affirmative, the projects will be granted the appropriate Terms of Reference for undertaking Environment Impact Assessment and preparation of Environment Management Plan and the Expert Appraisal Committee or State or Union territory level Expert Appraisal Committee, will prescribe specific Terms of Reference for the project on assessment of ecological damage, remediation plan and natural and community resource augmentation plan and it shall be prepared as an independent chapter in the environment impact assessment report by the accredited consultants, and the collection and analysis of data for assessment of ecological damage, preparation of remediation plan and natural and community resource augmentation plan shall be done by an environmental laboratory duly notified under the Environment (Protection) Act, 1986, or a environmental laboratory accredited by the National Accreditation Board for Testing and Calibration




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Laboratories, or a laboratory of the Council of Scientific and Industrial Research institution working in the field of environment.”

After the appraisal of the project, the SEAC decided that the Para No.2 stated above is applicable to the project. Hence, the proponent is directed to prepare appropriate reports as contained in the Para 2.

While complying with the specific aspects of the MoEF & CC directions as stated in the Para 2 above, the following steps should be followed:

Step 1: Enumerate the aspects of Violation:

- a) The proponent should enumerate the violations as applicable to the project.
- b) Furnish a description of each violation with quantitative and qualitative data.
- c) Violation categories are to be decided taking into consideration the stage at which the project execution stands.

Step 2: Ecological Damage Assessment:

- a) For each aspect of violation enumerated in step (1), identify the resultant environmental damage that may have been caused.
- b) Furnish a description of the environmental damages with quantitative and qualitative data.

Step 3: Remediation Plan:

- a) For the Environmental Damage(s) identified in the step (2) above, prepare the remediation plan for the each or combination of damages.
- b) The remediation plan should essentially consists of problem statement, target to be achieved (quantity), standards, technology/procedure for remediation, equipment and machinery to be used, time schedule and remediation cost(direct and indirect cost, capital as well as O&M costs).

SECTION B

I. Natural resource Augmentation:



a) The resources that should be considered for augmentation should essentially consist of land, biota, air, water and other resources as applicable.

b) Proponent may choose one or more of the resource augmentation as applicable and provide a description of the augmentation proposal in detail for each resource.

c) The proponent should also furnish the cost for each augmentation scheme.

2. Community resource Augmentation:

a) The proponent should prepare a plan of action for addressing the needs of the community in terms of resources in the sectors of education, health and sports primarily and other such resources as applicable to the community in the vicinity of the project.

b) The community resource augmentation plan should consist of rehabilitation of houses and people, budget allocation and time schedule for completing the activity.

SECTION C

The proponent should prepare content for the ecological damage assessment, remediation plan, natural resource augmentation and community resource augmentation separately in a chapter and include in the EIA / EMP report.

SECTION D

a) After the appraisal of the EIA / EMP report submitted by the proponent, the SEAC will make a judgement of the quality of the content in the EIA / EMP report specifically with reference to the chapter covering the ecological damage assessment, remediation plan, natural resource augmentation and community resource augmentation.

b) In the judgement of SEAC, if the quality of the content in the chapter is not satisfactory, the SEAC may direct the proponent to further revise the chapter and resubmit the EIA/EMP report.

c) If SEAC concludes that the technical part is satisfactory and the costing aspect is not satisfactory then the SEAC may revert to legal provisions, MoEF & CC guidelines and similar expert committee recommendations



for finalizing the cost aspects or the SEAC may use its own expertise and experience in finalizing the cost.

SECTION E

The proponent is directed to furnish data as per the questionnaire appended in Annexure I. It will help the SEAC in arriving the ecological damage and the associated cost.

SECTION F

In compliance with the Supreme Court order stated in MoEF & CC letter F.No. 3-50/2017 LA.III-pt dated: 05th January 2018, the proponent is required to submit the No Objection Certificate obtained from the Department of Geology and Mining, Government of Tamil Nadu regarding payment of 100% cost of illegally mined mineral under section 21(5) of MMDR Act 1957 which would account for mining operations in violation of the following:

- a) Without Environmental Clearance (EC), or in excess of the quantity approved in EC
- b) Without Consent to Operate (CTO) or in excess of the quantity approved in CTO and
- c) Without mining plan/scheme of mining or in excess of the quantity approved in mining plan / scheme of mining
- d) Without Forest Clearance
- e) Any other violation

List out the details of reserve forest and wildlife sanctuary nearby the project site (the details should also include other districts which are nearby the project site) and also furnish the detail of distance between the project site and reserve forests/wildlife sanctuary.

Whether the project site attracts the HACA clearance? If so, also furnish the HACA clearance for the mining from the competent authority.



The EIA study report shall provide the details of proposed and actual mined during the entire mining period.

The proponent is instructed to fill in the form contained in **Annexure I** to work out the details of the ecological damage during the violation period.

A. STANDARD TERMS OF REFERENCE

- 1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
- 2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
- 3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.
- 4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ 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 other ecological features of the study area (core and buffer zone).
- 5) Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
- 6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.
- 7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/



conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.

- 8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.
- 9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
- 10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
- 11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
- 12) A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
- 13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation



- (CA) should be indicated. A copy of the forestry clearance should also be furnished.
- 14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
 - 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
 - 16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.
 - 17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.
 - 18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.
 - 19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and



- furnished to the effect that the proposed mining activities could be considered.
- 20) Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease 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).
 - 21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.
 - 22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.
 - 23) Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be



shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.

- 24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
- 25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
- 26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
- 27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.
- 28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
- 29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.
- 30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.
- 31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory



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- afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.
- 32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.
 - 33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.
 - 34) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.
 - 35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.
 - 36) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.
 - 37) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.
 - 38) Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to



the proposed Project.

- 39) Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.
- 40) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- 41) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.
- 43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
- 44) Besides the above, the below mentioned general points are also to be followed:-
 - a) Executive Summary of the EIA/EMP Report
 - b) All documents to be properly referenced with index and continuous page numbering.
 - c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
 - d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.
 - e) Where the documents provided are in a language other than English, an English translation should be provided.
 - f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
 - g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(T) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.
 - h) Changes, if any made in the basic scope and project parameters (as submitted in




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

In addition to the above, the following shall be furnished:-

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

- 1) Project name and location (Village, District, State, Industrial Estate (if applicable).
- 2) Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.
- 3) Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative)
- 4) Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
- 5) Measures for mitigating the impact on the environment and mode of discharge or disposal.
- 6) Capital cost of the project, estimated time of completion.
- 7) Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt. / private land, status of its acquisition, nearby (in 2-3 km.) water body, population,




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with in 10km other industries, forest , eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary)

- 8) Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
- 9) Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
- 10) Likely impact of the project on air, water, land, flora-fauna and nearby population
- 11) Emergency preparedness plan in case of natural or in plant emergencies
- 12) Issues raised during public hearing (if applicable) and response given
- 13) CSR plan with proposed expenditure.
- 14) Occupational Health Measures
- 15) Post project monitoring plan

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

- a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.
- b. All documents may be properly referenced with index, page numbers and continuous page numbering.
- c. Copy of permission related to Port facility, Desalination plant, wind mill /solar power plant from competent Authority.
- d. Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.
- e. 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(T) dated 4th August, 2009, which are available on the website of this Ministry should also be followed.
- f. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No J - 11013/77/2004-IA-II(I) dated 2nd December, 2009, 18th March 2010, 28th May 2010 .



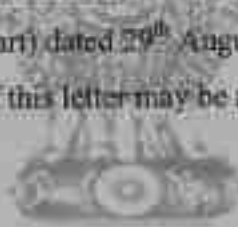
28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website <http://www.moef.nic.in/> may be referred.

- After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.

- The final EIA report shall be submitted to the SELAA, Tamil Nadu for obtaining Environmental Clearance.

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

The receipt of this letter may be acknowledged.




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SELAA-TN
S.H.
24/05/18

Copy to:

1. The Principal Secretary to Government, Environment & Forests Dept, 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, Ministry of Environment & Forest (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungambakkam, Chennai -34.
5. Monitoring Cell, IA Division, Ministry of Environment & Forests, Paryavaran Bhavan, CGO Complex, New Delhi 110003
6. Stock File.



Annexure IAdditional information for considering EC for mining projects

S.No.	Details to be provided	Page no.	
1)	Name of the project lease & owner		
2)	Lease Extent		
3)	Lease Validity		
4)	Approved Mining Plan/Scheme - Review a) Specify whether DSR is provided (applicable in case of minor minerals only)		
5)	Specify - Nature and type of violation		
	I. Without EC or in excess of quantity approved in EC		
	II. Without CTO or in excess of quantity approved in CTO		
	III. Without mining plan/Scheme of mining or in excess of quantity approved in Mining plan/Scheme of mining.		
	IV. Without forest Clearance		
	V. Any other violation		
6)	Violation period		
	I. Number of months		
	II. Number of Years		
7)	Exploitation/Excavation quantity- Reserves proved through exploration by drilling		
8)	Give details of production from the date of execution of the lease deed / since 1994		
	Year and		
	2010-11*	2011-12*	2012-13*



quantity	Planned	Actual	Planned	Actual	Planned	Actual
Ore/mineral /granite blocks (tonnes)						
Waste (tonnes/cu. m)						
* year of mining operation						
9)	Quantity mined out during the violation period & if, yes indicate the violated quantity, in term of % of consented quantity.					
Year and quantity mined out during the violation period	2010-11		2011-12		2012-13	
	Planned	Actual	Planned	Actual	Planned	Actual
Ore/mineral/g ranite blocks (tonnes)						
Waste excavation (tonnes/cu.m)						
10)	State illegal mining/encroachments outside the lease boundary? Percentage of quantity mined out outside the lease boundary.					
11)	Method of working					
I.	Category type: (a) Mechanised (b) Semi – Mechanised (c) Manual					
II.	Construction and design of haul roads					
	a) Dimension as per the statutory requirements which					



	were followed or otherwise										
	b) Number of vehicles plying on the main haul roads inside the mine and the approach road to the pit located outside the mine, if any.										
	c) Are any measures taken to minimise fugitive dust generated from mine haul roads? Does it comply with the CPCB/PCB Guidelines?										
	d) Is there a possibility that air pollutants emitted from the project area that do not comply with air quality standards as per CPCB/PCB?										
12)	Mechanized / Semi – Mechanized Method of Mining										
	(i) Number of loading / excavating equipments as per approved mining plan and capacity.										
	(ii) Number of loading / excavating equipments actually being deployed and capacity.										
	(iii) Type and number of transporting equipments.										
	(iv) Type of transporting system used – (a) trucks (b) Any other mode										
	(v) Capacity and Number of trucks used as per approved mining plan										
	(vi) Capacity and Number of trucks used actually in the mine.										
	(vii) Number and capacity of loading equipments and trucks used not in line with approved mining plan.										
	<table border="1"> <thead> <tr> <th></th> <th>Capacity (m³)</th> <th>Numbers</th> </tr> </thead> <tbody> <tr> <td>Excavator</td> <td></td> <td></td> </tr> <tr> <td>Trucks</td> <td></td> <td></td> </tr> </tbody> </table>		Capacity (m ³)	Numbers	Excavator			Trucks			
	Capacity (m ³)	Numbers									
Excavator											
Trucks											
	(viii) Impact of excess deployment of loading equipments (excavators) and transporting equipments on environment. (a) Air pollutants										



	(b) Water Quality (c) Land Quality (d) Noise level	
	(ix) Does the deployment of loading equipments (excavators) and trucks fulfil the statutory requirements as per MMR 1961, with respect to the site conditions?	
13)	Method of Rock Breaking/Material preparation for the excavation:	
	(i) Methodology adopted -	
	a) Drilling and blasting	
	b) Rock breakers	
	c) Rippers	
	d) Surface miners	
	e) Direct mucking by excavators	
	f) Manual means	
	g) Any other methods or combination of above	
	(ii) In case of drilling and blasting method:	
	(a) Type of blasting: short hole or deep hole	
	(b) Whether controlled blasting technique adopted? If yes, specify the technique with details of study, year of study	
	(c) Impacts due to blasting defined as per the studies, if any carried out previously as indicated	
	(d) Dust pollution	
	(e) Noise level (dB(A))	
	(f) Ground vibration studies and Fly rock projection	
	(iii) Impact of preparation of Ore and waste on environment-	
	a) Air Pollution	
	b) Noise Pollution	
	c) Water Pollution	




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	d) Safety standards	
	e) Traffic density	
	f) Road Condition (vulnerability)	
14)	Construction and Design of Dumps.	
	a) Place/Location	
	b) Approach to Dump from the mine distance and safety standards.	
	c) Area of extent occupied	
	d) Dimension of Dump and No. of terrace with heights (benches)	
	e) Vegetation covered ; If yes, specify the details of plants	
15)	Construction and Design of Waste Dumps :	
	(i) Numbers and Location of Dumps as per approved Mining Plan	
	(ii) Specify whether reject dumps are located within or outside mining lease	
	(iii) Area occupied in excess of the approval mining plan.	
	(iv) Dimension of Terracing, Light, shapes, etc., Dump as per approved Mining Plan	
	(v) Fresh/Existing Dimension Height, shape, width, etc., of Dumps in the mine.	
	(vi) Volume/Quantity added to Waste/Dump during the violated period.	
	(vii) Approach to the Dump-Dimension, distance.	
	(viii) Number of and type of equipments deployed in Dump.	
	(ix) Provision of Garland drains around the Dumps.	
	(x) Any vegetation made on the slopes.	
	(xi) Provision of safety standards.	
	(xii) Impact of Waste/Dumps on environment.	
	a) Air pollution	
	b) Water pollution	
	c) Dust pollution	



	d) Noise pollution	
	(xiii) Terracing	
16)	Construction and Design of Ore and sub grade ore/mineral Stacks:-	
	(i) Number and Location of Ore stacks.	
	(ii) Dimension of Ore/sub grade Stacks as per the Approved Mining Plan	
	(iii) Volume/Quantity added during the violation period.	
	(iv) Any Screening plant or any other loading equipment engaged during the violated period.	
	(v) Approach to Ore / sub grade stack –Distance, hazards.	
	(vi) Safety standards adopted while operation.	
	(vii) Impact of ore/sub grade on environment	
	a. Air pollution	
	b. Water pollution	
	c. Dust pollution	
	d. Noise pollution	
17)	Mine Pit Water	
	(i) Intersection of Ground water table, specify the measures taken.	
	(ii) Ground water table as per hydro geological Studies (Pumping test).	
	(iii) Provision of Garland drains around pit and dumps	
	(iv) Water pollution	
	(v) Management of mine water.	
	(vi) Ultimate pit limit, w.r.t Ground water intersection and management of drainage of ground water.	
18)	Diversion of General Drainage/River/Nallah course for mining	
19)	Clearing of vegetation before the commencement of mining operation- Number of trees (species wise)	
20)	Man Power	
	(a) Statutory management	
	(b) Regular (Non –statutory) Manpower	




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21)	Occupational Health and Safety.	
	(a) Periodical monitoring of health standards of persons employed as per Mine Act, 1952.	
	(b) Failure to inform statutory bodies periodically, if any	
22)	Population (Nearby Habitation)	
	(i) Population/Significant Population/Dense Population within the buffer zone of 10 Kms.	
	(ii) People displacement due to mining activities	
	(iii) Location/ Existence of habitation near the river or any other historical/sensitive/ forest distance.	
	(iv) Impact of mining on Surrounding and habitation-Air, Water, Noise, Pollution.	
	(v) Socio Economic aspects of mining.	
23)	CSR	
	(a) Field ground Activities or studies, Actual amount spent towards CSR and the future proposal.	
24)	NOC from DMG for quantity clarification in respect of settlement of all the amount payable against identified violation.	
25)	For the Clearance of EC, Public Hearing is mandated as per MoEF & CC Notification. Give reason for exemption of public hearing.	
26)	Conceptual post mining land use/restoration	
27)	Litigation/court cases, if any pending.	
28)	Disaster management plan for the mine	



**Additional TOR specified by the SEAC to deal with
Violation Aspects of Mining Projects.**

While complying with the specific aspects of the MoEF&CC directions, the following steps should be followed :

Sl. No.	Additional TOR	TOR Compliance	Page No.
	<u>Section A</u>		
Step 1	Enumerate the aspects of Violation:		
a	The Proponent should enumerate the violations as applicable to the Project.	Lessee has operated Khairulabad Limestone Mine after 15.01.2016 till January 2017 and produced 14,945 Tonnes of Limestone. Operating the Lease after 15.01.2016 without EC is the Violation. Lessee has applied for EC on 12.04.2018.	203 60
b	Furnish a description of each violation with quantitative and qualitative data.	Operating the Lease after 15.01.2016 without EC is the Violation.	203
c	Violation categories are to be decided taking into consideration the stage at which the project execution stands.	Operating the Lease after 15.01.2016 without EC is the Violation.	203
Step 2	Ecological Damage Assessment :		
a	For each aspect of violation examined in step (1), identify the resultant environmental damage that may have been caused.	The total Ecological/ Environmental Damage Cost assessed is Rs.3.72 Lakhs. The Project falls under Low Level Ecological Damage category.	209
b	Furnish a description of the environmental damages with quantitative and qualitative data.	Air Quality & Ecology : Rs. 1,15,283/- Water Environment-Dewatering for Consumption : Rs.2,325/- Socio-economics & Public Health : Rs.1,81,047/-	210-211
Step 3	Remediation Plan:		
a	For the Environmental damage(s) identified in the step (2), prepare the remediation plan for the each or combination of damages.	An amount of Rs.3.72 Lakhs toward Remediation Plan and Natural & Community Resource Augmentation Plans is allotted for approval which will be spent within 3 years.	212
b	The Remediation Plan should essentially consists of problem statement, target to be achieved (quantity), standards, technology/procedure for remediation, equipment and machinery to be used, time schedule and remediation cost	Additional Green Belt : Rs.1.60 Lakhs. Channelization & Utilisation of Surface Drains : Rs.0.30 Lakh. Community/Public Buildings Maintenance and Conducting Medical Camps : Rs. 0.60 Lakh Total : Rs.2.50 Lakhs	212

Sl. No.	Additional TOR	TOR Compliance	Page No.
	(direct and indirect cost, capital as well as O&M costs).		
	<u>Section B</u>		
1	Natural Resource Augmentation:		
a	The resources that should be considered for augmentation should essentially consist of land, biota, air, water and other resources as applicable.	Water conservation measure	211
b	Proponent may choose one or more of the resource augmentation as applicable and provide a description of the augmentation proposal in detail for each resource.	Providing Solar Street Lights to nearby Villages -Rs.0.60 Lakh	212
c	The proponent should also furnish the cost for each augmentation scheme	Provided	212
2	Community Resource Augmentation :		
a	The Proponent should prepare a plan of action for addressing the needs of the community in terms of resources in the sectors of education, health and sports primarily and other such resources as applicable to the community in the vicinity of the project.	Providing Furnitures to Khairulabad School-Rs.0.65 Lkabs	212
b	The community resource augmentation plan should consists of rehabilitation of houses and people, budget allocation and time schedule for completing the activity.	Not Applicable	-
	<u>Section C</u>		
a	The proponent should prepare content for the Ecological Damage Assessment, Remediation Plan, Natural Resource Augmentation and Community Resource Augmentation separately in a chapter and include in the EIA/EMP report.	Complied with. Discussed in Chapter 13.0	203
	<u>Section D</u>		
a	After the appraisal of the EIA/EMP report submitted by the proponent, the SEAC will make a judgement of the quality of the content in the EIA/EMP report specifically with reference to the chapter covering the Ecological Damage Assessment, Remediation Plan, Natural Resource Augmentation	Noted.	-

Sl. No.	Additional TOR	TOR Compliance	Page No.
	and Community Resource Augmentation.		
b	In the judgement of SEAC, if the quality of the content in the chapter is not satisfactory, the SEAC may direct the proponent to further revise the chapter and resubmit the EIA/EMP report.	Noted.	-
c	If SEAC concludes that the technical part is satisfactory and the costing aspect is not satisfactory then the SEAC may revert to legal provisions, MoEF&CC guidelines and similar expert committee recommendations for finalizing the cost aspects or the SEAC may use its own expertise and experience in finalizing the cost.	Noted.	-
	<u>Section E</u>		
a	The proponent is directed to furnish data as per the questionnaire appended in Annexure I. it will help the SEAC in arriving the ecological damage and the associated cost.	Compiled with. Annexure I is appended.	-
	<u>Section F</u>		
1	In compliance with the Supreme Court Order stated in MoEF&CC letter F. No. 3-50/2017 IA.III-pt dated 05 th January 2018, the proponent is required to submit the No Objection certificate obtained from the department of Geology and Mining, Government of Tamil Nadu regarding payment of 100% cost of illegally mined mineral under section 21(5) of MMDR Act 1957 which would account for mining operations in violation of the following :	The legal requirements will be followed during the EC Process. Lessee has received the Demand Notice vide Rc. No. 346/G&M/2018 dated 26.07.2019 for Rs.60,34,910/- , 100% cost of Mineral for 14,945 Tonnes of Limestone excavated during the period 15.01.2016 to January 2017 without EC (District Collector, Ariyalur vide Rc. No. 346/G&M/2018 dated 26.07.2019). Accordingly, the Lessee has remitted Rs.60,34,910/- on 30.07.2019 vide TNTC9 Chalan through State Bank of India, Ariyalur	54
a	Without Environmental Clearance (EC), or in excess of the quantity approved in EC	Operating the Lease after 15.01.2016 for a production of 14,945 Tonnes Tonnes Limestone leads to the Violation. Lessee has applied for EC on 12.04.2018.	53 54
b	Without Consent to Operate (CTO) or in excess of the quantity approved in CTO	CTOs were not obtained	206
c	Without Mining Plan/Scheme of Mining or in excess of the quantity	There is no violation in this regard.	206

Sl. No.	Additional TOR	TOR Compliance	Page No.
	approved in Mining Plan/Scheme of Mining	IBM has accorded the periodic Approvals for Mining Plans/Schemes of the Mine.	
d	Without Forest Clearance	No Forest Land involved.	206
e	Any other Violation	Nil	206
2	List out the details of Reserve Forest and Wildlife Sanctuary nearby the project site (the details should also include other districts which are nearby the project site) and also furnish the detail of distance between the project site and Reserve Forests/Wildlife Sanctuary.	Notified Karaivetti Bird Sanctuary is at 18 km in SW direction. There are no other Eco Sensitive Areas , National Parks, Wildlife Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar Sites, Tiger/Elephant Reserves, Reserved Forests, etc.	70
3	Whether the project site attracts the HACA Clearance? If so, also furnish the HACA Clearance for the mining from the competent authority.	No	-
4	The EIA study report shall provide the details of the proposed and actual quantity of mine during the entire mining period.	Since commencement in 2004-05, about 4,90,048 Tonnes of Limestone was mined out from the Mine. The maximum production was 1,26,671 Tonnes per Annum (TPA) during Year 2005-06. The assessed balance Reserves in UNFC '111' Category is 48,000 Tonnes of Limestone & '211' Category 2,22,000 Tonnes of Ferruginous Limestone, total 2,70,000 Tonnes ROM (as on 01.10.2018). It is proposed now to mined out 3,004 Tonnes Limestone & 3,024 Tonnes sub grade Ferruginous Limestone, thus, total 6,028 Tonnes ROM during balance ROMP Period i.e. during 2023-24.	53
5	The proponent is instructed to fill in the form contained in Annexure I to work out the details of the ecological damage during the violation period.	Complied.	-

Annexure I

Additional Information for considering EC for Mining Projects

Sl. No.	Details to be Provided	Submission	Page No.
1	Name of the Project Lease & Owner	Khairulabad Limestone Mining Lease (2.25 Ha); Lessee M/s. Dalmia Cement (Bharat) Limited	51
2	Lease Extent	2.25 Ha	51
3	Lease Validity	Commissioner of Geology & Mining, Chennai Proceeding Rc. No. 17783/MM4/2022 dated 27.01.2004 for 30 Years, valid till 12.08.2054 as per MMDR Amendment Act, 2015	66
4	Approved Mining Plan/Scheme - Review a). Specify whether DSR is provided (applicable in case of Minor minerals only)	Regional Controller of Mines, Indian Bureau of Mines (IBM), Chennai has accorded its Approval periodically for Mining Plans/Schemes. ROMP for the Period 2019-20 to 2023-24 approved vide TN/ALR/LST/ROMP-1523.MDS dated 13.01.2018. DSR Not Applicable-Major Mineral	66
5	Specify - Nature and type of violation :		
I	Without EC or in excess of quantity approved in EC	Operating the Lease after 15.01.2016 for a Production of 14,945 Tonnes Limestone leads to the Violation. Applied for EC on 12.04.2018.	68 72
II	Without CTO or in excess of quantity approved in CTO	No CTO	206
III	Without Mining Plan/Scheme of Mining or in excess of quantity approved in Mining Plan/Scheme of Mining	IBM has accorded the periodic Approvals for Mining Plans/Schemes of the Mine. Present ROMP is valid till 31.03.2024.	206
IV	Without Forest Clearance	No Forest Land involved.	206
V	Any other violation	Nil	206
6	Violation Period		
I	Number of Months	2 months from March 2016 & January 2017	205
II	Number of Years	0.2	
7	Exploitation/Excavation quantity – Reserves proved through exploration by drilling	4,90,048 Tonnes ROM	53
8	Give details of production from date of execution of the Lease deed/since 1994 Year 2010 2011 2012 and -11* -12* -13* qty. *Year of operation	Since commencement in 2004-05, about 4,90,048 Tonnes of Limestone was mined out from the Mine. The maximum production was 1,25,671 TPA during Year 2005-06. Table 1.4	67

Sl. No.	Details to be Provided	Submission	Page No.
9	Quantity mined out during the violation period & if, yes indicate the violated quantity, in term of consented quantity	Operating the Lease after 15.01.2016 for a Production of 14,945 Tonnes Limestone leads to the Violation.	53 203m
10	State illegal mining/encroachments outside the Lease boundary? Percentage of quantity mined out outside the Lease boundary.	There was no illegal mining/encroachment outside the Lease boundary. Also, there is no Waste Dump within or outside the Lease.	77
11	Method of Mining		
I	Category Type (a). Mechanized (b). Semi-Mechanized (c). Manual	The mining operation is carried out by adopting conventional mining method 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.	77
II	Construction and design of haul roads		
a)	Dimension as per the statutory requirements which were followed or otherwise	It is proposed now to mined out 3,004 Tonnes Limestone & 3,024 Tonnes sub grade Ferruginous Limestone, thus, total 6,028 Tonnes ROM during balance ROMP Period i.e. during 2023-24. Balance Reserves will be mined out during subsequent Plan Periods, Conceptual Stage Ultimate Pit depth will be 26.5 m BGL. Benches with 5 m height and 10 m width are proposed.	70 74
b)	Number of Vehicles plying on the main haul roads inside the mine and the approach road to the pit located outside the mine, if any.	1 Tippers.	154
c)	Are any measures taken to minimize fugitive dust generated from haul roads? Does it comply with the CPCB/PCB Guidelines?	<ul style="list-style-type: none"> ❖ Water sprinkling on the mining areas, loading point, haul roads, etc. are carried out. ❖ Covering of trucks/tippers with tarpaulin are done during the Mineral transportation. ❖ Over loading of Tippers are avoided to control the spillages during transportation. ❖ Monitored Air Quality was found to be in compliance with NAAQ Norms. 	174-175
D)	Is there a possibility that air pollutants emitted from the	No	-

Sl. No.	Details to be Provided	Submission	Page No.
	project area that do not comply with air quality standards as per CPCB/PCB?		
12	Mechanized/Semi-Mechanized Method of Mining:		
I	Number of loading/excavating equipments as per approved mining plan and capacity	Front End Loader-124 HP	85
II	Number of loading/excavating equipments actually being deployed and capacity	Front End Loader-124 HP	85
III	Type and number of Transporting equipments	30 Tons Tippers-1	154
IV	Type of Transporting system used (a) Trucks (b) Any other mode	Tippers	85
V	Capacity and Number of Trucks used as per Approved Mining Plan	Taurus Tippers (30 Tons)-1 No.	85
VI	Capacity and Number of Trucks use actually in the Mine	Taurus Tippers (30 Tons)-1 No.	85
VII	Number and capacity of loading equipments and trucks used not in line with Approved Mining Plan	Nil-All as per Approved Plan	-
VIII	Impact of excess deployment of loading equipments (Excavators) and transporting equipments on environment	No excess deployment of loading equipments and transporting equipments	-
a)	Air Pollutants	Within the stipulated Norms.	
b)	Water Quality	Within the stipulated Norms.	
c)	Land Quality	Within the stipulated Norms.	
D)	Noise Level	Within the stipulated Norms.	
IX	Does the deployment of loading equipments (excavators) and Trucks fulfill the statutory requirements as per MMR 1961, with respect to the site conditions?	Yes	85
13	Method of Rock Breaking/Material preparation for the excavation :		
I	Methodology adopted -		
a)	Drilling and Blasting	Yes.	77
b)	Rock Breakers	No	-
c)	Rippers	No	-
d)	Surface Miners	No	-
e)	Direct Mucking by Excavators	No	-
f)	Manual means	No	-

Sl. No.	Details to be Provided	Submission	Page No.
g)	Any other methods or combination of above	Excavators and Tipping Taurus Combination	77
II	In case of drilling and blasting method :		
a)	Type of blasting : Short hole/Deep hole	Deep Hole	77
b)	Whether controlled blasting technique adopted? If yes, specify the technique with details of study, year of study	Yes. Blasting is being done with slurry explosives and ANFO and Non-Electric shock tubes are used for controlling ground vibration and noise level.	77
c)	Impacts due to blasting defined as per the studies, if any carried out previously as indicated	No Previous study carried out.	-
d)	Dust pollution	Yes	-
e)	Noise Level (dB(A))	Yes	-
f)	Ground vibration studies and Fly rock projection	Yes	-
III	Impact of preparation of Ore and Waste on environment :-		
a)	Air Pollution	Within the stipulated Norms.	-
b)	Noise Pollution	Within the stipulated Norms.	-
c)	Water Pollution	Within the stipulated Norms.	-
d)	Safety Standards	Complied	-
e)	Traffic density	The existing traffic volume in the Project vicinity was found to be 5,110 Passenger Car Units (PCUs)/day (Table 4.2) . In the Post-Project Scenario, there will be an addition of 1 Vehicle (in 2 ways) due to due to the Project. Cumulatively, the traffic volume in the Project vicinity will be 5,115 PCU/day . The net increase (cumulative) will be 5 PCU/day . The existing Roads/NH are adequate to handle the proposed traffic volume due to the Project	154
f)	Road Condition (Vulnerability)	Existing Roads are adequate to handle proposed traffic volume due to the Project.	154
14	Construction and Design of Dumps	No Top Soil & No OB Dump in the Lease	77
a)	Place/Location	Not Applicable	-
b)	Approach to Dump from the Mine distance and Safety Standards	Not Applicable	-
c)	Area of extent occupied	Not Applicable	-
d)	Dimension of Dump and No. of terrace with heights (benches)	Not Applicable	-
e)	Vegetation covered : If yes, specify the details of plants	Not Applicable	-
15	Construction and Design of Waste Dumps	No Top Soil & No OB Dump in the Lease	77

Sl. No.	Details to be Provided	Submission	Page No.
I	Numbers and Location of Dumps as per Approved Mining Plan	Not Applicable	-
II	Specify whether Reject dumps are located within or outside Mining Lease	No	-
III	Area occupied in excess of the Approved Mining Plan	No	-
IV	Dimension of terracing, light, shapes, etc., Dump as per Approved Mining Plan	No Dump in the Lease	77
V	Fresh/Existing Dimension Height, Shape, Width etc., of Dumps in the Mine	Not Applicable	-
VI	Volume/quantity added to Waste/Dump during the violated period	Not Applicable	-
VII	Approach to the Dump-Dimension, distance	Not Applicable	-
VIII	Number of and type of equipments deployed in Dump	Not Applicable	-
IX	Provision of Garland drains around the Dumps	Not Applicable	-
X	Any vegetation made on the slopes	Not Applicable	-
XI	Provision of Safety Standards	Not Applicable	-
XII	Impact of Waste/Dumps on Environment	Not Applicable	-
a)	Air Pollution	Not Applicable	-
b)	Water Pollution	Not Applicable	-
c)	Dust Pollution	Not Applicable	-
d)	Noise Pollution	Not Applicable	-
XIII	Terracing	Not Applicable	-
16	Construction and Design of Ore and Sub grade Ore/Mineral Stacks :-		
I	Number and Location of Ore Stacks	Nil	-
II	Dimension or Ore/Sub grade Stacks as per the Approved Mining Plan	Not Applicable	-
III	Volume/Quantity added during the violation period	Nil	-
IV	Any screening plant or any other loading equipment engaged during the violated period	Not Applicable	-
V	Approach to Ore/Subgrade stack – Distance, hazards	Not Applicable	-
VI	Safety standards adopted while operation	Not Applicable	-

Sl. No.	Details to be Provided	Submission	Page No.
VII	Impact of Ore/Subgrade on environment	Not Applicable	-
a)	Air Pollution	Not Applicable	-
b)	Water Pollution	Not Applicable	-
c)	Dust Pollution	Not Applicable	-
d)	Noise Pollution	Not Applicable	-
17	Mine Pit Water		
I	Intersection of Ground water table, specify the measures taken	Mining is not intersected Ground Water-table	70
II	Ground water table as per hydro geological studies (Pumping Test)	Ultimate Pit Depth will be 26.5 m BGL. The Ground Water-table in the Mine vicinity is found to be at 40 m below ground level (BGL) during Postmonsoon Season and 45 m BGL during Premonsoon Season. Thus, the Mining will not intersect the ground water-table.	70
III	Provision of Garland drains around pit and dumps	Provided around the pit.	-
IV	Water Pollution	Dewatering will be @ 10 KLD during summer season and 25 KLD during the rainy periods.	87
V	Management of Mine Water	Dewatering will be @ 10 KLD during summer season and 25 KLD during the rainy periods.	87
VI	Ultimate Pit Limit, w.r.t Ground water intersection and management of drainage of ground water.	Ultimate Pit Depth will be 26.5 m BGL. Ground Water-table in the Mine vicinity is at 40-45 m BGL. Thus, the Mining will not intersect the ground water-table.	70
18	Diversion of General Drainage/River/Nalla course for Mining	No. There was no Nalla/Stream crossing in the Lease Area.	72
19	Clearing of vegetation before the commencement of mining operation - Number of trees (species wise)	Existing Mine since 2004. The entire lease area was already fully opened.	62
20	Man Power		
a)	Statutory Management	10	173
b)	Regular (Non-Statutory) Manpower	15	173
21	Occupational Health and Safety		
a)	Periodical monitoring of health standards of persons employed as per Mine Act, 1952	Yes; conducted periodically and Records maintained.	-
b)	Failure to inform statutory bodies periodically, if any	No; periodically informed.	-

Sl. No.	Details to be Provided	Submission	Page No.
22	Population (Nearby Habitation)		
I	Population/Significant population/Dense Population within the buffer zone of 10 kms	Periyagalur is the nearest settlement at a distance of 1.8 km in east. Manakudi (1.0 km in NW) and Kovilankudikadu (2.0 km in NNE) are the other nearby villages. V.Kaikatti Junction is at 3.7 km distance in southeast are nearby villages/ settlements.	72
II	People displacement due to mining activities	No R&R	-
III	Location/Existence of habitation near the river or any other historical/sensitive/forest distance	Nil	-
IV	Impact of Mining on surrounding and habitation – Air, Water, Noise Pollution	Chapter 4.0.	152
V	Socio Economic aspects of Mining	Project will employ about 10 persons directly and 15 persons indirectly. The direct & indirect employment, CER & CSR activities, etc., will have a positive impact on the Socioeconomic Structure of the area.	173
23	CSR		
a)	Field ground activities or studies. Actual amount spent towards CSR and the future proposal.	A budget of 2% of the Project Cost will be allotted for CSR/CER Budget.	177
24	NOC from DMG for quantity clarification in respect of settlement of all the amount payable against identified violation	DCBL has received Demand Notice from the District Collector, Ariyalur for 100% cost of Mineral value of Limestone quantity produced without EC vide Rc. No. 346/G&M/2018 dated 26.07.2019 for Rs.60,34,910/- . Accordingly, DCBL has remitted Rs.60,34,910/- on 30.07.2019 vide TNTC9 Chalan through State Bank of India, Ariyalur	54
25	For the clearance of EC, Public Hearing is mandated as per MoEF& CC Notification. Give reason for exemption of Public Hearing	TOR has been awarded with Public Hearing. Application is being submitted to TNPCB for conducting the Public Consultation & Public Hearing.	54
26	Conceptual post mining Land use/Restoration	At Conceptual Stage, out of 2.25 Ha Mine Area, 2.25 Ha will be the mine pit which will be left as Water Reservoir for harvesting the Rain Water.	86

Sl. No.	Details to be Provided	Submission	Page No.
27	Litigation/court cases, if any pending	There is no Litigation against the Proposal.	-
28	Disaster management Plan for the mine	Chapter 7.3	168

Standard TOR & their incorporation in EIA Report

Sl. No.	TOR Condition	Incorporation in EIA Report Page No.
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 increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	67
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Grant vide Rc. No. 17783 66 Docs 3 & 4
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 and mining technology and should be in the name of the lessee.	Complied with
4	All corner coordinates of the mine lease area, superimposed on a high Resolution Imagery/Topo sheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	64 71 127 128
5	Information should be provided in Survey of India Top sheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing mineral and mining history of the area, important water bodies, streams and rivers and soil characteristics.	70-72 78 90-91
6	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion mining should have approval from State land use board or the concerned authority.	Existing Mine 66
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process / procedures to bring into focus any infringement/ deviation / violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/ or shareholders or shareholders at large, may also be detailed in the EIA Report.	61
8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope in case of opencast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	169
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine/lease period.	89 69 77
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary and 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.	126 128 86
11	Details for the land 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.	No Dump No R&R 86
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status	Not Applicable; No Forest land is involved.

Sl. No.	TOR Condition	Incorporation in EIA Report Page No.
	of the forests, the site may be inspected by the State Forest Department along with the Regional office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	
13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not Applicable.
14	Implementation status of recognition of forest rights under the Schedule Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable.
15	Vegetation in the RF / PF areas in the study area, with necessary details should be given.	Not Applicable.
16	A study shall be got done to ascertain in 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.	Not Applicable.
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger / Elephant Reserves / (existing as well as proposed), if any, within 10 Km of the mine lease should be clearly indicated, supported by location map duly authenticated by Chief Wildlife Warden. Necessary Clearance as may be applicable to such projects due to the proximity of ecologically sensitive areas as mentioned above, should be Obtained from the Standing Committee of National Board of Wildlife and copy furnished.	Nil 70-72
18	A detailed biological study for the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on primary field survey clearly indicating the Schedule of the fauna present. In case of any Scheduled-I fauna found in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	16-140 No Schedule-I Fauna
19	Proximity to Area 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 clarifications from the Prescribed authorities, such as the SPCB or State Mining Department should also be secured and furnished to the effect that the proposed mining activities could be considered.	Nil 88
20	Similarly, for coastal projects, a CRZ map duly authenticated by one of the authenticating 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 approved of the concerned Coastal Management Authority)	Not Applicable 88
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs/STs and other weaker sections of the society in the study area, a needbased sample survey, family-wise, should undertaken to assess their requirements, and action programmes prepared and submitted accordingly, interacting with sectoral 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 issue relating to shifting of village(s) inducing their R&R and Socio-Economic aspects should be discussed in the report.	No R&R Issue 96
22	One season (non-monsoon) [i.e. March-May (summer season); October – December (Post monsoon season) ; December-February (winter season)] primary	Chapter 3 88-151

Sl. No.	TOR Condition	Incorporation in EIA Report Page No.
	<p>baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and fauna shall be collected and AAQ and other data so compiled presented date-wise in the EIA and EMP Report.</p> <p>Site-specific Metrological data should also be collected.</p> <p>The locations 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 atleast one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction.</p> <p>The mineralogical composition of PM10, particularly for free silica, should be given.</p>	<p>88, 96 101</p> <p>114</p>
23	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any and the habitation.</p> <p>The wind roses showing predominant wind direction may also be indicated on the map.</p>	157-160
24	<p>The water requirement for the project, its availability and source to be furnished. A detailed water balance should also be provided. Fresh water requirement for the project should be indicated.</p>	87
25	<p>Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the project should be provided.</p>	Not Applicable
26	<p>Description of water conservation measures proposed to be adopted in the project should be given. Details of rainwater harvesting proposed, if any, in the project should be provided.</p>	161
27	<p>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.</p>	161
28	<p>Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect the 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 the mining activities on these aquifers. Necessary permission from Central Groundwater Authority for working below ground water and for pumping of groundwater should also be obtained and furnished.</p>	<p>Nil No intersection 70</p>
29	<p>Details of any stream, seasonal or otherwise, passing through lease area and modification / diversion proposed, if any and the impact of the same on the hydrology should be brought out.</p>	<p>Nil 88</p>
30	<p>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.</p>	70
31	<p>A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear 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 with local and native species which are tolerant to pollution.</p>	176
32	<p>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 increased load. Arrangement for improving</p>	153-155

Sl. No.	TOR Condition	Incorporation in EIA Report Page No.
	the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	85-86
34	Conceptual post mining land use and Reclamation and Restoration of mined out Areas (with plans and with adequate number of sections) should be given in the EIA report.	86
35	Occupational health impact of project should be anticipated and preventive measures initiated. Details in this regard should be provided. Details of preplacement 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 detailed.	163
36	Public health implication 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 allocation.	143 163
37	Measures of socio economic significance and influence to the local community proposed to be provided by project proponent should be indicated. As far as possible, quantitative dimensions may be given with time frame for implementation.	163
38	Detailed Environmental Management Plan (EMP) to mitigate the environmental 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.	174-177
39	Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Will be complied
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.	Nil
41	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.	177
42	A Disaster Management Plan shall be prepared and included in the EIA/EMP of Report.	169-172
43	Benefits of the Project if the Project is implemented should be spelt out. The Benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	173
44	Besides the above, the below mentioned general points should also be followed:-	
(a)	Executive summary of the EIA/EMP Report. (Submitted for Public Consultation & Public Hearing)	Complied with Chapter 11
(b)	All documents may be properly referenced with index and continuous page numbering.	Complied with
(c)	Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.	Complied with
(d)	Project Proponent shall enclose all the analysis/testing reports of water, soil, noise, etc. using the MoEF&CC/NABL accredited laboratories. All the original/testing reports should be available during the appraisal of Project.	Complied with
(e)	Where the documents provided are in a language other than English, an English translation should be provided.	Complied with
(f)	The Questionnaire for environmental appraisal of mining projects as prescribed by the Ministry shall also be filled and submitted.	Complied with
(g)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. NO. J-11013/41/2006-Ia.II(I) dated 4 th August, 2009, which are available on the website of this Ministry, should be followed.	Complied with 7-8
(h)	Changes, if any made in the basic scope and project parameters(as submitted in	Complied with

Sl. No.	TOR Condition	Incorporation in EIA Report Page No.
	Form-I and the Feasibility Report for securing the TOR) should be brought to the attention of MoEF&CC/SEIAA 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 PH process) will entail conducting the PH again with the revised Documentation.	
(i)	As per the circular no. J-11011/618/2010-IA.II(I) dated 30.05.2012, 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 many be applicable.	Not Applicable
(j)	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 with 78 79 82
	In addition to the above the following shall be furnished:-	
	Executive Summary of EIA/EMP Report in about 8-10 pages should be prepared incorporating the information on following points:	
1	Project name and location (Village, District, State, Industrial Estate (if applicable).	
2	Process description brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.	
3	Measures for mitigating the impact on the environment and mode of discharge or disposal.	
4	Capital cost of the Project, estimated time of completion.	
5	Site selected for the project – Nature of land – Agricultural (single/double crop), barren, Govt / Private Land, status of its acquisition, nearby (in 2-3 Km.) water body, population, within 10 Km other industries, forest, eco-sensitive zones, accessibility, (note – in case of industrial estate this information may not be necessary).	Chapter 11 178-194 Separate Volume for PH
6	Baseline environmental data - air quality, surface and groundwater quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population.	
7	Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.	
8	Likely impact of the project on air, water, land, flora-fauna and nearby population.	
9	Emergency preparedness plan in case of natural or in plant emergencies.	
10	Issues raised during public hearing (if applicable) and response given.	
11	CSR plan with proposed expenditure.	
12	Occupational health measures.	
13	Post project monitoring plan.	
	Besides the above, the below mentioned general points should also be followed:-	
(a)	A note confirming compliance of the TOR, with cross referencing of the relevant / pages of the EIA report should be provided.	Complied with
(b)	All documents may be properly referenced with index, page numbers and continuous page numbering.	Complied with
(c)	Where data are presented especially in the tables, the period in which the data were collected and the sources should be indicated.	Complied with
(d)	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(I) dated 4 th August, 2009, which are available on the website of Ministry should also be followed.	Complied with
(e)	The consultants involved in the preparation of EIA / EMP report after accreditation with Quality Council of India (QCI) / National Accreditation Board of Education and	Complied with

Sl. No.	TOR Condition	Incorporation in EIA Report Page No.
	Training (NABET) would need to include a certificate in this regard the EIA / EMP reports prepared by them and data provided by other organization / Laboratories including their status of their of approvals etc. In this regard circular no F.No.J-11013/77/2004-IA-II(I) dated 2 nd December, 2009, 18 th March 2010, 28 th May 2010, 28 th June 2010 & 30 th September 2011 posted on the Ministry's website http://www.moef.nic.in may be referred.	
	After preparing the EIA (as per generic structure prescribed In Appendix-III of the EIA Notification, 2006) covering the abovementioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIS Notification, 2006.	Noted.
	The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.	Noted.
	The TORs prescribed shall be valid for a period of three years from date of issue, for submission of the EIA / EMP report as per OMNo.J-11013/41/2006-IA-II(I)(Part) dated 29 th August, 2017.	Noted.

1.0 Introduction

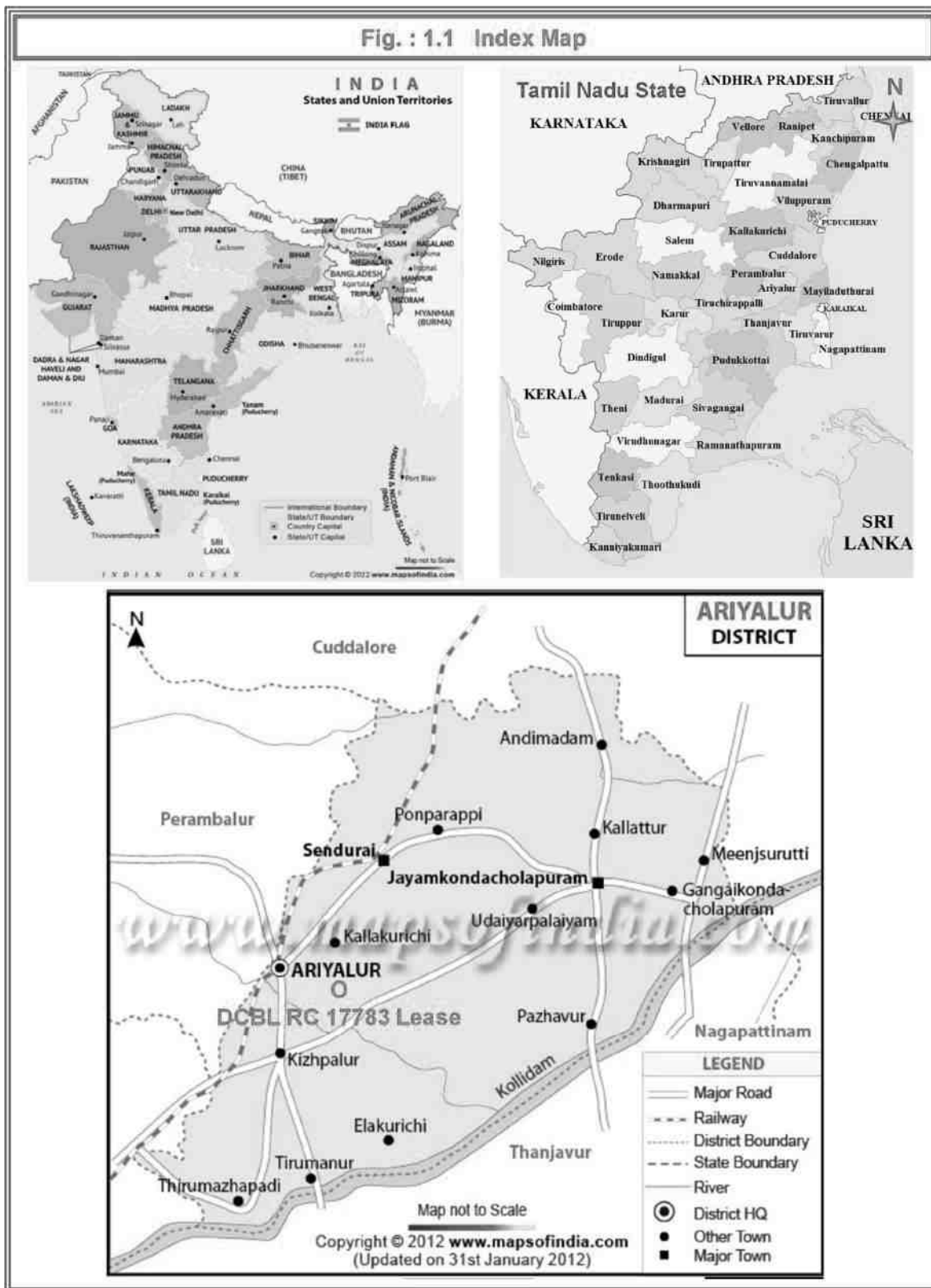
1.1 Purpose of the Report

M/s. Dalmia Cement (Bharat) Limited (DCBL) are operating Cement Plants at Dalmiapuram and Govindapuram in Ariyalur District of Tamil Nadu. With the recent Modernization & Expansion, Dalmiapuram Cement Plant Clinker production will be 3.23 Million Tonnes per Annum (MTPA) and Cement production will be 5.00 MTPA. Govindapuram Cement Plant Clinker production will be 2.50 MTPA and Cement production will be 4.00 MTPA. Dalmiapuram Cement Plant requires 5.00 MTPA Limestone and Govindapuram Cement Plant requires 4.00 MTPA Limestone. Limestone demand of both Cement Plants are met from existing captive mines of DCBL viz. Kallakudi-Kovandakurichi (KLK-KVK) Mines, Periyathirukonam (PTK) Mines and amalgamated Periyagalur, Aminabad & Khairulabad (PNR Group) Mines.

PNR Group Mines are being operated in 3 Leases for the last 52 years over an extent of **167.605 Ha** (under GO No. 179 over an extent of 70.01 Ha in Periyagalur; 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 applied and obtained a Lease vide GO (MS) No.106 dated 12.05.2015 for an extent of 0.845 Ha in Aminabad and will be amalgamated with GO No. 2 on obtaining all statutory clearances.

Khairulabad Limestone Mine is one of the Leases of DCBL in PNR Group. Total extent of the Lease area is 2.25 Ha of own **Patta Lands** in S.F. Nos. 455/1 (0.390 Ha), 456/2 (0.695 Ha) and 456/3 (1.165 Ha) of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu (**Fig. 1.1**). Mining Lease is granted for 30 Years from 13.08.2004 to 12.08.2034 vide RC No. 17783/MM4/2002 dated 27.01.2004. Lease Deed executed on 21.07.2004 and registered on 13.08.2004. The mining operations were commenced in this Lease on **25.08.2004** and stopped in February 2017 for want of Environmental Clearance. The present Review of Mining Plan (**ROMP**) & Progressive Mine Closure Plan has been approved by IBM, Chennai vide Letter No. TN/ALR/LST/ROMP-1523.MDS dated 13.11.2018 for the Period 2019-20 to **2023-24**.

The mine is located at a distance of about 8 km from Ariyalur Town and can be reached by Ariyalur – V Kaikatti Section of State highway (SH)-139 which runs about 1.8 km from southern boundary of the lease. Mine area falls in Survey of India Topo Sheet No. 58 M/4 and between the Coordinates 11°08'03.6" to 11°08'11.5" North Latitude and 79°07'47.2" to 79°07'58.5" E Longitude. 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. There are five Reserved Forests (RFs) in the Study Area. Karaivetti Bird Sanctuary is at 18 km in SW direction. There is an Archaeological/Fossil Museum at Varanavasi (8.5 km in SW). **Kallankurichi Kaliyuga Varadharaja Perumal Temple** is at 2.0 km in NNW direction from the Mine.



Seasonal Marudaiyar River drains the region and flows from west to east at about 5.8 km in south and joins Kollidam River. Seasonal Kallar River flows at 2 km distance in west and confluences into Marudaiyar River. Other than DCBL PNR-AK Mines, Ramco Cement's PNR Mines, UltraTech PNR Mine, TANCEM Kallankurichi Mines, etc. are located near the Mine. Ultratech Reddipalayam Cement Plant, TANCEM Kallankurichi Plant, Ramco Govindapuram Plant & Dalmia Ariyalur Plant are located within 10 km Study Area.

The mining operation was carried out by **fully mechanized Conventional Opencast Mining Method with Drilling & Blasting**. Excavated limestone was transported by 30 Tonnes Taurus Tippers to Dalmiapuram & Ariyalur Cement Plants at a road distance of 19 km and 40 km respectively. Since commencement in 2004-05, about 4,90,048 Tonnes of Limestone was mined out from the Mine. The maximum production was **1,26,671 Tonnes per Annum (TPA)** during Year 2005-06. Present Pit depth is 14 m BGL.

The assessed balance Reserves in UNFC '111' Category is 48,000 Tonnes of Limestone & '211' Category 2,22,000 Tonnes of Ferruginous Limestone, **total 2,70,000 Tonnes ROM** (as on 01.10.2018). There is **no Top Soil and Over Burden material** available at the mine. It is proposed now to mined out 3,004 Tonnes Limestone & 3,024 Tonnes sub grade Ferruginous Limestone, thus, total **6,028 Tonnes ROM** during balance ROM Period i.e. during 2023-24. Conceptual Stage **Ultimate Pit depth will be 26.5 m BGL**. As Ground Water-table in the vicinity is ranging between 40-45 m BGL, **mining will not intersect the ground water-table**. With the proposed production rate, the **Life of the Mine is for another 45 Years**.

'No prior Environmental Clearance (EC) is required for the Mines with <5 Ha Extent, in the context of the Ministry of Environment, Forest and Climate Change (MoEF&CC), Office Memorandum (OM) No. J-11013/182/2012-IA-II(M) dated 04.01.2013. However, the existing Mining Lease requires EC as per MoEF&CC Notification SO 141(E) dated 15.01.2016 under EIA Notification 2006. As per MoEF&CC, **'the mine leases which continue to operate without obtaining EC after 15.01.2016 shall be considered as Violation Cases** and the leases which were in operation till 15.01.2016 and stopped production after 15.01.2016 shall be considered for EC.

DCBL has operated Khairulabad Limestone Mine under RC No. 17783 after 15.01.2016 till January 2017 and **produced 14,945 Tonnes of Limestone**. **Operating the Lease without EC is in Violation** of EIA Notification 2006 (as amended). Though 12.5 months period is there after 15.01.2016, the production from the Mine was carried out during 2 months only in that period **viz. March 2016 (9,590 Tonnes) & January 2017 (5,355 Tonnes)**. As per CPCB Guidelines, No. of days violation took place have to be considered for Violation & Ecological Damage Assessment. Thus, the **Violation Period has been considered as 2 months**. The **mining activities were stopped in February 2017** and there is no production from this Mine.

Meanwhile, DCBL has received **Demand Notice** from the District Collector, Ariyalur for 100% cost of Mineral value of Limestone quantity produced without EC vide **Rc. No. 346/G&M/2018 dated 26.07.2019 for Rs.60,34,910/- (Doc-1)**. Accordingly, DCBL has remitted **Rs.60,34,910/- on 30.07.2019** vide TNTC9 Chalan through State Bank of India, Ariyalur (**Doc-2**). Now, the Mine will be operated only after obtaining all Statutory Clearances.

DCBL has applied for EC to SEIAA-TN vide Online Proposal No. **SIA/TN/MIN/24620/2018 on 12.04.2018**. The Proposal under Sl. No. 1(a), Category B1 was deliberated under Violation Category in State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 111th Meeting held on 17.05.2018 and in 306th SEIAA-TN Meeting held on 24.05.2018. Terms of Reference (TOR) has been awarded vide **Letter SEIAA-TN/F.No.6568/TOR-389/2018 dated 24.05.2018 with Public Hearing** for preparing Environmental Impact Assessment (EIA) Report.

Baseline Data (BLD) collected during Winter 2021-22 Season i.e. **December 2021-February 2022** has been utilised 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 **Additional Chapter No. 13** for Ecological Damage Assessment, Remediation Plan and Natural Resource Augmentation & Community Resource Augmentation Plan. The violation falls under **Low Level Ecological Damage** category. An amount of Rs.3.72 Lakhs towards Ecological Remediation Plan and Natural & Community Resource Augmentation Plans is allotted for approval.

The Summary EIA Reports (both in English and Tamil) along with Draft EIA Report are submitted for the Public Consultation & Public Hearing within TOR Validity Period in compliance with MoEF&CC Notification SO 221(E) dated 18.01.2021.

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**), Quality Council of India vide Certificate NABET/EIA/1922/RA 0155 with validity extended till **23.04.2023** vide Letter QCI/NABET/ENV/ACO/23/2646 (Sl. No. 4 of QCI/NABET List dated 04.04.2023) which will also be extended further by NABET.

The ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2022 with validity till 02.04.2024. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (**MoEF&CC**) vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years.

Rc.346/G&M/2018

Collectorate,
Ariyalur.
Dated :26.07.2019.

NOTICE

Sub : Mines & Minerals - Mining Lease - Limestone - Ariyalur District and Taluk - Kairulabad village - S.F.No.455/1, 456/2, 3, etc. - over an extent of 2.25.0 hectares of Patta lands - Mining lease granted to Tvl.Dalmia Cement (Bharat) Ltd. - mining activities carried out without obtaining environmental clearance from State Level Environment Impact Assessment Authority - violation of environmental clearance - collection of cost of material for the quantity transported from 15.01.2016 - notice to be issued - Reg.

- Ref:
1. Proceedings of Commissioner of Geology and Mining, Chennai-32 Rc.No.17783/MM4/2002, dated 27.1.2004
 2. Ministry of Environment & Forest and Climate change Notification No. S.O.141(E) dated 15.01.2016.
 3. Government letter No.6357/MMA2/2018-1, dated 04.07.2018.
 4. Tvl. Dalmia Cement (Bharat) Limited, Dalmiapuram letter No.DPM:Ariyalur:DGM:KBD:01 dated 12.07.2018.

Tvl.Dalmia Cement (Bharat) Limited, Dalmiapuram has been granted mining lease for mining limestone over an extent 2.25.0 hectares of patta lands in S.F.Nos. 455/1, 456/2, 3, etc., in Kairulabad village, Ariyalur Taluk & District for a period of 30 years vide Proceedings of the Commissioner of Geology and Mining, Chennai Rc.No.17783/MM4/2002, dated : 27.01.2004. The lease period is from 13.08.2004 to 12.08.2034.

2) In the reference 2nd cited, the Ministry of Environment & Forest and Climate Change, New Delhi has issued a notification No. S.O. 141 (E) dated 15.01.2016, stating that environmental clearance is required for the projects less than 50 hectares for non-coal mine lease. Therefore, mining leases below 50 hectares should obtain Environmental Clearance as per the Notification of MoEF. The Ministry of Environment and Forest and Climate Change, Impact Assessment Division NewDelhi in letter dated 03.04.2017 has informed that the mine leases which continue to operate without obtaining environmental clearance after 15.01.2016 shall be considered as

violation cases and the same shall be dealt in accordance with the violation policy under Environmental Impact Assessment Notification, 2006 as amended.

3) The lessee company Tvl.Dalmia Cement (Bharat) Limited, in the reference 4th cited has informed among others that requirement of EC has become applicable for the leases below 5 hectare also for limestone mineral. Hence, the operation of mine beyond 15.01.2016 without an environmental clearance is construed as violation as per sec.21(5) of MMRD Act, 2015. They have operated this mining lease for 2 months beyond 15.01.2016 i.e. in March 2016 and January 2017 by obtaining transport permits and the mine was not in operation from Feb.2017. They have enclosed the details of limestone production for the period from January 2016 to March 2018. They had submitted application for getting environment clearance to State Level Environment Impact Assessment Authority under EIA notification, 2016. The file is in active consideration for grant of clearance. In the mean while they have approached for extension of mining lease period as per section 8A(3) of the MMDR Amendment Act, 2015 and the same is forward to the Government. The Government in their letter No.6357/MMA2/2018-1, dated 04.07.2018 have asked them to obtain no objection certificate from the State Mines and Geology Department after remitting the penalty as per the provisions of section 21(5) of MMDR Act, 1957 for the violation period. Hence, they have requested to calculate and inform the penalty payable by them.

4) The lessee company has mined and transported the following tonnes of limestone during the period 15.01.2016 to till date after payment of necessary royalty.

Month & Year	Limestone Production in M.Ts.	Price (average sale price) in Rs.	Cost of Production in Rs.
15 Jan 2016	--	--	--
Feb.2016	--	--	--
Mar.2016	9590	397	3807230
Apr.2016	--	--	--
May.2016	--	--	--
June.2016	--	--	--
July.2016	--	--	--

Aug.2016	--	--	--
Sept.2016	--	--	--
Oct.2016	--	--	--
Nov.2016	--	--	--
Dec.2016	--	--	--
Jan.2017	5355	416	2227680
Feb.2017	--	--	--
Mar.2017	--	--	--
Total	14945		6034910

In view of the above, the lessee company Tvl.Dalmia Cement (Bharat) Ltd. is hereby directed to remit Rs. 60,34,910/- (Rupees Sixty lakhs thirty four thousand nine hundred and ten only) towards cost of material for the quantity of material mined by the lessee company without environmental clearance in the subject limestone mines situated over an extent of 2.25.0 hectares in S.F.Nos.455/1, 456/2, 3, etc., in Kairulabad village, Ariyalur Taluk & District and to produce the remitted challan to this office within 15 days.

Sd/- xxxxxx
District Collector,
Ariyalur.

//Forwarded/ By Order//


For District Collector,
Ariyalur.

To
Tvl. Dalmia Cement (Bharat) Limited,
Dalmiapuram,
Lalgudi Taluk,
Trichy District,
PIN: 621 651

..... By RPAD

சேமிப்பு செழிப்பைத் தரும் - Savings Create Prosperity

த.நா.க.வி.தொ. 9
T.N.T.C.9
செலுத்துப் படி
CHALLAN



செலுத்துபவர் உரிமை
Remitters Copy

எண் : []
No. []
தாள் :
Date: 30-7-19

இல் பணம் செலுத்துவதற்குரியது
For Payment of Money at SBI, Valayaganaganam
செலுத்துபவர் பெயரும் முகவரியும் TVL Dalma Account
Name and address of Remitter Dr. Varadharaj, Dalmapuram

க்கு பொருட்டு வரவு வைக்கப்பட செலுத்தப்படுகிறது.
Nature of Remittance Cost of the mineral for violation
துறை அலுவலரின் குறியீடு எண். Period-RC-NO
D.O. Code Kharulabed [] [] [] [] 17783

தகவல் தொகுப்புக் குறியீடு
Data Processing Code

கணக்குத் தலைப்பு	ரூ. Rs.	பை. P.
High grade Ferrous Mining and Metallurgical Industries 00 Non Ferrous Mining and Metallurgical Industries 800 Miscellaneous Receipts AC Miscellaneous Receipts 2007- Fines and Penalties - Forfeiture, Seizure, confiscation, etc..	6034910	00
மொத்தம்/Total..	6034910	00

ரூ. Sixty Lakhs thirty four thousand and ninety
பை. four and paise only
மட்டும் only

செலுத்துபவரின் கையொப்பம்
அலுவலரின் கையொப்பம் மற்றும் பதவிப் பெயர்
signature of the Officer verifying the challan
செலுத்துபவரின் கையொப்பம்
Signature of the Remitter.

வங்கி/கருவூலப் பயன்பாட்டிற்காக For use of Bank/Treasury
ரூபாய் Received Rs. பெறப்பட்டது.

காசாளர் Cashier
மேலாளர்/கணக்கர்/கார் தருவூல அலுவலர்
Manager/Accountant/Sub-Treasury Officer.

துறைத் தலைவரால் கணக்குத் தலைப்பு நிரப்பப்பட வேண்டும்.
Cheque No - 443527 & 443528 Date 30.07.19

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 35.9 Million Tonnes per Annum (**Million TPA or MTPA**) across 14 Cement Plants and Grinding Units which are spread across 10 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 & Ottalovil 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, MTPA	Recent EC Reference	NIPL - Modernization and Expansion, MTPA	
			Clinker	Cement
Dalmiapuram	4.02	MoEF&CC F. No. J-11011/68/2004-IA II (I) dt. 27.04.2005	3.23	5.00
Ariyalur	3.00	MoEF&CC F. No. J-11011/751/2007-IA II (I) dt. 19.06.2008	2.50	4.00

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 Periyanaagalur, Aminabad & Khairulabad (PNR Group) Mines (Regional Map as **Plate I**) (**Table 1.2**).

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

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	2.95	45%
Periyanalur, Aminabad & Khairulabad Mines (PNR & AK Group) (3 Leases)	167.605	1.90	30%
Periyathirukonam Mines (PTK Group; 2 Leases)	106.070	2.20	25%
Total	464.940	7.05	100%

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.
- ❖ First Place in Energy Conservation in the Cement Sector-National Energy Conservation Award by Bureau of Energy Efficiency, Ministry of Power, New Delhi in 2001 & 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.
- ❖ DCBL Human Resource team was recognized by Hewitt as 9th Best Employer in the manufacturing Sector-2009.

- ❖ Second place in the Manufacturing Today 'MT Awards for Excellence in Human Resources-2012'-Large Enterprises.
- ❖ CII-ITC Sustainability Award 2012 - for contributions to sustainability and conservation of environment.
- ❖ ITC Sustain Award from CII in 2014.
- ❖ ETTS Award from CII in 2015.
- ❖ 5-Star Award for the Mine Operations at Dalmiapuram.
- ❖ Green Pro Award from CII in 2016.
- ❖ Energy Excellence Award from CII in 2016.
- ❖ 5S Certification - QCFL & ABK - AoTS.
- ❖ Green Award by Tamil Nadu State Government for the Year 2016.
- ❖ Apex India Energy Efficiency Award 2017.
- ❖ Apex India Environmental Excellence Awards 2017.
- ❖ CII Southern Region 5S Excellence Awards 2017.
- ❖ "National Energy Leader" Award & Excellent Energy Efficient Unit Award" by CII -2020.

1.3 PNR Group of Mines

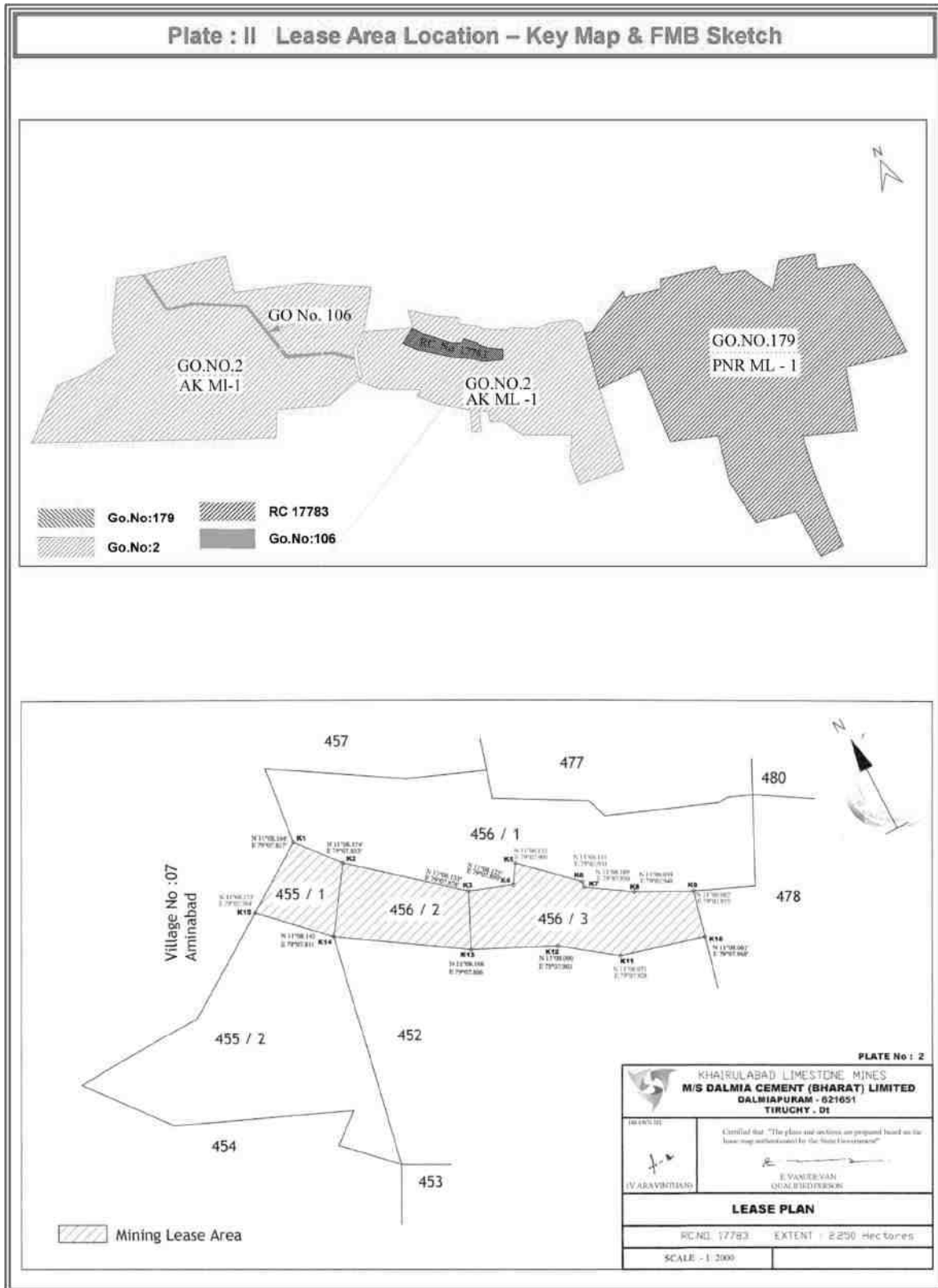
PNR Group Mines are being operated in 3 Leases for the last 52 years over an extent of **167.605 Ha** (under GO No. 179 over an extent of 70.01 Ha in Periyagalur; under GO No. 2 over an extent of 95.345 Ha in Aminabad & Khairulabad Villages and under **Rc No. 17783 over an extent of 2.25 Ha** in Khairulabad Village) for the total Production of 1.90 MTPA Limestone. DCBL has also applied and obtained a Lease vide GO (MS) No.106 dated 12.05.2015 for an extent of 0.845 Ha in Aminabad and will be amalgamated with GO No. 2 on obtaining all statutory clearances.

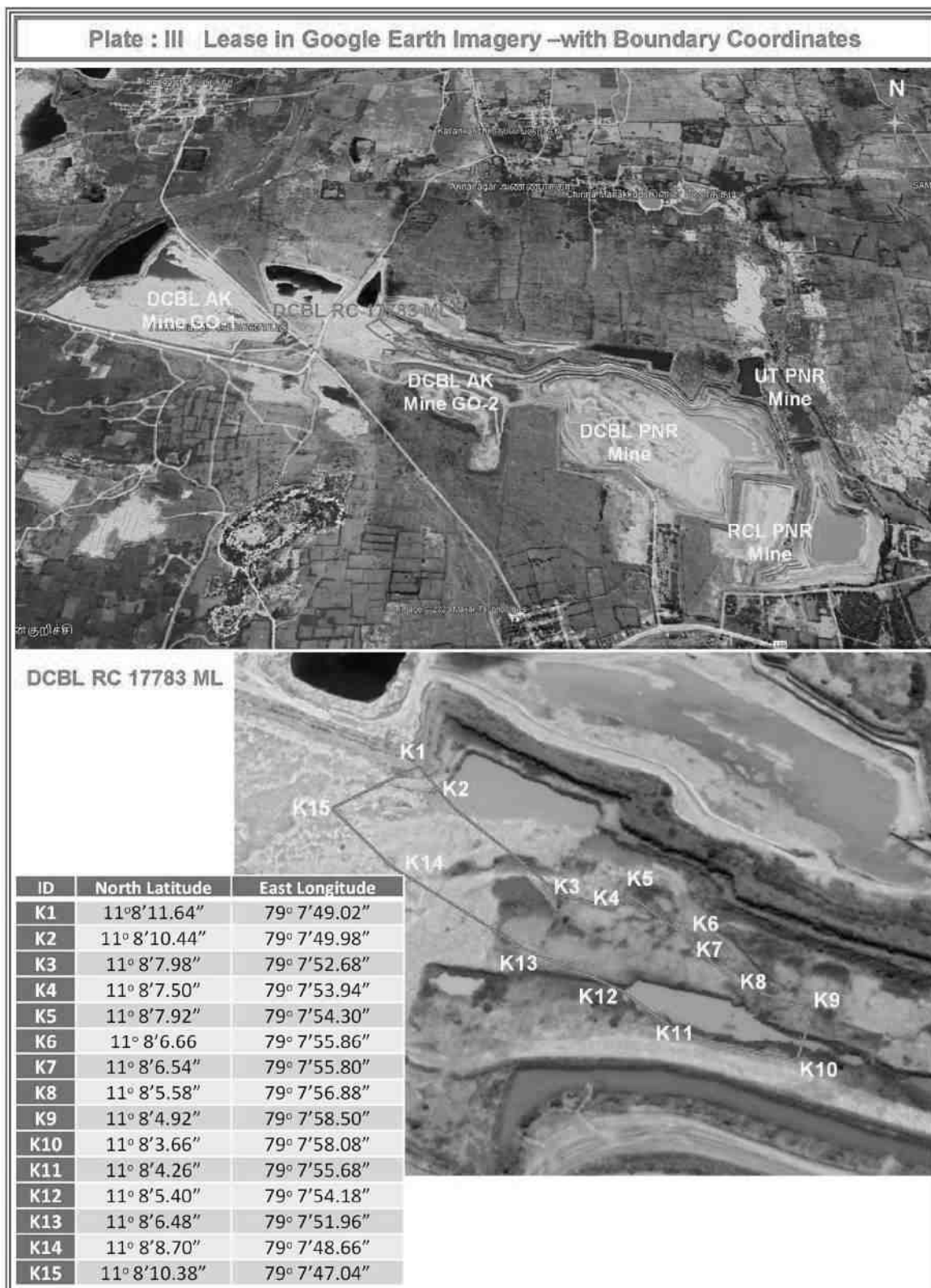
1.4 Khairulabad Limestone Mine under Rc. No. 17783

Khairulabad Limestone Mine is one of the Leases of DCBL in PNR Group. Total extent of the Lease area is 2.25 Ha of own **Patta Lands** in S.F. Nos. 455/1 (0.390 Ha), 456/2 (0.695 Ha) and 456/3 (1.165 Ha) of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu. The Lease is in DCBL AK Mines ML-I Pit No. 1 under GO No. 2 (95.345 Ha) (**Plate II** along with **FMB Sketch**). Mine Area in Google Earth Imagery is given as **Plate III** and Photographs are shown in **Plate IV**.

The mine is located at a distance of about 8 km from Ariyalur Town and can be reached by Ariyalur-V.Kaikatti Section of State highway (SH)-139 which runs about 1.8 km from southern boundary of the Lease.

The mining operation was carried out by fully mechanized Conventional Opencast Mining Method with Drilling & Blasting. Excavated limestone was transported by 30 Tonnes Taurus Tippers to Dalmiapuram & Ariyalur Cement Plants at a road distance of 19 km and 40 km respectively. The mining operations were commenced in this Lease on **25.08.2004** and stopped in February 2017 for want of Environmental Clearance.







1.5 Statutory Approvals

1.5.1 Mining Lease Grant

Mining Lease is granted for 30 Years from 13.08.2004 to 12.08.2034 vide RC No. 17783/MM4/2002 dated 27.01.2004 (**Doc-3**). Lease Deed executed on 21.07.2004 and registered on 13.08.2004 (**Doc-4**).

As per the recent MMDR Amendment Act 2015, the validity of the mining lease is extended up to 12.08.2054. DCBL has submitted its Application to the State Government for validity extension of the mining lease up to August 2054 which is in its active consideration. On obtaining the validity extension, it is planned to amalgamate the mining lease under Rc. No.17783 along with the adjoining contiguous mining leases of DCBL.

1.5.2 Mining Plan Approvals

First Mining Plan of Khairulabad Limestone Mine was approved by Indian Bureau of Mines (IBM) vide its Letter TN/PBR/MP/LST/1497/SZ dated 09.09.2003 for the Period 2004-05 to 2008-09. First Scheme of Mining was approved vide IBM Letter No. TN/ALR/LST/MS-496-/SZ dated 01.04.2009 and was valid up to 31.03.2014. Second Scheme of Mining was approved vide IBM Letter No. TN/ALR/LST/MS-1029.MDS dated 02.04.2014 for the Period 2014-15 to 2018-19.

The present Review of Mining Plan (**ROMP**) & Progressive Mine Closure Plan has been approved by IBM, Chennai vide Letter No. TN/ALR/LST/ROMP-1523.MDS dated 13.11.2018 for the Period 2019-20 to **2023-24** (**Doc-5**). The Mining Plans/Schemes approved for the Mine by Indian Bureau of Mines (IBM), Chennai so far are listed in **Table 1.3**.

Table : 1.3 Mining Plans/Schemes

Sl. No.	Mining Plan/Scheme	IBM Approval Letter Reference	Plan/Scheme Period
1	First Mining Plan	TN/PBR/MP/LST/1497/SZ dated 09.09.2003	2004-05 to 2008-09
2	First Scheme of Mining	TN/ALR/LST/MS-496-/SZ dated 01.04.2009	2009-10 to 2013-14
3	Second Scheme of Mining	TN/ALR/LST/MS-1029.MDS dated 02.04.2014	2014-15 to 2018-19
4	Review of Mining Plan (ROMP) & Progressive Mine Closure Plan	TN/ALR/LST/ROMP-1523.MDS dated 13.11.2018	2019-20 to 2023-24

1.5.3 Environmental Clearance

'No prior Environmental Clearance (EC) is required for the Mines with <5 Ha Extent, in the context of the Ministry of Environment, Forest and Climate Change (MoEF&CC), Office Memorandum (OM) No. J-11013/182/2012-IA-II(M) dated 04.01.2013. However, the existing Mining Lease

requires EC as per MoEF&CC Notification SO 141(E) dated 15.01.2016 under EIA Notification 2006. As per MoEF&CC, the mine leases which continue to operate without obtaining EC after 15.01.2016 shall be considered as Violation Cases and the leases which were in operation till 15.01.2016 and stopped production after 15.01.2016 shall be considered for EC. DCBL has applied for EC to SEIAA-TN vide Online Proposal No. SIA/TN/MIN/24620/2018 on 12.04.2018 i.e. **within Window Period**. Without EC, no Consents from TNPCB were obtained.

1.6 Development & Production of the Mine

1.6.1 Development

Entire Top Soil quantity of **7,200 Tons** generated in the Mine was fully utilized for Green Belt development. No Top Soil or Over Burden waste is now envisaged till the end of mining. Thus, there will be 'No Over Burden' (OB)' from the Lease and also 'No OB Dump' in the Lease.

1.6.2 Production

Actual Production Quantities are given in **Table 1.4**. Since commencement in 2004-05, about 4,90,048 Tonnes of Limestone was mined out from the Mine. The maximum production was 1,25,671 TPA during Year 2005-06. AD Mines Proceedings are given as **Doc-6**.

Table : 1.4 Actual Production

Year	Production, Tonnes
2004-05	88,572
2005-06	1,25,671
2006-07	61,290
2007-08	36,356
2008-09	27,559
2009-10	31,305
2010-11	27,718
2011-12	25,454
2012-13	26,478
2013-14	20,673
2014-15	4,027
2015-16	9,590
2016-17	5,355
2017-18	0
2018-19	0
2019-20	0
2020-21	0
2021-22	0
Total	4,90,048

1.7 Violation Qualitative & Quantitative

The existing Mining Lease requires EC as per MoEF&CC Notification SO 141(E) dated 15.01.2016 under EIA Notification 2006. The Hon'ble Supreme Court of India in '**Common Cause vs. Union of India & ANR in WP(C) No. 114 of 2014**' concluded that 'with effect from 14th September 2006, all mining projects having a lease area of 5 Ha or more are required to have an EC; the extraction of any mineral in such a case without an EC would amount to illegal or unlawful mining attracting the provisions of Section 21(5) of the MMDR Act and directing payment of 100% penalty for illegal mining operations to the relevant statutes'.

MoEF&CC issued another OM No.3-50/2017-IA.III(Pt) dated 30.05.2018 regarding consideration of Violation cases on the basis of Notification dated 14.03.2017 and amended it. For pursuing the Violation Proposals MoEF&CC has directed the followings as per its various Notifications/OMs/Specifications/Directions issued from time to time :

- ❖ Credible Action under EP Act, 1986.
- ❖ Project Proponent shall give an Undertaking by way of Affidavit to comply with all the Statutory requirements and Judgment of the Hon'ble Supreme Court of India in WP(C) No. 114 of 2014 before grant of TOR/EC including the commitment of the PP not to repeat of any such violation in future.
- ❖ The EC will not be operational till such time the Project Proponent complies with all statutory requirements.
- ❖ The State Government concerned shall ensure that mining operations shall not commenced till the entire compensation levied, if any, for the illegal mining paid by the Project Proponent through their respective Department of Mining & Geology (DMG).

Project Proponent shall also to submit NOC from DMG by indicating whether mine was operated:

- ❖ Without EC or in excess of quantity approved in EC.
- ❖ Without CTO or in excess of quantity approved in CTO.
- ❖ Without Mining Plan/Scheme of Mining or in excess of quantity approved in Mining Plan/Scheme of Mining.
- ❖ Without Forest Clearance.
- ❖ Any other violations.

DCBL has operated Khairulabad Limestone Mine under RC No. 17783 after 15.01.2016 till January 2017 and produced 14,945 Tonnes of Limestone. Operating the Lease without EC is in Violation of EIA Notification 2006 (as amended). Though 12.5 months period is there after 15.01.2016, the production from the Mine was carried out during 2 months only in that period viz. March 2016 (9,590 Tonnes) & January 2017 (5,355 Tonnes). As per CPCB Guidelines, No. of days violation took place have to be considered for Violation & Ecological Damage Assessment. Thus, the Violation Period has been considered as 2 months. The mining activities were stopped in

February 2017 and there is no production from this Mine. There was **no illegal mining/encroachment** outside the Lease boundary.

Meanwhile, DCBL has received **Demand Notice** from the District Collector, Ariyalur for 100% cost of Mineral value of Limestone quantity produced without EC vide **Rc. No. 346/G&M/2018 dated 26.07.2019 for Rs.60,34,910/-**. Accordingly, DCBL has remitted **Rs.60,34,910/- on 30.07.2019** vide TNTC9 Chalan through State Bank of India, Ariyalur. Now, the Mine will be operated only after obtaining all Statutory Clearances.

1.8 Reserves & Proposed Production

The assessed balance Reserves in UNFC '111' Category is 48,000 Tonnes of Limestone & '211' Category 2,22,000 Tonnes of Ferruginous Limestone, total 2,70,000 Tonnes ROM (as on 01.10.2018).

Total Reserves assessed	:	7,60,048 Tonnes ROM
Limestone mined out during 2004-05 to 2016-17	:	4,90,048 Tonnes (64.48%)
Reserves proved as on 01.10.2018	:	Limestone-48,000 T & Ferruginous Limestone-2,22,000 T
Quantity to be mined out in balance ROMP period	:	6,028 Tonnes ROM (0.79%).
Balance for successive Plan Periods	:	2,63,972 Tonnes ROM (34.73%).

As approved in ROMP by IBM, planned production for the current and successive Plan/Scheme periods are given in **Table 1.5**.

Table : 1.5 Planned Production till Lease Validity

Plan/ Sechem Periods	Limestone (111) Prodction, Mil. Tonnes	High Ferrugenous Limestone (211) Prodction, Mil. Tonnes	Total ROM, Mil. Tonnes
2019-24	0.015	0.015	0.030
2024-29	0.016	0.103	0.119
2029-34	0.017	0.104	0.121
Total			0.220 (28.95% of total Reserves)
Residual Reserves			0.044

1.9 The Proposal

The mining will be carried out by fully mechanized Conventional Opencast Mining Method with Drilling & Blasting. Excavated limestone will be transported by 30 Tonnes Taurus Tippers to Dalmiapuram & Ariyalur Cement Plants at a road distance of 19 km and 40 km respectively.

It is proposed now to mined out 3,004 Tonnes Limestone & 3,024 Tonnes sub grade Ferruginous Limestone, thus, total 6,028 Tonnes ROM during balance ROM Period i.e. during 2023-24. Ore:OB/Waste Ratio is 1:0. Balance Reserves will be mined out during subsequent Plan Periods,

Conceptual Stage Ultimate Pit depth will be 26.5 m BGL. As Ground Water-table in the vicinity is ranging between 40-45 m BGL, mining will not intersect the ground water-table. With the proposed production rate, the Life of the Mine is for another 45 Years.

Mine Profile :

Mining Pit Size	:	169 (L) x 133 (W) x 14 (D) m
Mineral	:	Limestone & Ferruginous Limestone
Mineral Resources	:	2,70,000 Tonnes ROM
Production- ROM Period	:	6,028 TPA ROM
No. of working days per annum	:	330 (3 shifts)
Life of the Mine	:	45 years (balance)
Ore:OB Ratio-Plan Period	:	1:0
Bench Parameters	:	Height-5 m & Width 10 m
Ultimate Pit Depth-Conceptual	:	26.5 m BGL (Top RL 80.5 m; Bottom RL 54 m)
Ground Water-table	:	40-45 m BGL

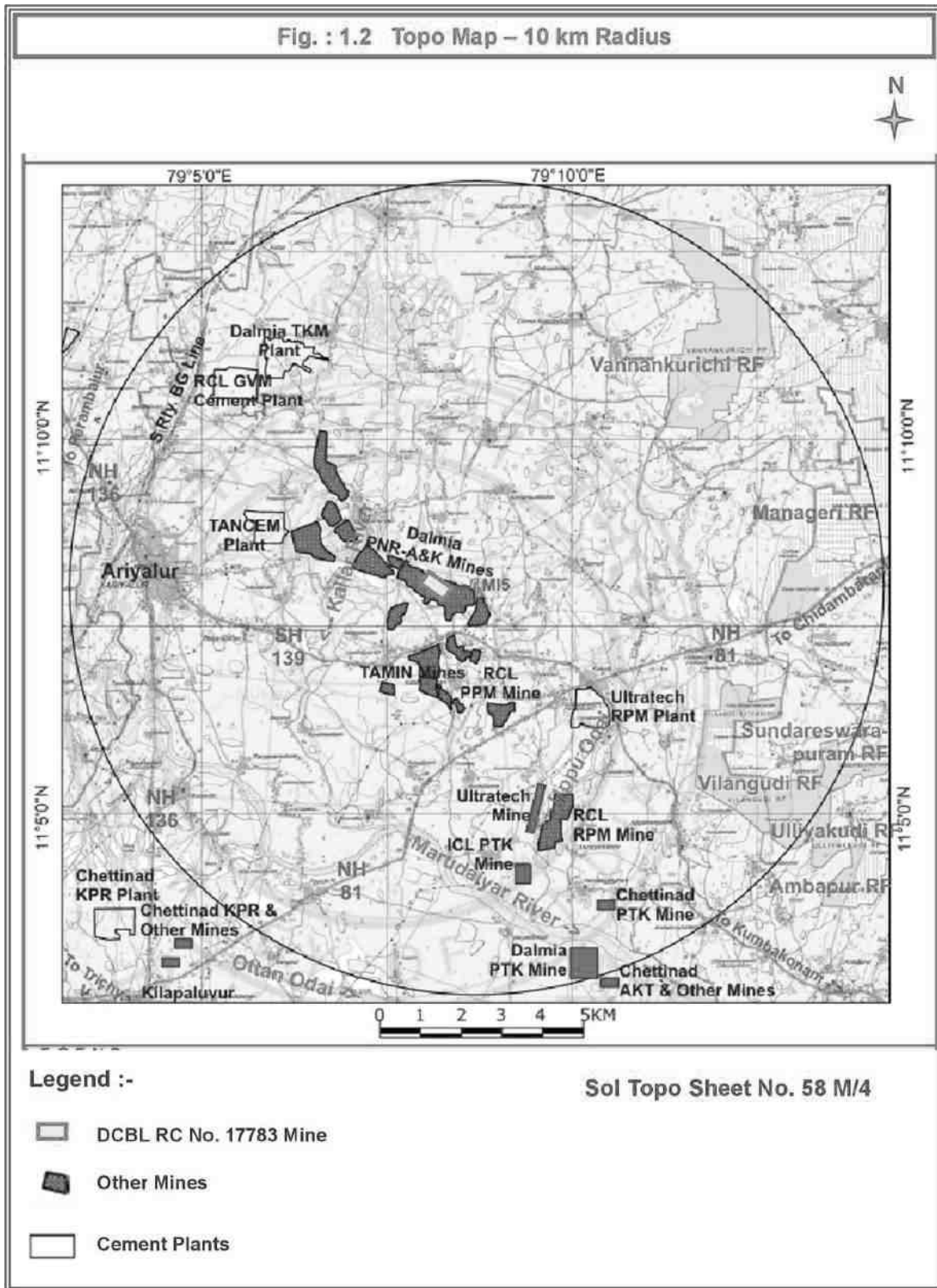
Mining will not intersect the ground water-table.

1.10 Environmental Setting

Mine area falls in Survey of India Topo Sheet No. 58 M/4 and between the Coordinates 11°08'03.6" to 11°08'11.5" North Latitude and 79°07'47.2" to 79°07'58.5" East 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. There are five Reserved Forests (RFs) in the Study Area. Karaivetti Bird Sanctuary is at 18 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 :

- ❖ Vannankurichi RF (mixed jungle) - 8.0 km in northeast.
- ❖ Managethi RF – 7.5 km (ENE).
- ❖ Vilangudi Extension RF-9.0 km (ESE)
- ❖ Vilangudi RF (Cashew Plantation) – 7.5 km (SE).
- ❖ Sundareswarapuram RF – 9.5 km (ESE).

Kallankurichi Kaliyuga Varadharaja Perumal Temple is at 2.0 km in NW direction from the Lease. There is **no nallah/stream crossing** at the Mine.



There is no perennial river in the study area. Seasonal **Marudaiyar River drains** the region and flows at 5.8 km in SSW direction. Seasonal Kallar River flows at 2.0 km (WNW), Uppu Odai at 3.8 km (ESE), Vilangudi Odai at 4.8 km (E) and Vanchiyam Odai at 7.0 km (WNW).

From the Lease Area, Dalmia PNR Mine Pit is at 400 m (East), Ramco PNR-A Pit at 1.2 km (SE) and TANCEM, UltraTech PNR, Khairulabad & Kallankurichi Mines at 0.25-1.75 km are situated. Ramco Usenabad Mine is at 2.8 km (WNW). Ramco Kattupirangium, Pudupalayam & Reddipalayam Mines are at 2.3, 3.5 & 6.1 km (SW, S & SSE) respectively, Ultratech Vellipirangiyum Mine at 5.8 (SE) & Ottakovil Mine at 8.0 km (NNW), ICL Periyathirukonam & Chettinad Periyathirukonam Mines at 6.8 km (SSE) & 8.7 km (SE), Dalmia Periyathirukonam Mines 9.0 km (SSE), etc. along with other Mines in the Study area.

From the Lease, Ultratech Cement Plant-Reddipalayam is at 4.5 km & its Township at 3.3 km in southeast. TANCEM Cement Plant-Kallankurichi at 3.2 km (WNW), Ramco Cement Plant-Govindapuram at 5.7 km (NW) and Dalmia Cement Plant-Tamaraikulam at 5.8 km (NNW). Chettinad Cement Plant-Kilapaluvur is at 10.5 km (SW).

The nearest village Periyagalur is about 1.8 km in east. Kattupirangiyum (1.1 km in SW), Manakudi (1.0 km in NW) and Kovilankudikadu (2.0 km in NNE) are the other nearby villages. V.Kaikatti Junction is at 3.7 km distance in southeast. Taluk and District Headquarters Ariyalur Town is at a distance of 5.5 km in west. Ariyalur Railway Station is at 7.4 km in west.

SH-139 (Ariyalur-Kumbakonam Section) runs at 1.4 km (S), NH-81 (Trichy-Chidambaram) at 4.3 km (SE) and NH-136 (Thanjavur-Ariyalur-Perambalur Section) at 5.0 km (W). Trichy Airport is at 60 km in SW direction and Chennai Airport is at 230 km in northeast. Karaikal Port is at 90 km in SE direction, Cuddalore port is at 90 km in NE direction from the Lease Area.

1.11 EIA Study

DCBL has applied for EC to SEIAA-TN vide Online Proposal No. **SI/TN/MIN/24620/2018** on **12.04.2018**. The Proposal under Sl. No. 1(a), Category B1 was deliberated under Violation Category in State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 111th Meeting held on 17.05.2018 and in 306th SEIAA-TN Meeting held on 24.05.2018. Terms of Reference (TOR) has been awarded vide **Letter SEIAA-TN/F.No.6568/TOR-389/2018** dated **24.05.2018** with **Public Hearing** for preparing Environmental Impact Assessment (EIA) Report.

Baseline Data (BLD) collected during Winter 2021-22 Season i.e. **December 2021-February 2022** has been utilised 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 within TOR Validity Period in compliance with MoEF&CC Notification SO 221(E) dated 18.01.2021.

EIA Report has been 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.

Additional Chapter No. 13 for Ecological Damage Assessment, Remediation Plan and Natural Resource Augmentation & Community Resource Augmentation Plan is also included.

The violation falls under **Low Level Ecological Damage** category. An amount of Rs.3.72 Lakhs towards Ecological Remediation Plan and Natural & Community Resource Augmentation Plans is allotted for approval.

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

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**), Quality Council of India vide Certificate NABET/EIA/1922/RA 0155 with validity extended till **23.04.2023** vide Letter QCI/NABET/ENV/ACO/23/2646 (Sl. No. 4 of QCI/NABET List dated 04.04.2023) which will also be extended further by NABET.

The ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2022 with validity till 02.04.2024. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (**MoEF&CC**) vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years.

2.0 Project Profile

2.1 Type of the Project

The Limestone to be mined out from this Lease is **Major Mineral and Lease extent is 2.25 Ha** (<250 Ha). The Proposal is listed at Sl. No. 1(a) of EIA Notification 2006 under **Category 'B1'** for EC from SEIAA-Tamil Nadu. DCBL has operated Khairulabad Limestone Mine under RC No. 17783 after 15.01.2016 till January 2017 and **produced 14,945 Tonnes of Limestone. Operating the Lease without EC is in Violation** of EIA Notification 2006.

The Proposal under Sl. No. 1(a), Category B1 was deliberated under Violation Category in State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 111th Meeting held on 17.05.2018 and in 306th SEIAA-TN Meeting held on 24.05.2018. Terms of Reference (TOR) has been awarded vide **Letter SEIAA-TN/F.No.6568/TOR-389/2018 dated 24.05.2018 with Public Hearing** for preparing Environmental Impact Assessment (EIA) Report.

2.2 Technology & Magnitude of Operation

The mining will be carried out by fully **mechanized Conventional Opencast Mining Method with Drilling & Blasting**. Excavated limestone will be transported by 30 Tonnes Taurus Tippers to Dalmiapuram & Ariyalur Cement Plants at a road distance of 19 km and 40 km respectively.

It is proposed now to mined out 3,004 Tonnes Limestone & 3,024 Tonnes sub grade Ferruginous Limestone, thus, total 6,028 Tonnes ROM during balance ROMP Period i.e. during 2023-24 (**Table 2.1**). Ore:OB Ratio is 1:0. Balance Reserves will be mined out during subsequent Plan Periods, Conceptual Stage Ultimate Pit depth will be 26.5 m BGL. As Ground Water-table in the vicinity is ranging between 40-45 m BGL, mining will not intersect the ground water-table. With the proposed production rate, the Life of the Mine is for another 45 Years.

Table : 2.1 Proposed Production during ROMP Period

Period	Working RLS, m (3 rd Bench)	Top Soil, cu.m	OB, cu.m	Production, Tonnes			Mineral Rej., Tonnes	Ore:OB Ratio
				Limestone	Ferruginous Limestone	Total ROM		
2019-20	70-65.5	0	0	3,015	3,033	6,048	0	1:0
2020-21	70-65.5	0	0	3,003	3,042	6,045	0	1:0
2021-22	70-65.5	0	0	3,012	3,042	6,054	0	1:0
2022-23	70-65.5	0	0	3,024	3,006	6,030	0	1:0
2023-24	70-65.5	0	0	3,004	3,024	6,028	0	1:0
Total		0	0	15,058	15,147	30,205	0	1:0

2.3 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 lainedby Sillakkudi formation. A massive rudist bivalve carbonate shell bank underlain by conglomerate bed at the base, is approximately aligned in North- Southdirection with a maximum thickness of 26 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



2.3.2 Local Geology

Khairulabad area has the limestone deposits, which are of sedimentary origin of Marine Transgressional series places as MAESTRICHTIAN age in the Upper Cretaceous. Limestone is yellowish in color with predominant well preserved GRYPHAEA shells and is highly fossiliferous with a Kankar top of grayish brown colour. The Gryphaea shells are well preserved and cemented together by a fine matrix of sand and clay. The basement if of pure sandstone, which is grey in colour.

The strike of the formation in the mining area is NW-SE and dips 2°- 5° towardsNE. The above deposit has the thickness raising from South to North. The average limestone thickness varies from 20 m to 26 m.

Age and Stage**Rock Type**

Upper Cretaceous

Kankar / Ordinary Clay

Shell Limestone

Ferruginous Limestone

Gondwana

Conglomerate / Calcareous sand stone

Archeans

Light Grey sand-sandstone basement

**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%

Constituents %	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO
Shell Limestone	7.15	1.98	2.61	47.14
Ferruginous limestone	8.93	2.63	8.08	42.61
Arenaceous Limestone	16.24	2.97	5.28	39.54
Calcareous sandstone	31.65	4.54	5.41	28.31
Sandstone	38.85	5.57	4.80	22.60

Based on the above chemical analysis, only Shell limestone, Ferruginous limestone and Arenaceous limestone can be used in cement manufacture as of now. The other litho units viz calcareous sandstone and sandstone occurring at the base of the limestone deposit shall be left in situ.

2.3.3 Resources

The mine is in operation for the last 19 years and detailed exploration in the adjacent major lease hold of the company has been taken and completed and three sides of the said lease area have been opened up and the mineralized zone is clearly visible. In accordance with the UNFC classification, the limestone reserves of this Khairulabad Limestone Mine can be classified as “111” “211” and “221” (Table 2.2). The assessed balance Reserves in UNFC ‘111’ Category is 48,000 Tonnes of Limestone & ‘211’ Category 2,22,000 Tonnes of Ferruginous Limestone, total 2,70,000 Tonnes ROM (as on 01.10.2018).

Table : 2.2 Assessed Resources

Level of Exploration		Resources in Million Tonnes	Grade
G1- Detailed Exploration		0.048	Cement Grade
G2- General Exploration		Nil	
G3 - Prospecting		Nil	
G4 Reconnaissance		Nil	
		UNFC CODE	Quantity, Million Tonnes
		Grade	
A.	Total Mineral Reserve		
	Proved Mineral Reserve	111	0.048
	Probable Mineral Reserve	121 & 122	Nil
B.	Total Remaining		
Resources			
	Feasibility Mineral Resource	211	0.222
	Pre feasibility Mineral Resources	221	0.466
	Measured Mineral Resource	331	Nil
	Indicated Mineral Resource	332	Nil
	Inferred Mineral Resource	333	Nil
Total Reserves + Resources			0.736

2.4 Mining Method

The mining operation is carried out by adopting conventional mining method 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 and thus, **No Waste Dump** in the Lease. **No Beneficiation/Screening** is required.

The approved Plans by IBM including Surface Plan/Layout, Geological Plan with Sections, Yearwise Plan, Conceptual Plan, etc. are given as **Figs. 2.1-2.5**.

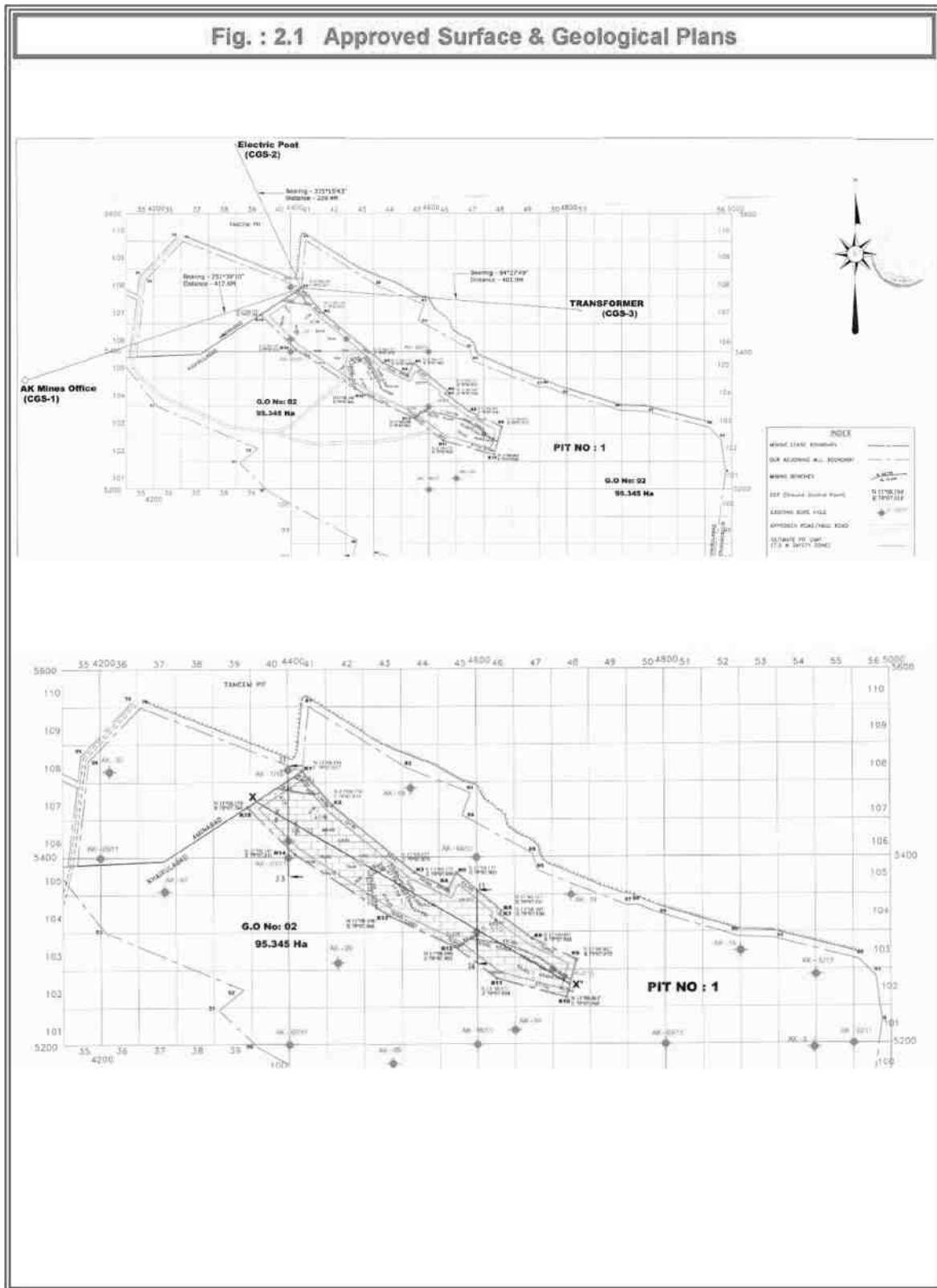


Fig. : 2.2 Geological Sections

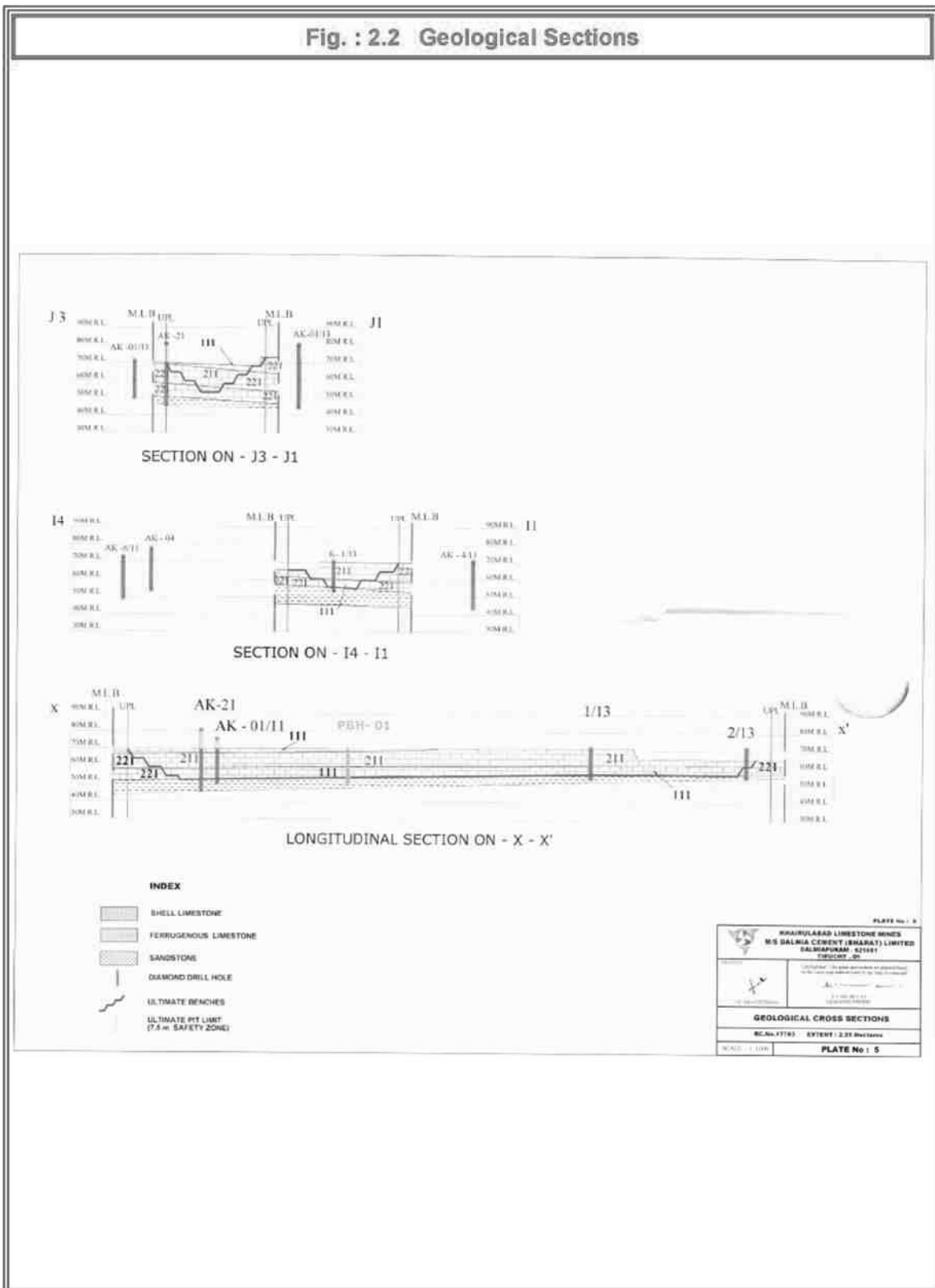
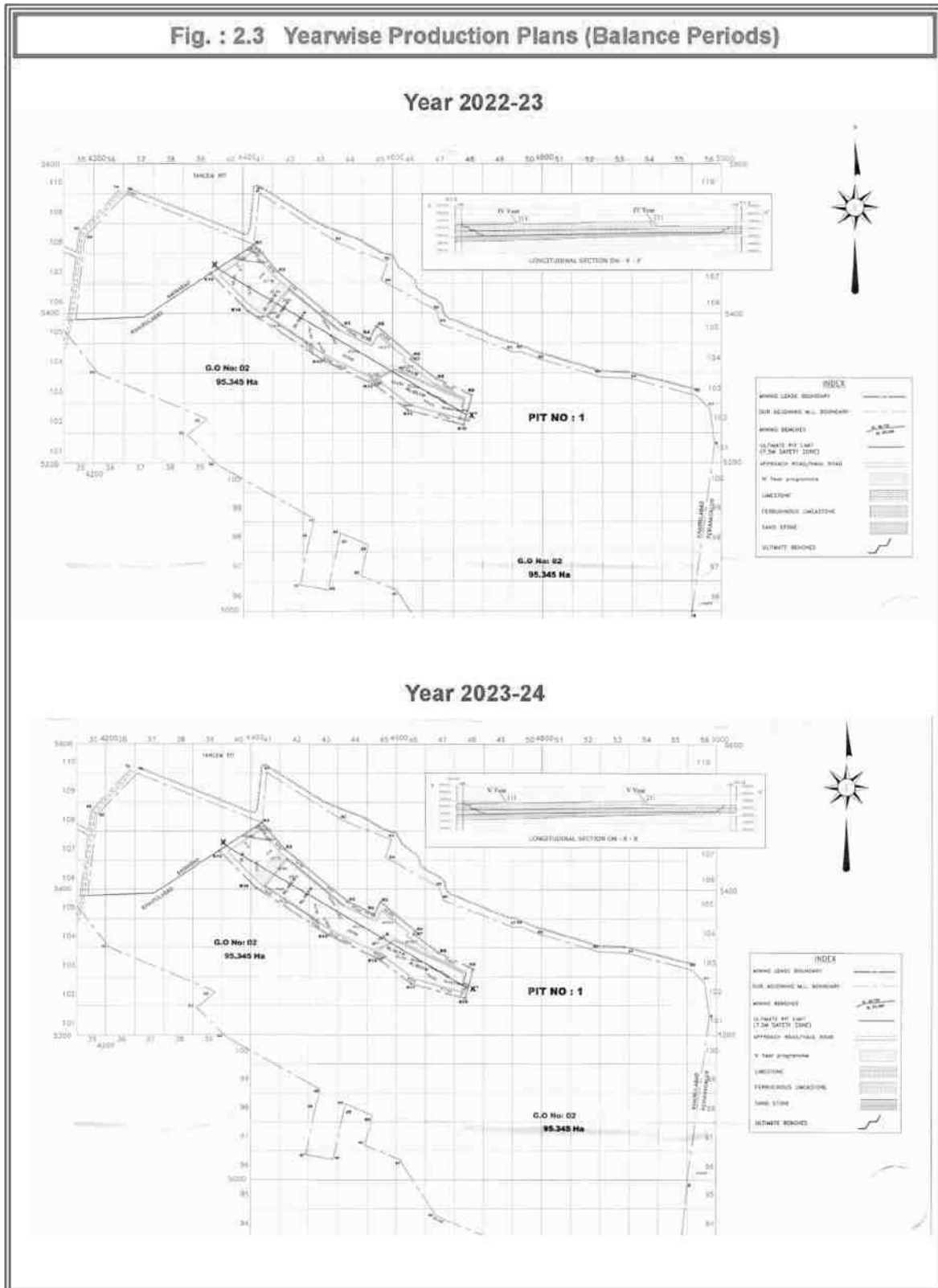
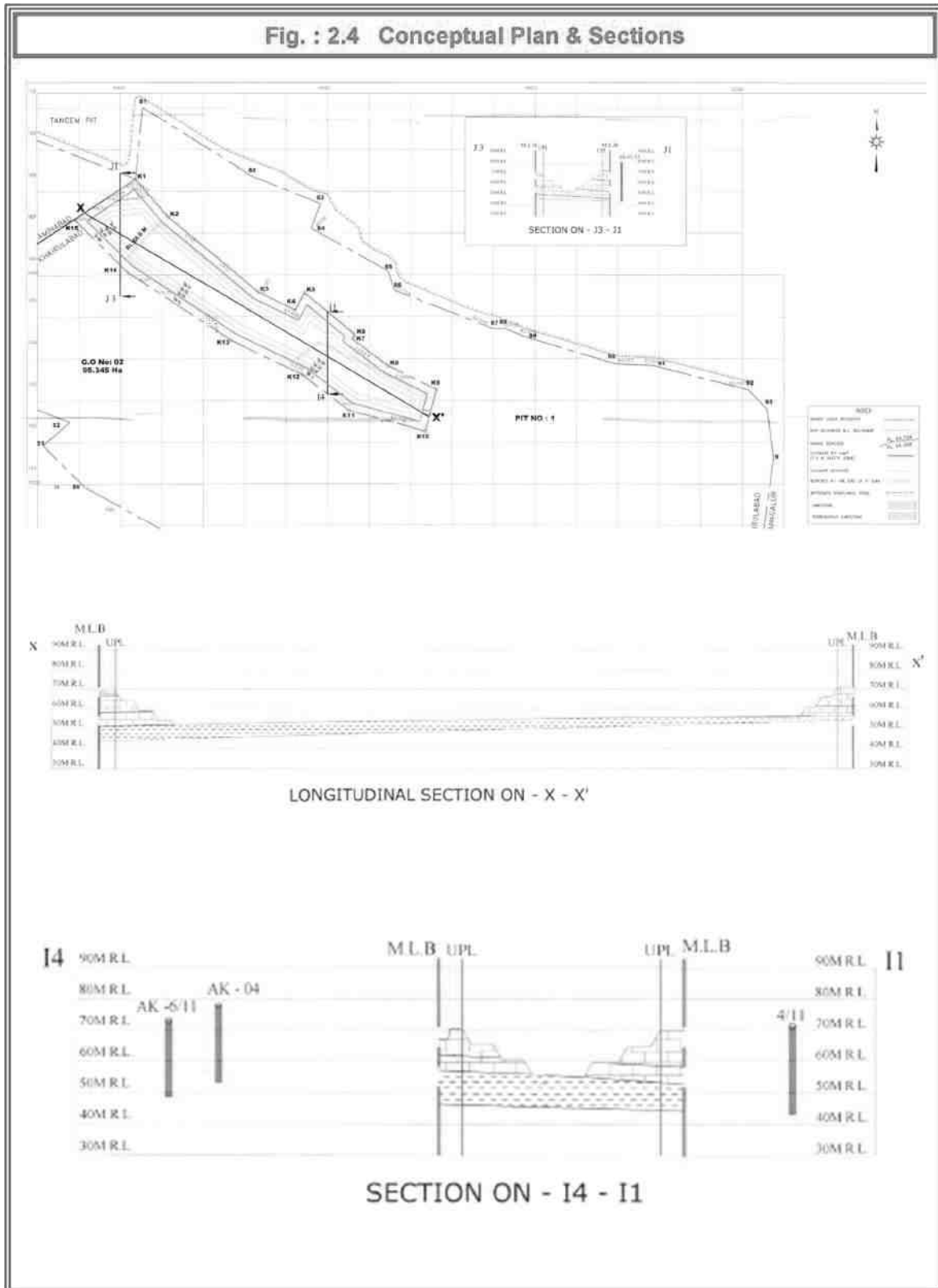
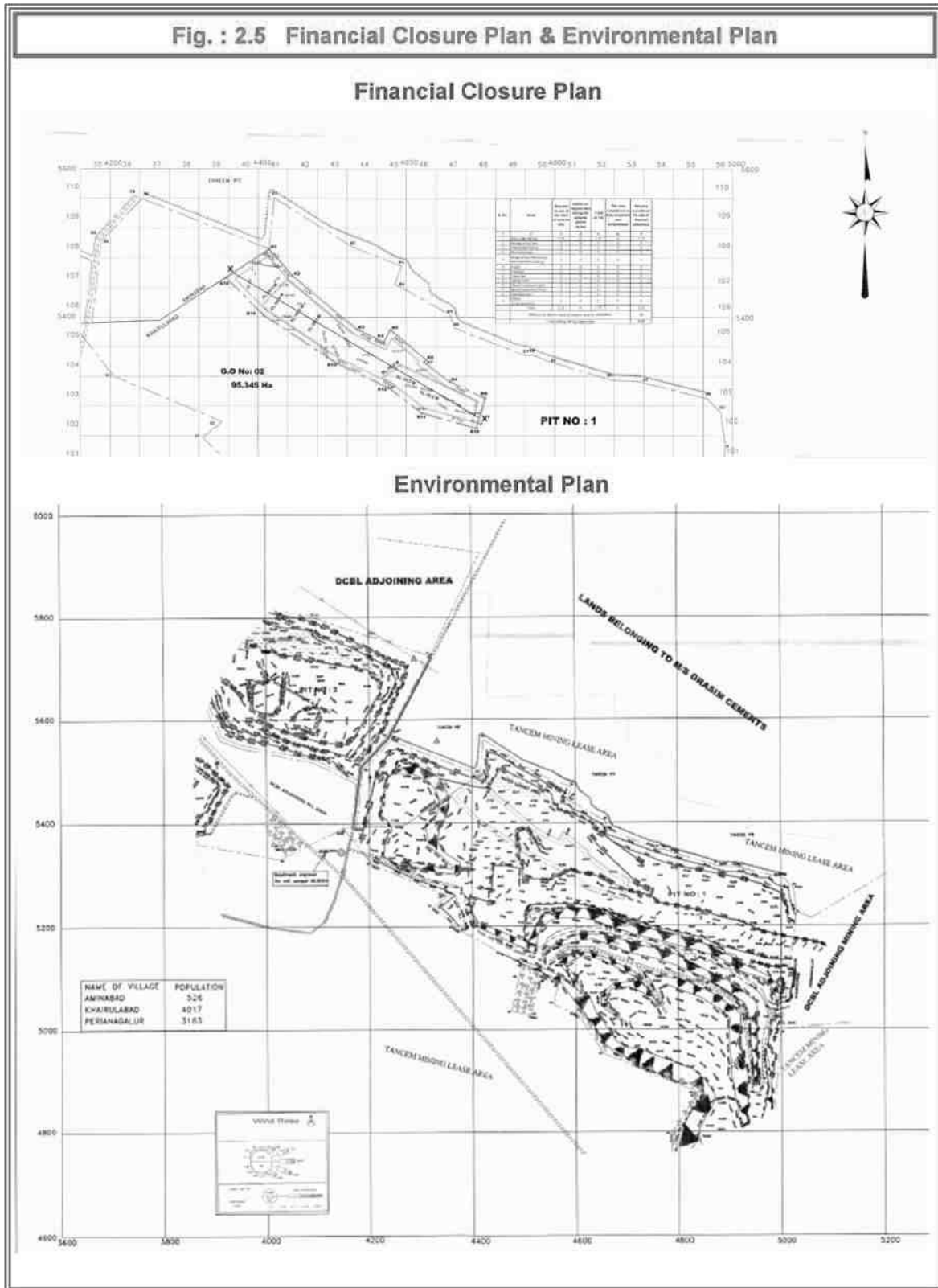


Fig. : 2.3 Yearwise Production Plans (Balance Periods)







As the lower mining benches are reached, the faces shall be made longer to ensure safe and smoother productive mining. The haul roads are maintained at not less than 1:16 gradient with sufficient width. Bench parameters are :

Bench height :	5 m
Bench width :	10-15 m
Bench slope :	10 – 15° to vertical

Blasting : In a single blast, 15 to 20 holes will be blasted by using either millisecond delay detonators or using the NONEL shock tubes depending upon the area of blasting. When the blasting is carried out very close to the office buildings / roads / other permanent structures not belonging to the owner, NONEL shock tubes are used to minimize the ground vibrations and noise arising out of the blasting operations. Shock tubes are available in different lengths varying from 4m to 12m with varying in hole delays like 200 ms, 225 ms, 250 ms etc. The shock tubes are connected at the surface with the help of noiseless trunk line delays of varying delays 17ms and 42ms. There is no secondary blasting in our mines. We use rock breaker for breaking the boulders.

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 including sub grade drilling	1.5-4.5 m
Inclination of hole	10-15° to vertical
Burden	2.5 m
Spacing	2.5 m
Charging	1.5 – 2.0 m
Stemming	0.5 - 1.0 m
Booster	8 %
Bulk loading (ANFO)	92%

The average quantity of material per blast	:	3000 Tonnes.
The average Powder factor		6 tons/Kg of explosive.
The explosives required per blast		500 (3000/6) Kgs
Booster req @ 8 %:		40 Kgs
ANFO @ 92 %:		460 Kgs.

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

Loading & Transportation : Blasted material is being loaded by wheel loaders of 1.7 m³ and transported by 30 tonnes Tipping Taurus to Dalmiapuram and Ariyalur plants.

The haul roads are being maintained with a gradient not less than 1:16. Ramp and access road shall not have gradients less than 1:10. **Existing Pit Size is 169 (L) x 133 (W) x 14 (D) m.**

2.5 Yearwise Production

On an average the handling of ferruginous limestone from this mine works out to about 0.003 million tons per annum. However, considering the quality requirements of the cement plant and for manufacturing of special cements like Oil Well cement etc., this high ferruginous limestone is directly consumed from the mines.

Plan for the Year 2019-20 : In this year of mining, a quantity of 3015 tonnes of limestone will be produced from the 3rd bench from RL 70 to RL 68.5 m. About 3033 tonnes of high ferruginous limestone (sub grade) will be produced from the 3rd bench from RL 70 to 65.5 m. Thus, total quantity of 6048 tonnes will be produced from the mine.

Plan for the Year 2020-21 : In this year of mining, a quantity of 3003 tonnes of limestone will be produced from the 3rd bench from RL 70 to RL 68.5 m. The height of the bench will be maintained at 1.5 m. Around 3042 tonnes of high ferruginous limestone (sub grade) will be produced from the 3rd bench. The height of the bench will be maintained at 4.5 m. Total quantity of 6045 tons will be produced.

Plan for the Year 2021-22 : In this year of mining, a quantity of 3012 tonnes of limestone will be produced from the 3rd bench from RL 70 to RL 68 m. The height of the bench will be maintained at 2 m. Around 3042 tonnes of high ferruginous limestone (sub grade) will be produced from the 3rd bench. The height of the bench will be maintained at 4.5 m. Total quantity of 6054 tons will be produced.

Plan for the Year 2022-23 : In this year of mining, a total quantity of 3024 tonnes of limestone will be produced from the 3rd bench from RL 69 to RL 67 m. The height of the bench will be maintained at 2 m. Around 3006 tonnes of high ferruginous limestone (sub grade) will be produced from the 3rd bench from RL 70 to 65.5 m. The height of the bench will be maintained at 4.5 m. Total quantity of 6030 tons will be produced.

Plan for the Year 2023-24 : In the current year of mining, a total quantity of 3004 tonnes of limestone will be produced from the 3rd bench from RL 68 to RL 66 m. The height of the bench will be maintained at 2 m. Around 3024 tonnes of high ferruginous limestone (sub grade) will be produced from the 3rd bench from RL 70 to 65.5 m. The height of the bench will be maintained at 4.5 m. Total quantity of 6028 tons will be produced from the mine.

The **Ore : O.B ratio will be 1:0** till the Conceptual Stage.

2.6 Machineries

The machineries deployed for the Mine are given in **Table 2.3**.

Table : 2.3 Mine Machineries

Sl. No.	Name of Machinery	Capacity	No.
1	Front end Loader –124 HP	HM 2021 Bucket capacity 1.7 cu.m	1
2	Compressor - 169 HP	Atlas Copco XAH 210 Portable Diesel Driven	1
3	Wagon Drill	Atlas Copco BVB 25	1
4	Portable Lighting Tower-7.5 HP	Aska	1
5	Diesel Water Pump -7.5 HP	Kirloskar	1

2.7 Competent Mining Personnel

The Mine will be operated with the required **Statutory Officials and Competent Persons** mandatorily appointed as per the provisions of Mines Act 1952 and Metalliferrous Mines Regulations 1961 (**Table 2.4**).

Table : 2.4 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	1	Nil	Skilled
4	Foreman	Foreman's Certificate of Competency	1	Nil	Skilled
5	HEMM Operators	Having heavy & Light vehicles license holders	1	Nil	Skilled
6	Workers : Skilled/Semi Skilled		2	Nil	-
Total			7	0	

2.8 Site Services

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. All the personnel engaged in the mining activity are well trained in first aid.

2.9 Solid Wastes

There is **no Top Soil and Over Burden material** available at the mine. The limestone consisting of $\text{Fe}_2\text{O}_3 < 6\%$ is blended with the limestone mined from other three mines in order to maintain the required quality parameters at the plant and also it will be utilized for making special cements like Oil well Cement etc.

2.10 Proposed Land Use

The mining benches have been so designed that the ultimate pit slope of the mine benches will be 40° - 45° at the stage of mine abandonment. The width of the abandoned benches will not be less than the height of the bench. Prior permission will be obtained from the competent authority to reduce the width of the benches at abandonment. The ultimate pit slope of 40° - 45° has been designed keeping in view the aspect of **bench slope stability**.

The lease area is compact and contiguous with the other adjoining leases. Thus, Green Belt is not developed independently. The excavated area shall be around 2.250 Ha at the end of mining operation (**Table 2.5**). The Mine Pit will be converted as Water Reservoir to collect the rain water and recharge the Ground water-table in its vicinity.

Table : 2.5 Land Use Pattern

Activities	Existing Land Use, Ha	At the End of ROMP Period, Ha	At Conceptual Stage, Ha
Mine Pit Area	2.250	2.250	2.250 Water Reservoir
Storage for top soil	0	0	0
Reject Dump	0	0	0
Infrastructures : Buildings, etc.	0	0	0
Roads	0	0	0
Green Belt Area	0	0	0
Others to specify	0	0	0
Total	2.250	2.250	2.250

2.11 Financial Closure Plan

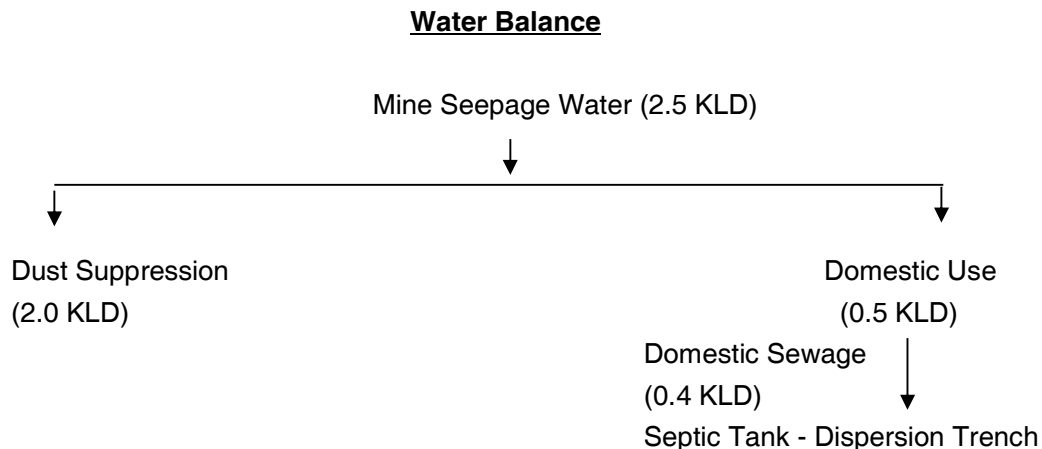
The entire leasehold area of about 2.25 Ha will be put to use for excavation and allied activities till the end of Plan period. Therefore, the amount of Rs 6,75,000/- (Rupees Six lakhs Seventy five thousand) @ Rs. 3,00,000 per ha has been calculated.

However, as per rule 27 (1) of MCDR 2017, the minimum financial assurance is Rs 10,00,000 (Rupees Ten lakhs). Hence, financial assurance of Rs 10,00,000/- (Rupees Ten Lakhs) has been considered for this Progressive Mine Closure Plan. Financial assurance for the said amount, is submitted to Regional Controller of Mines, Indian Bureau of Mines, Chennai, in the form of Bank Guarantee vide Ref. No, 1731318BG0000998 with validity till 31.03.2024 (**Doc-7**).

2.12 Water Demand & Source

The mine requires about 2.5 kilo litres/day (KLD) water which will be met from rain water harvested in the mine pit – Domestic Usage @ 0.5 KLD & Dust suppression @ 2.0 KLD.

Common workshop facility is there at PNR Mine. There is no trade effluent from the Mine. Only, domestic sewage generation @ 0.4 KLD is being biologically treated in a septic Tank followed by a Dispersion Trench.



2.13 Mine Dewatering

The Ultimate Pit Limit will be 26.5 m BGL (from Top RL 80.5 m upto 54.0 m RL). The water table is found at 45 m BGL (mean). Thus, **the Mining will not intersect the ground water table**. To pump out rain water collected in the Pit, a 7.5 HP Pump will be used. Dewatering will be @ 10 KLD during summer season and 25 KLD during the rainy periods.

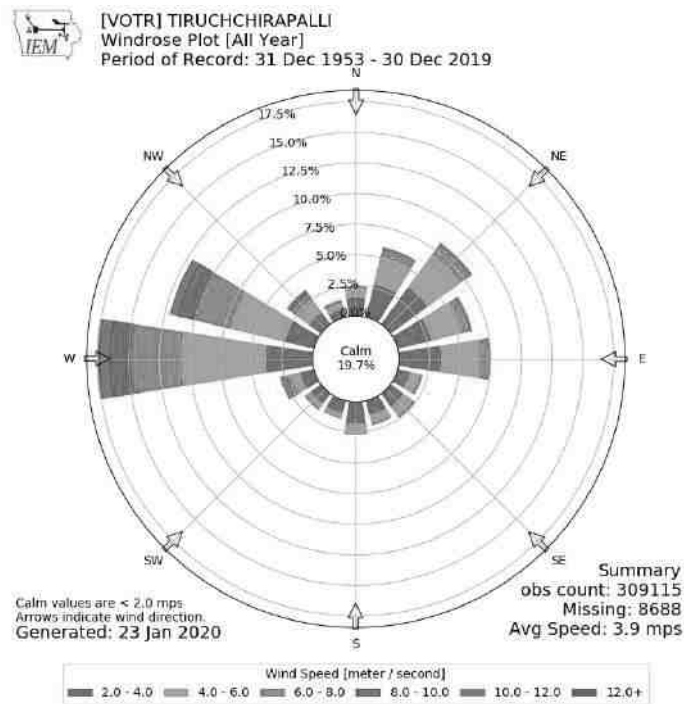
2.14 Power Demand & Source

The mine does not require any electrical supply as common facilities exist. No standby DG set is also there. HSD @ 200 lits./day is required for the mining equipments which is being dispensed directly to machines through a Diesel Bowser.

3.0 Description of the Environment (Baseline Status)

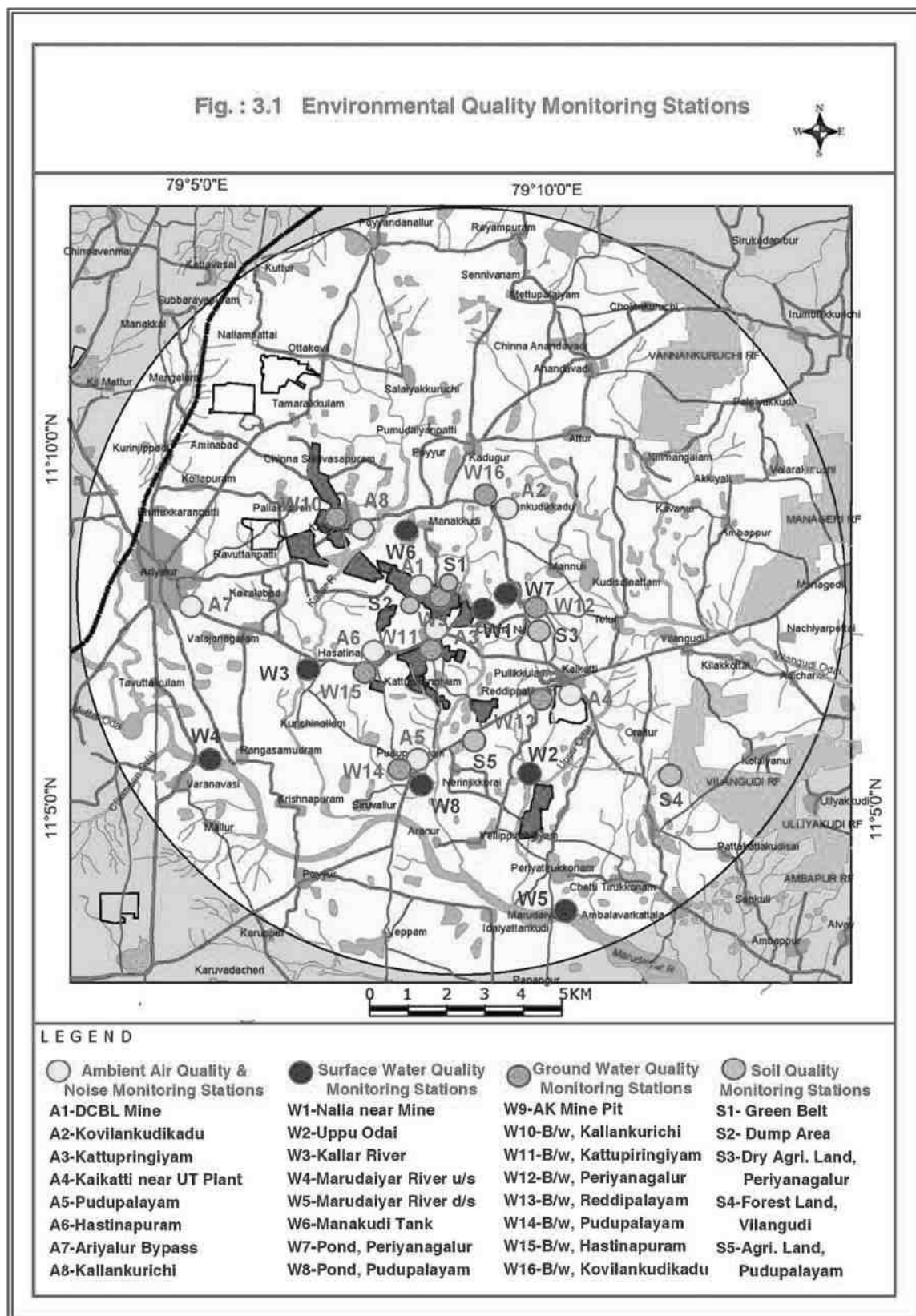
3.1 Study Area

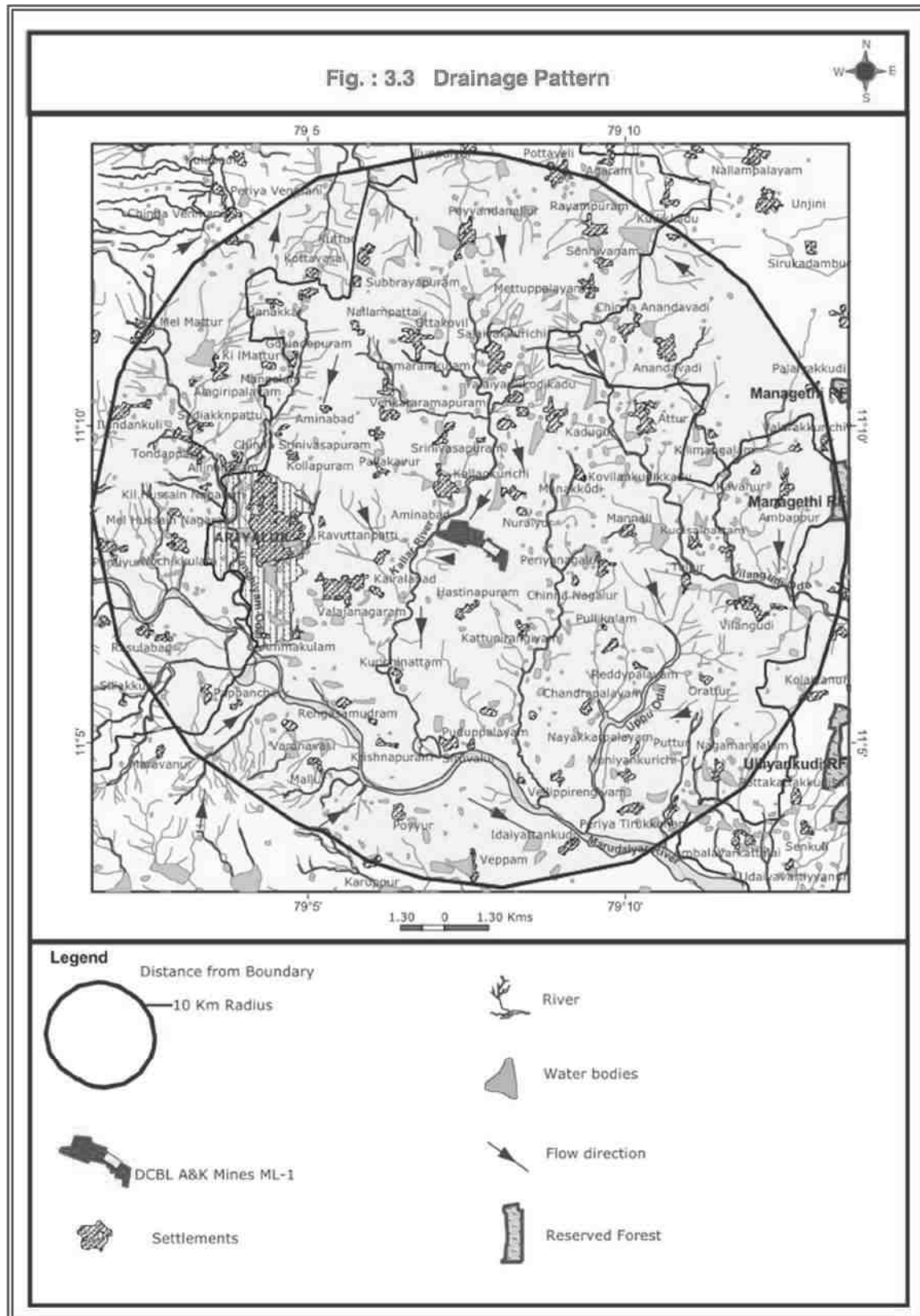
The study area of **10 km radius (from boundary)** (Fig. 3.1) has been considered for assessing the baseline environmental status. Project Area does not fall in **Critically Polluted Industrial Clusters** listed by CPCB. The nearest IMD Station is Trichy Airport. The monitoring stations were selected 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 (appended).



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 **80-65 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 **Marudaiyar River drains** the region and flows at 5.8 km in SSW direction (Fig. 3.3). Seasonal Kallar River flows at 2.0 km (WNW), Uppu Odai at 3.8 km (ESE), Vilangudi Odai at 4.8 km (E) and Vanchiyam Odai at 7.0 km (WNW). The overall drainage pattern of the region appears to be dendritic. There are also rainfed irrigation tanks and ponds in the study area.





3.2 Environmental Components

Considering the environmental setting of the project, project activities and their interaction, environmental regulations and standards, following Environmental Attributes have been included in EIA Study.

- ❖ **Site specific Micro-meteorological Data** from Lease Area for a Season on wind speed, wind direction (wind roses), temperature, humidity, cloud cover, atmospheric pressure, rainfall, etc.
- ❖ **Ambient Air Quality Monitoring at 8 locations** on 24-hourly basis, continuously for 2 days in a week for 4 weeks in a month for 3 months in the season for all 12 parameters as per Revised NAAQ Norms.
- ❖ Noise Level Measurements at all air quality monitoring station for Leq, Lday and Lnight values once in the season.
- ❖ Water Quality Monitoring – grab sampling of Surface Water (**8 locations**) and Ground Water (**8 Locations**) including existing Pit Water - once in the Season.
- ❖ Soil Quality Monitoring at **5 locations** once in the Season for Textural & Physical Parameters, Nutrients, etc.
- ❖ **Land Use Pattern** based on recent available Satellite Imagery.
- ❖ Biotic Attributes for : **Flora & Fauna** in Core & Buffer Zones.
- ❖ **Socio-Economic** Profile, based on 2011-Census and Need Based Assessment, once in the study period for: Total Population / Household Size, Gender Composition, SC / ST 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 PM2.5 impactor is passed through a 47 mm dia filter. Teflon filter membrane that retains the FPM. The APM 550 system allows removal of the PM2.5 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 ±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 as follows:

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. 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.

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 (Phenanthroline)
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.

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. The survey was based on personal observation, enquiry with local population and records available. This study included the identification of endangered and rare species as per Red Book.

Socio-Economic Survey : Project does not involve resettlement/rehabilitation. Socio-Economic profile of population living in study area has been prepared based on Census 2011 data.

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 3.1-3.3**. Based on the wind parameters, wind rose is drawn and presented as **Fig. 3.4**.

December 2021 : Predominant winds were from NE & ENE directions. Mean Wind velocity was 9.0 kmph. Temperature values were ranging from 19.0 °C to 35.0 °C with mean value of 25.7 °C. Mean maximum relative humidity value was 79.0%. Mean atmospheric pressure value was computed as 759.2 mm of mercury. There were 7 rainy days with total rainfall of 7.0 mm.

January 2022 : Predominant winds were from ENE & NE directions. Mean Wind velocity was 9.4 kmph. Temperature values were ranging from 21.0 °C to 35.0 °C with mean value of 26.4 °C. Mean maximum relative humidity value was 76.6%. Mean atmospheric pressure value was computed as 758.4 mm of mercury. There was one rainy day with total rainfall of 1.0 mm.

February 2022 : Predominant winds were from NE & ENE directions. Mean Wind velocity was 10.0 kmph. Temperature values were ranging from 21.0 °C to 36.0 °C with mean value of 27.0 °C. Mean maximum relative humidity value was 70.2%. Mean atmospheric pressure value was computed as 758.3 mm of mercury. There was one rainy day with total rainfall of 0.5 mm in this month. The monitored meteorological data were found to be **in compliance with local weather phenomena**.

Table : 3.1 Micrometeorological Data – December 2021

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				
01.12.2021	6.8	42	24.0	29.0	26.0	86	3	759.0	1.5
02.12.2021	8.3	54	23.0	31.0	26.2	81	2	758.5	0.5
03.12.2021	5	138	23.0	30.0	26.9	76	2	759.0	0
04.12.2021	3.8	199	24.0	28.0	25.6	85	2	759.5	0
05.12.2021	5.6	112	23.0	33.0	27.3	80	4	759.5	0
06.12.2021	6	163	22.0	27.0	25.3	85	5	759.5	0.5
07.12.2021	7.9	63	24.0	35.0	26.9	78	3	760.0	0
08.12.2021	9.3	50	24.0	31.0	26.8	79	4	759.5	0
09.12.2021	9.6	48	24.0	29.0	26.0	86	4	759.5	0
10.12.2021	11.7	45	24.0	32.0	27.1	80	3	759.5	0
11.12.2021	10.6	52	24.0	30.0	26.9	82	3	759.0	1.0
12.12.2021	11.4	91	23.0	30.0	26.7	79	2	760.0	2.5
13.12.2021	12.3	53	23.0	31.0	26.3	81	2	759.0	0
14.12.2021	9.5	110	23.0	30.0	24.8	85	2	759.0	0
15.12.2021	12.3	87	23.0	30.0	26.1	71	2	759.5	0.5
16.12.2021	10.5	78	23.0	30.0	25.8	77	3	759.0	0
17.12.2021	12.4	55	23.0	30.0	26.2	79	2	759.5	0
18.12.2021	13.6	47	22.0	31.0	25.6	74	2	759.5	0
19.12.2021	12.1	49	21.0	30.0	24.7	72	3	759.0	0
20.12.2021	10.3	56	21.0	30.0	25.1	74	2	759.0	0
21.12.2021	6.8	56	21.0	30.0	25.2	75	4	758.5	0
22.12.2021	6.9	61	21.0	30.0	24.9	77	3	759.0	0
23.12.2021	5.8	59	19.0	29.0	24.0	76	4	758.5	0
24.12.2021	6.6	60	19.0	30.0	24.5	75	2	758.5	0
25.12.2021	6.9	88	20.0	30.0	24.4	78	2	759.0	0
26.12.2021	7.4	115	20.0	30.0	24.7	76	3	759.0	0
27.12.2021	8.6	123	21.0	30.0	25.2	77	2	759.0	0
28.12.2021	10.9	83	21.0	31.0	25.5	77	4	759.5	0
29.12.2021	8.7	53	22.0	31.0	25.4	77	2	759.0	0
30.12.2021	10.9	69	23.0	29.0	24.8	83	5	759.5	0.5
31.12.2021	11.1	125	23.0	29.0	24.3	89	3	759.0	0
Monthly Abstract	9.0	80.1	19.0	35.0	25.7	79.0	2.9	759.2	7.0

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

Table : 3.2 Micrometeorological Data – January 2022

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				
01.01.2022	10.2	111	23.0	25.0	23.8	91	3	759.0	0
02.01.2022	13.1	51	23.0	29.0	25.5	83	5	759.0	1.0
03.01.2022	13.0	58	22.0	30.0	25.5	77	3	758.5	0
04.01.2022	11.6	63	21.0	29.0	24.7	77	3	758.5	0
05.01.2022	10.5	76	22.0	31.0	25.6	76	2	759.0	0
06.01.2022	10.9	49	22.0	30.0	25.5	81	3	758.5	0
07.01.2022	11.3	66	23.0	31.0	26.3	78	3	758.5	0
08.01.2022	10.7	68	23.0	31.0	26.2	79	3	759.0	0
09.01.2022	8.6	76	23.0	31.0	26.0	78	3	759.0	0
10.01.2022	8.6	53	24.0	31.0	26.6	76	3	758.5	0
11.01.2022	7.6	69	23.0	31.0	26.8	79	2	759.0	0
12.01.2022	6.1	64	24.0	33.0	27.3	78	3	759.0	0
13.01.2022	6.6	91	24.0	33.0	27.6	78	3	758.5	0
14.01.2022	5.9	65	24.0	32.0	27.6	77	3	758.5	0
15.01.2022	9.3	58	24.0	33.0	27.3	79	3	758.5	0
16.01.2022	11.9	56	23.0	32.0	26.8	78	3	758.0	0
17.01.2022	12.0	97	22.0	29.0	25.5	74	3	758.5	0
18.01.2022	11.8	102	22.0	31.0	25.8	73	3	758.0	0
19.01.2022	8.2	73	21.0	32.0	25.7	73	3	758.0	0
20.01.2022	5.8	80	21.0	31.0	25.6	73	2	758.5	0
21.01.2022	6.9	76	22.0	33.0	26.7	74	2	758.0	0
22.01.2022	7.3	60	23.0	35.0	27.9	72	3	758.0	0
23.01.2022	6.9	64	23.0	34.0	27.8	72	3	758.0	0
24.01.2022	5.6	90	24.0	33.0	27.5	77	3	758.5	0
25.01.2022	6.1	98	23.0	32.0	26.5	74	2	758.0	0
26.01.2022	7.4	93	22.0	32.0	26.3	77	2	758.5	0
27.01.2022	11.1	55	22.0	33.0	26.3	71	2	758.5	0
28.01.2022	16.7	40	24.0	31.0	26.8	72	3	758.0	0
29.01.2022	12.1	58	24.0	31.0	26.3	75	3	758.0	0
30.01.2022	8.2	67	23.0	30.0	26.0	80	5	758.0	0
31.01.2022	8.1	53	23.0	33.0	27.1	74	5	758.0	0
Monthly Abstract	9.4	70.3	21.0	35.0	26.4	76.6	3.0	758.4	1.0

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

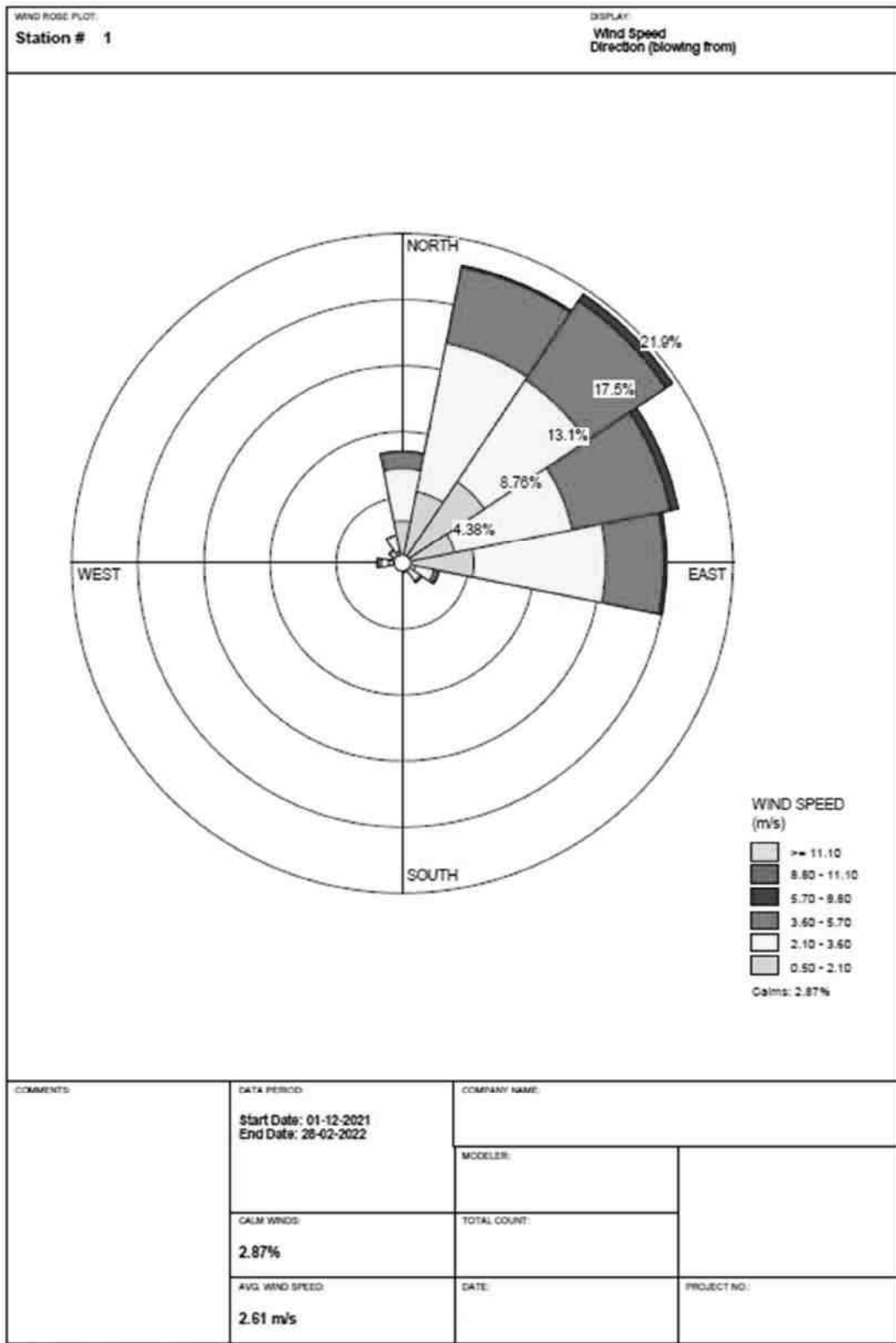
Table : 3.3 Micrometeorological Data – February 2022

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				
01.02.2022	6.0	78	21.0	30.0	25.5	78	5	758.0	0
02.02.2022	5.6	69	21.0	33.0	25.7	70	4	758.0	0
03.02.2022	5.1	98	22.0	33.0	26.8	68	4	758.0	0
04.02.2022	7.3	110	24.0	36.0	28.6	69	4	758.5	0
05.02.2022	5.9	60	23.0	34.0	27.8	71	3	758.5	0
06.02.2022	10.9	57	23.0	34.0	27.4	70	4	759.0	0
07.02.2022	10.1	72	22.0	33.0	26.8	68	5	759.0	0
08.02.2022	12.0	48	22.0	34.0	26.8	66	5	759.0	0.5
09.02.2022	11.9	125	21.0	32.0	25.8	67	3	758.5	0
10.02.2022	10.2	81	24.0	31.0	26.8	70	3	758.0	0
11.02.2022	9.9	55	23.0	26.0	23.5	93	3	758.0	0
12.02.2022	13.5	73	24.0	30.0	26.4	73	3	758.5	0
13.02.2022	9.8	46	22.0	31.0	26.0	71	4	758.0	0
14.02.2022	10.2	112	22.0	32.0	26.1	72	4	758.0	0
15.02.2022	11.0	96	22.0	31.0	26.1	67	3	758.5	0
16.02.2022	11.2	87	21.0	33.0	26.1	67	3	758.5	0
17.02.2022	11.8	76	22.0	33.0	26.4	69	3	758.0	0
18.02.2022	11.6	58	22.0	33.0	26.7	71	3	758.0	0
19.02.2022	9.7	89	23.0	32.0	27.0	73	3	758.0	0
20.02.2022	6.6	171	24.0	34.0	28.3	71	2	758.0	0
21.02.2022	5.1	94	24.0	35.0	28.9	70	2	758.0	0
22.02.2022	12.3	68	23.0	35.0	28.2	67	3	758.5	Tr
23.02.2022	13.7	58	23.0	34.0	27.7	66	3	758.5	0
24.02.2022	11.5	50	22.0	33.0	27.0	69	2	759.0	0
25.02.2022	12.5	46	22.0	33.0	26.8	67	3	758.5	0
26.02.2022	13.3	54	23.0	34.0	28.3	67	3	758.0	0
27.02.2022	11.5	99	23.0	33.0	27.5	71	4	758.0	0
28.02.2022	9.7	180	26.0	36.0	30.3	64	3	758.0	0
Monthly Abstract	10.0	82.5	21.0	36.0	27.0	70.2	3.4	758.3	0.5

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



3.5 Ambient Air Quality

3.5.1 Monitoring Locations

AAQ Monitoring Stations were selected based on the **Upwind & Downwind directions for the Season** (Table 3.4) and covering the existing Industries & Mines. Due to Covid Pandemic, **Mobile Stations were also established** 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 3.5-3.12**. The abstract of those monitored data is given as **Table 3.13** and ambient air quality status in the study area as **Table 3.14**.

Table : 3.4 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-DCBL KBD Mine	11°08'06.6"	79°08'0.9"	-	-	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-V.Kaikatti	11°06'28.3"	79°10'29.2"	SE	4.0	Upwind
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 :

PM2.5 values (24 hours Time Weighted) were monitored in the range between 12-44 **microgram/cu.m (ug/m³)** in the Study Area with **mean value of 23.0 ug/m³** against NAAQ Norm value of **60 ug/m³** (24 hours Time Weighted).

PM10 values were monitored in the range between 22-68 **ug/m³** with **mean value of 51.9 ug/m³** against NAAQ Norm value of **100 ug/m³** (24 hours Time Weighted).

SO₂ values were monitored in the range between 6-28 **ug/m³** with **mean value of 15.5 ug/m³** against NAAQ limit value of **80 ug/m³** (24 hours Time Weighted).

NO_x values were monitored in the range between 6-30 **ug/m³** with **mean value of 17.6 ug/m³** against NAAQ limit value of **80 ug/m³** (24 hours Time Weighted).

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

O₃ concentrations (**hourly samples reported for 8-hour average**) were monitored in the range between 10.2-38.9 ug/m³ with **mean value of 22.5 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	29.0	60	0.48	Low
PM10, ug/m ³	51.9	100	0.52	Moderate
SO ₂ , ug/m ³	15.5	80	0.19	Low
NO ₂ , ug/m ³	17.6	80	0.22	Low

Table : 3.5 Ambient Air Quality Data at A1-DCBL KBD Mine

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	21	47	7	8	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	24	51	9	10	<5	10.4	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	18	40	8	9	<5	13.6	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	22	46	7	8	<5	17.1	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	20	43	8	9	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	26	50	7	10	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	22	46	9	11	<5	10.9	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	28	53	6	7	<5	11.5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	24	48	8	9	<5	13.6	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	20	45	7	8	<5	21.7	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	27	52	7	9	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	23	48	6	7	<5	15.4	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	20	43	8	10	<5	16.1	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	25	54	7	8	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	27	57	10	12	<5	17.1	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	22	45	9	11	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	26	53	8	10	<5	15.9	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	24	50	7	8	<5	17.0	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	28	58	6	8	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	26	55	7	9	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	23	47	8	10	<5	19.0	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	25	51	7	8	<5	23.6	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	27	58	10	12	<5	25.1	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	24	50	8	10	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		18-28	40-58	6-10	7-12	<5	10.4-25.1	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		23.8	49.6	7.7	9.2	<5	17.4	<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 : 3.6 Ambient Air Quality Data at A2-Kovilankudikadu

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	12	22	7	8	<5	10.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	15	28	6	7	<5	11.2	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	17	33	6	8	<5	10.5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	14	27	6	7	<5	11.2	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	13	25	8	9	<5	12.1	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	15	30	7	8	<5	10.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	16	33	6	7	<5	12.1	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	20	38	6	6	<5	14.2	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	14	31	7	8	<5	13.6	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	17	33	8	9	<5	10.7	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	21	40	7	8	<5	11.2	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	15	32	6	8	<5	12.9	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	17	35	7	10	<5	10.2	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	20	38	6	8	<5	11.7	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	22	41	6	7	<5	18.6	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	17	35	7	9	<5	11.4	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	19	40	7	8	<5	15.2	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	21	43	8	10	<5	13.7	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	23	45	9	11	<5	10.9	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	24	47	7	9	<5	12.1	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	22	40	6	8	<5	11.4	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	27	51	7	8	<5	10.7	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	25	48	9	10	<5	11.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	23	45	7	9	<5	12.1	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		12-27	22-51	6-9	6-11	<5	10.2-18.6	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		18.7	36.7	6.9	8.3	<5	12.1	<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; **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 : 3.7 Ambient Air Quality Data at A3-Kattupirangiyam (on SH-139)

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	28	52	15	18	<5	21.7	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	30	58	20	22	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	24	47	18	20	<5	25.1	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	27	53	21	23	<5	18.6	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	32	60	17	19	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	29	55	14	17	<5	21.3	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	37	62	16	19	<5	20.7	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	33	58	15	18	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	25	47	17	18	<5	26.3	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	28	53	19	21	<5	25.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	30	55	15	17	<5	24.1	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	27	51	14	18	<5	25.3	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	32	54	17	20	<5	23.7	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	34	57	14	18	<5	25.8	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	28	50	19	22	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	25	47	18	20	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	31	58	15	19	<5	32.4	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	27	52	14	17	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	31	59	15	18	<5	30.5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	28	55	17	20	<5	24.2	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	33	58	16	19	<5	27.1	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	35	60	21	23	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	31	56	18	20	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	34	58	16	18	<5	28.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		24-37	47-62	14-21	17-23	<5	18.6-32.4	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		30.0	54.8	16.7	19.3	<5	25.4	<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; **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 : 3.8 Ambient Air Quality Data at A4-V.Kaikatti

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	33	55	15	18	<5	27.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	30	51	18	20	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	27	48	17	19	<5	28.1	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	33	52	16	17	<5	25.9	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	35	55	15	17	<5	30.2	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	30	48	18	20	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	32	52	20	22	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	28	50	17	19	<5	33.8	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	31	53	22	25	<5	34.5	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	33	57	18	21	<5	30.6	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	34	58	20	23	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	27	51	22	24	<5	32.3	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	33	62	17	18	<5	34.7	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	25	48	19	21	<5	30.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	28	50	20	23	<5	28.7	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	36	62	18	21	<5	29.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	41	64	21	24	<5	31.2	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	34	58	23	25	<5	33.5	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	32	50	17	19	<5	30.7	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	29	47	19	21	<5	32.4	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	33	55	20	22	<5	31.8	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	35	58	18	20	<5	28.9	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	32	51	21	23	<5	32.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	34	53	23	27	<5	30.7	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		25-41	47-64	15-23	17-27	<5	25.9-34.7	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		31.9	53.7	18.9	21.2	<5	30.6	<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; **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 : 3.9 Ambient Air Quality Data at A5-Pudupalayam (on NH-81)

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	28	55	14	18	<5	18.6	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	25	51	16	19	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	30	54	18	20	<5	22.1	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	33	58	15	17	<5	17.9	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	27	47	20	22	<5	15.6	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	31	51	17	19	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	24	45	21	24	<5	22.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	28	53	18	21	<5	18.7	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	26	50	21	25	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	30	57	17	19	<5	19.3	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	28	54	16	17	<5	21.4	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	33	60	19	20	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	27	53	20	23	<5	18.5	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	30	57	22	25	<5	19.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	29	55	17	19	<5	21.2	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	32	60	19	21	<5	17.8	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	37	62	21	24	<5	20.5	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	33	60	23	27	<5	18.1	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	28	51	18	20	<5	20.3	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	30	57	20	22	<5	24.2	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	38	60	21	23	<5	18.6	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	35	57	23	24	<5	19.2	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	31	50	20	22	<5	17.5	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	33	54	24	27	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		24-38	45-62	14-24	17-27	<5	15.6-24.2	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		30.3	54.6	19.2	21.6	<5	19.7	<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 : 3.10 Ambient Air Quality Data at A6-Hastinapuram (on SH-139)

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	27	49	16	18	<5	21.3	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	33	55	14	16	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	30	53	20	23	<5	22.6	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	35	57	18	20	<5	20.7	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	38	62	20	21	<5	18.5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	33	53	23	25	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	29	50	17	20	<5	21.3	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	31	53	19	22	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	33	56	20	23	<5	21.3	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	27	50	23	25	<5	22.4	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	29	52	21	22	<5	20.6	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	28	53	24	27	<5	25.1	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	31	57	22	23	<5	27.2	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	34	59	25	28	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	33	62	22	24	<5	25.6	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	28	58	21	23	<5	29.1	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	30	60	20	23	<5	27.2	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	35	63	23	26	<5	29.0	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	32	57	21	23	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	37	64	21	24	<5	32.5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	34	58	22	25	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	33	55	18	20	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	31	60	20	22	<5	28.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	34	61	23	24	<5	25.6	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		27-38	49-64	14-25	16-28	<5	18.4-32.5	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		31.9	56.5	20.5	22.8	<5	24.8	<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 A7-Ariyalur Bypass

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	33	55	21	23	<5	31.3	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	31	52	20	21	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	35	57	23	25	<5	35.1	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	37	61	20	23	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	34	55	22	22	<5	29.5	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	38	63	24	26	<5	32.7	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	33	57	25	28	<5	33.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	39	60	27	30	<5	30.8	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	42	64	22	24	<5	36.1	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	35	57	23	26	<5	38.9	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	38	60	20	22	<5	30.1	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	43	65	22	25	<5	32.5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	40	61	21	23	<5	27.9	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	37	57	23	24	<5	30.4	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	35	55	25	27	<5	32.0	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	39	59	28	30	<5	28.4	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	42	66	22	24	<5	29.1	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	40	68	24	25	<5	31.7	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	38	57	27	28	<5	33.2	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	42	65	23	25	<5	32.0	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	40	60	21	23	<5	30.5	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	44	66	24	26	<5	28.9	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	41	62	21	23	<5	34.7	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	38	58	25	27	<5	38.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		31-44	52-68	20-28	21-30	<5	27.9-38.9	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		38.1	60.0	23.0	25.0	<5	32.1	<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; **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 : 3.12 Ambient Air Quality Data at A8-Kallankurichi

Season : Winter 2021-22

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 Avg.)	CO (8-hly Avg.)	Pb, ug/m ³	As, ng/m ³	Ni, ng/m ³	C ₆ H ₆ , ug/m ³	BaP, ng/m ³
01-02.12.2021	06:00-06:00	24	45	12	14	<5	21.7	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.12.2021	06:00-06:00	27	50	10	11	<5	18.3	<1000	<0.1	<1	<1	<0.01	<0.1
09-10.12.2021	06:00-06:00	23	43	9	11	<5	20.4	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.12.2021	06:00-06:00	26	47	11	13	<5	21.2	<1000	<0.1	<1	<1	<0.01	<0.1
17-18.12.2021	06:00-06:00	22	41	8	10	<5	18.4	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.12.2021	06:00-06:00	25	48	10	12	<5	17.6	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.12.2021	06:00-06:00	28	51	10	14	<5	15.9	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.12.2021	06:00-06:00	24	44	9	13	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.01.2022	06:00-06:00	30	55	11	13	<5	17.1	<1000	<0.1	<1	<1	<0.01	<0.1
04-05.01.2022	06:00-06:00	26	47	12	15	<5	14.5	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.01.2022	06:00-06:00	28	50	10	12	<5	16.3	<1000	<0.1	<1	<1	<0.01	<0.1
12-13.01.2022	06:00-06:00	25	47	11	14	<5	21.2	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.01.2022	06:00-06:00	30	52	9	12	<5	15.7	<1000	<0.1	<1	<1	<0.01	<0.1
20-21.01.2022	06:00-06:00	27	48	11	14	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.01.2022	06:00-06:00	29	51	10	12	<5	17.3	<1000	<0.1	<1	<1	<0.01	<0.1
28-29.01.2022	06:00-06:00	33	53	12	15	<5	15.2	<1000	<0.1	<1	<1	<0.01	<0.1
02-03.02.2022	06:00-06:00	24	47	14	16	<5	18.6	<1000	<0.1	<1	<1	<0.01	<0.1
03-04.02.2022	06:00-06:00	27	50	11	13	<5	20.2	<1000	<0.1	<1	<1	<0.01	<0.1
10-11.02.2022	06:00-06:00	30	52	12	15	<5	21.4	<1000	<0.1	<1	<1	<0.01	<0.1
11-12.02.2022	06:00-06:00	26	48	11	13	<5	20.7	<1000	<0.1	<1	<1	<0.01	<0.1
18-19.02.2022	06:00-06:00	28	49	10	13	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
19-20.02.2022	06:00-06:00	31	52	12	15	<5	17.3	<1000	<0.1	<1	<1	<0.01	<0.1
26-27.02.2022	06:00-06:00	33	55	13	14	<5	15.6	<1000	<0.1	<1	<1	<0.01	<0.1
27-28.02.2022	06:00-06:00	35	57	14	17	<5	18.2	<1000	<0.1	<1	<1	<0.01	<0.1
Range (Minimum-Maximum)		22-35	41-57	8-14	10-17	<5	14.5-21.7	<1000	<0.1	<1	<1	<0.01	<0.1
Mean Value		27.5	49.3	10.9	13.4	<5	18.3	<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 : 3.13 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-DCBL KBD Mine				A2-Kovilankudikadu			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	18	40	6	7	12	22	6	6
3	10 th Percentile Value	20	44	6	8	14	27	6	7
4	20 th Percentile Value	22	46	7	8	15	31	6	8
5	30 th Percentile Value	22	47	7	8	16	33	6	8
6	40 th Percentile Value	23	48	7	9	17	33	7	8
7	50 th Percentile Value	24	50	8	9	18	37	7	8
8	60 th Percentile Value	25	51	8	10	20	40	7	8
9	70 th Percentile Value	26	52	8	10	21	40	7	9
10	80 th Percentile Value	26	53	8	10	22	44	7	9
11	90 th Percentile Value	27	56	9	11	24	46	8	10
12	95 th Percentile Value	28	58	10	12	25	48	9	10
13	98 th Percentile Value	28	58	10	12	26	50	9	11
14	Maximum	28	58	10	12	27	51	9	11
15	Arithmetic Mean	23.8	49.6	7.7	9.2	18.7	36.7	6.9	8.3
16	Geometric Mean	23.7	49.4	7.6	9.1	18.3	35.9	6.9	8.3
17	Standard Deviation	2.8	4.9	1.1	1.4	4.1	7.6	0.9	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-V.Kaikatti			
1	No. of Observations	24	24	24	24	24	24	24	24
2	Minimum	24	47	14	17	25	47	15	17
3	10 th Percentile Value	26	48	14	17	27	48	16	18
4	20 th Percentile Value	27	52	15	18	29	50	17	19
5	30 th Percentile Value	28	53	15	18	30	51	18	20
6	40 th Percentile Value	28	54	16	18	32	51	18	20
7	50 th Percentile Value	30	55	17	19	33	53	19	21
8	60 th Percentile Value	31	57	17	20	33	55	20	22
9	70 th Percentile Value	32	58	18	20	33	55	20	23
10	80 th Percentile Value	33	58	18	20	34	58	21	23
11	90 th Percentile Value	34	60	20	22	35	61	22	25
12	95 th Percentile Value	35	60	21	23	36	62	23	25
13	98 th Percentile Value	36	61	21	23	39	63	23	26
14	Maximum	37	62	21	23	41	64	23	27
15	Arithmetic Mean	30.0	54.8	16.7	19.3	31.9	53.7	18.9	21.2
16	Geometric Mean	29.8	54.6	16.6	19.3	31.7	53.5	18.8	21.0
17	Standard Deviation	3.4	4.3	2.2	1.8	3.5	4.8	2.3	2.7
18	NAAQ Norms*	60	100	80	80	60	100	80	80
19	% Values exceeding Norms*	0	0	0	0	0	0	0	0

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10-Respirable Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; 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 : 3.13 (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	24	45	14	17	27	49	14	16
3	10 th Percentile Value	26	50	16	18	28	51	17	20
4	20 th Percentile Value	28	51	17	19	29	53	19	21
5	30 th Percentile Value	28	53	18	20	30	53	20	22
6	40 th Percentile Value	29	54	18	20	31	55	20	23
7	50 th Percentile Value	30	55	20	22	33	57	21	23
8	60 th Percentile Value	31	57	20	22	33	58	21	23
9	70 th Percentile Value	32	57	21	23	33	59	22	24
10	80 th Percentile Value	33	59	21	24	34	60	23	25
11	90 th Percentile Value	34	60	23	25	35	62	23	26
12	95 th Percentile Value	37	60	23	27	37	63	24	27
13	98 th Percentile Value	38	61	24	27	38	64	25	28
14	Maximum	38	62	24	27	38	64	25	28
15	Arithmetic Mean	30.3	54.6	19.2	21.6	31.9	56.5	20.5	22.8
16	Geometric Mean	30.1	54.5	19.0	21.4	31.7	56.4	20.4	22.6
17	Standard Deviation	3.6	4.4	2.6	2.9	3.0	4.3	2.6	2.7
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	31	52	20	21	22	41	8	10
3	10 th Percentile Value	33	55	20	22	24	44	9	11
4	20 th Percentile Value	35	57	21	23	25	47	10	12
5	30 th Percentile Value	37	57	22	23	26	47	10	13
6	40 th Percentile Value	38	58	22	24	26	48	10	13
7	50 th Percentile Value	38	60	23	25	27	50	11	13
8	60 th Percentile Value	39	61	23	25	28	50	11	14
9	70 th Percentile Value	40	62	24	26	29	51	12	14
10	80 th Percentile Value	41	64	25	27	30	52	12	15
11	90 th Percentile Value	42	66	26	28	32	54	13	15
12	95 th Percentile Value	43	66	27	30	33	55	14	16
13	98 th Percentile Value	44	67	28	30	34	56	14	17
14	Maximum	44	68	28	30	35	57	14	17
15	Arithmetic Mean	38.1	60.0	23.0	25.0	27.5	49.3	10.9	13.4
16	Geometric Mean	37.9	59.9	22.9	24.9	27.4	49.1	10.8	13.3
17	Standard Deviation	3.5	4.2	2.3	2.4	3.3	3.9	1.5	1.7
18	NAAQ Norms*	60	100	80	80	60	100	80	80
19	% Values exceeding Norms*	0	0	0	0	0	0	0	0

Legend : PM2.5-Particulate Matter size less than 2.5 um; PM10-Respirable Particulate Matter size less than 10 um; SO₂-Sulphur dioxide; 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 : 3.14 Ambient Air Quality Status

Season : Winter 2021-22

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	12	22	6	6
3	10 th Percentile Value	21	41	7	8
4	20 th Percentile Value	24	47	8	10
5	30 th Percentile Value	26	50	10	13
6	40 th Percentile Value	28	51	14	17
7	50 th Percentile Value	29	53	17	19
8	60 th Percentile Value	31	55	18	20
9	70 th Percentile Value	33	57	20	22
10	80 th Percentile Value	34	58	21	23
11	90 th Percentile Value	37	61	23	25
12	95 th Percentile Value	39	62	24	27
13	98 th Percentile Value	42	65	25	28
14	Maximum	44	68	28	30
15	Arithmetic Mean	29.0	51.9	15.5	17.6
16	Geometric Mean	28.2	51.1	14.1	16.3
17	Standard Deviation	6.4	8.2	6.1	6.4
18	NAAQ Norms*	60	100	80	80
19	% Values exceeding NAAQ Norms	0	0	0	0

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

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

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

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

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

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

3.5.3 RSPM Analysis

The Mine is not in operation. However, working in the adjacent mines were considered. With the samples of Respirable Suspended Particulate Matter (RSPM or PM_{10}) monitored, the main focus is on characterization and apportionment of PM_{10} to have a better understanding and correlation between the RSPM fraction at source and receptor. The results are tabulated in **Table 3.14 (a)**. 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 2.4% of RSPM that monitored in the Study Area.

Free Respirable Silica Content (FTIR Method) : 2.4%.

Table : 3.14 (a) RSPM Analytical Data

Parameter	Percentage in RSPM Content	
	Upwind Direction (Location A2)	Downwind Direction (Location A6)
Loss on Ignition	17.7	18.0
Iron oxides (Fe_2O_3)	7.4	7.1
Calcium oxide (CaO)	20.5	20.3
Magnesium oxide (MgO)	15.1	14.8
Sodium oxide (Na_2O)	0.30	0.31
Potassium oxide (K_2O)	0.25	0.22
Aluminium oxide (Al_2O_3)	18.3	18.1
Titanium oxide (TiO_2)	0.08	0.05

3.6 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 3.15**.

Ambient Noise Levels were ranging from 32.4 dB(A) to 100.7 dB(A) during day times and from 31.8 dB(A) to 100.7 dB(A) during night times on the monitoring days. Day Equivalent Noise (Leq-d) level was found to be 44.2 dB(A) and Night Equivalent Noise (Leq-n) level was 42.2 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.

Table : 3. 15 Ambient Noise Level Data (Abstract)

Monitoring Dates : 10-11.12.2021; 12-13.01.2022 & 10-11.02.2022

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-DCBL KBD Mine	Industrial	33.7	92.4	41.7	31.8	90.2	40.1
2	A2-Kovilankudikadu	Residential	32.4	85.1	42.1	32.1	81.7	40.4
3	A3-Kattupirangiyam	Residential	34.3	97.3	43.8	32.5	98.6	41.1
4	A4-V.Kaikatti	Industrial	35.2	100.7	46.9	34.2	100.4	44.7
5	A5-Pudupalayam	Residential	33.8	98.6	43.1	32.8	100.1	41.5
6	A6-Hastinapuram	Residential	34.5	100.2	44.1	32.8	100.7	42.3
7	A7-Ariyalur	Commercial	36.2	98.4	47.4	33.8	95.7	44.6
8	A8-Kallankurichi	Residential	34.1	95.5	44.1	32.6	90.4	42.7
Study Area			32.4	100.7	44.2	31.8	100.7	42.2
MoEF&CC Norms* for Residential Areas			-		55	-		45
MoEF&CC Norms for Commercial Areas			-		65	-		55
MoEF&CC Norms for Industrial Areas			-		75	-		70

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

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

3.7 Water Environment

3.7.1 Hydrogeology

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. The last 10 years Rainfall Data of Ariyalur District is 888.7 mm (Table 3.16).

Ground Water Levels : 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 and give as 5 years average in Table 3.17.

Table : 3.16 Rainfall Data (TWAD)

Year	Rainfall, mm				
	Mar-May	Jun-Sep.	Oct.-Nov.	Dec.-Feb.	Total, mm
2010-11	93.0	329.4	759.1	29.3	1210.8
2011-12	43.0	238.5	596.3	8.4	886.2
2012-13	29.5	301.9	313.6	7.3	652.3
2013-14	128.5	345.2	285.8	1.0	760.5
2014-15	110.0	208.6	361.0	4.5	684.1
2015-16	89.4	263.2	681.2	0.0	1033.8
2016-17	85.0	313.0	138.7	100.0	636.6

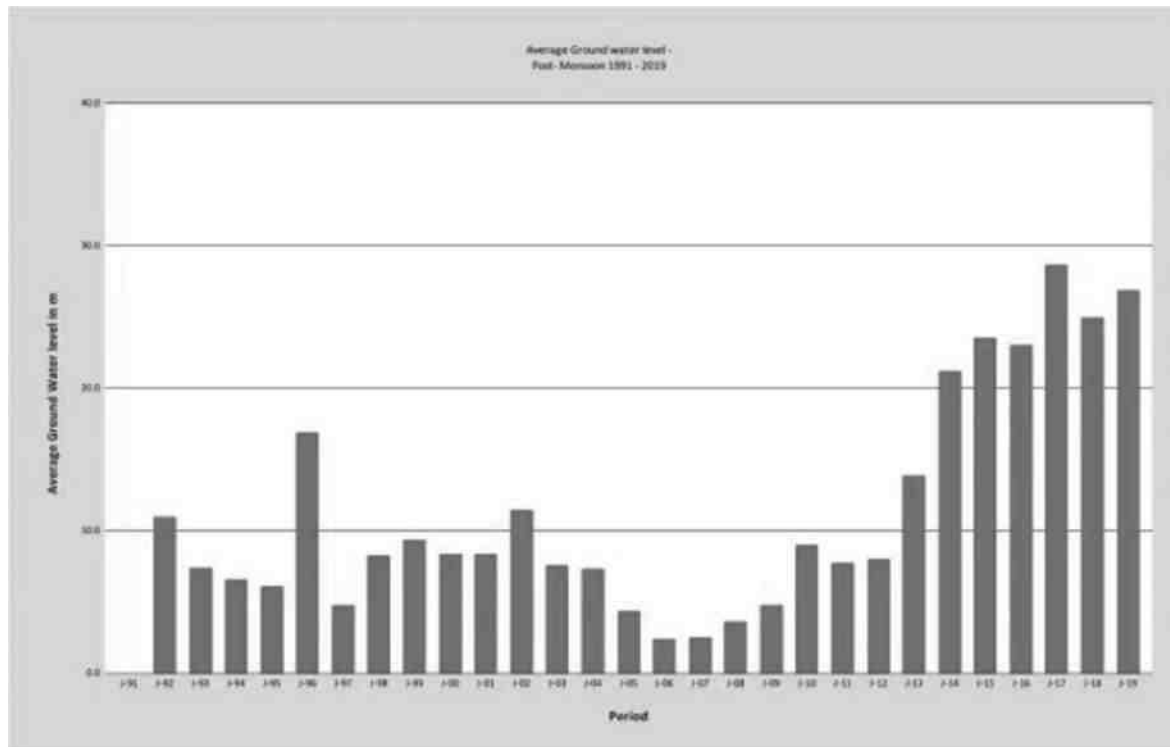
Year	Rainfall, mm				
	Mar-May	Jun-Sep.	Oct.-Nov.	Dec.-Feb.	Total, mm
2017-18	52.2	549.4	491.7	25.8	1119.1
2018-19	0.1	218.4	518.3	0	736.8
2019-20	31.0	588.0	524.0	24.0	1167.0
Annual Avg.	66.2	335.6	467.0	20.0	888.7

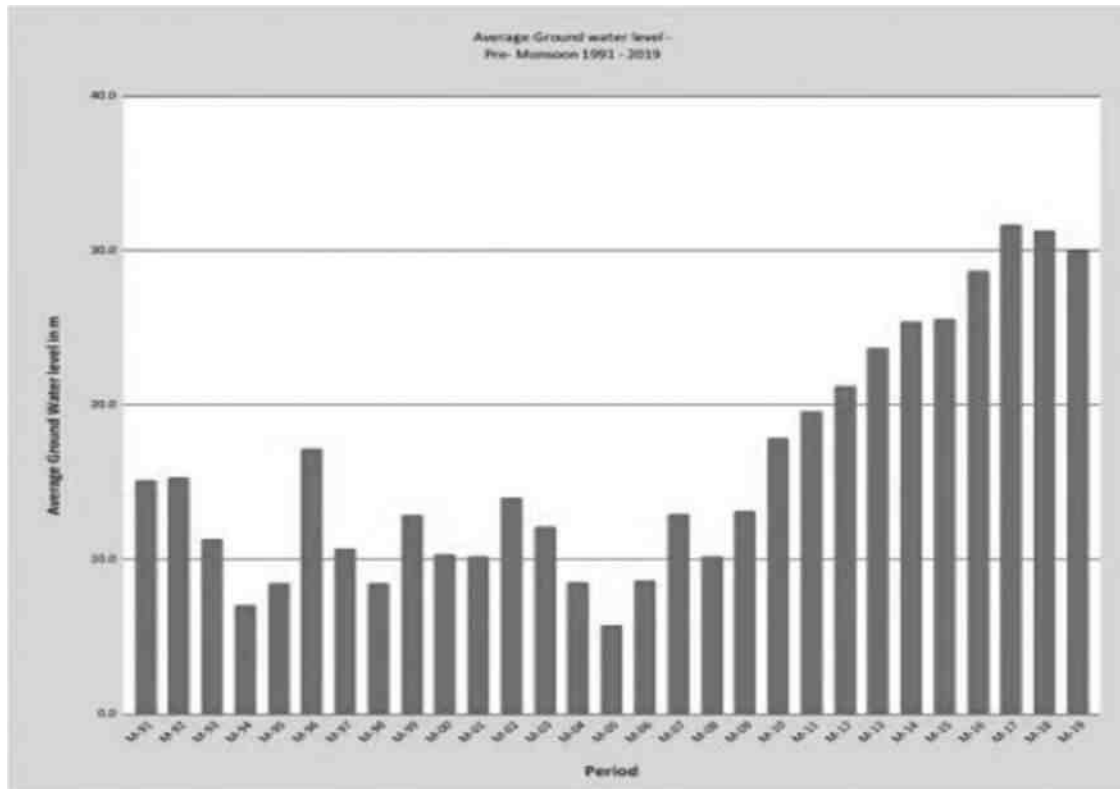
(Source : Ariyalur District Statistic Book; 2019-20)

Table : 3.17 Ground Water Level Data (TWAD)

Monitored Month & Ground Water Level, m BGL													
Jan. 2013	May 2013	Jan 2014	May 2014	Jan 2015	May 2015	Jan 2016	May 2016	Jan 2017	May 2017	Jan 2018	May 2018	Jan 2019	May 2019
13.9	23.6	21.2	25.4	23.6	25.6	23.0	28.7	28.7	31.7	25.0	31.3	26.9	30.0
7-Years Pre-monsoon Average – 28.0 m BGL. 5-Years Post-monsoon Average – 23.2 m BGL Source : TWAD Data for Ariyalur District.													

Ground Water-table in the District ranges from 13.9 m to 28.7 m with average level at **23.2 m BGL during Post-monsoon** and 23.6 m to 31.7 m with average level at **28.0 m BGL during Premonsoon** Period. Data for the Period 1991-2019 are also appended.





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.

Aquifer Parameters	Alluvium	Sedimentary	Hard Rock
Well Yield, lpm	300-950	300-550	80-210
Transmissivity (T), m ² /day	225-1500	90-190	35-130
Permeability (K), m/day	20-50	15-30	5-20
Net Groundwater Availability, MCM			314.97

Existing Gross Groundwater Draft for All Users, MCM	161.52
Stage of Groundwater Development	51 %
Categorization of the District	Safe

The ground water **Stage of Development of Ariyalur Block is Safe (<70%) Category**. Also, there is no Firka of Ariyalur District falls in either in Over Exploited (>100%) and Critical (90-100%) Category.

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 3.18**).

Table : 3.18 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.

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.

The Ground Water Quality Parameters were 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 3.19-3.20** and the abstract of those data is given as **Table 3.21**.

Table : 3.19 Surface Water Quality Data

Monitoring Dates : 10.12.2021; 12.01.2022 & 10.02.2022 (06:00-10:00 hrs.)
(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	7.72	7.69	7.64	7.58	6.5-9.0
2	Colour, Hazen units	<2	<2	<2	<2	-
3	Temperature, °C	26.8	26.6	26.3	26.2	-
4	Turbidity, NTU	1.1	1.6	1.4	1.0	-
5	Residual Chlorine, mg/l	Nil	Nil	Nil	Nil	-
6	Dissolved Oxygen, mg/l	4.8	5.0	5.2	5.4	>4
7	Total Suspended Solids, mg/l	13	18	16	12	-
8	Electrical Conductivity, umhos/cm	600	680	580	560	-
9	Total Dissolved Solids, mg/l	390	440	370	350	-
10	Total Hardness (as CaCO ₃), mg/l	150	190	140	140	-
11	Calcium Hardness, mg/l	80	90	70	70	-
12	Magnesium Hardness, mg/l	70	100	70	70	-
13	Calcium (as Ca), mg/l	32	36	28	28	-
14	Magnesium (as Mg), mg/l	17	24	17	17	-
15	Sodium (as Na), mg/l	28	34	27	30	-
16	Potassium (as K), mg/l	1	3	2	2	-
17	Chlorides (as Cl), mg/l	82	90	76	72	-
18	Sulphates (as SO ₄), mg/l	21	36	24	28	-
19	Total Alkalinity (as CaCO ₃), mg/l	90	100	80	70	-
20	BOD-3 days @ 27°C, mg/l	<2	<2	<2	<2	<3
21	COD, mg/l	8	6	4	8	-
22	Oil & Grease, mg/l	Nil	Nil	Nil	Nil	-
23	Iron (as Fe), mg/l	0.07	0.09	0.06	0.07	-
24	Fluorides (as F), mg/l	0.14	0.17	0.11	0.18	-
25	Nitrates (as NO ₃), mg/l	1.2	1.5	1.0	0.5	-
26	Phosphates (as PO ₄), mg/l	<0.05	<0.05	<0.05	<0.05	-
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	<0.05	<0.05	<0.05	<0.05	-
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	-
33	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	-
34	Aluminium (as Al), mg/l	<0.03	<0.03	<0.03	<0.03	-
35	Cadmium (as Cd), mg/l	<0.005	<0.005	<0.005	<0.005	-
36	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	-
37	Boron (as B), mg/l	<0.005	<0.005	<0.005	<0.005	-
38	Mercury (as Hg), mg/l	<0.005	<0.005	<0.005	<0.005	-
39	Lead (as Pb), mg/l	<0.005	<0.005	<0.005	<0.005	-
40	Zinc (as Zn), mg/l	<0.01	<0.01	<0.01	<0.01	-
41	Percent Sodium, %	28.7	27.6	29.2	31.4	-
42	Total Coliforms, MPN/100 ml	6	12	20	26	<5000
43	Faecal Coliforms, MPN/100 ml	2	8	12	17	-
44	E. Coli, MPN/100 ml	<2	4	10	11	-

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

- : Not included/Not available.

Table : 3.19 (Contn.) Surface Water Quality Data

Monitoring Dates : 10.12.2021; 12.01.2022 & 10.02.2022 (06:00-10:00 hrs.)
(Worst case & Mean values are reported)

Sl. No.	Parameter	W5 Marudaiyar River down stream	W6 Manakudi Tank	W7 Pond, Periyagalur	W8 Pond, Pudupalayam	CPCB Norms*
1	pH	7.53	7.36	7.42	7.51	6.5-9.0
2	Colour, Hazen units	<2	<2	<2	<2	-
3	Temperature, °C	26.3	26.5	26.4	26.6	-
4	Turbidity, NTU	1.3	1.8	1.0	1.7	-
5	Residual Chlorine, mg/l	Nil	Nil	Nil	Nil	-
6	Dissolved Oxygen, mg/l	5.3	5.2	5.4	5.0	>4
7	Total Suspended Solids, mg/l	16	22	13	21	-
8	Electrical Conductivity, umhos/cm	620	480	520	560	-
9	Total Dissolved Solids, mg/l	400	300	330	360	-
10	Total Hardness (as CaCO ₃), mg/l	160	110	120	130	-
11	Calcium Hardness, mg/l	90	60	60	70	-
12	Magnesium Hardness, mg/l	70	50	60	60	-
13	Calcium (as Ca), mg/l	36	24	24	28	-
14	Magnesium (as Mg), mg/l	17	12	14	14	-
15	Sodium (as Na), mg/l	36	24	26	32	-
16	Potassium (as K), mg/l	2	1	1	2	-
17	Chlorides (as Cl), mg/l	78	64	66	70	-
18	Sulphates (as SO ₄), mg/l	34	20	23	26	-
19	Total Alkalinity (as CaCO ₃), mg/l	80	60	70	70	-
20	BOD-3 days @ 27°C, mg/l	<2	<2	<2	<2	<3
21	COD, mg/l	6	2	3	4	-
22	Oil & Grease, mg/l	Nil	Nil	Nil	Nil	-
23	Iron (as Fe), mg/l	0.08	0.06	0.04	0.08	-
24	Fluorides (as F), mg/l	0.14	0.10	0.12	0.14	-
25	Nitrates (as NO ₃), mg/l	0.8	0.5	0.5	1.0	-
26	Phosphates (as PO ₄), mg/l	<0.05	<0.05	<0.05	<0.05	-
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	<0.05	<0.05	<0.05	<0.05	-
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	-
33	Selenium (as Se), mg/l	<0.01	<0.01	<0.01	<0.01	-
34	Aluminium (as Al), mg/l	<0.03	<0.03	<0.03	<0.03	-
35	Cadmium (as Cd), mg/l	<0.005	<0.005	<0.005	<0.005	-
36	Arsenic (as As), mg/l	<0.01	<0.01	<0.01	<0.01	-
37	Boron (as B), mg/l	<0.005	<0.005	<0.005	<0.005	-
38	Mercury (as Hg), mg/l	<0.005	<0.005	<0.005	<0.005	-
39	Lead (as Pb), mg/l	<0.005	<0.005	<0.005	<0.005	-
40	Zinc (as Zn), mg/l	<0.01	<0.01	<0.01	<0.01	-
41	Percent Sodium, %	32.5	31.9	31.8	34.4	-
42	Total Coliforms, MPN/100 ml	21	11	10	15	<5000
43	Faecal Coliforms, MPN/100 ml	14	8	6	9	-
44	E. Coli, MPN/100 ml	10	4	2	4	-

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

- : Not included/Not available.

Table : 3.20 Ground Water Quality Data

Monitoring Dates : 10.12.2021; 12.01.2022 & 10.02.2022 (06:00-10:00 hrs.)
(Worst case & Mean values are reported)

Sl. No.	Parameter	W9 KBD Mine Pit	W10 Borewell, K'kurichi	W11 Borewell, Kattupiringiyam	W12 Borewell, Periyagalur	IS:10500 Norms*
1	pH	7.62	7.63	7.68	7.61	6.5-8.5
2	Colour, Hazen units	<2	<2	<2	<2	5/15#
3	Temperature, °C	26.2	27.0	26.3	26.1	-
4	Turbidity, NTU	0.8	0.8	0.8	0.6	1/5
5	Residual Chlorine, mg/l	Nil	Nil	Nil	Nil	0.2/1.0
6	Dissolved Oxygen, mg/l	5.4	4.6	4.4	4.5	-
7	Total Suspended Solids, mg/l	12	10	10	8	-
8	Electrical Conductivity, umhos/cm	600	680	680	730	-
9	Total Dissolved Solids, mg/l	390	480	430	470	500/2000
10	Total Hardness (as CaCO ₃), mg/l	170	160	180	180	200/600
11	Calcium Hardness, mg/l	90	90	90	100	-
12	Magnesium Hardness, mg/l	80	70	90	80	-
13	Calcium (as Ca), mg/l	36	36	36	40	75/200
14	Magnesium (as Mg), mg/l	19	17	22	19	30/100
15	Sodium (as Na), mg/l	32	40	44	51	-
16	Potassium (as K), mg/l	2	1	1	1	-
17	Chlorides (as Cl), mg/l	80	102	98	104	250/1000
18	Sulphates (as SO ₄), mg/l	28	34	37	42	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	80	80	80	90	200/600
20	BOD-3 days @ 27°C, mg/l	<2	<2	<2	<2	-
21	COD, mg/l	6	2	4	2	-
22	Oil & Grease, mg/l	Nil	Nil	Nil	Nil	-
23	Iron (as Fe), mg/l	0.04	0.04	0.04	0.03	0.3
24	Fluorides (as F), mg/l	0.08	0.12	0.14	0.11	1.0/1.5
25	Nitrates (as NO ₃), mg/l	0.5	0.5	0.5	0.5	45
26	Phosphates (as PO ₄), mg/l	<0.05	<0.05	<0.05	<0.05	-
27	Cyanides (as CN), mg/l	<0.01	<0.01	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	0.001/0.002
30	Manganese (as Mn), mg/l	<0.05	<0.05	<0.05	<0.05	-
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	<0.03	<0.03	<0.03	<0.03	0.03/0.2
35	Cadmium (as Cd), mg/l	<0.005	<0.005	<0.005	<0.005	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	<0.005	<0.005	<0.005	<0.005	0.5/1.0
38	Mercury (as Hg), mg/l	<0.005	<0.005	<0.005	<0.005	0.001
39	Lead (as Pb), mg/l	<0.005	<0.005	<0.005	<0.005	0.01
40	Zinc (as Zn), mg/l	<0.10	<0.10	<0.10	<0.10	5/15
41	Percent Sodium, %	28.7	35.0	34.5	37.9	-
42	Total Coliforms, MPN/100 ml	Absent	Absent	Absent	Absent	Absent
43	Faecal Coliforms, MPN/100 ml	Absent	Absent	Absent	Absent	Absent
44	E. Coli, MPN/100 ml	Absent	Absent	Absent	Absent	Absent

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

Table : 3.20 (Contn.) Ground Water Quality Data

Monitoring Dates : 10.12.2021; 12.01.2022 & 10.02.2022 (06:00-10:00 hrs.)
(Worst case & Mean values are reported)

Sl. No.	Parameter	W13 Borewell, Reddipalayam	W14 Borewell, Pudupalayam	W15 Borewell, Hastinapuram	W16 Borewell, Kovilankudi kadu	IS:10500 Norms*
1	pH	7.73	7.65	7.73	7.63	6.5-8.5
2	Colour, Hazen units	<2	<2	<2	<2	5/15#
3	Temperature, °C	26.8	26.2	26.6	26.3	-
4	Turbidity, NTU	1.1	0.7	1.0	0.6	1/5
5	Residual Chlorine, mg/l	Nil	Nil	Nil	Nil	0.2/1.0
6	Dissolved Oxygen, mg/l	4.4	4.6	4.4	4.8	-
7	Total Suspended Solids, mg/l	13	10	12	8	-
8	Electrical Conductivity, umhos/cm	660	580	760	550	-
9	Total Dissolved Solids, mg/l	420	380	490	360	500/2000
10	Total Hardness (as CaCO ₃), mg/l	170	140	180	130	200/600
11	Calcium Hardness, mg/l	90	70	100	70	-
12	Magnesium Hardness, mg/l	80	70	80	60	-
13	Calcium (as Ca), mg/l	36	28	40	28	75/200
14	Magnesium (as Mg), mg/l	19	17	19	14	30/100
15	Sodium (as Na), mg/l	43	38	52	30	-
16	Potassium (as K), mg/l	2	1	2	1	-
17	Chlorides (as Cl), mg/l	94	88	112	82	250/1000
18	Sulphates (as SO ₄), mg/l	32	27	44	24	200/400
19	Total Alkalinity (as CaCO ₃), mg/l	90	70	100	70	200/600
20	BOD-3 days @ 27°C, mg/l	<2	<2	<2	<2	-
21	COD, mg/l	6	4	6	2	-
22	Oil & Grease, mg/l	Nil	Nil	Nil	Nil	-
23	Iron (as Fe), mg/l	0.07	0.04	0.08	0.03	0.3
24	Fluorides (as F), mg/l	0.14	0.12	0.14	0.08	1.0/1.5
25	Nitrates (as NO ₃), mg/l	0.8	0.5	1.0	0.5	45
26	Phosphates (as PO ₄), mg/l	<0.05	<0.05	<0.05	<0.05	-
27	Cyanides (as CN), mg/l	<0.01	<0.01	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	0.001/0.002
30	Manganese (as Mn), mg/l	<0.05	<0.05	<0.05	<0.05	-
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	<0.03	<0.03	<0.03	<0.03	0.03/0.2
35	Cadmium (as Cd), mg/l	<0.005	<0.005	<0.005	<0.005	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	<0.005	<0.005	<0.005	<0.005	0.5/1.0
38	Mercury (as Hg), mg/l	<0.005	<0.005	<0.005	<0.005	0.001
39	Lead (as Pb), mg/l	<0.005	<0.005	<0.005	<0.005	0.01
40	Zinc (as Zn), mg/l	<0.10	<0.10	<0.10	<0.10	5/15
41	Percent Sodium, %	35.1	36.9	38.2	33.2	-
42	Total Coliforms, MPN/100 ml	Absent	Absent	Absent	Absent	Absent
43	Faecal Coliforms, MPN/100 ml	Absent	Absent	Absent	Absent	Absent
44	E. Coli, MPN/100 ml	Absent	Absent	Absent	Absent	Absent

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

Table : 3.21 Water Quality Status

Monitoring Dates : 10.12.2021; 12.01.2022 & 10.02.2022

Sl. No.	Parameter	Concentration Range & Norms			
		Surface Waters	CPCB Norms* for Surface Waters	Ground Waters	IS:10500 Norms** for Drinking Waters
1	pH	7.36-7.72	6.5-9.0	7.61-7.73	6.5-8.5
2	Total Dissolved Solids, mg/l	300-440	-	360-490	500-2000*
3	Dissolved Oxygen, mg/l	4.8-5.4	>4	4.4-5.4	-
4	BOD (3 days @ 27 °C), mg/l	<2	<3	<2	-
5	COD, mg/l	2-8	-	2-6	-
6	Oil & Grease, mg/l	Nil	-	Nil	-
7	Chlorides (as Cl), mg/l	64-90	-	80-112	250-1000
8	Iron (as Fe), mg/l	0.04-0.09	-	0.03-0.08	0.3/1.0
9	Trace Metals, mg/l	<0.01	-	<0.01	<0.001-<0.01
10	Total Coliforms, MPN/100 ml	6-26	5000	Absent	Absent

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

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

- : Not included/Not available.

The **surface water** samples were monitored with pH in the range 7.36-7.72 against the Limit value of 6.5-9.0. DO levels were in the range 4.8-5.4 mg/l against the minimum requirement value of 4.0 mg/l. TDS values were monitored in the range of 300-440 mg/l. Chloride values ranging from 64 mg/l to 90 mg/l. Iron content was found to be in the range 0.04-0.09 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 2-8 mg/l respectively. The surface water quality were found to be within the prescribed CPCB Norms.

The pH of the **ground water** samples were ranging from 7.61-7.73 against the BIS Norm of 6.5-8.5. TDS and Chloride values were found to be in the range 380-490 mg/l (Norm 500 mg/l or 2,000 mg/l in the absence of alternate source) and 80-112 mg/l (Norm 250/1000 mg/l) respectively. Iron content was found to be in the range 0.03-0.08 mg/l. Oil & Grease, Cyanides, Phenols, Pesticides, etc. were found to be absent. Most of the trace metals were monitored to be below their detectable limits. In general, the water quality of ground waters were found to be within the prescribed IS 10500:2012 Norms for Drinking in the absence of an alternative source.

The pH value of the **Mine Pit water (not in operation)** was found to be 7.62. TDS value was 390 mg/l. Chloride value was 80 mg/l. Iron content was found to be 0.04 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.

Exceedance Factor (EF) : All the monitored Water Quality Parameters were found to be well within the respective Limit Values and there was no Exceedance of the Norms.

3.8 Land Environment

3.8.1 Soil Status

The collected soil quality data are given as **Table 3.22**. Soils with medium compaction and silty loam texture were predominant in the study area. Soil pH values (7.63-8.02) were found to be in alkaline range and Electrical Conductivity values were in the range 1.13-1.63 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 2.16-3.31 (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. The soil water properties reveal that the soil will suit for salt tolerant and semisalt tolerant plants

Table : 3.22 Soil Status

Monitoring Date : 12.01.2022

Sl. No.	Parameter	S1 Green Belt	S2 OB Dump	S3 Dry Agri. Land, Periyana-galur	S4 Forrest Land, Vilangudi	S5 Agri. Land, Pudu-palayam	Desirable Range*
i	Colour	Brown	Brown	Grey	Reddish Brown	Brown	-
ii	Compaction	Medium	Low	Medium	Medium	Medium	-
1	pH (10% Solution)	7.88	8.02	7.78	7.72	7.63	5.5-9.0
2	Electrical Conductivity, mmhos/cm	1.33	1.63	1.24	1.28	1.13	0.2-0.5
3	Natural Moisture Content, %	10.4	8.7	9.6	10.7	12.6	-
4	Organic Carbon, %	0.82	0.70	0.93	1.12	1.23	>0.75
5	Nitrogen (as N), %	0.008	0.006	0.010	0.010	0.014	0.01-0.02
6	Phosphorus (as P), %	0.004	0.005	0.005	0.006	0.007	0.002-0.004
7	Potassium (as K), %	0.008	0.011	0.005	0.008	0.006	>0.01
8	Sodium (as Na), ppm	150	180	140	140	110	-
9	Calcium (as Ca), ppm	90	90	80	90	80	-
10	Magnesium (as Mg), ppm	80	80	90	80	70	-
11	Chlorides (as Cl), ppm	260	300	210	220	190	-
12	Sulphates (as SO ₄), ppm	90	110	80	70	70	-
13	Cation Exchange Capacity, meq/100 g	22.5	19.4	23.6	22.9	24.0	10-30
14	Grain Size Distribution :i. Sand, %	28.4	32.9	24.1	27.3	23.7	-
ii	Silt, %	63.3	60.0	67.9	62.3	66.6	-
iii	Clay, %	8.3	7.1	8.0	10.4	9.7	-
15	Textural Class	Silty loam	Loamy	Silty loam	Silty loam	Silty loam	Loam
16	Bulk Density, g/cc	1.33	1.38	1.35	1.32	1.30	-
17	Infiltration Rate, cm/hr	3.6	4.4	3.8	3.7	3.5	-
18	Field Capacity, %	22.7	18.8	24.2	24.6	27.2	-
19	Wilting Coefficient, %	1.3	0.5	1.0	1.6	2.2	>0.4
20	Available Water Storage Capacity, %	21.4	18.3	23.2	23.0	25.0	-
21	Sodium Absorbing Ratio	2.76	3.31	2.54	2.58	2.16	<5

* : Desirable Range for High Production Soil.

3.8.2 Land Use Pattern

For Land use study of the Study Area, IRS P6 LISS-III **Satellite Imagery**/data (dated 14.03.2021) is used (**Fig. 3.5**). Visual interpretation technique has been adopted for land use classification based on 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 3.23**. 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 : 3.23 Land Use Pattern

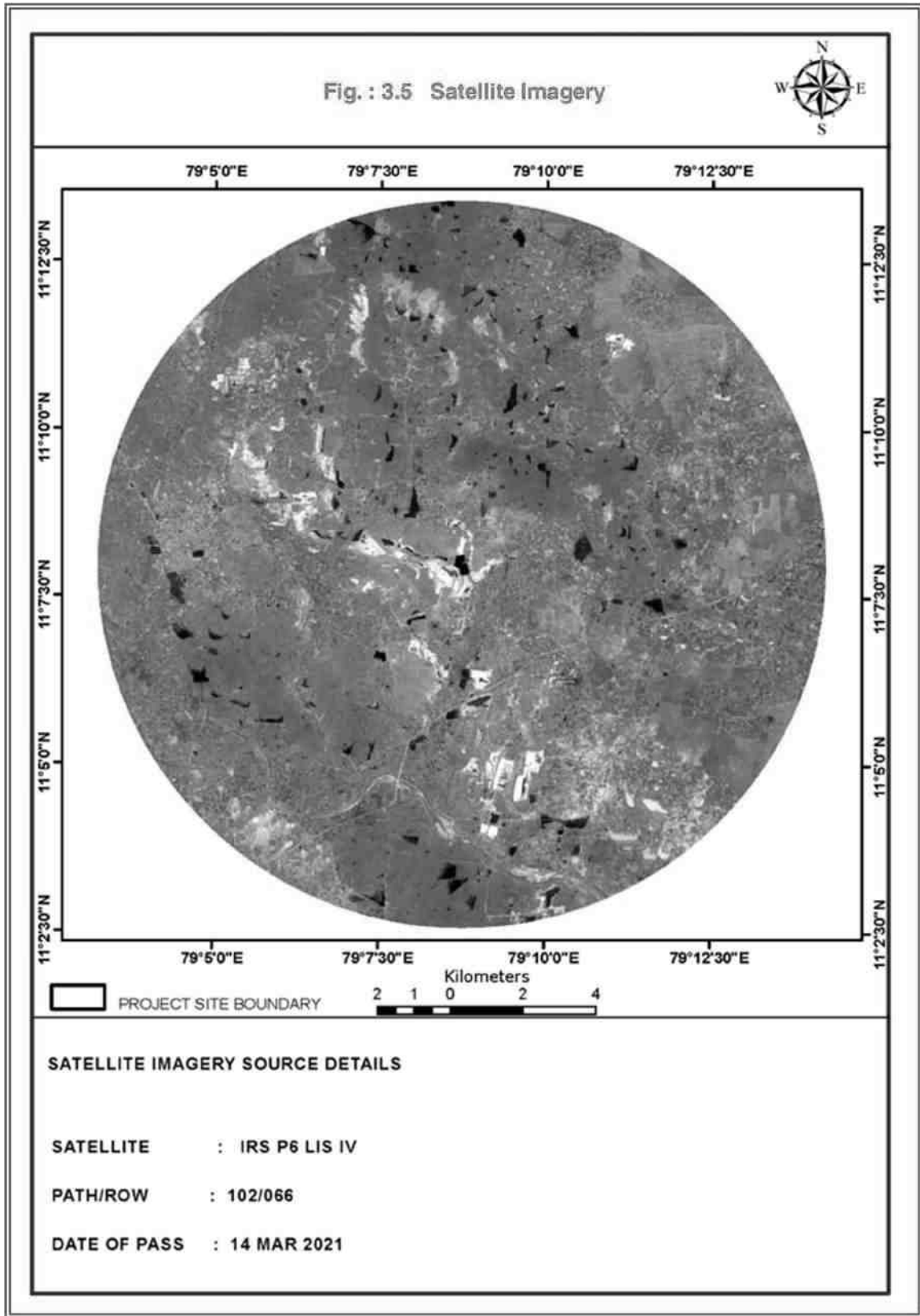
Sl. No.	Land Use	Area, sq, km	Area (in %)
1	Agricultural Crop Land	94.28	29.97
2	Fallow Land	138.52	43.41
3	Barren/Unculturable/Scrub	27.54	8.78
4	Other Mine/Quarry/Industry	10.13	3.22
5	Forest	18.34	5.83
6	Built-up Land	15.33	4.88
7	Water bodies	12.29	3.91
Total		320.72	100.00

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 3.24**. The list of plant species in the Core and Buffer Zones are presented in **Table 3.25 & Table 3.26** 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.



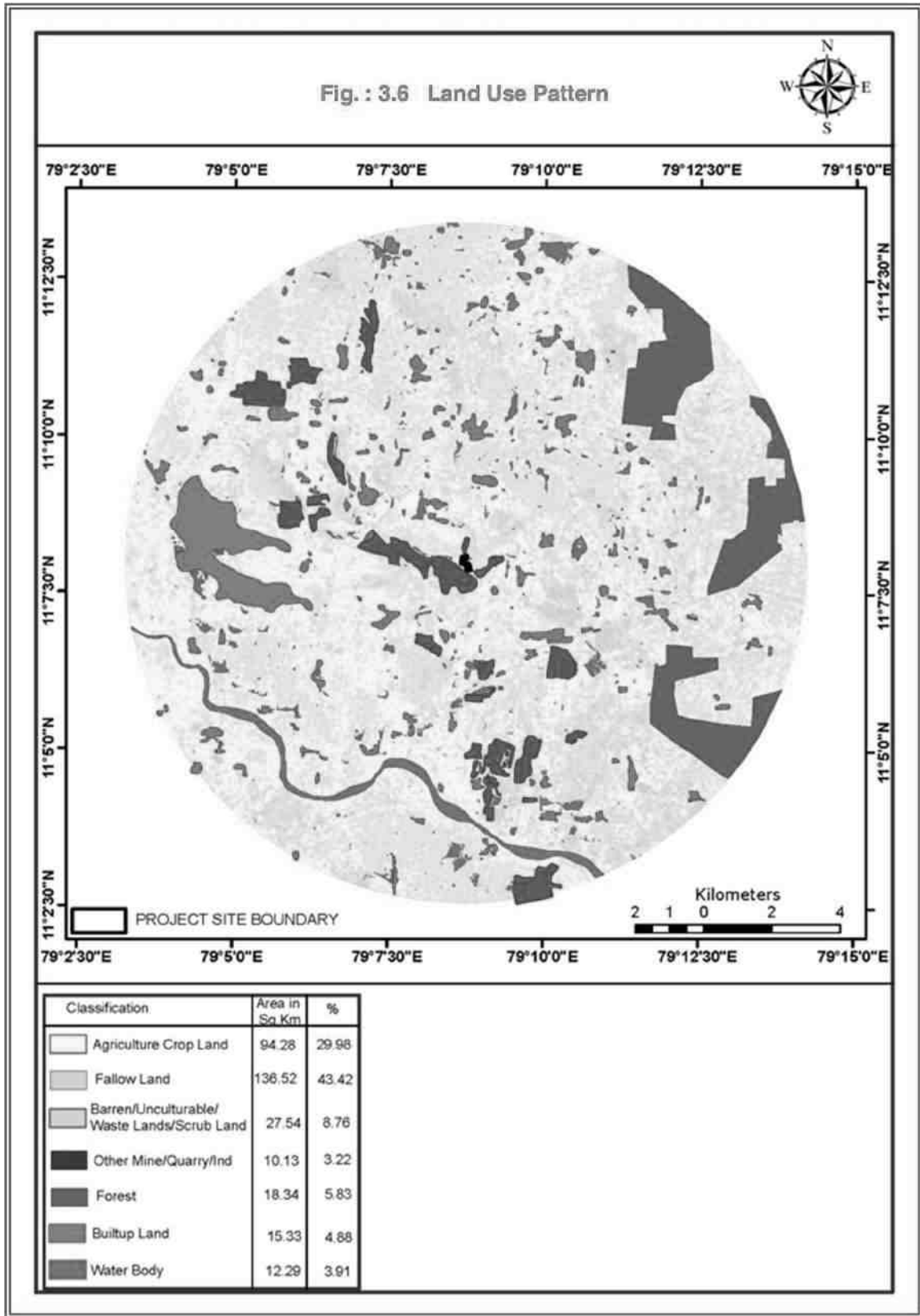


Table : 3.24 List of Flora in the Reserve Forests

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	Caesaiaceae	Konnai	Kassod
11	Eucalyptus globulus	Myrtaceae	Araspadi, Thailam	Eucalyptus
12	Ficus benghalensis	Moraceae	Alamaram	Banyan
13	Lanea 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 oenoplia	Rhamnaceae	Suraimul	-

Table : 3.25 List of Flora - Core Zone (Green Belt)

Sl. No.	Botanical Name	Family	Common Name	Habit
1	Azadirachta indica	Meliaceae	Vembu, Veppa	Tree
2	Pongamia pinnata	Fabaceae	Pungai, Pungan	Tree
3	Morinda tinctoria	Rubiaceae	Nuna	Tree
4	Leucaena leucocephala	Fabaceae	Periyatagarai, Horse	Tree
5	Abutilon indicum	Malvaceae	Country Mallow, Tutti	Herb
6	Acalypha indica	Euphorbiaceae	Kuppaimeni	Herb
7	Aristida adscensionis	Poaceae	Common Needle grass	Herb
8	Cassia auriculata	Fabaceae	Aavarampoo	Shrub
9	Datura metel	Solanaceae	Thorn apple, Oomathai	Shrub
10	Vitex negundo	Lamiaceae	Nochi	Shrub

Table : 3.26 List of Flora - Distribution of Vegetation in Buffer Zone

S.No.	Name of the Plant (Scientific)	Family Name	Common Name	Habit
Agricultural Crops				
1	<i>Arachis hypogea</i>	Fabaceae	Groundnut	Herb
2	<i>Oryza sativa</i>	Poaceae	Rice	Herb
3	<i>Phaseolus mungo</i>	Fabaceae	Black gram	Herb
4	<i>Sacharum officinarum</i>	Poaceae	Sugarcane	Herb
5	<i>Zea mays</i>	Poaceae	Maize	Herb
Commercial Crops (including vegetables)				
1	<i>Capsicum frutescens</i>	Solanaceae	Milagaai	Herb
2	<i>Carica papaya</i>	Caricaceae	Papaya	Tree
3	<i>Citrus limon</i>	Rutaceae	Lemon	Tree
4	<i>Cocos nucifera</i>	Arecaceae	Coconut, Thennai	Tree
5	<i>Cucurbita pepo</i>	Cucurbitaceae	Pumpkin	Creeper
6	<i>Cyamopsis tetragonoloba</i>	Fabaceae	Cluster bean	Shrub
7	<i>Gossypium arboreum</i>	Malvaceae	Cotton, Paruthi	Shrub
8	<i>Hibiscus esculentus</i>	Malvaceae	Lady's finger, Vendai	Herb
9	<i>Lagenaria vulgaris</i>	Cucurbitaceae	Bottle gourd	Creeper
10	<i>Lycopersicum esculentum</i>	Solanaceae	Tomato	Herb
11	<i>Mangifera indica</i>	Anacardiaceae	Mango	Tree
12	<i>Momordica charantia</i>	Cucurbitaceae	Bittergourd	Creeper
13	<i>Moringa oleifera</i>	Moringaceae	Drumstick, Murungai	Tree
14	<i>Musa paradisiaca</i>	Musaceae	Plantain, Vazhai	Tree
15	<i>Psidium gujava</i>	Myrtaceae	Guava	Tree
16	<i>Ricinus communis</i>	Euphorbiaceae	Castor Bean Plant	Shrub
17	<i>Sesamum indicum</i>	Pedaliaceae	Seasame, Ellu	Herb
18	<i>Solanum melongena</i>	Solanaceae	Brinjal	Herb
19	<i>Solanum torvum</i>	Solanaceae	Turkey berry	Shrub
20	<i>Trichosanthes cucurmina</i>	Cucurbitaceae	Snake gourd	Creeper
21	<i>Vicia faba</i>	Fabaceae	Broad Bean	Creeper
Plantations				
1	<i>Anacardium occidentale</i>	Anacardiaceae	Cashew	Tree
2	<i>Cocos nucifera</i>	Arecaceae	Coconut, Thennai	Tree
3	<i>Casuarina equisetifolia</i>	Casuarinaceae	Casuarina, Savukku	Tree
4	<i>Eucalyptus sp.</i>	Myrtaceae	Eucalyptus	Tree
5	<i>Musa paradisiaca</i>	Musaceae	Plantain, Vazhai	Tree
6	<i>Tectona grandis</i>	Lamiaceae	Teak	Tree
Natural Vegetation				
1	<i>Abrus precatorius</i>	Fabaceae	Coral bead vine, Rosary pea,	Climber
2	<i>Abutilon indicum</i>	Malvaceae	Country Mallow, Tutti	Herb
3	<i>Acacia leucophloea</i>	Mimosaceae	Velvelam, White babool	Tree
4	<i>Acacia nilotica</i>	Mimosaceae	Babul, Karuvelam	Tree
5	<i>Acalypha indica</i>	Euphorbiaceae	Kuppaimeni	Herb
6	<i>Acanthospermum hispidum</i>	Asteraceae	Seruppadithazhai,	Herb
7	<i>Achchyranthes aspera</i>	Amaranthaceae	Prickly Chaff flower, Nayuruvi	Herb
8	<i>Adathoda vasica</i>	Acanthaceae	Vasaca, Adathodai	Shrub
9	<i>Adina cordifolia</i>	Rubiaceae	Manjakadambu	Tree
10	<i>Aegle marmelos</i>	Rutaceae	Wood Apple, vilvam	Tree
11	<i>Aerva lanata</i>	Amaranthaceae	Sirupulai	Herb
12	<i>Agave sisalana</i>	Agavaceae	Kathalai, Sisal	Herb
13	<i>Ageratum conyzoides</i>	Asteraceae	Goat weed, Pumppillu	Herb

S.No.	Name of the Plant (Scientific)	Family Name	Common Name	Habit
14	<i>Ailanthus excelsa</i>	Simaroubaceae	Indian Tree of Heaven,	Tree
15	<i>Albizia amara</i>	Mimosaceae	Usilamaram	Tree
16	<i>Albizia lebbek</i>	Mimosaceae	Siris Tree, Vagai	Tree
17	<i>Aloe vera</i>	Liliaceae	Kathalai	Herb
18	<i>Alternanthera sessilis</i>	Amaranthaceae	Dwarf Copperleaf, Ponnanganni	Herb
19	<i>Amaranthus spinosus</i>	Amaranthaceae	Mullukkirai	Herb
20	<i>Amaranthus viridis</i>	Amaranthaceae	Kuppaikeerai	Herb
21	<i>Ammannia baccifera</i>	Lythraceae	Acrid weed, Kalluruvi	Herb
22	<i>Anacardium occidentale</i>	Anacardiaceae	Cashew	Tree
23	<i>Anona squamosa</i>	Anonaceae	Custard apple	Tree
24	<i>Apluda mutica</i>	Poaceae	Mauritian Grass	Herb
25	<i>Arachis hypogea</i>	Faboideae	Ground nut	Herb
26	<i>Argemone mexicana</i>	Papaveraceae	Prickly poppy, Kudiyotti	Shrub
27	<i>Aristida adscensionis</i>	Poaceae	Coomon Needle grass	Herb
28	<i>Artocarpus heterophyllus</i>	Moraceae	Jackfruit	Tree
29	<i>Azadirachta indica</i>	Meliaceae	Neem, Vembu	Tree
30	<i>Bambusa arundanacea</i>	Poaceae	Bamboo	Tree
31	<i>Barleria prionitis</i>	Acanthaceae	Porcupine flower, Kundan	Herb
32	<i>Bassia latifolia</i>	Sapotaceae	Iluppai	Tree
33	<i>Blumea lacera</i>	Asteraceae	Kattumullangi, Narakkarandai	Herb
34	<i>Boerheavia diffusa</i>	Nyctaginaceae	Pig weed, Mukkarattai Keerai	Herb
35	<i>Borassus flabellifer</i>	Arecaceae	Palmyra Palm	Tree
36	<i>Bougainvillea spectabilis</i>	Nyctaginaceae	Kaakithapoo	Shrub
37	<i>Bulbostylis barbatta</i>	Cyperaceae	Mukkutikorei	Herb
38	<i>Butea monosperma</i>	Fabaceae	Flame of Forest	Tree
39	<i>Caesalpinia pulcherrima</i>	Caesalpiaceae	Peacock Flower, Mayurkondrai	Tree
40	<i>Calendula officinalis</i>	Asteraceae	Marigold	Herb
41	<i>Calophyllum inophyllum</i>	Clusiaceae	Punnai	Tree
42	<i>Calotropis gigantea</i>	Asclepiadaceae	Crown Flower, Erukku	Shrub
43	<i>Calotropis procera</i>	Asclepiadaceae	Vellerukku	Shrub
44	<i>Canna indica</i>	Cannaceae	Indian shot, Kalvalai	Shrub
45	<i>Capparis sepiaria</i>	Capparaceae	Kattukkathiri	Shrub
46	<i>Carica papaya</i>	Caricaceae	Pappaali	Tree
47	<i>Cassia auriculata</i>	Fabaceae	Aavarampoo	Shrub
48	<i>Cassia fistula</i>	Fabaceae	Golden shower tree, Kondrai	Tree
49	<i>Cassia occidentalis</i>	Caesalpiaceae	Coffee weed, Payaverai	Herb
50	<i>Cassia siamea</i>	Caesalpiaceae	Manja konnai	Tree
51	<i>Cassia tora</i>	Caesalpiaceae	Sickle senna, Tagarai	Herb
52	<i>Casuarina equisetifolia</i>	Casuarinaceae	Whistling Pine, Savukku	Tree
53	<i>Ceiba pentandra</i>	Bombacaceae	Silk-Cotton Tree,	Tree
54	<i>Cenchrus ciliaris</i>	Poaceae	Buffel grass	Herb
55	<i>Chloris dolichostachya</i>	Poaceae	Finger grass, Kuruthupillu	Herb
56	<i>Chrysanthemum sp.</i>	Asteraceae	Chrysanthemum, Samanthi	Herb
57	<i>Cissus quadrangularis</i>	Vitaceae	Devil's Backbone, Pirandai	Climber
58	<i>Citrus limon</i>	Rutaceae	Lemon	Tree
59	<i>Cleome gynandra</i>	Cleomaceae	Wild Spider flower, Nalvelai	Herb
60	<i>Cleome viscosa</i>	Cleomaceae	Tickweed, Naikkaduku	Herb
61	<i>Clitoria ternatea</i>	Fabaceae	Sankupushpam	Climber
62	<i>Coccinia indica</i>	Cucurbitaceae	Kovai	Climber
63	<i>Cocculus hirsutus</i>	Menispermaceae	Broom Creeper, Kattukkodi	Climber
64	<i>Cocos nucifera</i>	Palmae	Coconut	Tree
65	<i>Codiaeum variegatum</i>	Euphorbiaceae	Croton	Shrub

S.No.	Name of the Plant (Scientific)	Family Name	Common Name	Habit
66	Commelina benghalensis	Commelinaceae	Dew Flower, Kanavachai	Herb
67	Corchorus olitorius	Tiliaceae	Perattikkirai	Shrub
68	Crotolaria retusa	Fabaceae	Rattlepod	Herb
69	Croton sparsiflorus	Euphorbiaceae	Reilpoondu	Herb
70	Cucumis melo	Cucurbitaceae	Musk melon, Thumattikai	Herb
71	Cucumis sativus	Cucurbitaceae	Cucumber	Climber
72	Cuscuta reflexa	Convolvulaceae	Verillakothan, Kodyagundal	Climber
73	Cymbopogon sp.	Poaceae	Lemon grass	Herb
74	Cynodon dactylon	Poaceae	Bermuda grass, Arugampul	Herb
75	Cyperus difformis	Cyperaceae	Smallflower umbrella-sedge	Herb
76	Cyprus rotundus	Cyperaceae	Korai, Nut grass	Herb
77	Datura metel	Solanaceae	Thorn apple, Oomathai	Shrub
78	Delonix regia	Fabaceae	Gulmohar	Tree
79	Dendrophthoe falcata	Loranthaceae	Honey Suckle Mistletoe,	Herb
80	Dichanthium annulatum	Poaceae	Marvel grass	Herb
81	Digetaria adscendens	Poaceae	Crab grass	Herb
82	Digetaria bicornis	Poaceae	Finger grass	Herb
83	Eclipta alba	Asteraceae	Bhringaraj, Karisalankanni	Herb
84	Eclipta prostrata	Asteraceae	False daisy, Karisalankanni	Herb
85	Eichhornia crassipes	Pontederiaceae	Water hyacinth	Aquatic Weed
86	Emblica officinalis	Phyllanthaceae	Indian gooseberry, Nelli	Tree
87	Enicostemma axillare	Gentianaceae	Vellarugu	Herb
88	Eragrostis spectabilis	Poaceae	Bunchgrass	Herb
89	Erythrina indica	Fabaceae	Mullu murungai	Tree
90	Erythrina variegata	Fabaceae	Indian coral tree,	Tree
91	Eucalyptus globulus	Myrtaceae	Blue gum	Tree
92	Euphorbia antiquorum	Euphorbiaceae	Kalli, Triangular Spurge	Tree
93	Euphorbia heterophylla	Euphorbiaceae	Painted euphorbia	Herb
94	Euphorbia hirta	Euphorbiaceae	Asthma weed, Ammam	Herb
95	Euphorbia tirucalli	Euphorbiaceae	Pencil cactus, Thirukalli	Shrub
96	Evolvulus alsinoides	Convolvulaceae	Dwarf Morning Glory,	Herb
97	Ficus benghalensis	Moraceae	Banyan, Alamaram	Tree
98	Ficus religiosa	Moraceae	Peepal, Arasamaram	Tree
99	Gardenia jasminoides	Rubiaceae	Cape jasmine, Kumbai	Shrub
100	Gisekia pharnaceoides	Aizoaceae	Manal keerai	Herb
101	Gloriosa superba	Colchicaceae	Flame lily, Kallappai kilangu	Herb
102	Gomphrena globosa	Amaranthaceae	Globe Amaranth, Vaadamalli	Herb
103	Heliotropium indicum	Boraginaceae	Indian heliotrope, Thel kodukku	Herb
104	Hemidesmus indicus	Apocynaceae	Indian sarasaparilla, Nannari	Herb
105	Heterostemma tanjorensis	Asclepiadaceae	Palakeerai	Herb
106	Hibiscus cannabinus	Malvaceae	Pulichakeerai	Shrub
107	Hibiscus esculentus	Malvaceae	Lady's finger, Vendai	Herb
108	Hibiscus micranthus	Malvaceae	Tiny Flower Hibiscus	Herb
109	Hibiscus rosasinensis	Malvaceae	Shoeflower, Sembaruthi	Shrub
110	Hygrophila auriculata	Acanthaceae	Marsh Barbel, Neermulli	Herb
111	Hyptis suaveolens	Lamiaceae	Pignut	Shrub
112	Impatiens balsamina	Balsaminaceae	Garden Balsam,	Herb
113	Indigofera tinctoria	Fabaceae	Cassia Indigo, Avuri	Shrub
114	Ipomea carnea	Convolvulaceae	Bush Morning Glory	Shrub
115	Ipomea hederfolia	Convolvulaceae	Kanavaiikkodi	Herb
116	Ipomea obscura	Convolvulaceae	Obscure morning glory, Chirutali	Herb
117	Ixora coccinea	Rubiaceae	Ixora, Vedchi	Shrub

S.No.	Name of the Plant (Scientific)	Family Name	Common Name	Habit
118	<i>Ixora parviflora</i>	Rubiaceae	Torch tree, Shulundu	Tree
119	<i>Jasminum officinale</i> L.	Oleaceae	Jasmine	Shrub
120	<i>Jasminum arborescens</i>	Oleaceae	Shrubby Jasmine, Kattumalligai	Shrub
121	<i>Jatropha glandulifera</i>	Euphorbiaceae	Kaatuamanakku	Shrub
122	<i>Kyllinga triceps</i>	Cyperaceae	Spikes edge, Velutta Nirbasi	Herb
123	<i>Lannea coromandelica</i>	Anacardiaceae	Indian Ash Tree, Othiyamaram	Tree
124	<i>Lantana camara</i>	Verbenaceae	Lantana, Unnichi	Shrub
125	<i>Lawsonia inermis</i>	Lythraceae	Henna, Maruthondri	Shrub
126	<i>Lemna minor</i>	Arecaceae	Common Duckweed	Weed
127	<i>Leucaena leucocephala</i>	Fabaceae	Periyatagarai, Horse Tamarind	Shrub
128	<i>Leucas aspera</i>	Lamiaceae	Common Leucas, Thumbai	Herb
129	<i>Limonia acidissima</i>	Rutaceae	Wood apple, Vilampazham	Tree
130	<i>Lycopersicon esculentum</i>	Solanaceae	Thakkali	Herb
131	<i>Malvastrum coromandelianum</i>	Malvaceae	False Mallow	Herb
132	<i>Mangifera indica</i>	Anacardiaceae	Mango	Tree
133	<i>Marselia quadrifolia</i>	Marsileaceae	Four Leaf Clover, Araikkeerai	Herb
134	<i>Melia azadirachta</i>	Meliaceae	Indian Liliac, Malaivembu	Tree
135	<i>Merremia emarginata</i>	Convolvulaceae	Kidney Leaf Morning Glory,	Herb
136	<i>Millingtonia hortensis</i>	Bignoniaceae	Tree Jasmine, Katmalli	Shrub
137	<i>Mimosa hamata</i>	Mimosaceae	Hooked Mimosa	Shrub
138	<i>Mimosa pudica</i>	Mimosaceae	Touch-me-not, Thottachurungi	Herb
139	<i>Morinda tinctoria</i>	Rubiaceae	Nuna	Tree
140	<i>Moringa oleifera</i>	Moringaceae	Drumstick, Murungai	Tree
141	<i>Murraya koengii</i>	Rutaceae	Curry leaf, Karuveppilai	Shrub
142	<i>Musa paradisiaca</i>	Musaceae	Banana	Tree
143	<i>Nelumbo nucifera</i>	Nelumbonacea	Lotus	Aquatic Plant
144	<i>Nerium indicum</i>	Apocynaceae	Sevvarali	Shrub
145	<i>Nerium oleander</i>	Apocynaceae	Oleander, Arali	Shrub
146	<i>Nymphaea</i> sp.	Nymphaeaceae	Water Lily	Aquatic Plant
147	<i>Ocimum americanum</i>	Lamiaceae	Hoary Basil, Nai Thulasi	Herb
148	<i>Ocimum basilicum</i>	Lamiaceae	Sweet Basil, Thirunitruthulasi	Herb
149	<i>Ocimum gratissimum</i>	Lamiaceae	Wild Basil, Peruntulasi	Herb
150	<i>Ocimum sanctum</i>	Lamiaceae	Holy Basil, Thulasi	Herb
151	<i>Oldenlandia umbellata</i>	Rubiaceae	Choyroot, Chayaver	Herb
152	<i>Opuntia dillenii</i>	Cactaceae	Prickly Pear, Chappathikkalli	Shrub
153	<i>Opuntia vulgaris</i>	Aizoaceae	Pricklypear	Shrub
154	<i>Oxalis corniculata</i>	Oxalidaceae	Creeping Wood Sorrel, Paliakiri	Climber
155	<i>Pandanus odoratissimus</i>	Pandanaceae	Thazhai	Shrub
156	<i>Parthenium hysterophorus</i>	Asteraceae	Congress grass	Herb
157	<i>Passiflora foetida</i>	Passifloraceae	Stinking passionflower,	Climber
158	<i>Pavetta indica</i>	Rubiaceae	Indian Pavetta, Kattukkarani	Shrub
159	<i>Pavonia zeylanica</i>	Malvaceae	Sittamutti, Thengai poondu	Shrub
160	<i>Peltophorum pterocarpum</i>	Fabaceae	Copperpod, Perunkondrai	Tree
161	<i>Pergularia daemia</i>	Asclepiadaceae	Pergularia, Uttamani, Seendhal	Climber
162	<i>Phoenix acaulis</i>	Arecaceae	Stemless Date Palm	Shrub
163	<i>Phoenix sylvestris</i>	Arecaceae	Eecham	Tree
164	<i>Phyllanthus nodifolia</i>	Verbanaceae	Poduthalai	Herb
165	<i>Phyllanthus niruri</i>	Phyllanthaceae	Keelanelli, Seed under leaf	Herb
166	<i>Phyllanthus reticulatus</i>	Phyllanthaceae	Black-berried featherfoil,	Herb
167	<i>Physalis minima</i>	Solanaceae	Ground Cherry, Kupanti	Herb
168	<i>Pistia stratiotes</i>	Arecaceae	Water lettuce, Agasatamarai	Aquatic Plant
169	<i>Pithecellobium dulce</i>	Mimosaceae	Sweet tamarind, Kodukkappuli	Tree

S.No.	Name of the Plant (Scientific)	Family Name	Common Name	Habit
170	<i>Polyalthia longifolia</i>	Annonaceae	Indian mast tree, Vansulam	Tree
171	<i>Pongamia pinnata</i>	Fabaceae	Indian Beech, Pungam	Tree
172	<i>Portulaca oleracea</i>	Portulacaceae	Common Purslane, Paruppu	Herb
173	<i>Premna tomentosa</i>	Verbenaceae	Bastard Teak, Malaithaekku	Tree
174	<i>Prosopis glandulosa</i>	Mimosodeae	Vaelikkaruvai	Tree
175	<i>Prosopis juliflora</i>	Fabaceae	Algaroba, Seemaikaruvel	Tree
176	<i>Psidium gujava</i>	Myrtaceae	Guava	Tree
177	<i>Punica granatum</i>	Lythraceae	Pomegranate, Mathulai	Shrub
178	<i>Rosa indica</i>	Rosaceae	Rose	Herb
179	<i>Saccharum munja</i>	Poaceae	Munja grass	Herb
180	<i>Saccharum spontaneum</i>	Poaceae	Kans grass, Pekkarimpu	Herb
181	<i>Samanea saman</i>	Mimosodeae	Thoongumoonij maram	Tree
182	<i>Sesbania grandiflora</i>	Fabaceae	Agathikeerai	Tree
183	<i>Sida acuta</i>	Malvaceae	Common Wireweed, Palambasi	Herb
184	<i>Sida cordifolia</i>	Malvaceae	Country Mallow, Kurunthotti	Herb
185	<i>Sida rhombifolia</i>	Malvaceae	Wild mallow, Jelly Leaf	Herb
186	<i>Solanum nigrum</i>	Solanaceae	Black-berry night	Herb
187	<i>Solanum surattense</i>	Solanaceae	Kandan kattiri	Herb
188	<i>Solanum torvum</i>	Solanaceae	Turkey berry, Sundaikkai	Shrub
189	<i>Solanum trilobatum</i>	Solanaceae	Thoodhuvalai	Shrub
190	<i>Sorghum bicolor</i>	Poaceae	Fox tail millet, Maize	Herb
191	<i>Syzygium cumini</i>	Myrtaceae	Jamun, Navalpazham	Tree
192	<i>Tabernaemontana coronaria</i>	Apocynaceae	Nandiyarvattam	Shrub
193	<i>Tamarindus indica</i>	Fabaceae	Tamarind, Puliyamaram	Tree
194	<i>Tectona grandis</i>	Lamiaceae	Teak	Tree
195	<i>Tephrosia purpurea</i>	Fabaceae	Fish poison, Kollukkai Velai	Herb
196	<i>Thespesia lampas</i>	Malvaceae	Common Mallow, Kattupparuthi	Herb
197	<i>Thespesia populnea</i>	Malvaceae	Indian Tulip Tree, Poovarasu	Tree
198	<i>Thevetia peruviana</i>	Apocynaceae	Yellow Oleander, Arali	Tree
199	<i>Tinospora cordifolia</i>	Menispermaceae	Guduchi, Shindilakodi	Climber
200	<i>Tribulus terrestris</i>	Zygophyllaceae	Puncture Vine, Nerunji	Herb
201	<i>Tridax procumbens</i>	Asteraceae	Tridax daisy,	Herb
202	<i>Typha angustata</i>	Typhaceae	Cat tail reed	Herb
203	<i>Vernonia cinerea</i>	Asteraceae	Purple Fleabane,	Herb
204	<i>Vicoa indica</i>	Asteraceae	Mukkuthipoo	Herb
205	<i>Vinca rosea</i>	Apocynaceae	Nithyakalyani	Herb
206	<i>Vitex negundo</i>	Lamiaceae	Nochi	Shrub
207	<i>Xanthium strumarium</i>	Asteraceae	Common Cocklebur,	Shrub
208	<i>Ziziphus jujube</i>	Rhamnaceae	Jujube, Elandhai	Tree
209	<i>Ziziphus nummularia</i>	Rhamnaceae	Jhar Beri, Narielandai	Shrub
210	<i>Ziziphus oenoplia</i>	Rhamnaceae	Jackal Jujube, Suraimullu	Shrub
Medicinal species				
1	<i>Abrus precatorius</i>	Fabaceae	Coral bead vine, Rosary pea,	Crepper
2	<i>Achchyranthes aspera</i>	Amaranthaceae	Prickly Chaff flower, Nayuruvi	Herb
3	<i>Adathoda vasica</i>	Acanthaceae	Vasaca, Adathodai	Shrub
4	<i>Aegle marmelos</i>	Rutaceae	Wood Apple, vilvam	Tree
5	<i>Aloe vera</i>	Liliaceae	Kathalai	Herb
6	<i>Alternanthera sessilis</i>	Amaranthaceae	Dwarf Copperleaf, Ponnanganni	Herb
7	<i>Amaranthus viridis</i>	Amaranthaceae	Kuppaikeerai	Herb
8	<i>Asparagaus 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

S.No.	Name of the Plant (Scientific)	Family Name	Common Name	Habit
11	Cassia auriculata	Fabaceae	Tanners cassia, Avaram	Shrub
12	Cissus quadrangularis	Vitaceae	Devil's Backbone, Pirandai	Climber
13	Cynodon dactylon	Poaceae	Bermuda grass, Arugampul	Herb
14	Eclipta alba	Asteraceae	Bhringaraj, Karisalankanni	Herb
15	Enicostemma axillare	Gentianaceae	Vellarugu	Herb
16	Euphorbia hirta	Euphorbiaceae	Asthma weed, Ammam	Herb
17	Ficus benghalensis	Moraceae	Banyan, Alamaram	Tree
18	Heterostemma tanjorensis	Asclepiadaceae	Palakeerai	Herb
19	Jatropha glandulifera	Euphorbiaceae	Kaatuamanakku	Shrub
20	Leucas aspera	Lamiaceae	Common Leucas, Thumbai	Herb
21	Ocimum sanctum	Lamiaceae	Holy Basil, Thulasi	Herb
22	Solanum surattense	Solanaceae	Yellow-berried Nightshade,	Herb
23	Solanum trilobatum	Solanaceae	Thoodhuvalai	Shrub
24	Tridax procumbens	Asteraceae	Tridax daisy,	Herb
25	Vitex negundo	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	:	210 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. The nature of shrubs and trees in the study areas were of **drought resistant types**.

Among tree species Acacia, Azadirachta, Borassus, Ficus, Morinda, Prosopis species showed luxuriant growth. 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 gujava (Koyya), Mangifera indica (Mango)

3.9.2 Fauna

Both direct and indirect observation methods were used to survey the fauna. Visual Encounter (search) Method was employed to record vertebrate species. Additionally, survey of relevant literature was also done to consolidate the list of vertebrate fauna distributed in the area. Since birds may be considered as indicators for monitoring and understanding human impacts on ecological systems, attempt was made to gather quantitative data on the group. Based on the Wildlife Protection Act, 1972 (WPA 1972), species were short-listed as Schedule II or I and considered as endangered species. Species listed in Ghosh (1994) are considered as Indian Red List species. The details of fauna recorded are given in **Tables 3.27-3.28**.

Table : 3.27 List of Fauna in the Reserve Forests

Sl. No.	Scientific Name	Family	Common Name
Mammals			
1.	Felis chaus	Felidae	Cat
2.	Funambulus palmarum	Sciuridae	Squirrel
3.	Herpestes auropunctatus	Herpestidae	Mongoose
4.	Oryctolagus cuniculus	Leporidae	Rabbit
5.	Paradoxurus henmaphroditurs	Viverridae	Civit
6.	Ratturs rattus	Muridae	Rat
Reptiles			
1.	Bungaruscaeruleus	Elapidae	Krait
2.	Calotesversicolor	Agamidae	Common garden lizard
3.	Lygosomapunctata	Scincidae	Spotted supple skink
4.	Ptyasmuscosa	Colubridae	Indian rat snake
5.	Xenochrophispiscator	Colubridae	Checkered keel back
Birds			
1.	Ardea alba	Ardeidae	Large egret
2.	Ardeola 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 : 3.28 List of Fauna in the Study Area

Sl. No.	Scientific Name	Common Name	Status	WPA Schedule
Insects				
1	Agrion sp & Petalura sp	Dragon fly	C	IV
2	Apis indica	Honey bee	C	IV
3	Aranea sp	Spider	C	IV
4	Carausius sp	Stick insect	C	IV
5	Cicada sp.	Cicade	C	IV
6	Coccinella septempunctata	Lady bird beetle	C	IV
7	Coenagrion sp & Ischnura	Damsel fly	C	IV
8	Eumenus	Wasp	C	IV
9	Hamitermes silvestri	Termite	C	IV
10	Hieroglyphus sp	Grasshopper	C	IV
11	Mantis religiosa	Praying mantis	C	IV
12	Monomorium indicum	Ant	C	IV
13	Myremeleon	Ant lion larva	C	IV
14	Palamnaeus swammerdam	Scorpion	C	IV
15	Scolopendra	Centipede	C	IV
Butterflies				
1	Acraea terpsicore	Tawny coster	C	IV
2	Danaus chiysippus	Plain tiger	C	IV
3	Danaus plexippus	Striped tiger	C	IV
4	Euthalia nais	Baronet	C	IV
5	Graphium Agamemnon	Tailed jay	C	IV
6	Ixias marianne	White orange tip	C	IV
7	Juninia almanac	Peacock pansy	C	IV
8	Junonia atlites	Grey pansy	C	IV
9	Neptis hylas	Common sailor	C	IV
10	Pachiopta hector	Crimson rose	C	IV
11	Papilio demoleus	Lime butterfly	C	IV
12	Papilio polytes	Common mormon	C	IV
13	Papilio polymnstor	Blue mormon	C	IV
14	Parantica aglea	Glassy tiger	C	IV
15	Precis hierta	Yellow Pansy	C	IV
16	Terias hecabe	Grass yellow	C	IV
17	Triodes minos	Southern birdwing	C	IV
Fish				
1	Amblypharyngodon sp	Carplet	C	IV
2	Catla catla	Catla	C	IV
3	Chela sp	Trout	C	IV
4	Cirrhinus mrigala	Mrigal	C	IV
5	Cyprinus carpio	Common Carp	C	IV
6	Labeo rohita	Rohu	C	IV
7	Ophiocephalus punctatus	Kuravai	C	IV
8	Oreochromis mossambicus	Tilapia	C	IV
Amphibians				
1	Bufo melanostictus	Common Indian Toad	C.R	IV
2	Euphlyctis cyanophlyctis	Skittering frog	C.R	IV

Sl. No.	Scientific Name	Common Name	Status	WPA Schedule
3	<i>Rana hexadactylus</i>	Indian Pond frog	C,R	IV
4	<i>Rana tigrina</i>	Common frog	C	IV
Reptiles				
1	<i>Ahaetulla nasuta</i>	Common Green Whip Snake	C, R	IV
2	<i>Bangarus caeruleus</i>	Common Indian Krait	C, R	II
3	<i>Boiga spp.</i>	Cat snake	C, R	III
4	<i>Calotes versicolor</i>	Common Garden lizard	C,R	IV
5	<i>Chameleon zeylanicus</i>	Indian chamaeleon	C, R	II
6	<i>Daboia russelii</i>	Russels viper	C, R	III
7	<i>Gongylophis conicus</i>	Rough tailed Sand boa, Pudaiyan	C, R	IV
8	<i>Hemidactylus flaviviridis</i>	House gecko	C,R	IV
9	<i>Lissemys punctata</i>	Indian mud turtle	C,R	IV
10	<i>Mabuya carinata</i>	Brahminy Skink	C, R	II
11	<i>Naja naja</i>	Indian Cobra	C, R	IV
12	<i>Passerita mycterizaris</i>	Common Green Snake	C, R	IV
13	<i>Ptyas mucosus</i>	Common rat snake	C, R	IV
Birds				
1	<i>Acridotheres tristis</i>	Common myna	C	IV
2	<i>Alcedo atthis</i>	Common kingfisher	C	IV
3	<i>Anas acuta</i>	Common teal	C,R	IV
4	<i>Ardeola grayii</i>	Pond Heron or PaddyBird	C,R	IV
5	<i>Athene brama</i>	Spotted Owlet	C,R	IV
6	<i>Bubo bubo</i>	Indian great horned owl	C	IV
7	<i>Bubulcus ibis</i>	Cattle egret	C	IV
8	<i>Caprimulgus asiaticus</i>	Common Indian jar	C	IV
9	<i>Centropus sinensis</i>	Crow-Pheasant or coucal	C, R	IV
10	<i>Cinnyris asiatica</i>	Purple sunbird	C	IV
11	<i>Cinnyris lotensis</i>	Loten's sunbird	C	IV
12	<i>Columbus livibus</i>	Pigeon	C	IV
13	<i>Copsychus saularis</i>	Magpie robin	C	IV
14	<i>Coracias benghalensis</i>	Indian Roller	C,R	IV
15	<i>Corvus splendens</i>	House Crow	C,R	V
16	<i>Coryllis vaeralis</i>	Lorikeet	C	V
17	<i>Cuculus varius</i>	Common-Hawk Cuckoo	C,R	IV
18	<i>Cypsiurus parvus</i>	Palm Swift	C,R	IV
19	<i>Dendrocitta vagabunda</i>	Indian Tree pie	C,R	IV
20	<i>Dicaeum erythrorhynchos</i>	Tickell's Flowerpecker	C,R	IV
21	<i>Dicrurus macrocerus</i>	Black Drongo	C,R	IV
22	<i>Egretta garzetta</i>	Little egret	C	IV
23	<i>Eudynamys scolopacea</i>	Koel	C, R	V
24	<i>Francolinus pondicerianus</i>	Grey Partridge	C, R	IV
25	<i>Gallus gallus</i>	Red jungle fowl	R	IV
26	<i>Halcyon smyrnensis</i>	Whitebreasted Kingfisher	C,R	IV
27	<i>Haliastur Indus</i>	Brahmny kite	C	IV
28	<i>Hierococys varius</i>	Common hawk cuckoo	C	IV
29	<i>Megalaima merulinus</i>	Indian cuckoo	C	IV
30	<i>Microfus affinis</i>	House swift	C	IV

Sl. No.	Scientific Name	Common Name	Status	WPA Schedule
31	Milyus migrans	Common kite	C	IV
32	Mirafra erythroptera	Redwinged Bushlark	C.R	IV
33	Motacilla maderaspatensis	Large pied wagtail	C	IV
34	Orthotomus sutorius	Tailor Bird	C.R	IV
35	Passer domesticus	House Sparrow	C.R	IV
36	Ploceus Philippines	Weaver bird	C	IV
37	Prinia subflava	Plain Wren-Warbler	C.R	IV
38	Psittacula krameri	RoseRinged Parakeet	C, R	IV
39	Pycnonotus cafer	Redvented BulBul	C.R	IV
40	Quills contronix	Grey quail	C	IV
41	Saxicoloides fulicata	Indian Robin	C.R	IV
42	Streptopelia decaocto	Indian Ring Dove	C, R	IV
43	Tchitrea paradisi	Paradise Flycatcher	C	IV
44	Temenuchus pagodarum	Brahmny myna	C	IV
45	Tephrodornis pondiceraianus	Common wood shrike	C	IV
46	Turdoides striatus	White headed babler	C	IV
47	Uroloncha striata	Spotted munia	C	IV
Mammals				
1	Bandicota indica	Bandicoot	C.R	IV
2	Bos indicus	Cow	C	IV
3	Bubalus bubalis	Buffalo	C	IV
4	Canis auries	Jackal	C.R	III
5	Canis familiaris	Dog	C	-
6	Capra hircus	Goat	C	-
7	Felis chaus	Jungle cat	C	II
8	Felis rubiginosa	Rusty spotted Cat	C	IV
9	Funambulus palmarum	Indian Palm squirrel	C.R	IV
10	Herperetes edwardii	Indian grey mongoose	C.R	IV
11	Macaca radiata	Bonnet macaque	C.R	II
12	Mus booduga	Indian Field Mouse	C	V
13	Ovis aries	Sheep	C	-
14	Paradoxurus hermaphroditus	Common palm civet	C.R	II
15	Pteropus giganteus	Bat, Indian Flying Fox	C	V
16	Rattus norvegicus	Field mouse	C.R	IV
17	Rattus rattus	House Rat	C	IV
18	Sauria lacertidae	Lizard	C	IV
19	Sorex caerulescens	Common mush shrew	C	IV
20	Vulpus benghalensis	Indian Fox	C.R	II

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

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

Planktons :The studies on the aquatic biological environment were carried out at selected sites. The analysis of Phyto and Zoo-plankton was carried out as per the procedures of APHA. In the

study area, water samples were collected using standard methods and analyzed for plankton diversity (Table 3.29).

Table : 3.29 List of Planktons

Phytoplanktons	Chlorella sp, Chlorococcum sp, Pediastrum duplex, Spirogyra sp, Cpsmarium, Cymbella sp, Euglena sp, Fragillaria sp, Glepcapsa sp, Gomphonema sp, Melosira sp, Merismopedia sp, Mecrocysstis sp, Navicula sp, Nitzschia sp, Oscillatoria sp, Scendesmus sp, Spirulina sp, Tetradron sp, Moughtia sp, Ankistrodesmus falcatus, Asnabaena sp, Rivularia sp
Zooplanktons	Amoeba sp, Arcella sp, Cypris sp., Cyclops sp., Condyllostoma sp, Daphnia sp, Kertella sp, Macrotric sp, Brachionus sp, Filinia sp

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.

SWI-H values	Quality of Water
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 3.30).

Table : 3.30 Diversity Index

Sl. No.	Water body	Usage	Diversity Index	
			Phytoplankton	Zooplankton
1	Nagamangalam Lake	Bathing, Washing & irrigation	2.77	1.86
2	Meleri at Melmathur	Irrigation, Bathing & washing	2.94	2.19

3.10 Socio-economic Environment

Ariyalur District consists of two Revenue Divisions viz., Ariyalur and Udayarpalayam, three Taluks viz., Ariyalur, Udayarpalayam and Sendurai 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 3.31**.

Table : 3.31 Population – Decennial Growth

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

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

District Population by Religion is as follows :

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

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

POPULATION BY BROAD INDUSTRIAL CATEGORIES OF WORKERS

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

Khairulabad Village Profile : Kayarlabath Village total population is 5215 and number of houses are 1349. Male Population is 2602 and Female Population is 2613 (50.1%). Village literacy rate is 75.5% and the Female Literacy rate is 34.7%. (Table 3.32).

Table : 3.32 Khairulabad Village Profile

Particulars	Census Data
Total Population	5215
Total No of Houses	1349
Female Population %	50.1 % (2613)
Total Literacy rate %	75.5 % (3937)
Female Literacy rate	34.7 % (1809)
Scheduled Tribes Population %	0.1 % (5)
Scheduled Caste Population %	16.9 % (881)
Working Population %	36.0 %
Child(0 -6) Population by 2011	492
Girl Child(0 -6) Population % by 2011	48.0 % (236)
Total Population	5215
Total No of Houses	1349
Female Population %	50.1 % (2613)
Total Literacy rate %	75.5 % (3937)

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 3.33-3.39**.

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.

Maternal Mortality Rate represents the most sensitive and key indicator of women's health and their status in the society. In Ariyalur block, the MMR is 224.2, which is far above the state level. The district administration must give proper maternity hospital facilities to reduce the mortality rate.

In Ariyalur district, 96 percent of the children below 5 years were immunized. Ariyalur district earnestly fought against the HIV positive cases. Compared to the year 2007 the HIV positive cases among the male decreased from 195 to just 88 in 2011. Like that in female HIV positive cases the number is declined from 169 in 2007 to 135 in 2011. But the decline rate is very slow compared to the males. Among the various age groups of HIV affected people most are in the age group of 40-49 both in male and female. Tuberculosis and leprosy are the most common disease in Ariyalur district.

Table : 3.33 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	Ambbappur	3159	1594	1565	1103	556	547	48	25	23	2060	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	2461	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	1261	778	483	930	357	573	2191
6	Govindapuram	4996	2502	2494	1347	674	673	0	0	0	3260	1871	1389	1736	631	110	4996
7	Kadugur	3217	1627	1590	493	253	240	1	1	0	1893	1172	721	1324	455	869	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	Kavanur	3242	1634	1608	594	307	287	11	7	4	1790	1092	698	1452	542	910	3242
11	Kayarlabath	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	1662	979	683	1294	521	773	2956
14	Managethi	3916	1998	1918	1209	604	605	74	37	37	2423	1427	996	1493	571	922	3916
15	Nagamangalam	3360	1716	1644	1295	652	643	90	40	50	1878	1143	735	1482	573	909	3360
16	Ottakoil	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	Periyagalur	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	516	260	256	5	3	2	2457	1432	1025	1669	663	100	4126
23	Sennivanam	1870	932	938	1179	586	593	0	0	0	1257	711	546	613	221	392	1870
24	Siruvalur	2155	1043	1112	453	230	223	0	0	0	1261	743	518	894	300	594	2155
25	Thealur	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	1623	886	737	587	258	329	2210
27	Valajanagaram	7355	3702	3653	1550	805	745	0	0	0	5078	2873	2205	2277	829	144	7355
28	Varanavasi	4087	1947	2140	1412	651	761	0	0	0	2521	1359	1162	1566	588	978	4087
29	Vilangudi	2635	1312	1323	1058	533	525	128	64	64	1526	860	666	1109	452	657	2635
	Total	33198	127501	63678	63823	29651	14913	14738	711	348	363	82432	4660	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 : 3.34 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	Agricultural Labourers	Household Industrial Workers	Other Workers	Cultivators	Agricultural Labourers	Household Industrial Workers	Other Workers
1	Ambbappur	1594	1447	980	467	1712	614	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	176
3	Anandavadi	2108	1931	1130	801	2331	978	1353	712	648	31	201	30	212	12	85
4	Ariyalur (TP)	14349	10283	7815	2468	18619	6534	12085	315	670	298	7165	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	2057	867	1190	853	1337	54	179	29	247	3	14
10	Kavanur	1634	1808	970	838	1434	664	770	1080	299	13	133	39	165	9	70
11	Kayarlabath	2602	1878	1414	464	3337	1188	2149	238	351	34	1059	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	6	15
14	Managethi	1998	2225	1296	929	1691	702	989	529	834	12	153	306	353	14	24
15	Nagamangalam	1716	1629	984	645	1731	732	999	743	570	1	128	3	167	1	16
16	Ottakoil	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	Periyagalur	1762	1805	1021	784	1733	741	992	756	331	62	431	4	195	1	25
19	Periyathirukona	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	691	9	129
21	Rayampuram	1846	1969	1073	896	1749	773	976	678	260	36	210	50	502	14	219
22	Reddipalayam	2095	1946	1210	736	2180	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	Siruvalur	1043	1125	629	496	1030	414	616	440	273	5	160	4	229	1	13
25	Thealur	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	Valajanagaram	3702	3033	2017	1016	4322	1685	2637	528	475	44	1089	108	563	11	215
28	Varanavasi	1947	1802	1117	685	2285	830	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	59323	36881	22442	68178	26797	41381	15393	15215	992	16173	1351	6802	321	3076
	Percentage	-	46.5	28.9	17.6	53.5	21.0	32.5	12.1	11.9	0.8	12.7	1.1	5.3	0.3	2.4

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

Table : 3.35 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	Ambbappur	1	1	1	1	1	c	c	c	c	c	c	c
2	Ammenabath	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	Kadugur	1	1	a	a	b	c	b	c	c	c	c	c
8	Kallankurichi	1	1	1	1	b	b	b	c	c	c	a	b
9	Karuppur	1	1	1	1	1	c	c	c	c	c	c	b
10	Kavanur	1	1	1	1	b	b	1	c	b	b	c	b
11	Kayarlabath	1	1	1	1	1	a	c	c	a	c	a	b
12	Kilimangalam	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	c	c
15	Nagamangalam	1	1	1	1	a	c	b	c	b	b	c	b
16	Ottakoil	1	1	b	1	b	b	c	c	c	c	a	c
17	Papancheri	1	1	1	1	b	b	c	c	b	c	b	b
18	Periyagalur	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	Pudupalayam	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	Sennivanam	1	1	1	a	a	c	c	c	c	c	b	c
24	Siruvalur	1	1	1	1	b	b	c	c	b	c	b	b
25	Thelur	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	Valajanagaram	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 : 3.36 Medical Facilities in the Study Area

Sl. No.	Name of the Village	CHC*	PHC*	PHSC*	MCW*	TBC*	HA*	HAM*	D*	VH*	MHC*	FWC*	NGM-I/O*
1	Ambbappur	c	1	1	1	1	c	c	1	1	0	1	0
2	Ammenabath	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	Kadugur	1	1	1	1	1	c	c	1	b	0	1	0
8	Kallankurichi	b	b	1	b	b	b	b	b	b	0	b	0
9	Karuppur (Senapathy)	c	1	1	1	1	c	c	1	1	0	1	0
10	Kavanur	b	b	1	b	b	c	c	b	b	0	b	0
11	Kayarlabath	b	b	1	a	a	a	a	b	a	0	b	1
12	Kilimangalam	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	Ottakoil	b	a	1	a	b	b	b	a	b	0	a	0
17	Papanacheri	c	b	a	b	b	b	b	b	b	0	b	0
18	Periyagalur	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	Pudupalayam	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	Sennivanam	b	b	a	b	b	c	c	b	b	0	b	0
24	Siruvalur	c	b	a	b	b	b	b	b	b	0	b	0
25	Thealur	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	Valajanagaram	b	b	1	a	a	a	a	b	a	0	b	0
28	Varanavasi	c	b	1	b	b	b	b	b	b	0	b	0
29	Vilangudi	c	1	1	1	1	c	c	1	1	0	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-Aallopathic Hospital

HAM- Alternative Medicine

D-Dispensary

VH-Veterinary Hospital

FWC-Family Welfare Centre

MH-Mobile Health Clinic

NGM-I/O-Non Government Medical facilities In & Out

*-Numbers

a-Facility available at <5

b-Facility available at 5-10

c-Facility available at >10

Table : 3.37 Communication & Transport Facilities in the Study Area

Sl. No.	Name of the Village	PO*	SPO*	P&T*	T*	PCO*	MP*	IC*	PCF*	BS*	PBS*	RS*	NH*	SH*	MDR*	BTR*	GR	AWR*
1	Ambbappur	1	b	1	1	1	1	c	b	1	1	c	b	b	1	1	1	1
2	Ammenabath	b	1	b	1	1	1	b	b	1	1	b	b	b	b	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	c	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	c	c	c	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	c	1	1	1	1	1	1
10	Kavanur	c	1	c	1	1	1	c	c	1	1	c	c	b	b	1	1	1
11	Kayarlabath	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	Ottakoil	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	Periyagalur	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	1	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	Siruvallur	b	1	b	1	1	1	b	1	1	b	b	a	1	1	1	1	1
25	Thelur	c	1	c	1	1	1	c	c	1	1	c	c	1	1	1	1	1
26	Valaikurichi	b	1	b	1	1	1	b	b	1	b	c	c	b	1	1	1	1
27	Valajanagaram	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

SPO-Sub Post Office

MP- Mobile Phone Coverage

PBS-Private Bus Service

AWR-All Weather Road

1-Available

b-Facility available at 5-10
KmsP&T-Post/Telegraph
OfficeIC-Internet Cafes / Common
Service Centre (CSC)

RS-Railway Station

MDR – Major District Road

2-Not

c-Facility available at >10
KmsT-Telephones
(landlines)

PCF-Private Courier Facility

NH – National Highways

BTR-Black Topped (Pucca) Roads

Available

Table : 3.38 Water & Drainage Facilities in the Study Area

Sl. No.	Name of the Village	TP	CW	UCW	HP	TW/BH	S	R/C	T/P/L	CD	OD	CT
1	Ambbappur	1	1	1	1	2	2	2	1	1	2	1
2	Ammenabath	1	2	2	1	2	2	2	1	1	2	1
3	Anandavadi	1	2	1	1	2	2	2	1	1	1	1
4	Ariyalur (TP)	1	1	1	1	1	2	2	1	1	1	1
5	Edayathankudi	1	1	1	2	2	2	2	2	1	2	1
6	Govindapuram	1	1	2	1	1	2	2	1	1	1	1
7	Kadugur	1	2	2	1	2	2	2	1	1	2	1
8	Kallankurichi	2	2	1	1	1	2	2	1	1	1	2
9	Karuppur	1	2	1	1	1	1	2	1	1	2	1
10	Kavanur	1	1	1	1	1	2	1	1	1	1	1
11	Kayarlabath	1	1	1	1	2	2	2	1	1	1	1
12	Kilimangalam	1	1	2	1	1	2	1	1	1	2	1
13	Mallur	1	2	1	1	2	2	2	2	1	2	1
14	Managethi	1	2	1	1	2	2	2	1	1	1	1
15	Nagamangalam	1	2	2	1	2	2	2	1	1	1	1
16	Ottakoil	1	1	1	1	2	2	2	1	1	2	1
17	Papanacheri	1	2	2	1	2	2	2	1	1	1	1
18	Periyagalur	1	1	1	1	2	2	1	1	1	1	1
19	Periyathirukonam	1	1	1	1	1	2	2	1	1	2	1
20	Pudupalayam	1	1	1	1	2	2	1	1	1	2	1
21	Rayampuram	1	2	1	1	2	2	1	1	1	1	1
22	Reddipalayam	1	1	1	1	2	2	2	1	1	1	1
23	Sennivanam	1	2	2	2	2	2	1	1	1	2	1
24	Siruvalur	1	2	1	1	1	2	2	2	1	2	1
25	Thealur	1	2	1	1	1	1	2	1	1	2	1
26	Valaikurichi	2	2	1	2	2	2	2	2	1	1	2
27	Valajanagaram	1	1	1	1	2	2	2	1	1	1	1
28	Varanavasi	1	2	1	1	2	2	2	1	1	2	1
29	Vilangudi	1	1	1	1	2	2	2	1	1	2	1

T-Tap Water

CW-Covered Well

UCW-Uncovered Well

HP-Hand Pump

TW/BH-Tube Well/Bore Well

S-Spring

R/C- River/Canal

T/P/L-Tank/Pond/Lake

CD-Covered Drainage

OD-Open Drainage

CT-Community Toilet Complex for General Public

*-Status

1-Available

2-Not Available

Table : 3.39 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	Ammbappur	b	b	c	1	1	1	c	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	Kavanur	b	b	c	b	1	1	c	c	1	1	b	1	1	1	1	1	1
11	Kayarlabath	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	Ottakoil	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	Periyagalur	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	Thealur	a	c	c	a	1	1	c	c	1	1	b	a	a	1	1	1	1
26	Valaikurichi	b	b	b	b	1	1	b	c	1	1	b	b	b	1	1	1	1
27	Valajanagaram	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	c	1	1	1	c	c	1	1	a	1	1	1	1	1	1

CB-Commercial Bank PDS-Public Distribution System (Shop)

NC-AC-Nutritional Centres-
Anganwadi Centre
CC-Community Centre
with/without TV

NP-Daily Newspaper Supply

ATM-Automatic Teller Machine

a-Facility available at <5 Kms

COB-Co-operative Bank

RM-Regular Market

APS-Assembly Polling Station

*-Status

b-Facility available at 5-10 Kms

ACS-Agricultural Credit
Societies

AMS-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

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

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

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

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

Perception 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 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 were 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 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).

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 will have varying impacts on the environment and are considered for the impact assessment :

- ❖ Land Environment.
 - ❖ Traffic Volume.
 - ❖ Air Quality.
 - ❖ Noise Levels.
 - ❖ Water Environment.
 - ❖ 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	UltraTech PeriyanaGalur Limestone Mine (ML5)	4.985 Ha (0.15 MTPA)	Adjacent Lease; Not in operation
2	Ramco Amalgamated Mining Lease	53.320 Ha (3.00 MTPA)	Adjacent Lease partly in operation. Downwind side & not contributing
3	Dalmia PeriyanaGalur & AK Limestone Mines	167.605 Ha (1.9 MTPA)	Adjacent Lease in operation. Downwind side & not contributing other than Traffic Volume
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 and cumulative impacts are to be assessed

4.3.1 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, no vibration impact due to mining. Also, as there is **no Solid Waste generation and no Waste Dump** proposed now, **there will not be any significant change to existing Land Environment** due to the Proposal.

Mitigating Measures :-

- ❖ Earthen bunds are to be strengthened along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be maintained 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.
- ❖ 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.

4.3.2 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 (in western part). 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.

Baseline Status : For assessing the baseline status, the Traffic Survey based on Indian Road Congress-IRC: 64/106 Norms were carried out at NH81-Underpass Road Junction. The existing traffic volume in the Project vicinity was found to be **5,110 Passenger Car Units (PCUs)/day (Table 4.2)**. In the Post-Project Scenario, there will be an addition of **1 Vehicle** (in 2 ways) due to the Project. Cumulatively, the traffic volume in the Project vicinity will be **5,115 PCU/day**. **The net increase (cumulative) will be 5 PCU/day (Table 4.3)**. The existing Roads/NH are adequate to handle the proposed traffic volume due to the Project. Thus, there will not be any impact on the existing baseline traffic volume due to the Proposal..

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 4.4). 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 4.5.

Table : 4.2 Existing Traffic Volume - Baseline Status

Type of Vehicle	NH-81 Under Pass & SH 139 Road Junction				
	No. of Vehicles/day			PCU Factor	PCU/day
	Week Day (19.01.2022; Wednesday)	Week End (23.01.2022; Sunday)	Avg. Traffic		
Cycles	96	72	92.6	0.4	37.0
2-wheelers	648	608	642.3	0.5	321.1
Autos	80	76	79.4	1.2	95.3
Vans/Tempos	60	68	61.1	1.4	85.6
Cars	292	204	279.4	1	279.4
Buses	176	156	173.1	2.2	380.9
Trucks	1488	1248	1453.7	2.2	3198.2
Trailers	192	96	178.3	4	713.1
Total	3032	2528	2960	-	5110.6

Table : 4.3 Projected Traffic Volume – Operation Phase

Type of Vehicle	NH-81 Under Pass & SH 139 Road Junction		Cumulative Traffic Volume due to Mines, Nos./day	PCU Factor as per IRC	Cumulative Traffic Volume due to Mines, PCU/day
	Avg. Traffic, Nos./day	Projected due to Mines, Nos./day			
Cycles	92.6	0	92.6	0.4	37.0
2-wheelers	642.3	0	642.3	0.5	321.1
Autos	79.4	0	79.4	1.2	95.3
Vans/Tempos	61.1	0	61.1	1.4	85.6
Cars	279.4	0	279.4	1.0	279.4
Buses	173.1	0	173.1	2.2	380.9
Trucks	1453.7	2	1455.7	2.2	3202.5
Trailers	178.3	0	178.3	4.0	713.1
Total	2960	2	3010	-	5114.9

Table : 4.4 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 : 4.5 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:-					
NH-81 Underpass	213.0	3600	0.06	A	Excellent
Proposed :-					
NH-81 Underpass	213.1	3600	0.06	A	Excellent

Thus, there will not be any impact on the existing baseline traffic volume due to the Proposal.

Carbon Emission & Climate Change:

Greenhouse gases include carbon dioxide, methane, nitrous oxides, and water vapour. The proposed quarrying and transporting activities will utilise about 4,000 Litres HSD/year. By considering the Transport Emission Factors for Medium & Heavy Duty Trucks viz. 0.997 kg

CO₂/km, 0.012 g CH₄/km and 0.008 g N₂O/km [as per US EPA 2014 emission factors for Green House Gases (GHGs) Inventories], the gaseous emissions will be as follows :

HSD consumption	:	4,000 LPA
Total CO ₂ Emissions	:	0.012 Tons/Annum
CO _{2-e} for CH ₄ Emissions	:	0.004 Tons/Annum
CO _{2-e} for N ₂ O Emissions	:	0.029 Tons/Annum.

Thus, total CO₂ Emission due to the Proposal will be **0.045 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.

Adequate parking area is provided in the Mine Area. Facilities for **drivers (rest room, toilet, etc.)** are also provided. Other mitigating Measures are :

- ❖ All Tippers are to be fully covered with Tarpaulin to avoid any spillage on transportation.
- ❖ Restriction of over loading of Tippers shall be enforced.
- ❖ Speed restrictions shall be enforced.
- ❖ Restriction of Truck parking in the Highway and Public Roads shall be enforced.
- ❖ Regular and preventive maintenance of transport vehicles are to be ensured.
- ❖ Compliance to 'Pollution under Control' Certification has to be ensured and to be checked periodically.
- ❖ 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 (Ref. ESA).

4.3.3 Air Quality

Emissions from Mines : Mining, Drilling & Blastings, Loading and Transporting activities would generate both fugitive dust emissions and smoke from HEM Machineries/Equipments & 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 & Allied activities. The equations for various activities are:

<u>Activity</u>	=	<u>Equation</u>
Drilling & Blastings	=	0.6 kg/hole
Excavation of Ore	=	23.6 kg/hr particulate matter for every 1,000 Tonnes per hour material handling
Ore transportation	=	0.2 kg/vehicle/km.

Accordingly, the computed values of PM Emission for various activities (other Pollutants are in insignificant levels from Mining activities) are:

Mining	: 2.7×10^{-7} g/sec
Loading	: 3.29×10^{-7} g/sec
Haulage	: 3.98×10^{-7} g/sec.

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 (appended below).

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 4.6**.

Input Data

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	STCK1	300376.95 RM/Kiln BH	1228246.30	61.00	110.00	0.27900	358.00	12.50	3.20
POINT	STCK2	300235.79 Coal Mill	1228301.91	62.00	85.00	0.15500	342.00	16.50	2.00
POINT	STCK3	300263.62 Cooler	1228335.29	60.00	40.00	0.18500	486.00	23.00	2.45
POINT	STCK4	300330.68 Cement Mill	1228452.13	62.00	35.00	0.06400	340.00	16.40	1.20

Open Pit 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]	Volume of Open Pit [m ³]	Orientation Angle from North [deg]
OPEN PIT	1	297394.27 PNR Pits	1231356.00	50.00	0.50	1.50E-7	10.00	10.00	100.00	0.00

Output Data

Results Summary

C:\Lakes\AERMOD View\UTPNR Mine\UTPNR Mine.isc

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	1.25624	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	03-02-2022, 24
24-HR	2ND	0.98088	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	24-12-2021, 24
24-HR	3RD	0.93941	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	02-02-2022, 24
24-HR	4TH	0.84961	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	23-12-2021, 24
24-HR	5TH	0.78208	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	01-12-2021, 24
24-HR	6TH	0.73998	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	30-01-2022, 24
24-HR	7TH	0.65358	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	13-01-2022, 24
24-HR	8TH	0.63820	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	29-12-2021, 24
24-HR	9TH	0.63329	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	12-01-2022, 24
24-HR	10TH	0.59498	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	05-12-2021, 24
PERIOD		0.29827	ug/m ³	297382.78	1231384.55	72.00	0.00	72.00	

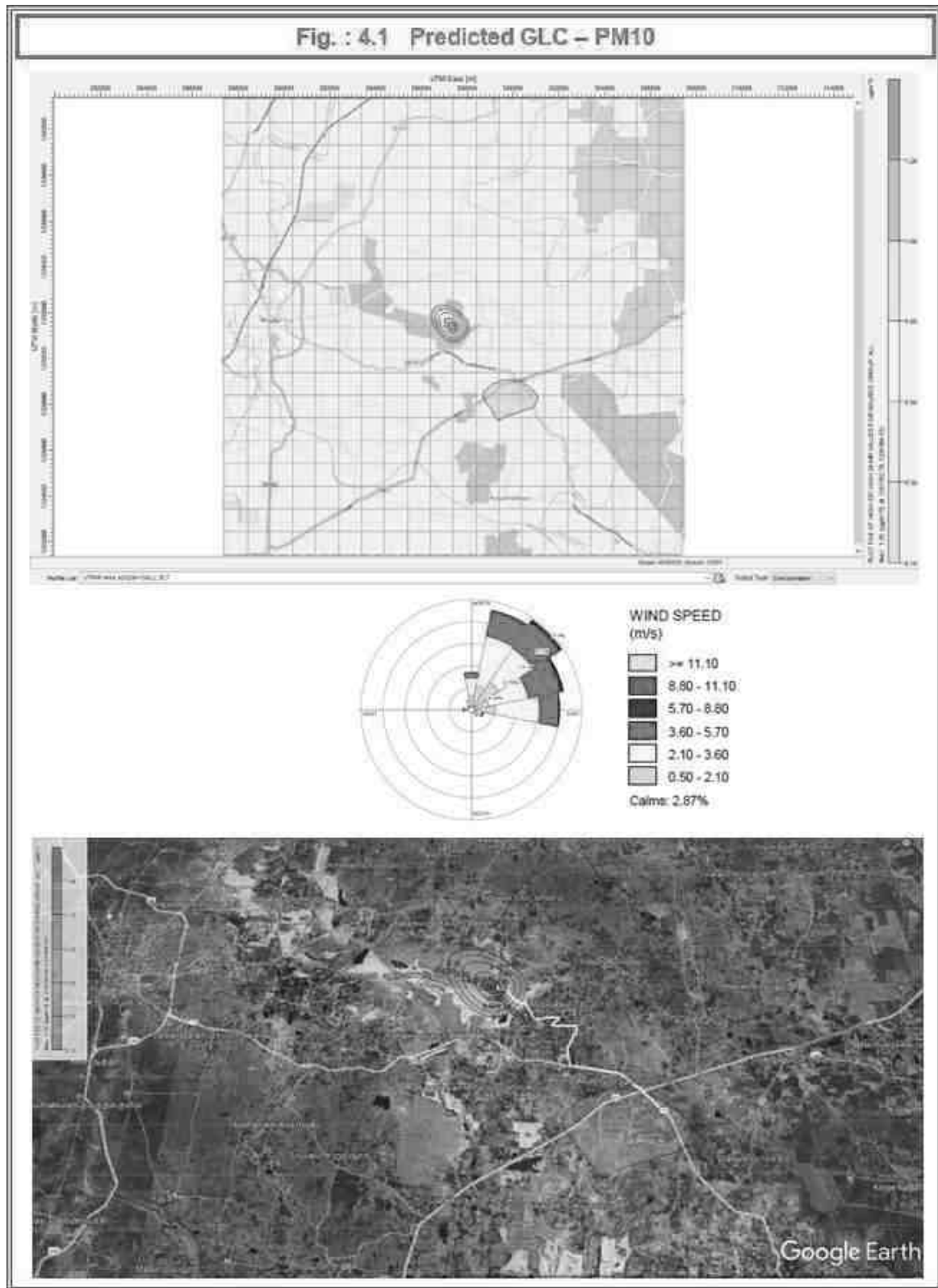


Table : 4.6 Predicted GLCs

Sl. No.	Pollutant	Background Concentration (24-hly. Avg.), ug/m ³	Max. Predicted Ground Level Concentration, ug/m ³	Distance from the Plant (max.), km	Total Concentration, ug/m ³	Revised NAAQ Norms, ug/m ³	Buffer Available in the Atmosphere
1	PM10	51.9	1.26	0.1	53.16	100	46.84

The predicted maximum GLC-PM10 for cumulative operation of Mining activities is 1.26 ug/m³ and found to be confined locally i.e. within 0.1 km radius from the boundaries. Also, **adequate Buffer Level available (46.84%)** in the Air Environment for the Proposal.

The predicted GLC is also **superimposed on the baseline map** and given as **Fig. 4.1**.

Mitigating Measures : As mitigative measure to control air pollution, the following measures are to be implemented effectively :

- ❖ Water sprinkling on the Mining areas, loading point, haul roads, etc. has to be carried out.
- ❖ Controlled Blasting is to be carried out and during day times only.
- ❖ No Blasting is carried out during overcast conditions.
- ❖ 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.
- ❖ Periodical checkup of vehicles for 'Emission Under Control' Certificate is to be ensured.
- ❖ Effective Green Belt with thick foliage has to be developed along the boundaries and haul roads and maintained.

4.3.4 Noise Levels

The mining operation is carried out by adopting conventional mining method involving deephole 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. The noise level due to Mining Equipments during operation, is being maintained at <90 db(A) at a distance of 1.5 m from the sources (**Table 4.7**). The blast induced ground vibration is controlled & maintained within permissible limits by using milli second delay detonators (MSDD) and NONEL shock tubes. In general, noise generated by these sources is within the limit of 90 dB(A) prescribed by Director General of Mines Safety (DGMS), Dhanbad. The work force is exposed to <85 dB(A) levels during the 8-hours Shift.

Table : 4.7 Source Noise Levels - Mine Machineries

Equipment	Location	Noise Level (Leq), dB(A)
Mining Operations	Operator's Position	80-85
Dumper, operating	10 m away	70
Dozer & Dumper both, operating	10 m away	85-90

Mitigating Measures :

The noise and vibration generated due to the blasting operations can 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. 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.

The monitored peak particle velocity (PPV) and noise levels during the blasting is periodically monitored through 'Minimate' Instrument and found to be well within the DGMS norms for Residential Areas. Records are being maintained as per statutory requirements and submitted to the Authorities periodically.

- ❖ 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 along roads and around lease boundary will act as acoustic barriers.

4.3.5 Water Environment

There will not be any impact on the Surface Water bodies. As per TWAD Data, 70 year Normal Rainfall of Ariyalur Rain Gauge Station is 1,096 mm. Surface Runoffs from the Plant Area is estimated as per Manual of Artificial Recharge of Ground Water (CGWB, 2007). **Pre-Project Runoffs** is 4,932 KL/Annum and **Post-Project Runoffs** will be 4,932 KL/Annum. About 750 KL/Annum will be utilized as Raw Water for the Mine. Balance Quantity will be recharging the Ground Water-table in the Mine vicinity. Also, there will be no Ground Water-table Intersection due to the Mining and thus, **no significant impact on the Ground Water regime.**

Mine requires about 2.5 KLD which will be met by Mine Pit Water. There **will not be any water drawl from Surface or Ground Water Sources** in the Lease Area. Domestic sewage generation will be about 0.4 KLD which will be biologically treated in a Septic Tank followed by a Dispersion Trench. **No workshop** is proposed and thus, no effluent generation from the Lease.

Mitigating Measures :

- ❖ Earthen bunds are to be provided along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be constructed around the Lease.
- ❖ Settling Pond has to be provided to the Garland Drains, to settle the Suspended Solids, before letting into the natural drains.
- ❖ Periodical maintenance/desilting of garland drains shall be done.
- ❖ Green Belt shall be developed and maintained along the Lease boundaries and Safety Barriers.
- ❖ Mined out area shall be converted into a Water Reservoir to recharge the Ground Water-table in the vicinity.

4.3.6 Solid Wastes

Entire Top Soil quantity of **7,200 Tons** generated in the Mine was fully utilized for Green Belt development. OB/Rejects generated was stored in the permitted **Dump. No Top Soil or Over Burden waste is now envisaged** till the end of mining.

Mitigating Measures :

- ❖ Construction/maintenance of garland drains around mine areas shall be done.
- ❖ Saplings will also be planted along the foot and unused slopes to arrest / prevent erosion.
- ❖ After the mine reaches the ultimate depth, developmental wastes and rejects stacked in the earmarked locations shall be backfilled and the topsoil shall be spread and afforested.
- ❖ Organic wastes (dry leaves, food wastes, etc.) shall be subjected to vermi composting and used as manure for the Green Belt.
- ❖ Inorganic wastes (papers and other wastes) are to be properly disposed of.

4.3.7 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 will be developed in the Lease Area as per CPCB guidelines. Normally Neem, pungan, Gulmohar, Acacia, etc. will be planted which gives 90% survival rate.
 - ❖ Afforestation in backfilled & reclaimed areas shall be undertaken.
-

4.3.8 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.

Mitigating 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.
- ❖ As per MMDR Act 2015, 30% of Royalty Amount will be earmarked for District Mineral Foundation (DMF) and the amount will be spent for benefit of local villages.

4.3.9 Occupational Health

Occupational Health Centre (with qualified Occupational Health Specialist) is established at Dalmiapuram. The **first aid boxes** are made available for immediate treatment. **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.

Mitigating Measures :

- ❖ All employees undergo check-up on recruitment and periodically during employment.
 - ❖ Maintenance of Pre, during & Post Employment Records.
 - ❖ Provision of all Personal Protective Equipments for the employees at Mines.
 - ❖ Standard operating procedures for all occupations and operations with respect to occupational safety and health.
 - ❖ Provision of illumination facilities at proper places for ease of working during night times.
 - ❖ Work comfort and its periodic review by a committee.
 - ❖ Provision of Rest Shelter at mines.
-

4.4 Evaluation of Impacts

Impacts during Operation Phase are critically examined and both Negative (Adverse) and Positive (Beneficial) Impacts are evaluated. The widely adopted **Matrix Method** for Evaluating the Impacts of the Project in its environs is used and dealt in **Table 4.10**. The potential significance (both Negative & Positive) of Impacts are denoted as :

- I** : Insignificant Impact & Short Term.
- S** : Significant Impact & Short Term.
- P** : Significant Impact but Control Measures Incorporated.
- R** : Significant Impact, Long Term & Permanent.
- Z** : Significant & Benefit.

Table : 4.10 EIA Matrix

Environmental Components & Parameters		Operation Phase							
		Land Use	Fugitive Emissions	Ore Transport -ation	Mine Pit Water & Utilisation	Noise Levels HEM	Green Belt	Rain Water Harvesting	CSR
Land	Land Use Pattern	R	-	-	-	-	Z	-	-
	Soil Quality	S	I	I	I	-	P	-	-
	Agricultural Resources	-	I	I	-	-	-	-	-
	Backfilling & Reclamation	I	-	-	-	-	-	-	-
Air	Meteorology	-	-	-	-	-	R	-	-
	Air Quality	-	R	R	-	-	P	-	-
Noise	Intensity	-	-	S	-	S	Z	-	-
	Duration / Frequency	-	-	S	-	S	-	-	-
Water	Surface Waters	I	-	-	-	-	-	-	-
	Ground Waters	-	-	-	R	-	-	-	-
	Water-table	-	-	-	-	-	-	R	-
Biological (Flora & Fauna)	Species	I	S	-	-	-	R	-	-
	Population	I	-	-	-	-	R	-	-
	Habitat	-	I	-	-	I	Z	-	-
Socio-Economics	Infrastructures	-	-	P	-	-	-	-	Z
	Population	-	S	S	-	S	-	-	-
	Employment	-	-	Z	-	-	Z	-	Z
	Economy	-	-	-	-	-	-	-	Z
	Occupational Health	-	S	S	-	S	-	-	-
	Health	-	I	S	-	-	-	-	Z
Aesthetic	-	R	-	-	-	-	Z	-	-

Note : - denotes 'No Impact/Impact Not Applicable'.

4.5 Impact Quantification

To quantify the assessed impacts which are qualitatively described in the EIA Matrix, they are assigned certain arbitrary weightages (Table 4.11), with (+) for Positive Impacts and (-) for Negative Impacts.

To sum up impact source, the coefficients impacts, ranging from 0 to 5 are used in quantification of total impact value for the proposed project (Table 4.12). The 'Plus' and 'Minus' values reported are cumulative value of the impact assigned for a particular Parameter under a particular Environmental Component as per EIA Matrix.

Table : 4.11 Coefficient Values

Sl. No.	Coefficient Criteria	Coefficient of Impact
1	No Impact	0
2	Insignificant impact-Short Term (I)	1
3	Significant impact-Short Term (S)	2
4	Significant Impact but Control Measures incorporated (P)	3
5	Significant Impact, Long Term & Permanent (R)	4
6	Significant Benefit (Z)	5

Table : 4.12 Impact Quantification – Operation Phase

Envl. Component	Import-ance Value	Project Activity & Coefficient Values								Impact Value
		Land Use	Fugitive Emission	Ore Transportation	Mine Pit Water & Utilisation	Noise Levels HEM	Green Belt	Rain Water Harvesting	CSR	
Land	200	-5	-2	-2	1		8			-400
Air	200		-4	-4			7			-200
Noise	50			-4		-4	5			-150
Water	200	-1			-4			4		-200
Biological	100	-2	-3			-1	13			700
Socio-economic	200		-5	-3		-4	5		20	2600
Aesthetic	50	-4					5			50
Total	1000					-				+2400

The total impact value is **+2,400** favours the implementation of the Proposal. The total impact source is an assertive, positive score. In other words, the **Spatial Impacts due to the Proposal will be low/insignificant and the Project can be implemented**. Also, all indicated mitigative measures for pollution control in **EMP shall be implemented in the post-project scenario by the Project Proponent to enhance the positive impacts**.

5.0 Analysis of Alternatives (Technology & Site)

5.1 Technology

- ❖ The mining operation is carried out by adopting conventional mining method involving deephole 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. 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 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

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.

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	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	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 : As per MMDR Act 2015, 30% of Royalty Amount (about **Rs.64.80 Lakhs**) will be earmarked for **District Mineral Foundation (DMF)** and the amount will be spent for benefit of local villager in the Lease Area.

Social Benefits : Project will employ about 10 persons directly and 15 persons indirectly. The direct & indirect employment, CSR/CER activities, etc., will have a positive impact on the Socioeconomic Structure of the area. The Proposal will be beneficial and important to the Society and the Country by way of :

- ❖ Royalty to the Exchequer.
- ❖ Improved local and regional economy.
- ❖ Direct and indirect employments.
- ❖ Improvement in direct and indirect means of livelihoods of local population.

9.0 Environmental Cost Benefit Analysis

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

Mining operations will be carried out scientifically as per approved Mining Plan, stipulated EC & CFO Conditions, IBM Approvals, DGMS Norms, etc. EMP Measures for Operation Phase are proposed below :

10.2.1 Land Use

- ❖ Earthen bunds are to be strengthened along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be maintained 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.
- ❖ 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.

10.2.2 Traffic Impact

- ❖ All Tippers are to be fully covered with Tarpaulin to avoid any spillage on transportation.
- ❖ Restriction of over loading of Tippers shall be enforced.
- ❖ Speed restrictions shall be enforced.
- ❖ Restriction of Truck parking in the Highway and Public Roads shall be enforced.
- ❖ Regular and preventive maintenance of transport vehicles are to be ensured.
- ❖ **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.

10.2.3 Air Environment

- ❖ Conventional method of mining is adopted.
 - ❖ Controlled Blasting is 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.

10.2.4 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 along roads and around lease boundary will act as acoustic barriers.
- ❖ Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.

10.2.5 Water Environment

- ❖ Proper Mine Pit Water management shall be practiced.
- ❖ Earthen bunds are to be provided along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be constructed around the Lease.
- ❖ Settling Pond has to be provided to garland drains, to settle the Suspended Solids.
- ❖ Periodical maintenance/desilting of garland drains shall be done.
- ❖ Green Belt shall be developed and maintained along the Lease boundaries and Safety Barriers.
- ❖ Mined out area shall be converted into a Water Reservoir to recharge the Ground Water-table in the vicinity.
- ❖ Periodical monitoring of mine pit water shall be carried out and Reports submitted.

10.2.6 Land Environment – Solid Wastes

- ❖ Earthen banks shall be provided on non-operating side of dumps to arrest wash-offs.
 - ❖ After the mine reaches the ultimate depth, developmental wastes and rejects stacked in the earmarked locations shall be backfilled and topsoil shall be spread and afforested.
-

- ❖ Organic wastes (dry leaves, food wastes, etc.) shall be subjected to vermi composting and used as manure for the Green Belt.
- ❖ Inorganic wastes (papers and other wastes) are to be properly disposed of.

10.2.7 Biological Environment

- ❖ Effective Green Belt has to be developed and maintained. **With the guidance of DFO**, about **2,200 Trees** (@ 1,500 Trees/Ha), predominantly local species like Neem, Pungan, Teak, etc. will be planted @ **500 Trees/annum** and maintained 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.

10.2.8 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.

- ❖ Joining Hands with District Administration in implementing Govt. Schemes.
- ❖ Development of Infrastructure Facilities in the Region.
- ❖ Medical Camps and extending medical facilities.
- ❖ Contribution to Education.
- ❖ Drinking Water Supply.
- ❖ Budget for covering Public Hearing issues will be included in EMP Budget.

10.2.9 Occupational Health Measures

- ❖ All employees undergo check-up on recruitment and periodically during employment.
 - ❖ Maintenance of Pre, during & Post Employment Records.
 - ❖ Provision of all Personal Protective Equipments for the employees at Mines.
-

- ❖ Provision of illumination facilities at proper places for ease of working during night times.
- ❖ Work comfort and its periodic review by a committee.
- ❖ Provision of Rest Shelter at mines.

10.3 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.

10.4 EMP Budget

The capital cost of the Project is **Rs. 10.00 Lakhs**. An amount of **Rs.5.00 Lakhs is earmarked as Capital EMP Budget** and **Rs.15.32 Lakhs per Annum is Operating Cost towards EMP** measures, Green Belt maintenance, Environmental Monitoring, etc. Also, an amount of Rs. 3.00 Lakhs per Annum has been earmarked for Occupational Health & Safety Measures. Also, about **Rs.10.00 Lakhs** has been allotted as **Corporate Environmental Responsibility (CER) Budget** in compliance with MoEF&CC OM dated 01.05.2018 for execution within 2 years period.

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 and Govindapuram in Ariyalur District of Tamil Nadu. With the recent Modernization & Expansion, Dalmiapuram Cement Plant Clinker production will be 3.23 Million Tonnes per Annum (MTPA) and Cement production will be 5.00 MTPA. Govindapuram Cement Plant Clinker production will be 2.50 MTPA and Cement production will be 4.00 MTPA. Dalmiapuram Cement Plant requires 5.00 MTPA Limestone and Govindapuram Cement Plant requires 4.00 MTPA Limestone. Limestone demand of both Cement Plants are met from existing captive mines of DCBL viz. Kallakudi-Kovandakurichi (KLK-KVK) Mines, Periyathirukonam (PTK) Mines and amalgamated Periyanaalur, Aminabad & Khairulabad (PNR Group) Mines.

The communication address is as follows :

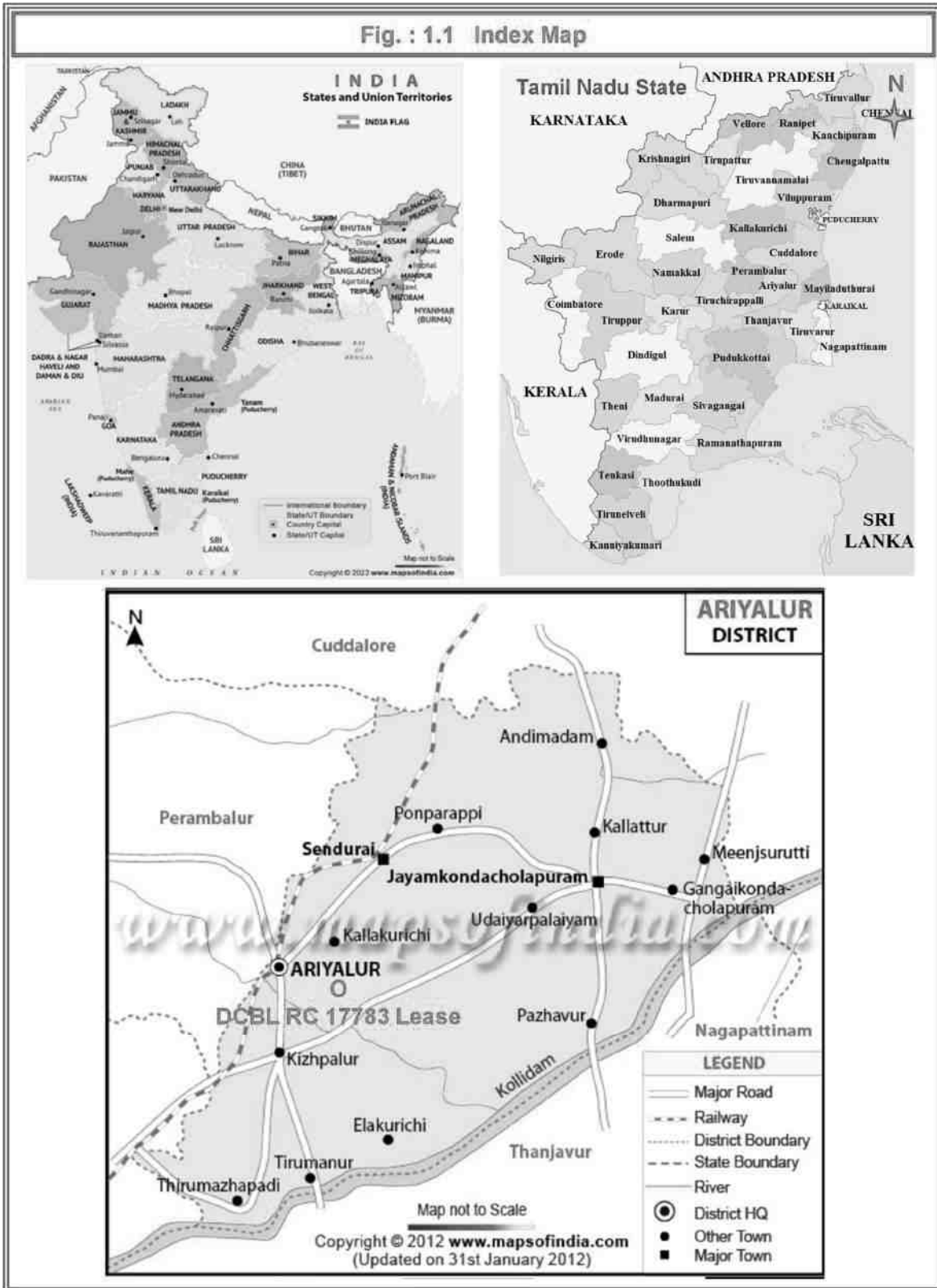
The Unit Head,
Dalmia Cement (Bharat) Limited,
Dalmiapuram,
Lalgudi Taluk, Tiruchirapalli District,
Tamil Nadu-621 651.
Telephone Nos. : 04329-235123; Fax : 04329-235111
e-mail : k.vinayagamurthi@dalmiacement.com

1.2 Project Profile

PNR Group Mines are being operated in 3 Leases for the last 52 years 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 applied and obtained a Lease vide GO (MS) No.106 dated 12.05.2015 for an extent of 0.845 Ha in Aminabad and will be amalgamated with GO No. 2 on obtaining all statutory clearances.

Khairulabad Limestone Mine is one of the Leases of DCBL in PNR Group. Total extent of the Lease area is 2.25 Ha of own **Patta Lands** in S.F. Nos. 455/1 (0.390 Ha), 456/2 (0.695 Ha) and 456/3 (1.165 Ha) of Khairulabad Village, Ariyalur Taluk & District, Tamil Nadu (**Fig. 1.1**). Mining Lease is granted for 30 Years from 13.08.2004 to 12.08.2034 vide RC No. 17783/MM4/2002 dated 27.01.2004. Lease Deed executed on 21.07.2004 and registered on 13.08.2004. The mining operations were commenced in this Lease on **25.08.2004** and stopped in February 2017 for want of Environmental Clearance.

Fig. : 1.1 Index Map



The present Review of Mining Plan (**ROMP**) & Progressive Mine Closure Plan has been approved by IBM, Chennai vide Letter No. TN/ALR/LST/ROMP-1523.MDS dated 13.11.2018 for the Period 2019-20 to **2023-24**. Approved Surface Plan is given as **Fig. 2.1**.

The mine is located at a distance of about 8 km from Ariyalur Town (in west) and can be reached by Ariyalur-V.Kaikatti Section of State highway (SH)-139 which runs about 1.8 km from southern boundary of the lease. No R&R is involved in this existing mine. There is litigation/case against the Project.

The mining operation was carried out by fully mechanized Conventional Opencast Mining Method with Drilling & Blasting. Excavated limestone was transported by 30 Tonnes Taurus Tippers to Dalmiapuram & Ariyalur Cement Plants at a road distance of 19 km and 40 km respectively. Since commencement in 2004-05, about 4,90,048 Tonnes of Limestone was mined out from the Mine. The maximum production was 1,25,671 Tonnes per Annum (TPA) during Year 2005-06. Present Pit depth is 14 m BGL.

The assessed balance Reserves in UNFC '111' Category is 48,000 Tonnes of Limestone & '211' Category 2,22,000 Tonnes of Ferruginous Limestone, total 2,70,000 Tonnes ROM (as on 01.10.2018). There is no Top Soil and Over Burden material available at the mine. It is proposed now to mined out 3,004 Tonnes Limestone & 3,024 Tonnes sub grade Ferruginous Limestone, thus, total 6,028 Tonnes ROM during balance ROMP Period i.e. during 2023-24 (**Table 1.1**). Ore:OB/Waste Ratio is 1:0. Balance Reserves will be mined out during subsequent Plan Periods,

Conceptual Stage Ultimate Pit depth will be 26.5 m BGL. As Ground Water-table in the vicinity is ranging between 40-45 m BGL, mining will not intersect the ground water-table. With the proposed production rate, the Life of the Mine is for another 45 Years.

Mine Profile :

Mining Pit Size	:	169 (L) x 133 (W) x 14 (D) m
Mineral	:	Limestone & Ferruginous Limestone
Mineral Resources	:	2,70,000 Tonnes ROM
Production- ROMP Period	:	6,028 TPA ROM
No. of working days per annum	:	330 (3 shifts)
Life of the Mine	:	45 years (balance)
Ore:OB Ratio-Plan Period	:	1:0
Bench Parameters	:	Height-5 m & Width 10 m
Ultimate Pit Depth-Conceptual	:	26.5 m BGL (Top RL 80.5 m; Bottom RL 54 m)
Ground Water-table	:	40-45 m BGL

Mining will not intersect the ground water-table.

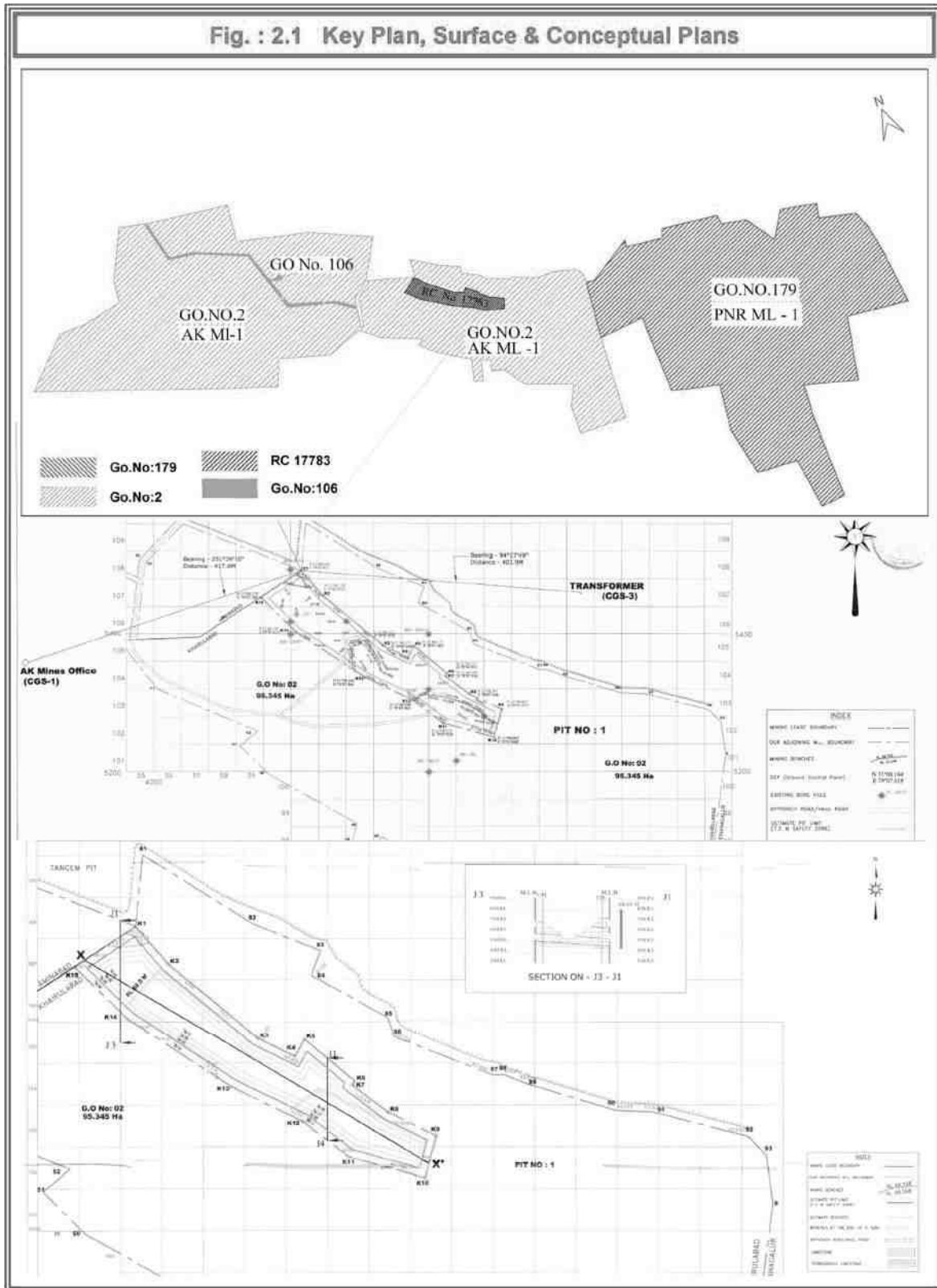


Table : 1.1 Proposed Production during ROMP Period

Period	Working RLS, m (3 rd Bench)	Top Soil, cu.m	OB, cu.m	Production, Tonnes			Mineral Rej., Tonnes	Ore:OB Ratio
				Limestone	Ferruginous Limestone	Total ROM		
2019-20	70-65.5	0	0	3,015	3,033	6,048	0	1:0
2020-21	70-65.5	0	0	3,003	3,042	6,045	0	1:0
2021-22	70-65.5	0	0	3,012	3,042	6,054	0	1:0
2022-23	70-65.5	0	0	3,024	3,006	6,030	0	1:0
2023-24	70-65.5	0	0	3,004	3,024	6,028	0	1:0
Total		0	0	15,058	15,147	30,205	0	1:0

'No prior Environmental Clearance (EC) is required for the Mines with <5 Ha Extent, in the context of the Ministry of Environment, Forest and Climate Change (MoEF&CC), Office Memorandum (OM) No. J-11013/182/2012-IA-II(M) dated 04.01.2013. However, the existing Mining Lease requires EC as per MoEF&CC Notification SO 141(E) dated 15.01.2016 under EIA Notification 2006. As per MoEF&CC, 'the mine leases which continue to operate without obtaining EC after 15.01.2016 shall be considered as Violation Cases and the leases which were in operation till 15.01.2016 and stopped production after 15.01.2016 shall be considered for EC.

DCBL has operated Khairulabad Limestone Mine under RC No. 17783 after 15.01.2016 till January 2017 and produced 14,945 Tonnes of Limestone. Operating the Lease without EC is in Violation of EIA Notification 2006 (as amended). Though 12.5 months period is there after 15.01.2016, the production from the Mine was carried out during 2 months only in that period viz. March 2016 (9,590 Tonnes) & January 2017 (5,355 Tonnes). As per CPCB Guidelines, No. of days violation took place have to be considered for Violation & Ecological Damage Assessment. Thus, the Violation Period has been considered as 2 months. The mining activities were stopped in February 2017 and there is no production from this Mine.

Meanwhile, DCBL has received Demand Notice from the District Collector, Ariyalur for 100% cost of Mineral value of Limestone quantity produced without EC vide Rc. No. 346/G&M/2018 dated 26.07.2019 for Rs.60,34,910/- (Doc-1). Accordingly, DCBL has remitted Rs.60,34,910/- on 30.07.2019 vide TNTC9 Chalan through State Bank of India, Ariyalur (Doc-2). Now, the Mine will be operated only after obtaining all Statutory Clearances.

DCBL has applied for EC to SEIAA-TN vide Online Proposal No. SIA/TN/MIN/24620/2018 on 12.04.2018. The Proposal under Sl. No. 1(a), Category B1 was deliberated under Violation Category in State Level Expert Appraisal Committee-Tamil Nadu (SEAC-TN) in its 111th Meeting held on 17.05.2018 and in 306th SEIAA-TN Meeting held on 24.05.2018. Terms of Reference (TOR) has been awarded vide Letter SEIAA-TN/F.No.6568/TOR-389/2018 dated 24.05.2018 with Public Hearing for preparing Environmental Impact Assessment (EIA) Report.

Baseline Data (BLD) collected during Winter 2021-22 Season i.e. **December 2021-February 2022** has been utilised 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 **Additional Chapter No. 13** for Ecological Damage Assessment, Remediation Plan and Natural Resource Augmentation & Community Resource Augmentation Plan. The violation falls under **Low Level Ecological Damage** category. An amount of Rs.3.72 Lakhs towards Ecological Remediation Plan and Natural & Community Resource Augmentation Plans is allotted for approval.

The Summary EIA Reports (both in English and Tamil) along with Draft EIA Report are submitted for the Public Consultation & Public Hearing within TOR Validity Period in compliance with MoEF&CC Notification SO 221(E) dated 18.01.2021.

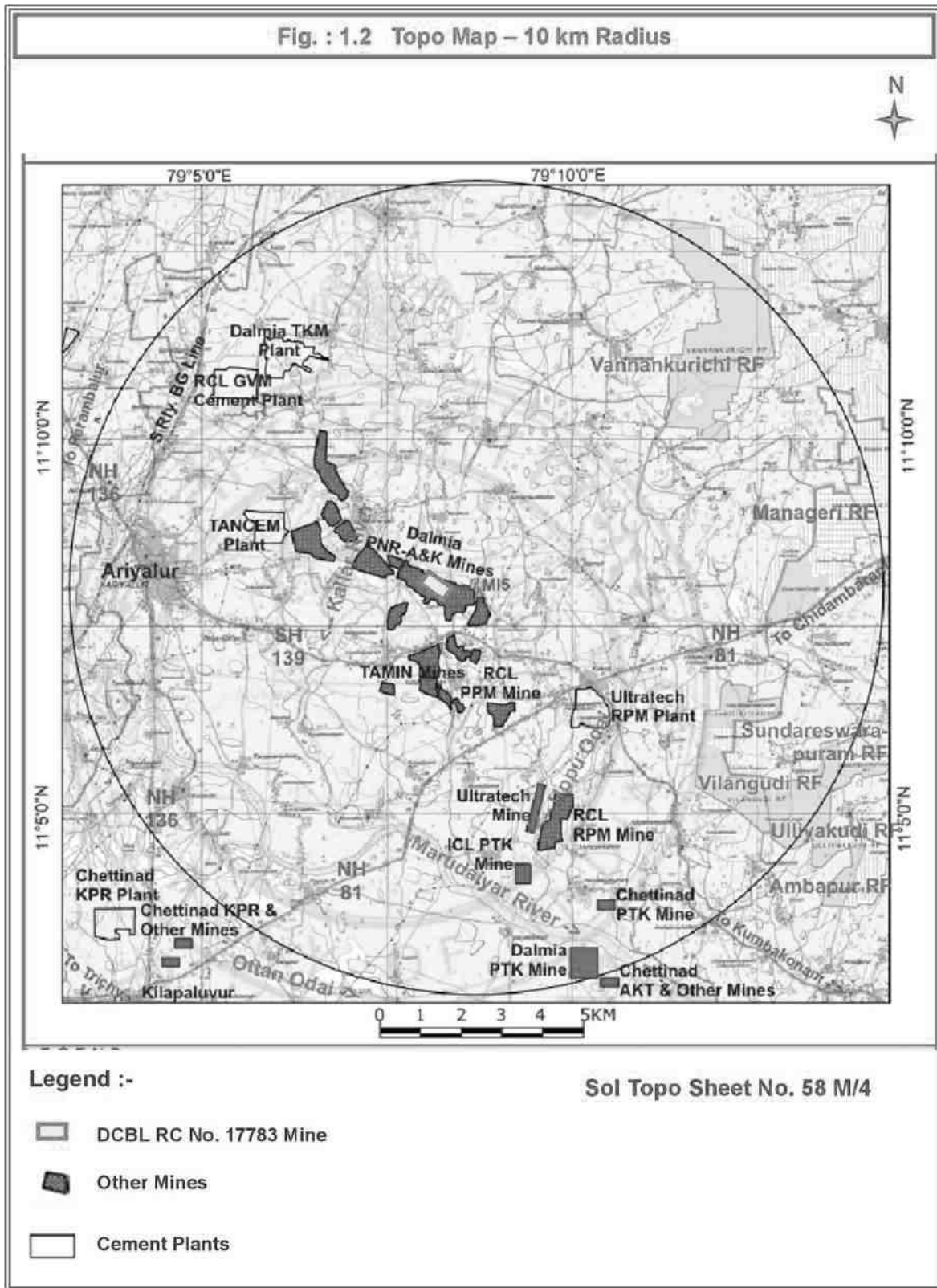
The EIA Consultant, M/s. ABC Techno Labs India Private Limited, Chennai has been accredited for various Sectors including Sector-1 (Mining Projects) for Category 'A' by the National Accreditation Board for Education & Training (**NABET**), Quality Council of India vide Certificate NABET/EIA/1922/RA 0155 with validity extended till **23.04.2023** vide Letter QCI/NABET/ENV/ACO/23/2646 (Sl. No. 4 of QCI/NABET List dated 04.04.2023) which will also be extended further by NABET. The ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2022 with validity till 02.04.2024. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (**MoEF&CC**) vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years.

2.0 Description of the Environment

2.1 Environmental Setting

Mine area falls in Survey of India Topo Sheet No. 58 M/4 and between the Coordinates 11°08'03.6" to 11°08'11.5" North Latitude and 79°07'47.2" to 79°07'58.5" East 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. There are five Reserved Forests (RFs) in the Study Area. Karaivetti Bird Sanctuary is at 18 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 :

- ❖ Vannankurichi RF (mixed jungle) - 8.0 km in northeast.
- ❖ Managethi RF – 7.5 km (ENE).
- ❖ Vilangudi Extension RF-9.0 km (ESE)
- ❖ Vilangudi RF (Cashew Plantation) – 7.5 km (SE).
- ❖ Sundareswarapuram RF – 9.5 km (ESE).



Kallankurichi Kaliyuga Varadharaja Perumal Temple is at 2.0 km in NW direction from the Lease. There is **no nallah/stream crossing** at the Mine. There is no perennial river in the study area. Seasonal **Marudaiyar River drains** the region and flows at 5.8 km in SSW direction. Seasonal Kallar River flows at 2.0 km (WNW), Uppu Odai at 3.8 km (ESE), Vilangudi Odai at 4.8 km (E) and Vanchiyam Odai at 7.0 km (WNW).

From the Lease Area, Dalmia PNR Mine Pit is at 400 m (East), Ramco PNR-A Pit at 1.2 km (SE) and TANCEM, UltraTech PNR, Khairulabad & Kallankurichi Mines at 0.25-1.75 km are situated. Ramco Usenabad Mine is at 2.8 km (WNW). Ramco Kattupirangium, Pudupalayam & Reddipalayam Mines are at 2.3, 3.5 & 6.1 km (SW, S & SSE) respectively, Ultratech Vellipirangiyum Mine at 5.8 (SE) & Ottakovil Mine at 8.0 km (NNW), ICL Periyathirukonam & Chettinad Periyathirukonam Mines at 6.8 km (SSE) & 8.7 km (SE), Dalmia Periyathirukonam Mines 9.0 km (SSE), etc. along with other Mines in the Study area.

From the Lease, Ultratech Cement Plant-Reddipalayam is at 4.5 km & its Township at 3.3 km in southeast. TANCEM Cement Plant-Kallankurichi at 3.2 km (WNW), Ramco Cement Plant-Govindapuram at 5.7 km (NW) and Dalmia Cement Plant-Tamaraikulam at 5.8 km (NNW). Chettinad Cement Plant-Kilapaluvur is at 10.5 km (SW).

The nearest village Periyanalur is about 1.8 km in east. Kattupirangiyum (1.1 km in SW), Manakudi (1.0 km in NW) and Kovilankudikadu (2.0 km in NNE) are the other nearby villages. V.Kaikatti Junction is at 3.7 km distance in southeast. Taluk and District Headquarters Ariyalur Town is at a distance of 5.5 km in west. Ariyalur Railway Station is at 7.4 km in west.

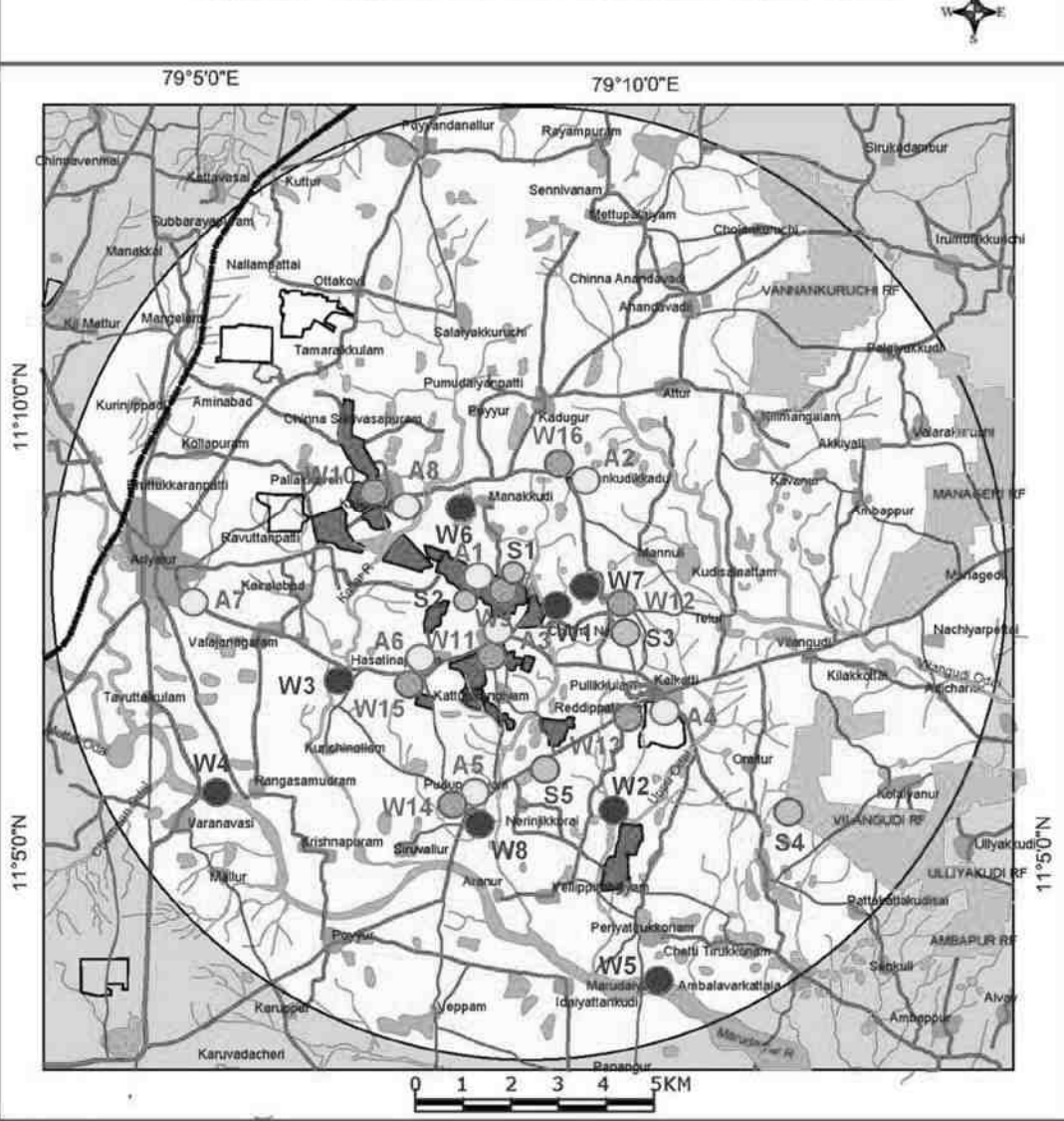
SH-139 (Ariyalur-Kumbakonam Section) runs at 1.4 km (S), NH-81 (Trichy-Chidambaram) at 4.3 km (SE) and NH-136 (Thanjavur-Ariyalur-Perambalur Section) at 5.0 km (W). Trichy Airport is at 60 km in SW direction and Chennai Airport is at 230 km in northeast. Karaikal Port is at 90 km in SE direction, Cuddalore port is at 90 km in NE direction from the Lease Area.

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. Considering the environmental setting of the project, project activities and their interaction, environmental regulations and standards, following Environmental Attributes have been included in EIA Study.

- ❖ **Site specific Micro-meteorological Data** from Lease Area for a Season on wind speed, wind direction (wind roses), temperature, humidity, cloud cover, atmospheric pressure, rainfall, etc.
- ❖ **Ambient Air Quality Monitoring at 8 locations** on 24-hourly basis, continuously for 2 days in a week for 4 weeks in a month for 3 months in the season for all 12 parameters as per Revised NAAQ Norms.

Fig : 3.1 Environmental Quality Monitoring Stations



LEGEND

○ Ambient Air Quality & Noise Monitoring Stations	● Surface Water Quality Monitoring Stations	● Ground Water Quality Monitoring Stations	● Soil Quality Monitoring Stations
A1-DCBL Mine	W1-Nalla near Mine	W9-AK Mine Pit	S1- Green Belt
A2-Kovilankudikadu	W2-Uppu Odai	W10-B/w, Kallankurichi	S2- Dump Area
A3-Kattupringiyam	W3-Kallar River	W11-B/w, Kattupringiyam	S3-Dry Agri. Land, Periyanalalur
A4-Kaikatti near UT Plant	W4-Marudaiyar River u/s	W12-B/w, Periyanalalur	S4-Forest Land, Vilangudi
A5-Pudupalayam	W5-Marudaiyar River d/s	W13-B/w, Reddipalayam	S5-Agri. Land, Pudupalayam
A6-Hastinapuram	W6-Manakudi Tank	W14-B/w, Pudupalayam	
A7-Ariyalur Bypass	W7-Pond, Periyanalalur	W15-B/w, Hastinapuram	
A8-Kallankurichi	W8-Pond, Pudupalayam	W16-B/w, Kovilankudikadu	

- ❖ Noise Level Measurements at all air quality monitoring station for Leq, Lday and Lnight values once in the season.
- ❖ Water Quality Monitoring – grab sampling of Surface Water (**8 locations**) and Ground Water (**8 Locations**) including existing Pit Water - once in the Season.
- ❖ Soil Quality Monitoring at **5 locations** once in the Season for Textural & Physical Parameters, Nutrients, etc.
- ❖ **Land Use Pattern** based on recent available Satellite Imagery.
- ❖ Biotic Attributes for : **Flora & Fauna** in Core & Buffer Zones.
- ❖ **Socio-Economic** Profile, based on 2011-Census and Need Based Assessment, once in the study period for: Total Population / Household Size, Gender Composition, SC / ST Population, Literacy Levels, Occupational Structure, etc.

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	12	44	29.0	60
	PM10	22	68	51.9	100
	SO ₂	6	28	15.5	80
	NO _x	6	30	17.6	80
Ambient Noise, dB(A)	Leq-Day	41.7	47.4	44.2	55
	Leq-Night	40.1	44.7	42.2	45
Surface Waters	TDS, mg/l	300	440	-	500/2100
Ground Waters	TDS, mg/l	360	490	-	500-2000
Soil Status	EC, mmhos/cm	1.13	1.63	-	0.2-0.5
	SAR	2.16	3.31	-	<5

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

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

- ❖ The collected meteorological data during this season represented the local weather phenomena.
- ❖ The monitored ambient air quality in the study area was found to be in compliance with the Revised National Ambient Air Quality (NAAQ) 24-hourly Norms for Industrial, Residential, Rural and other areas.
- ❖ Ambient equivalent noise levels (Leq) during day and night times were found to be well within the MoEF&CC Norms.
- ❖ The water quality of surface waters were 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. Following industrial activities are considered for **Cumulative Impact Assessment** for assessing their contribution (Table 3.1).

Table : 3.1 Industrial Activities considered for Cumulative Impact

Sl. No.	Industry / Mine	Extent & Consented Production	Bearing & Contribution during Study Period
1	UltraTech PeriyanaGalur Limestone Mine (ML5)	4.985 Ha (0.15 MTPA)	Study Lease; Not in operation
2	Ramco Amalgamated Mining Lease	53.320 Ha (3.00 MTPA)	Adjacent Lease partly in operation. Downwind side & not contributing
3	Dalmia PeriyanaGalur & AK Limestone Mines	167.605 Ha (1.9 MTPA)	Adjacent Lease in operation. Downwind side & not contributing other than Traffic Volume
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 and cumulative impacts are to be assessed

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 and Blasting** proposed and thus, vibration impact due to mining. Also, as there is **no Solid Waste generation and no Waste Dump** proposed now, **there will not be any significant change to existing Land Environment** due to the Proposal.

Traffic Impact : For assessing the baseline status, the Traffic Survey based on Indian Road Congress-IRC: 64/106 Norms were carried out at NH81-Underpass Road Junction. The existing traffic volume in the Project vicinity was found to be **5,110 Passenger Car Units (PCUs)/day**. In the Post-Project Scenario, there will be an addition of **1 Vehicle** (in 2 ways) due to due to the Project. Cumulatively, the traffic volume in the Project vicinity will be **5,115 PCU/day**. **The net increase (cumulative) will be 5 PCU/day**. The existing Roads/NH are adequate to handle the proposed traffic volume due to the Project. Thus, there will not be any impact on the existing baseline traffic volume due to the Proposal.

Air Pollution : Mining, Drilling & Blasting, Loading and Transporting activities would generate both fugitive dust emissions and smoke from HEM Machineries/Equipments & 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 & Allied activities. **AERMOD View** Software is used for Predicting the maximum Ground Level Concentrations (GLCs) including **Transportation Impact**. The predicted GLC is given in **Table 3.2**.

Table : 3.2 Predicted GLC

Sl. No.	Pollutant	Background Concentration (24-hly. Avg.), ug/m ³	Max. Predicted Ground Level Concentration, ug/m ³	Distance from the Mines (max.), km	Total Concentration, ug/m ³	Revised NAAQ Norms, ug/m ³	Buffer Available in the Atmosphere
1	PM10	51.9	1.26	0.1	53.16	100	46.84

The predicted maximum GLC-PM10 for cumulative activities is 1.26 ug/m³ and found to be confined locally i.e. within 0.1 km radius from the boundaries. Also, **adequate Buffer Level available (46.84%)** in the Air Environment for the Proposal.

Noise Levels : In the Mines, Noise level due to Mining Equipments during operation, is being maintained at <90 db(A) at a distance of 1.5 m from the sources . 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. The peak particle velocity (PPV) and noise levels during the blasting will be periodically monitored through 'Minimate' Instrument.

Water Environment : There will not be any impact on the Surface Water bodies. As per TWAD Data, 70 year Normal Rainfall of Ariyalur Rain Gauge Station is 1,096 mm. Surface Runoffs from the Plant Area is estimated as per Manual of Artificial Recharge of Ground Water (CGWB, 2007). **Pre-Project Runoffs** is 4,932 KL/Annum and **Post-Project Runoffs** will be 4,932 KL/Annum. About 750 KL/ Annum will be utilized as Raw Water for the Mine. Balance Quantity will be recharging the Ground Water-table in the Mine vicinity. Also, there will be no Ground Water-table Intersection due to the Mining and thus, **no significant impact on the Ground Water regime.**

Mine requires about 2.5 KLD which will be met by Mine Pit Water. There **will not be any water drawl from Surface or Ground Water Sources** in the Lease Area. Domestic sewage generation will be about 0.4 KLD which will be biologically treated in a Septic Tank followed by a Dispersion Trench. **No workshop** is proposed and thus, no effluent generation from the Lease.

Solid Wastes : Entire Top Soil quantity of **7,200 Tons** generated in the Mine was fully utilized for Green Belt development. OB/Rejects generated was stored in the permitted **Dump**. **No Top Soil or Over Burden waste is now envisaged** till the end of mining.

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 boxes** are made available for immediate treatment. **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 the 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.

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 : As per MMDR Act 2015, 30% of Royalty Amount (about **Rs.64.80 Lakhs**) will be earmarked for **District Mineral Foundation (DMF)** and the amount will be spent for benefit of local villager in the Lease Area.

Social Benefits : Project will employ about 10 persons directly and 15 persons indirectly. 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 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.
- ❖ 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 :

- ❖ All Tippers are to be fully covered with Tarpaulin to avoid any spillage on transportation.
- ❖ Restriction of over loading of Tippers shall be enforced.
- ❖ Speed restrictions shall be enforced.
- ❖ Restriction of Truck parking in the Highway and Public Roads shall be enforced.
- ❖ Regular and preventive maintenance of transport vehicles are to be ensured.
- ❖ **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.

Air Environment :

- ❖ Conventional method of mining is adopted.
- ❖ Controlled Blasting is 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 along roads and around lease boundary will act as acoustic barriers.
- ❖ Periodical Noise Monitoring shall be carried out and Reports submitted to the Authorities.

Water Environment :

- ❖ Proper Mine Pit Water management shall be practiced.
- ❖ Earthen bunds are to be provided along the boundaries to arrest wash-offs.
- ❖ Garland drains are to be constructed around the Lease.
- ❖ Settling Pond has to be provided to garland drains, to settle the Suspended Solids.
- ❖ Periodical maintenance/desilting of garland drains shall be done.
- ❖ Green Belt shall be developed and maintained along the Lease boundaries and Safety Barriers.
- ❖ Mined out area shall be converted into a Water Reservoir to recharge the Ground Water-table in the vicinity.
- ❖ Periodical monitoring of mine pit water shall be carried out and Reports submitted.

Solid Wastes :

- ❖ Earthen banks shall be provided on non-operating side of dumps to arrest wash-offs.
- ❖ After the mine reaches the ultimate depth, developmental wastes and rejects stacked in the earmarked locations shall be backfilled and topsoil shall be spread and afforested.
- ❖ Organic wastes (dry leaves, food wastes, etc.) shall be subjected to vermi composting and used as manure for the Green Belt.
- ❖ Inorganic wastes (papers and other wastes) are to be properly disposed of.

Biological Environment :

- ❖ Effective Green Belt has to be developed and maintained. **With the guidance of DFO**, about **2,200 Trees** (@ 1,500 Trees/Ha), predominantly local species like Neem, Pungan, Teak, etc. will be planted @ **500 Trees/annum** and maintained 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.

- ❖ Joining Hands with District Administration in implementing Govt. Schemes.
- ❖ Development of Infrastructure Facilities in the Region.
- ❖ Medical Camps and extending medical facilities.
- ❖ Contribution to Education.
- ❖ Drinking Water Supply.

Occupational Health Measures :

- ❖ All employees undergo check-up on recruitment and periodically during employment.
- ❖ Maintenance of Pre, during & Post Employment Records.
- ❖ Provision of all Personal Protective Equipments for the employees at Mines.
- ❖ Provision of illumination facilities at proper places for ease of working during night times.
- ❖ Work comfort and its periodic review by a committee.
- ❖ Provision of Rest Shelter at mines.

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 capital cost of the Project is **Rs. 10.00 Lakhs**. An amount of **Rs.5.00 Lakhs** is earmarked as **Capital EMP Budget** and **Rs.15.32 Lakhs per Annum** is **Operating Cost** towards EMP measures, Green Belt maintenance, Environmental Monitoring, etc. Also, an amount of Rs. 3.00 Lakhs per Annum has been earmarked for Occupational Health & Safety Measures. Also, about **Rs.10.00 Lakhs** has been allotted as **Corporate Environmental Responsibility (CER) Budget** in compliance with MoEF&CC OM dated 01.05.2018 for execution within 2 years period.

12.0 Disclosure of Consultants

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**), Quality Council of India vide Certificate NABET/EIA/1922/RA 0155 with validity extended till **23.04.2023** vide Letter QCI/NABET/ENV/ACO/23/2646 (Sl. No. 4 of QCI/NABET List dated 04.04.2023) (Sl. No. 4 of QCI/NABET List dated 04.04.2023).

The ABC Techno Labs India Private Limited Laboratory is accredited by the National Accreditation Board for Testing and Calibration Laboratories (**NABL**) vide Certificate No. TC-5770 dated 03.04.2022 with validity till 02.04.2024. The Lab is also recognised by the Ministry of Environment, Forest and Climate Change (**MoEF&CC**) vide Letter F. No. Q-15018/04/2019-CPW dated 14.10.2019 with validity of 5 years. The services of M/s.Ensyscon, Chennai for the coordination of the Study on behalf of DCBL.

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 multifaceted 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.

33



Quality Council of India

National Accreditation Board for Education & Training

CERTIFICATE OF ACCREDITATION



ABC Techno Labs India Private Limited, Chennai
"ABC Tower", 400, 13th Street, SIDCO Industrial Estate North Phase, Ambattur, Chennai 600098

Accredited as Category - A organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations:
Version 3 for preparing EIA-EMP reports in the following Sectors:

Sl. No.	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including open cast/ underground mining	1	1 (a) (i)	A
2	Offshore and onshore oil and gas exploration, development & production	2	1 (b)	A
3	River Valley projects	3	1 (c)	A
4	Thermal power plants	4	1 (d)	A
5	Mineral beneficiation including pelletisation	7	2 (b)	B
6	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	B
7	Cement plants	9	3 (b)	A
8	Petroleum refining industry	10	4 (a)	A
9	Asbestos milling and asbestos based products	12	4 (c)	A
10	Leather/skin/hide processing industry 4	15	4 (f)	A
11	Chemical Fertilizers	16	5 (a)	A
12	Petro-chemical complexes	18	5 (c)	A
13	Petrochemical based processing	20	5 (e)	A
14	Synthetic organic chemicals industry	21	5 (f)	A
15	Distilleries	22	5 (g)	A
16	Pulp & paper industry excluding manufacturing of paper from wastepaper and manufacture of paper from ready pulp without bleaching	24	5 (i)	A
17	Sugar Industry	25	5 (j)	B
18	Oil & gas transportation pipeline, passing through national parks/ sanctuaries/coral reefs / ecologically sensitive areas including LNG terminal	27	6 (a)	A
19	Isolated storage & handling of hazardous chemicals	28	-	B
20	Airports	29	7 (a)	A
21	Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	31	7 (c)	A
22	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	32	7 (d)	A
23	Ports, harbours, break waters and dredging	33	7 (e)	A
24	Highway	34	7 (f)	A
25	Common Effluent Treatment Plants (CETPs)	36	7 (h)	B
26	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
27	Building and construction projects	38	8 (a)	B
28	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 Jan 17, 2020 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/ACC/20/1257 dated March 02, 2020. 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: March 02, 2020

Certificate No.
NABET/ EIA/1922/ RA 0155

Valid till
May 24, 2022

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

**National Accreditation Board for Education and Training**

QCI/NABET/ENV/ACO/23/2646

January 23, 2023

To,

ABC Techno Labs India Private Limited,
"ABC Tower", 400, 13th Street
SIDCO Industrial Estate North Phase, Ambattur
Chennai-600098, Tamil Nadu

Sub.: Extension of Validity of Accreditation till April 23, 2023– regarding**Ref.:** Certificate no. NABET/EIA/1922/RA0155

Dear Sir/Madam,

This has reference to the accreditation of your organization under QCI-NABET EIA Scheme, the validity of **ABC Techno Labs India Private Limited** is hereby extended till April 23, 2023, or completion of assessment process, whichever is earlier.

The above extension is subject to the submitted documents/required information with respect to your application and timely submission and closure of NC/Obs during the process of assessment.

You are requested not to use this letter after expiry of the above stated date.

With best regards.

(A K Jha)
Sr. Director, NABET



**SCHEME FOR ACCREDITATION OF EIA
CONSULTANT ORGANIZATIONS**
NATIONAL ACCREDITATION BOARD FOR EDUCATION AND TRAINING



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Accredited EIA Consultant Organisations (as on April 4, 2023)

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<p>4 ABC Techno Labs India Private Limited (formerly known as ABC Environ Solutions Pvt. Ltd.) Address: # 400, 13th Street, SIDCO Industrial Estate (North Phase), Ambattur, Chennai - 600098 Head Name: Mr G Murugesh Head Designation: Chairman and Managing Director Email: abc@abctechnolab.com, info@abctechnolab.com Tel: 9566055555, 044 26257788 Remarks: Conditions apply</p>	1	Mining of minerals - Opencast and underground	A	1 (a) (i)	 Certificate No.: NABET/EIA/1922/RA0155 Validity: 5/24/2022 Validity Extension Letter No.: QCI/NABET/ENV/ACO/23/2646 Extension Letter Validity: 23-04-2023 UserName: ORG000715 Accreditation Date: 5/24/2017 category: A <div style="border: 1px solid black; padding: 2px; display: inline-block;">Human Resource</div>
	2	Offshore and onshore oil and gas exploration, development & productions	A	1 (b)	
	3	River Valley projects - Irrigation projects only	A	1 (c)	
	4	Thermal power plant	A	1 (d)	
	7	Mineral beneficiation	A	2 (b)	
	8	Metallurgical industries: (secondary ferrous only)	B	3 (a)	
	9	Cement Plants	A	3(b)	
	10	Petroleum refining industry	A	4 (a)	
	12	Asbestos milling and asbestos based products	A	4 (c)	
	15	Leather/skin/hide processing industry	A	4 (f)	
	16	Chemical Fertilizers	A	5 (a)	
	18	Petro-chemical complexes (industries based on processing of petroleum fractions & natural gas and/or reforming to aromatics)	A	5 (c)	
	20	Petrochemical based processing	A	5 (e)	
	21	Synthetic organic chemicals industry (dyes & dye intermediates, bulk drugs and intermediates excluding drug formulations; synthetic rubbers, basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	A	5 (f)	

22	Distilleries	A	5 (g)
25	Sugar Industry	B	5 (j)
27	Oil & gas transportation pipeline (crude and refinery/ petrochemical products), passing through national parks/sanctuaries/ coral reefs/ecologically sensitive areas including LNG terminal	A	6 (a)
28	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of Schedule 2 & 3 of MSHC Rules 1989 amended 2000)	B	-
29	Airports	A	7 (a)
31	Industrial estates/ parks/ complexes/ Areas, export processing zones (EPZs), Special economic zones (SEZs), Biotech parks, Leather complexes	A	7 (c)
32	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	A	7 (d)
33	Ports, harbours, jetties, marine terminals, break waters and dredging	A	7 (e)
34	Highways	A	7 (f)
36	Common effluent treatment plants (CETPs)	B	7 (h)
37	Common municipal solid waste management facility (CMSWMF)	B	7 (i)
38	Building and construction projects	B	8 (a)
39	Townships and Area development projects	B	8 (b)



**SCHEME FOR ACCREDITATION OF EIA
CONSULTANT ORGANIZATIONS**

NATIONAL ACCREDITATION BOARD FOR EDUCATION AND TRAINING



Online Portal for Scheme of Accreditation of EIA Consultant Organization || FAQ For Initial Accreditation

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

S No	Name	Type	Designation	Sector	FA	Remarks	Scan QR
1	Ratnakumar V Mudliar	Empanelled	EC,FAE	2(A),21(A),32(A),37(B),39(B)	SHW(A),SC(A),WP(A)		
2	Abhik Saha	In House	EC,FAE	2(A),9(A),12(A),21(B),22(A)	WP(A),EB(A),AP(B),SHW(A)		
3	Dr. R. K Jayaseelan	In House	EC,FAE	1(B),31(B),39(B),21(A),37(B)	LJ(A),WP(A),HG(A),SHW(A)		
4	Dr. R. Paramasivam	In House	EC,FAE	31(A),35(A)	WP(A),HG(A)		
5	Dr.Mohit Kumar Ray	Empanelled	EC	10(A),18(A),4(a),20(A),27(A)			
6	Geetha S	In House	FAE		SE(B)		
7	Haneesh Paniker	Empanelled	EC,FAE	34(B),36(B),37(B),39(B),39(B)	AP(B),WP(B),NV(B)		

8	K Sekar	Empanelled	EC	1(A),7(A),9(A),31(A),33(A)		Opencast mining only	
9	Kavitha Zog	Empanelled	EC,FAE	3(A),4(B),22(A),25(B),39(B)	SHW(B),WP(B),EB(B)		
10	M.S Bhaskar	Empanelled	EC,FAE	1(A),2(A),7(B),21(A)	Geo(A),HG(A),LU(A),NV(B)	Onshore only for sector-2. Opencast mining only for sector-1.	
11	Muthiah Mariappan	Empanelled	EC,FAE	4(A),10(A),15(A),16(A),29(A)	SHW(A),AP(A),WP(A)		
12	P Swaminaj	Empanelled	EC	34(A)			
13	R Rajendran	Empanelled	EC,FAE	8(B),39(B),39(B),29(A)	SHW(B),AP(B),N(B),SC(B)		
14	Shankar N Gajhiye	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(A)		
18	Vinod Kumar Gautam	Empanelled	EC,FAE	29(A),38(B),28(B),21(A),34(A)	SHW(A),AQ(A),RH(A)		
19	Vivek P Navare	Empanelled	EC,FAE	1(A)	NV(A)		

  **National Accreditation Board for Testing and Calibration Laboratories**

CERTIFICATE OF ACCREDITATION

ABC TECHNO LABS INDIA PRIVATE LIMITED

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

ABC TOWER, NO 400, 13TH STREET, SIDCO INDUSTRIAL ESTATE-NORTH PHASE, AMBATTUR, CHENNAI, TAMIL NADU, INDIA

in the field of

TESTING

Certificate Number: TC-5770

Issue Date: 03/04/2022

Valid Until: 02/04/2024

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL. (To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : ABC Techno Labs India Private Limited

Signed for and on behalf of NABL




N. Venkateswaran
Chief Executive Officer

13.0 Ecological Damage Assessment, Remediation Plan and Natural Resource Augmentation & Community Resource Augmentation Plan

13.1 Need & Objectives of the Study

The assessment of environmental damage caused due to an activity (mining) under Violation of a regulatory framework needs to be measured across different aspects viz. natural resource degradation, socio-economic effects versus the economic benefits gained at the cost of environmental damage. For estimation of environmental damage, all causes/aspects of the Project which may interact with Environmental Components (viz. Land, Air, Water, Soil, etc.,) are identified/evaluated and the resultant degradation/deterioration/damage attributed to the activity has to be assessed.

To compensate the degradation/deterioration/damage, remedial measures are to be identified based on the severity of the damage to the vulnerable Environmental Components (viz. Land, Air, Water, Soil, etc.,) of the environmental attribute (Natural Resource, Community Infrastructures, etc.). The objectives of the Study are as described below :

i. Ecological Damage Assessment : Analyse and Assess the environmental impacts and ecological damages with respect to Environmental Attributes due to Production during Violation Period.

ii. Formulation of Remediation Plan (RP) : Identify the corrective measures to compensate or restore or replace the damaged natural resources to mitigate the adverse impacts on such resources.”

iii. Formulation of Natural & Community Resource Augmentation Plan (NCRAP) : Remedial measures to compensate for the damaged natural resource, community resource infrastructure, etc., which were providing Socio-economic benefit to the local community.

13.2 Qualitative & Quantitative Assessment

DCBL has operated Khairulabad Limestone Mine under RC No. 17783 after 15.01.2016 till January 2017 and produced 14,945 Tonnes of Limestone. Operating the Lease without EC is in Violation of EIA Notification 2006 (as amended). Though 12.5 months period is there after 15.01.2016, the production from the Mine was carried out during 2 months only in that period viz. **March 2016 (9,590 Tonnes) & January 2017 (5,355 Tonnes)**. As per CPCB Guidelines, No. of days violation took place have to be considered for Violation & Ecological Damage Assessment. Thus, the **Violation Period has been considered as 2 months**. The mining activities were stopped in **February 2017** and there is no production from this Mine. There was **no illegal mining/encroachment** outside the Lease boundary.

Mining activities were carried out in the Lease as detailed below :

- ❖ Opencast Mechanized **Conventional Method of Mining, with controlled Drilling & Blasting**.
- ❖ No Top Soil or Over Burden generation and thus **No Waste Dumps** in the Lease.
- ❖ **No Ground Water-table Intersection** due to the Mining.
- ❖ **No Surface or Ground Water Drawl** and Rain Water Harvested in the Pit was only gainfully utilised.

The Project Status before (Baseline) and during the Violation Period are detailed in **Table 13.1**. However, the Environmental Management Plan (**EMP Measures were in place** during the Violation Period also (**Table 13.2; Enumeration of Aspects of Violation**). Thus, **there were no significant changes** in the Environmental Attributes during Baseline Period and Violation Period.

Table : 13.1 Project Status – Before & during Violation Period

Sl. No.	Description	Details	Approvals			Reference / Remarks
			Yes	No	NA	
1	Name of the Mine	DCBL Khairulabad Limestone Mine under Rc. No. 17783 (2.25 Ha)	√	-	-	Mining Lease is granted for 30 Years from 13.08.2004 to 12.08.2034 vide RC No. 17783/MM4/2002 dated 27.01.2004.
2	Lessee	Dalmia Cement (Bharat) Limited	√	-	-	ML Grant
3	Land Extent	Own Patta Land	√	-	-	2.25 Ha
		Govt. Poramboke Land	-	√	-	0 Ha
		Forest Land	-	√	-	0 Ha
4	Commencement & Operations	Mining Period	√	-	-	Mining commenced on 25.08.2004.
5	Status now	In Temporary Discontinuance	-	-	-	Not in operation since 01.02.2017
6	Total Production	Limestone	√	-	-	Since commencement in 2004-05, about 4,90,048 Tonnes of Limestone was mined out from the Mine.
7	Total Despatch	Limestone	√	-	-	4,90,048 Tonnes
8	Maximum Production Achieved	Limestone Qty. during 2005-06	-	-	-	1,25,671 TPA
9	Maximum Production Proposed	Limestone Qty. proposed during 2023-24	√	-	-	6,028 Tonnes @ 20 TPD

Sl. No.	Description	Details	Approvals			Reference / Remarks
			Yes	No	NA	
10	Method of Mining	Opencast Mechanised Conventional	√	-	-	With Drilling & Blastings
11	Drilling & Blasting	Controlled Drilling & Blasting	√	-	-	-
12	Ground Water-table (GWT) Intersection	Mining did not intersect the Ground Water-table	-	-	-	Mining done upto 14 m BGL and GWT Level is 40-45 m BGL
13	Dumps : Inside & Outside ML	No Top Soil / Over Burden Dumps	-	-	-	Generated Top Soil was fully utilized & No OB.
14	Violation Period	15.01.2016 to 31.01.2017	-	-	-	2 month operation
15	Violation Details	Valid EC	-	√	-	Required from 15.01.2016
		Valid CTO	-	√	-	-
		Valid Mining Plans/Schemes	√	-	-	IBM, Chennai vide Letter No. TN/ALR/LST/ROMP-1523.MDS dated 13.11.2018 for the Period 2019-20 to 2023-24
		Forest Clearance	-	-	√	-
		Transport Permits	√	-	-	-
		Any other Violation	-	√	-	-
16	Violation Quantity	Limestone Excavated during Violation Period	-	-	-	14,945 Tonnes
17	Approx. value of the Mineral	As per Demand Notice	-	-	-	Rs.60,34,910/-
18	Penalty Paid	As per Demand Notice	√	-	-	Rs.60,34,910/- on 30.07.2019 vide TNTC9 SBI Challan
19	Project Cost	Including all	-	-	-	Rs.10,00,000
20	EMP Budget	Capital & Operating Cost				An amount of Rs.5.00 Lakhs is earmarked as Capital EMP Budget and Rs.15.32 Lakhs per Annum is Operating Cost towards EMP measures

Violation Applicable to the Project

Sl. No.	Statute Requirement	Status	Remarks
1	Valid EC	Operating the Lease after 15.01.2016 for a Production of 14,945 Tonnes Limestone leads to Violation. Applied for EC on 12.04.2018.	EC was not required for this Mine (<5 Ha) upto 15.01.2016.
2	Valid CTO	No CTOs were obtained	Violation
3	Valid Mining Plans/ Schemes	IBM has accorded the periodic Approvals for Mining Plans/Schemes of the Mine.	There is NO VIOLATION in this regard.
4	Forest Clearance	No Forest Land involved.	Not Applicable
5	Transport Permits	DCBL has obtained the required Transport Permits.	There is NO VIOLATION in this regard.
6	Any other Violation	Nil	Nil

Table : 13.2 Enumeration of Aspects of Violation

Sl. No.	Environmental Components & Attributes		Baseline Status (Before Violation)	EMP Implementation during Violation		Change in Status during Violation
				Yes	No	
1	Mining Method	Opencast; Mechanized	Conventional	√	-	Drilling & Blastings before as well as during Violation Period
2	Land Use	Mine Area	2.25 Ha	-	-	No change; Mining was carried out in already excavated Pit.
		Additional Area	0	-	-	Not involved
		Top Soil Dump	0	-	-	No Top Soil Generation
		OB Dump	0	-	-	No OB Generation
		Green Belt	0	√	-	Nil
		Soil Quality	Desirable Quality	√	-	Bunds & Garland Drains are provided. No change to the baseline status
3	Air Quality determination due to :	Excavation	Max. 240 TPD	√	-	-
		Loading	Max. 240 TPD	√	-	-

Sl. No.	Environmental Components & Attributes		Baseline Status (Before Violation)	EMP Implementation during Violation		Change in Status during Violation
				Yes	No	
		Haulage / Transportation	Max. 240 TPD	√	-	-
4	Noise Levels	Mining	In desirable Quality	√	-	No change to the baseline status
		Transportation		√	-	
5	Water Resources	Surface Waters	No drawl	√	-	No change to the baseline status
			Drainage Pattern	√	-	
		Ground Waters	No drawl	√	-	
			GWT Intersection	-	√	
Mine Pit Water	Gainfully utilised	√	-			
6	Wastewaters	Effluent Generation	No Effluent Generation	-	√	Nil
		Sewage Generation	0.4 KLD	√	-	No change to the baseline status
		Sewage Treatment & Disposal	Septic Tank-Dispersion Trench	√	-	No change to the baseline status
		Pit Water Discharge	No Discharge	-	√	No change to the baseline status
7	Solid Wastes	Generation	No Solid Wastes	-	√	Nil
8	Biological	Eco Sensitive Area- 5km Radius	Nil	-	√	No change to the baseline status
		Reserved Forests	In 10 km Radius	-	√	
9	Socioeconomics	R&R	No R&R	-	√	No change to the baseline status
		Nearby Settlement	Khairulabad	-	-	
		Population	About 5000	-	-	
		Employment to	10	-	-	
		CSR Budget & Spent	Rs.50,000 per Annum	-	-	-
10	Occupational Health	Provision of PPE to Workers	Provided	√	-	No change to the baseline status
		Medical Surveillance	Carried out	√	-	

13.3 Ecological/Environmental Damage Assessment

During the Violation Period from 15.01.2016 to 31.07.2016, the Lessee has operated the Mining Lease for a Production of 26,520 Tonnes of Limestone. During the Period, the impacts on the Environmental Components viz. Air, Water, Land, Biological and Socioeconomics Environment are assessed based on the **Norms specified by the Central Pollution Control Board (CPCB)** to implement "Polluter Pays" Principle and to levy Environmental Compensation for Restoration of Environmental Damages ('Report of the CPCB In-house Committee on Methodology for Assessing Environmental Compensation and Action Plan to utilize the Fund' based on the Agenda Note of 63rd Conference of Chairman and Member Secretary of PCBs/Committees held on 18.03.2019). The Environmental Compensation shall be based on the following formula:

$$EC = PI \times N \times R \times S \times LF$$

where,

EC is Environmental Compensation in Rupees

PI = Pollution Index of Industrial Sector

N = Number of days of violation took place

R = A factor in Rupees for EC

S = Factor for Scale of Operation

LF = Location Factor.

Note:

- a. The industrial sectors have been categorized into Red, Orange and Green, based on their Pollution Index in the range of 60 to 100, 41 to 59 and 21 to 40, respectively. It was suggested that the average pollution index of 80, 50 and 30 may be taken for calculating the Environmental Compensation for Red, Orange and Green categories of industries, respectively.
- b. N, number of days for which violation took place is the period between the day of violation observed/due date of direction's compliance and the day of compliance verified by CPCB/SPCB/PCC.
- c. R is a factor in Rupees, which may be a minimum of 100 and maximum of 500. It is suggested to consider R as 250, as the Environmental Compensation in cases of violation.
- d. S could be based on small/medium/large industry categorization, which may be 0.5 for micro or small, 1.0 for medium and 1.5 for large units.
- e. LF, could be based on population of the city/town and location of the industrial unit. For the industrial unit located within municipal boundary or up to 10 km distance from the municipal boundary of the city/town, following factors (LF) may be used:

S. No.	Population* (million)	Location Factor [#] (LF)
1	Less than 1	1.0
2	1 to <5	1.25
3	5 to <10	1.5
4	10 and above	2.0

*Population of the city/town as per the latest Census of India

#LF will be 1.0 in case unit is located >10km from municipal boundary

For critically polluted areas / Ecologically Sensitive areas, the scope of LF may be examined further.

- f. In any case, minimum Environmental Compensation shall be ₹ 5000/day.

With applicable values of PI-80 (Red Category Industry), N-62 days (of violation period), R-Rs.150, S-0.5 (cumulatively Large Scale Unit), LF-1.0 (Local Population is less than one million), the Environmental Compensation computed is as follows :

EC for Rc. No. 17783 = $80 \times 62 \times 150 \times 0.5 \times 1.0 = \text{Rs.3,72,000/-}$ (Maximum)

As per CPCB Guidelines, the minimum Environmental Compensation shall be Rs.5,000/- per day. Accordingly, the minimum Environmental Compensation for 75 days of Violation will be **Rs.3,10,000/-** (Minimum).

Considering the Project under Low Level Ecological Damage, EIA Coordinator has arrived the Costs as detailed below :

Ecological Remediation Cost @ Rs.0.25 Lakh/Ha for 2.25 Ha	:	Rs.0.563 Lakhs
Natural Resource Augmentation Plan @ Rs.0.30 Lakh/Ha	:	Rs.0.675 Lakhs
Community Resource Augmentation Plan @ Rs.0.40 Lakh/Ha	:	Rs.0.900 Lakhs

Total	:	Rs.2.111 Lakhs

CER @ Rs.0.25 Lakh/Ha	:	Rs.0.563 Lakhs

The damage to an Environment Attribute can be resulted due to different causes and will lead to different impacts. An impact that poses risks to human health or degradation of environmental quality is considered as a significant damage due to the project activity. For estimation of environmental damage, all causes/aspects of the environmental degradation for a particular environmental attribute are identified and assessed. The Assessment of Ecological Damage and its Cost (as per available/existing Guidelines) are given in **Table 13.3**.

During Violation Period, indirect impact/damage on air quality in Buffer Zone due to Particulate Matter, SO₂, NO_x and CO₂ generated in Mining operations is considered. PM10 emissions due to emissions and other activities are calculated based on USEPA's AP-42 Norms. For accounting the cost for environmental damage due to air pollutants, environmental costs considered in the energy and transport sectors by Federal Environmental Agency, Germany (Aug. 2013) has been considered. Transport Emission Factors for Medium & Heavy Duty Trucks viz. 0.997 kg CO₂/km and 0.08 g N₂O/km have been taken from US EPA 2014 emission factor for Green House Gases (GHGs). Euro to INR Rs.88.34 (as on 30.11.2020) has been considered for Conversion.

Total Production during Violation Period	:	14,945 Tonnes
HSD @ 80 LPD for 62 days	:	4960 Liters (max.)

Greenhouse gases include carbon dioxide, methane, nitrous oxides, and water vapour. The proposed quarrying and transporting activities will utilise about 4,960 Litres HSD. By considering the Transport Emission Factors for Medium & Heavy Duty Trucks viz. 0.997 kg CO₂/km, 0.012 g

CH₄/km and 0.008 g N₂O/km [as per US EPA 2014 emission factors for Green House Gases (GHGs) Inventories], the gaseous emissions will be as follows :

HSD consumption	:	4,960 LPA
Total CO ₂ Emissions	:	0.014 Tons
CO _{2-e} for CH ₄ Emissions	:	0.004 Tons
CO _{2-e} for N ₂ O Emissions	:	0.035 Tons/

Thus, total CO₂ Emission due to the Proposal will be **0.053 Tons/**.

During Violation period, PM₁₀ was 0.081 Tons, SO₂ was 0.019 Tons and NO_x was 0.049Tons. Accordingly, the total Indirect Damage due to Air Pollution was **Rs.1,15,283/-**.

Air Emissions	Climate Damage (Rs.)	Health Damage (Rs.)	Biodiversity Loss Cost (Rs.)	Crop Damage Cost (Rs.)		Material Damage Cost (Rs.)	Total Cost (Rs.)
GHG	1,11,862	-	-	-	-	1,11,862	1,11,862
PM ₁₀	-	249.07664	-	-	-	249	-
NO _x	-	47.906807	47.90680726	1901.06378	380.212756	2,377	-
SO ₂	-	18.062523	18.06252252	-	758.929518	795	-
Total	1,11,862	315	66	1,901	1,139	1,15,283	1,11,862

Table : 13.3 Ecological Damage Assessment & its Cost

Sl. No.	Environmental Component	Mine Activity	Impact on the Environment	Damage	Damage Cost
1	Land Use	Production of 14,945 Tonnes Tonnes Limestone over an extent of 2.25 Ha by Opencast Mechanized Conventional method	Mining was carried out in already excavated Pit. Drilling & Blasting was there. No Ground Vibration. No Waste Dumps. No loss of vegetation.	No Damage to Land Use/ Land Cover due to the Activity	No damage cost
2	Air Quality & Ecology	Production for 62 Mine Working Days for 240 Tonnes.	Predicted GLC (Cumulative) impact was very marginal, well within the NAAQ Norms and adequate Buffer was there. Good Quality Index was prevailing in the ML vicinity.	No direct damage. Ambient air Quality damage is part of indirect damages caused to biological environment	Rs.1,15,283/-

Sl. No.	Environmental Component	Mine Activity	Impact on the Environment	Damage	Damage Cost
				as well as to public health.	
3	Noise & Vibration	Drilling & Blasting and thus, no vibration.	Mine workers were provided with ear plugs and ear muffs.	No Damage due to the Activity	No damage cost
4	Dewatering for Consumption	No Surface or Ground Water drawl for Mine water demand. No Ground Water-table Intersection	Rain Water collected and Mine Seepage water accumulated in the Mine Pit was utilised @ 2.5 KLD	CPCB ECR-GW Rate for Safe Area is Rs.15 per KLD. Mine utilized 2.5 KLD for 62 days.	Rs.2,325/-
5	Wastewaters	No Effluent and no mine Pit Discharge	Domestic sewage generation is 0.4 KLD and is biologically treated in a Septic Tank followed by a Dispersion Trench.	No Damage due to the Activity	No damage cost
6	Solid Wastes	No Top Soil or OB Generation	No Backfilling and Reclamation	No Damage due to the Activity	No damage cost
7	Socio-economics	Direct employment to 20 persons and indirect employment to 30 persons	As per MoEF&CC Norms, 3% of total economic benefit derived to be contributed.	Economic Benefit due to the Production was Rs.60,34,910/-	Rs.1,81,047/-
8	Occupational Health and Risk	Mining and allied activities	Occupational health & Safety Standards were adopted	No Damage due to the Activity	No damage cost
9	Public Health	Mining and allied activities	Periodical Medical Camps	Covered in CSR	No damage cost
Total Damage Cost					Rs.2,98,655 /-

13.4 Ecological Damage Remediation Plan

Thus, the maximum Environmental Damage Cost arrived is **Rs.3,72,000/-**. The remedial measures have been identified based on the severity of the damage as well as the vulnerable agent (Infrastructure, Natural resource, Community etc.,) to which the damage was caused. To compensate the Ecological Damage caused due to mining during the Violation Period, the Remediation Plan is proposed which will be implemented on approval by SEIAA-TN.

An amount of **Rs.3.72 Lakhs** toward Remediation Plan and Natural & Community Resource Augmentation Plans is allotted for approval which will be spent within 3 years. The details of Remediation Plan, Natural Resource Augmentation Plan and Community Resource Augmentation Plan with budgetary provisions & Action Plan are given in **Tables 13.4-13.6** and their Summary in **Table 13.7**.

Table : 13.4 Ecological Damage Remediation Plan

Sl. No.	Environmental Component	Remediation Plan / Activity Description	Budgetary Provision, Rs. Lakhs			Total, Rs. Lakhs
			I	II	III	
1	Air Quality & Ecology	Green Belt by Planting 300 Trees in Mine Area @ Rs.400 per Tree including its maintenance-100 Trees every year	1.00	0.30	0.30	1.60
2	Water Environment	Channelization & Utilisation of Surface Runoffs through Garland Drains towards water demand	0.10	0.10	0.10	0.30
3	Socio-economics & Public Health	Community/Public Buildings Maintenance and Conducting Medical Camps	0.20	0.20	0.20	0.60
Total		-	1.30	0.60	0.60	2.50

Table : 13.5 Natural Resource Augmentation Plan

Sl. No.	Activity Proposed	Budgetary Provision, Rs. Lakhs			Total, Rs. Lakhs
		I	II	III	
1	Providing Solar Street Lights to nearby Village @ Rs.20,000/- per Light, 1 per village, 3 villages	0.20	0.20	0.20	0.60
Total		0.20	0.20	0.20	0.60

Table : 13.6 Community Resource Augmentation Plan

Sl. No.	Activity Proposed	Budgetary Provision, Rs. Lakhs			Total, Rs. Lakhs
		I	II	III	
1	Providing Furnitures to Kairulabad School	0.25	0.20	0.20	0.65
Total		0.25	0.20	0.20	0.65

Table : 13.7 Summary of Remediation, Natural & Community Resource Augmentation Plan

Sl. No.	Activity Proposed	Budgetary Provision, Rs. Lakhs			Total, Rs. Lakhs
		I	II	III	
1	Cost of Damage Remediation Plan	1.30	0.60	0.60	2.50
2	Natural Resource Augmentation Plan	0.20	0.20	0.20	0.60
3	Community Resource Augmentation Plan	0.25	0.20	0.20	0.65
Total		1.75	1	1	3.75

13.5 Conclusion

Total budgetary provision with respect to Remediation Plan and Natural & Community Resource Augmentation Plan is Rs.3.75 Lakhs. DCBL shall be required to submit a Bank Guarantee of an amount of Rs.3.75 Lakhs in favour of TNPCB prior to the grant of EC. The Remediation Plan shall be completed in 3 years whereas Bank Guarantee shall be for 5 years. The Bank Guarantee will be released after successful implementation of the Remediation Plan and Natural and Community Resource Augmentation Plan and after the recommendation by the Regional Office of the Ministry. **Credible Action under Section 19 of the E(P) Act shall also be complied.**

Meanwhile, DCBL has received **Demand Notice** from the District Collector, Ariyalur for 100% cost of Mineral value of Limestone quantity produced without EC vide **Rc. No. 346/G&M/2018 dated 26.07.2019 for Rs.60,34,910/-**. Accordingly, DCBL has remitted **Rs.60,34,910/- on 30.07.2019** vide TNTC9 Chalan through State Bank of India, Ariyalur. Now, the Mine will be operated only after obtaining all Statutory Clearances.

PROCEEDINGS OF THE COMMISSIONER OF GEOLOGY
AND MINING, GUINDY, CHENNAI 600 032

Present: Thiru. Hans Raj Verma, I.A.S.

Re. No.17783/MM4/2002

Date:27.1.2004

Sub: Mines and Minerals-Limestone-Mining lease-Patta land-Over an extent of 2.25.0 Hects. in Survey Number 455/1, 456/2 and 456/3 etc. of Kairulabad Village, Ariyalur Taluk, Perambalur District-Mining lease application of Tvl. Dalmia Cement [Bharat] Ltd., Dalmiapuram-Mining lease granted-orders issued.

- Ref: 1. Mining lease application of Tvl. Dalmia Cement [Bharat] Ltd., Dalmiapuram Dated 29.10.2001.
2. The District Collector, Perambalur Letter No.244/G&M/2001, Dated 17.10.2002.
3. This office letter No.17783/MM4/2002 Dated 6.4.2003 addressed to the Applicant.
4. Letter No.TN/PBR/MP/LST-1497/SZ Dated 9.9.2003 from Controller of Mines, Indian Bureau of Mines, Bangalore-560 022.
5. G.O. Ms. No.133/Industries (MMA 1) Department Dated 4.5.98.

ORDER:

- 1) Tvl. Dalmia Cement [Bharat] Ltd., Dalmiapuram has applied on 2.11.2001 for grant of a mining lease to mine limestone in respect of the following areas for a period of thirty years:

Sl No	Name of District	Taluk	Village	Survey Field Number	Extent (in Hectares)	Classification
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Perambalur	Ariyalur	Kairulabad	455/1	0.39.0	Patta Land
				456/2	0.69.5	"
				456/3	1.15.5	"
				Total	2.25.0	

- 2) The District Collector, Perambalur has recommended the above Mining lease application to the Director of Geology and Mining in his letter under reference 2nd cited.

- 3) Scrutiny of the Mining lease application along with the documents received therewith and the District Collector's reports reveals the following:

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456/2 and 456/3 etc. covering an extent of 2.25.0 Hects. are classified as patta lands and stand registered in the name of Tvl. Dalmia Cement [Bharat] Ltd., Dalmiapuram. Therefore, the applicant company have got surface rights over the area applied for Mining lease.

5] There are no permanent structures in and around areas applied for lease.

6] The Assistant Director [Geology and Mining], Perambalur has inspected the areas and reported that the mineral limestone is found to occur in the applied area. He has further estimated an inferred reserve of 7.35 Lakh Tonnes of recovery in the areas applied for lease. He has also reported that the mineral limestone is cement and cement plus grade variety.

7] On enquiry from the public, it has been reported that there is no objection for the grant of mining lease in the areas applied for lease.

8] The District Collector, Prambalur has therefore recommended for grant of Mining lease to mine limestone over an extent of 2.25.0 Hects. of patta lands in Survey Field Number 455/1, 456/2 and 456/3 etc. of patta lands of Kairulabad Village, Ariyalur Taluk, Perambalur District in favour of Tvl. Dalmia Cement [Bharat] Ltd., Dalmiapuram for a period of thirty years.

9] The area applied for Mining lease is compact and contiguous and thus the area satisfies Section 6(1) (c) of Mines and Minerals (Development and Regulation) Act 1957.

10] The area applied are for an extent of 2.25.0 Hects. only and do not exceed 5.00.0 Hects. Hence requirement of clearance from Environment and Forests Department does not arise.

11] The area applied for Mining lease are not covered in the hill Villages. Therefore, requirement of clearance from Hill Area Conservation Authority does not arise.

12] As per affidavit furnished under Rule 22 [3] [i] [g] of Mineral Concession Rules 1960, the areas applied for mining lease do not exceed 10 sq. kms. within the state as per Government of India Notification No.51/Dated 20.12.1999. Hence relaxation of Section 6 [1] [b] Mines and Minerals [Development and Regulation] Act 1957 does not arise.

13] The report of the Assistant Director [Geology and Mining], Perambalur has established the existence of the mineral limestone in the areas applied for mining lease. Thus the area applied for mining lease satisfies Section 5 [2] [a] of Mines and Minerals (Development and Regulation) Act 1957.

14] The area applied for lease has not been reserved for state exploitation.

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15] The applicant company have submitted the mining plan duly approved by Indian Bureau of Mines in their letter No.TN/PBR/MP/LST/1497/SZ Dated 9.9.2003.

The area applied for Mining lease is verified with the concerned Mining lease application along with Approved Mining Plan with reference to Survey Number/Extent and F.M.B' and it is found to be correct.

16] The mineral applied for lease is limestone which is deleted from the 1st scheduled of Mines and Minerals [Development and Regulation] Act 1957 as per Government of India Notification No.51, dated 20.12.1999. Hence obtaining prior approval of Government of India is not necessary.

17] In the light of the above facts, in exercise of the powers delegated in G.O. Ms. No.133/Industries (MMA 1) Department Dated 4.5.1998 the mining lease for limestone in respect of the following areas

Sl No	Name of District	Taluk	Village	Survey Field Number	Extent (in hectares)	Classification
(1)	(2)	(3)	(4)	(5)		(7)
1.	Perambalur	Ariyalur	Kairulabad	455/1	0.39.0	Patta Land
				456/2	0.69.5	
				456/3	1.16.5	"
				Total	2.25.0	

is hereby granted for a period of thirty Years in favour of Tvl. Dalmia Cement [Bharat] Ltd., Dalmiapuram subject to the following conditions.

1] The applicant company should produce the progressive Mine Closure Plan duly approved by the Indian Bureau of Mines within 180 days as per the amended Rule 22 [5] [Va] of Mineral concession Rules 1960.

18] The rate of royalty, dead rent and surface rent shall be as follows:

(a)	Royalty	1) Limestone (L.D. grade less than 1.5% silica cement content)	Rs.50/- per MT
		2) Limestone (Others)	Rs.40/- per MT
(b)	Dead rent	First year of the lease	Nil
		2 nd year to 5 th year of the lease	Rs.70/- per hectare.
		6 th year to 10 th year of the lease	Rs.140/- per hectare.
		11 th year of the lease and onwards	Rs.200/- per hectares.

The rate of royalty and dead rent are subject to such changes as may be notified from time to time.

19) Surface rent and water rates:

At such rates as the land revenue and other cesses assessable on the land shall be paid.

20) The applicant shall pay a deposit of Rs.10,000 (Rupees Ten Thousand Only) as prescribed in Rule 32 of Mineral Concession Rules, 1960 before lease deed is actually executed.

21) The usual and special conditions indicated in this order are subject to such further modifications and alteration as may be included in the lease deed when finalised.

22) The District Collector, Perambalur District is requested to take necessary further action for execution of lease deed in the prescribed form incorporating all the conditions specified in this order. As soon as the lease deed is executed, the date of such execution should be reported to the Government and the Commissioner of Geology and Mining and the District Collector should ensure that the lease deed executed is registered before commencement of mining operation. The District Collector is also requested to ensure the compliance by the lessee of the amended provisions of Mines and Minerals (Development and Regulation) Act 1957, Mineral Concession Rules 1960, Mineral Conservation and Development Rules 1988, Mines Act 1952, Metalliferous Mines Regulations 1961, Mineral Conservation and Development [Amendment] Rules 2003 Dated 10.4.2003, Environment and Forest Act and other Acts and rules including the Forest Conservation) Act 1980 in force.

Sd. Hans Raj Verma
Commissioner of Geology and Mining

// Forwarded by Order //

[Signature]
29/1/04
Deputy Director
P.H. Desh
29.1.04

To

M. Dalmia Cement [Bharat] Ltd.,
Dalmiapuram,
Lalgudi Taluk,
Tiruchirappalli District-621 651.

- BY RPAD

Copy to: The District Collector,
Perambalur District

(enclosing a copy of the Approved Mining Plan furnished by the applicant along with mining lease application and documents).

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23
25000



2004 Sold to Dalmia Cement (Bharat) Ltd.
Dalmiapuram. *S. Narayana*
0100 792932
ASSISTANT TREASURY OFFICER
SUP. TREASURY, *17/7/04*
ARIYALUR - 621 704

FORM - K
(RULE 31 OF MINERAL CONCESSION RULES 1960)

MINING LEASE DEED

Proceedings No. Rc.17783/MM4/2002 dated 27.1.2004 of the Commissioner (Geology and Mining), Chennai 600 032.

This Indenture made this *21st* day of July, 2004 between the Governor of Tamilnadu (hereinafter referred to as the "State Government" which expression shall where the context so admits be deemed to include the successors in office and assigns) of the one part; and

For Dalmia Cement (Bharat) Limited,

Gasper Fenelon
LESSEE
G. Gasper Fenelon
By, Executive Director
Dalmia Cement (Bharat) Ltd.,
Balmiapuram, 621 651

[Signature]
District Collector
LESSOR *1/32*



[Handwritten signature]

923/2004

presented in the presence of the District Registrar of Ariyalur and Fee of Rs. 115.00 Paid between the hours of 10.11 AM on 5th day of August 2004 by



Document No. 923 of 2004 of Book... Contains 32 Sheet

Execution Admitted by... Jeyelon

George Fanelon S/o George Fanelon BS Dalmiapuram Colony Dy. Executive Director Dalma Cement (Bharat) Ltd. Dalmaipuram. C-47, Dalma, Colony, Dalmiapuram - 621051.

Identified by... V. Kartikeyan S/o P. Vijayakrishnan

(E. PARAGAN) S/o R. Srinivasan Dalmaipuram

I have satisfied myself as to the execution of the instrument by Thiru. P. V. Kumarandam D.A.S., District Collector, Perambalur who is exempted from personal appearance Under Section 58 (i) of the Registration Act

Joint I Sub Registrar

5th day of August 2004

Joint I Sub Registrar Ariyalur

Registered as No. 923 of 2004 of Book... 5th day of August 2004

JOINT SUB REGISTRAR-I





No 45/Sold to Dalma's Cement Co Ltd
Dalmiapuram

0100 792933

CONSTANT TREASURY OFFICER
SUB-TREASURY,
ARIPALUD - 621 704

[Handwritten signature]

19-3-04

- 2 -

Thiruvallur DALMIA CEMENT (BHARAT) LIMITED, a company registered under the Companies Act, 1913 and having their Registered Office at Dalmiapuram, Tamil Nadu and having their factory at Dalmiapuram, Tiruchirapalli District (hereinafter

For Dalma Cement (Bharat) Limited,

[Signature]
LESSEE
G. Gasper Fenelon
By, Executive Director
Dalma Cement (Bharat) Ltd.
Dalmiapuram 621 651

[Signature]
District Collector
LESSOR $\frac{2}{32}$





Sl. No 46/81 d to Dalmia Cement (Bharat) Ltd 0100 792934
Dalmiapuram



[Handwritten signature]

[Handwritten signature]
ASSISTANT TREASURY OFFICER
SUB-TREASURY,
ARIYALUR - 691 704

-3-

referred to as the "Lessee" which expression shall where the context so admits be deemed to include its successors and permitted assigns) of the other part;

Whereas the lessee has applied to the State Government in accordance with the Mineral Concession Rules, 1960 (hereinafter referred to as the "said Rules") for a

For Dalmia Cement (Bharat) Limited,

LESSEE *[Handwritten signature]*

G. Gasper Fenelon
Dy. Executive Director
Dalmia Cement (Bharat) Ltd.,
Dalmiapuram) 621 651

[Handwritten signature]
District Collector
LESSOR

3/32





Sl No 13. Sold to Dalmia Cement (Bharat) Limited
 0411 609047

27
 18

ASSISTANT TREASURY OFFICER
 SUB-TREASURY,
 ARYALUR - 621 764

- 9 -

In Witness whereof these presents have been executed in manner hereunder appearing the day and year first above written.

The schedule above referred to:

PART-I

The area of this lease

Location and area of lease:

All that tract of lands situated at **KAIRULABAD VILLAGE, ARIYALUR TALUK, PERAMBALUR DISTRICT** in the Registration District of Ariyalur and In the Sub

For Dalmia Cement (Bharat) Limited,

G. Gasper Fenelon
 LESSEE
G. Gasper Fenelon
 Dy. Executive Director
 Dalmia Cement (Bharat) Ltd.,
 Dalmiapuram 621 651

[Signature]
 District Collector
 LESSOR

9/32



- 10 -

Registration District of Ariyalur bearing Cadastral Survey Nos. containing an area of 2.25.0 Hectares or thereabouts delineated on the Plan hereto annexed thereon coloured RED and bounded as follows:

S.F.No.	Extent in Hec.	Classification	Four Boundaries by			
			North	South	East	West
455/1	0.390	Patta lands	456	455/2	456	Aminabad
456/2	0.695	Patta lands	456/1	452	456/3	455
456/3	1.165	Patta lands	456/1	452	478	456/2
Total	2.250					

hereinafter referred to as "the Said lands.

PART - II

Liberties, powers and privileges to be exercised and enjoyed by the lessee/lessees subject to the restrictions and conditions in Part III.

To enter upon land and search for win, work etc:

1. Liberty and power at all times during the term hereby demised to enter upon the said lands and to search for mine bone, dig, drill or win, work-dress, process, convert, carry away and dispose of the said mineral/ minerals.

To sink, drive and make pits shafts and inclines etc:

2. Liberty and power for or in connection with any of the purposes mentioned in this part to sink, drive, make maintain and use in the said lands any pits, shafts, inclines drifts, levels, water-ways, airways and other works (and to use maintain deepen or extend any existing works of the like nature in the said lands.)

To bring to use machinery equipment etc:

3. Liberty and power for or in connection with any of the purposes mentioned in this part to erect, construct, maintain and use on or under the said lands any engines, machinery, plant, dressing floors, furnaces, coke ovens, brick-kilns, work shops, store houses, bungalows, go downs, sheds and other buildings and other works and conveniences of the like nature on or under the said lands.

To make roads and ways etc., and use existing roads and ways:

4. Liberty and power for or in connection with any of the purpose mentioned in this part to make any tramways, railways, roads, aircraft landing grounds and other ways in or over the said lands and to use, maintain and go and trespass with or without horses, cattle, wagons, aircrafts, locomotives or other vehicles over the same (or any existing tramways, railways, roads and other ways in or over the said lands) on such conditions as may be agreed to.

For Dalmia Cement (Bharat) Limited,

G. Gasper Fenslon
 LESSEE
G. Gasper Fenslon
 Dy. Executive Director
 Dalmia Cement (Bharat) Ltd.,
 Dalmiapuram 621 051



[Signature]
 District Collector
 LESSOR

10/32

In witness where of these presents have been executed in the manner hereunder appearing the day and year first above written.

Signed by **Thiru. D.Vivekanandan, I.A.S., District Collector, Perambalur** for and behalf of the Governor of Tamil Nadu and **Thiru G.Gasper Fenelon, Dy. Executive Director and the Power of Attorney holder** on behalf of **Tvl. Dalmia Cement (B) Limited., Dalmiapuram, Trichy District** have hereunto set their respective hands.

For Dalmia Cement (Bharat) Limited,

Gasper Fenelon
G. Gasper Fenelon
Dy. Executive Director
Dalmia Cement (Bharat) Ltd.,
Dalmiapuram 621 651

[Signature]
District Collector
Perambalur
LESSOR $\frac{30}{32}$

IN THE PRESENCE OF

1. *[Signature]*
V. KARTHICKAN
S/o P. VISAYAKRISHNAN
Minis Manager,
Dalmia Cement

1. *[Signature]*
(J. RAJARAM)
Assistant Director,
Dept. of Geology and Mining,
Perambalur.

2. *[Signature]*
(S. MAKESH)
S/o. S. SANDARAN (Late).
Asst. Minis Manager,
DALMIA CEMENT.

2. *[Signature]*
(P. CHINNAMARUTHU)
ASSISTANT GEOLOGIST
O/o. the Asst. Dir ctor,
Dept. of Ecology & Mining
Perambalur District
PERAMBALUR.

Scribe.



Doc-5
 GOVERNMENT OF INDIA
 MINISTRY OF MINES
 INDIAN BUREAU OF MINES
 OFFICE OF THE REGIONAL CONTROLLER OF MINES

225

Telephone no.: 044-24914461/1570
 Telefax no. 044-24911295
 Email ID: ro.chennai@ibm.gov.in/rcomchennai@yahoo.co.in

C-4-A Rajaji Bhavan
 CGO complex, Besant Nagar
 Chennai - 600 090.

No. TN/ALR/LST/ROMP/1523.MDS

Dated : 13/11/2018

✓ To :

M/s. Dalmia Cement (Bharat) Limited
 Dalmiapuram
 Trichy - 621 651.

Sub : Approval of Review of Mining Plan (including Progressive Mine Closure Plan) for Khairulabad Limestone Mine (Rc.No.17783) over an area of 2.25 hectares in Khairulabad Village, Ariyalur Taluk, Ariyalur District submitted under Rule 17(1) of MCR, 2016.

Ref : Your letter no. DCBL:DPM:RMP:Khairulabad:IBM:11/2018 dated 05.11.2018.

Sir,

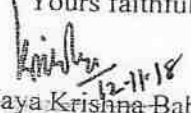
In exercise of the powers delegated to me under Rule 16 of Minerals (Other than Atomic & Hydro Carbon Energy Minerals) Concession Rules, 2016 vide Gazette Notification No. S.O. 1857(E) dated 18.5.2016 issued by the Controller General, Indian Bureau of Mines under F.No. T-43004/CGBM/MM(DR)/2015, I hereby approve the above said Review of Mining Plan for limestone mineral. This approval is subject to the following conditions.

- 1) ~~That the Review of 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 Review of 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, 1960, Environment Protection Act, 1986 and the rules made there under.
- 3) That this Review of 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 / Scheme of Mining 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 28 of Mineral Conservation and Development Rules, 1988, 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 Review 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 23E(2) of MCDR, 1988 setting for 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 Review of Mining Plan is approved for the proposals contained therein and as applicable from the date of approval of the document for the mining activities to be carried out within the mining leasehold.
- 13) As per rule 27(2) of MCDR, 2017 the financial assurance of Rs. 500000/- in respect of Cat. B mines to be submitted within a period of 90 days from the date of notification of the rules i.e. 27.02.2017, the bank guarantee for the balance amount may be submitted within the time.
- 14) The financial assurance submitted should be renewed before expiry of the same.
- 15) 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.
- 16) This approval is subject to the extension of the validity of the mining lease by the State Government as per MMDR Act, 2015 (Amended).

Encl. Copy of approved Review of Mining Plan
(including Progressive Mine Closure Plan)


Yours faithfully,


(V. Jaya Krishna Babu)
Regional Controller of Mines

Copy for information to:-

- 1) Sri E. Vasudevan, Qualified Person, No. 53, E-8/S-1, Kamarajar Nagar, Second Cross Street, Ariyalur District.
- 2) The Commissioner of Geology & Mining, Government of Tamilnadu, Guindy, Chennai - 600 032 along with copy of the approved Review of Mining Plan.

Encl : As above.


(V. Jaya Krishna Babu)
Regional Controller of Mines

**PROCEEDINGS OF THE DEPUTY DIRECTOR (GEOLOGY AND MINING),
ARIYALUR.**

Present: Thiru. P.Saravanan, M.Sc.,

Roc.No.58/G&M/2016

Dated:16.12.2016

Sub: Mines and Minerals – Ariyalur District – Mining lease for Limestone held by M/s. Dalmia Cement (Bharat) Limited, Dalmiapuram. Fixation of Royalty/Dead rent for the year 2015-16 – orders issued.

Ref: CGM Proceedings.Rc.No.17783 /MM4/2002 Dt. 27.01.2004.

ORDER:

M/s. Dalmia Cement (Bharat) Limited, Dalmiapuram is holding mining lease as detailed below:

1.	GO. Ms. No. in which the mining lease was granted	:	CGM Proceedings.Rc.No.17783 / MM4/2002 Dt. 27.01.2004
2.	Survey Number	:	455/1,456/2,456/3 etc.
3.	Kind of mineral for which lease was granted	:	Limestone
4.	Period of lease	:	30 years from 13.08.2004 to 12.08.2034
5.	Date of execution of mining lease deed	:	21.07.2004

Particulars of leasehold area:

Taluk	Village	Survey No.	Extent (Hec.)	Classification
Ariyalur	Khairulabad	455/1,456/2,456/3 etc.	2.25.0	Patta Land

There was mining operation in the lease hold during the year 2015-2016. The lessee company has permitted to transport **7,800** M.Tons of Limestone for the year 2015-16 and they have removed a quantity of **9,590** M.Tons of limestone from the lease hold area during the year 2015-2016.

Under Section 9 of the Mines and Minerals (Development & Regulation) Act 1957 and Rule 27 (1) (c) and (d) of the Mineral Concession Rules 1960, the royalty, dead rent etc. due from the lessee is fixed as detailed below.

Royalty:

For **9,590** M.Tons of limestone at Rs.80/- per
Tonne from 01.04.2015 to 31.03.2016 - Rs. 7, 67,200/-

- Rs. 7, 67,200/-

Less

Excess paid amount for the previous year 2013-2014 - Rs. 65,129 /-

Total

- **Rs. 7,02,071/-**

Dead Rent

Amount remitted by company - Nil

Surface Rent

For 2.25.0 Hec.. Used for the mining operation - Rs.6/-

Total amount due - Rs.7,02,077/-

Advance Royalty remitted during 01.04.2014 to 31.03.2015
for **7800 MTs** of limestone @ Rs 80 /- - Rs.6,24,000/-

On 11.04.2016, company paid additional - Rs.78,081/-

Amount remitted by the company towards Surface rent - Rs.6/-

Total amount Collected - Rs.7,02,087/-

The Royalty and Surface rent due from the lessee company for the year
2015-2016 is fixed at **Rs.7,02,087/-**. The excess royalty amount of **Rs.10/-** to be
adjusted during the financial year 2016-17.



To
M/s. Dalmia Cement (Bharat) Limited,
Dalmiapuram,
Lalgudi TK,
Trichy- 621651.

[Signature]
16.12.16
**Deputy Director,
Geology and Mining,
Ariyalur.**

*dy
16/12/16*

**PROCEEDINGS OF THE DEPUTY DIRECTOR (GEOLOGY AND MINING),
ARIYALUR.**

Present: Thiru. P.Saravanan, M.Sc.,

Rc.No.493/G&M/2017

Dated:19.03.2018

Sub: Mines and Minerals – Ariyalur District – Mining lease for Limestone held by M/S Dalmia Cement (Bharat) Limited, Dalmiapuram. Fixation of Royalty/Dead rent for the year 2016-17 – Orders Issued.

Ref: 1. CGM Proceedings.Rc.No.17783 / MM4/2002 Dt. 27.01.2004

ORDER:

M/S Dalmia Cement (Bharat) Limited, Dalmiapuram is holding mining lease as detailed below:

1.	GO. Ms. No. in which the mining lease was granted	:	CGM Proceedings.Rc.No.17783 / MM4/2002 Dt. 27.01.2004
2.	Survey Number	:	455/1,456/2,456/3 etc.
3.	Kind of mineral for which lease was granted	:	Limestone
4.	Period of lease	:	30 years from 13.08.2004 to 12.08.2034
5.	Date of execution of mining lease deed	:	21.07.2004

Particulars of leasehold area:

Taluk	Village	Survey No.	Extent (Hec.)	Classification
Ariyalur	Khairulabad	455/1,456/2,456/3 etc.	2.25.0	Patta Land

There was mining operation in the lease hold during the year 2016-2017. The lessee company has permitted to transport **3,900** M.Tons of Limestone for the year 2016-17 and they have removed a quantity of **5,355** M.Tons of limestone from the lease hold area during the year 2016-2017 and they have removed a quantity of **1,455** M Tons of Limestone from the lease hold area during the year 2016 -2017.

Under Section 9 of Mines and Minerals (Development & Regulation) Act 1957 and Rule 27 (1) (c) and (d) of Mineral Concession Rules 1960, the royalty, dead rent etc. due from the lessee is fixed as detailed below.

Royalty:

For **5,355** M.Tons of limestone at Rs.80/- per Tonne from 01.04.2016 to 31.03.2017

- Rs. 4, 28,400/-

- Rs. 4, 28,400/-

Less

Excess paid amount for the previous year 2015-2016 Rs. 10 /-

Total - **Rs. 4,28,390/-**

Dead Rent

Amount remitted by company - Nil

Surface Rent

For 2.25.0 Hec.. Used for the mining operation - Rs.6/-

Total amount due - Rs. 4,28,396/-

Advance Royalty remitted during 01.04.2016 to 31.03.2017 for **3900 MTs** of limestone @ Rs 80 /-

Rs. 3,12,000/-

Difference royalty paid for the year 2016 -2017 Rs. 1,16,470/-

Amount remitted by the company towards Surface rent Rs.6/-

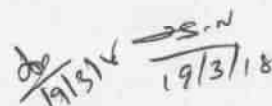
Total amount Collected - Rs.4,28,476/-

Excess paid (2016 - 2017) Rs. 80/-

The Royalty and Surface rent due from the lessee company for the year 2016-2017 is fixed at **Rs.4,28,476/-** .The excess royalty amount of **Rs.80** to be adjusted during the financial year 2017-18.


19/03/18
Deputy Director
Geology and Mining
Ariyalur

To,
M/s. Dalmia Cement (Bharat) Limited,
Dalmiapuram, Lalgudi TK, Trichy- 621651.


19/3/18

**PROCEEDINGS OF THE ASSISTANT DIRECTOR (GEOLOGY AND MINING),
ARIYALUR.**

Present: Dr.G.Panneerselvam, M.Sc., M.Phil., PhD.,

R.c.No.224 / G&M / 2021

Dated : 10/2021

Sub: Mines and Minerals – Ariyalur District – Mining lease for Limestone held by Tvl Dalmia Cement (Bharat) Limited, Dalmiapuram - Fixation of Royalty/Dead rent for the year **2020-21** – orders issued.

Ref: 1. CGM Proceedings Rc.No. 17783 / MM4/2002, Dt.27.01.2004.
2. Proceedings of the Deputy Director of Geology and Mining in RcNo. 112/ G&M /2019 Dt.09.07.2019.

ORDER:

Tvl Dalmia Cement (Bharat) Limited, Dalmiapuram is holding mining lease as detailed below:

1.	Govt. Order for Grant	:	CGM Proceedings Rc.No. 17783 / MM4/2002, Dt.27.01.2004
2.	Survey Number	:	455/1, 456/2, 456/3
3.	Kind of mineral for which lease was granted	:	Limestone
4.	Period of lease	:	Originally granted for 30 years from 13.08.2004 to 12.08.2034.
5.	Details of lease deed execution	:	Original Lease executed on 21.07.2004

Particulars of leasehold area:

Taluk	Village	Survey No.	Extent (Hects.)	Classification
Ariyalur	Khairulabad	455/1,456/2,456/3	2.25.0	Patta Land

There is no mining operation during the period 2020-21.

Under Section 9 of Mines and Minerals (Development & Regulation) Act 1957 Rule 27(1)(a) and Rule 27(1)(b) of Mineral Concession Rules 2016, the royalty, dead rent etc. due from the lessee is fixed as detailed below.

<u>DEMAND FOR THE YEAR 2020-21 :</u>		
1. Royalty Demand FY 2020-21- for 0 MTs of limestone at Rs.80/- per MT	:	0
2. Dead Rent	:	Rs.4500
3. Surface Rent	:	Rs.6
4. Annual Compensation Amount for the period 2020-21	:	0
5. DMF	:	0
6. NMET	:	0
7. Interests if any	:	0
A. <u>Total amount payable by the company (1+2+3+4+5+6+7)</u>	:	Rs.4506
<u>REMITTANCES : (Actuals)</u>		
1. Royalty paid for the year 2020-2021	:	0
2. Difference in Royalty	:	0
3. Dead Rent	:	Rs.4500
4. Surface Rent	:	Rs.6
5. Annual Compensation Amount for the period 2020-21	:	0
6. DMF paid for the year 2020-21	:	0
7. Difference in DMF + Arear DMF paid	:	0
8. NMET amount paid for the year 2020-21	:	0
9. Difference in NMET + Arear NMET paid	:	0
10. Excess Royalty available as on 01.04.2020	:	0
11. Excess DMF available as on 01.04.2020	:	0
12. Excess NMET available as on 01.04.2020	:	0
B. <u>Total amount collected (1+2+3+4+5+6+7+8+9+10+11+12)</u>	:	Rs.4506

There is no mining operations during the year 2020-21.



To
Tvl. Dalmia Cement (Bharat) Limited
Dalmiapuram
Lalgudi Tk.
Trichy 621651

g.p.mad
13/10/21
Assistant Director
Geology and Mining
Ariyalur

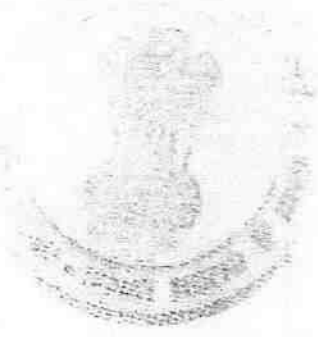
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13/10/21

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STATE BANK OF INDIA
C.A.G. II NEW DELHI
4TH AND 5TH FLOOR
REDFORT
CAPITAL PARSVANATH
TOWERS, NEW DELHI

Tel No. :
Fax No. :
SWIFT No. : SBININBB824
PIN Code :



02-11-2018

THE PRESIDENT OF INDIA
OFFICE OF THE REGIONAL CONTROLLER OF MINES, INDIAN BUREAU OF MINES, C-4-A, RAJAJI
ROAD, BHARATI NAGAR, CHENNAI-600090

GUARANTEE NUMBER : 1731318BG0000998
AMOUNT OF GUARANTEE : INR 1,000,000.00
GUARANTEE COVER FROM : 02-11-2018 TO 31-03-2024
LAST DATE FOR LODGEMENT OF CLAIM : 31-03-2024


THIS BILL OF GUARANTEE IS EXECUTED BY THE STATE BANK OF INDIA, CONSTITUTED UNDER THE STATE BANK OF INDIA ACT, 1955 HAVING THE CENTRAL OFFICE AT NARIMAN POINT, MUMBAI AND BRANCHES AT OTHER PLACES, A BRANCH AT C.A.G. II NEW DELHI. HEREIN AFTER REFERRED TO AS 'THE BANK' IN FAVOUR OF THE PRESIDENT OF INDIA (HEREIN AFTER REFERRED TO AS 'BENEFICIARY') FOR AN AMOUNT NOT EXCEEDING INR 1,000,000.00

AT THE REQUEST OF M/S DALMIA CEMENT(BHARAT)LIMITED, AND THE GUARANTEE SHALL REMAIN IN FORCE UPTO 31-03-2024 AND CANNOT BE INVOKED OTHERWISE THAN BY WRITTEN DEMAND OR CLAIM UNDER THIS GUARANTEE SERVED ON THE BANK ON OR BEFORE THE 31-03-2024

SUBJECT TO AS AFORESAID

NOTWITHSTANDING ANYTHING CONTAINED HEREIN ABOVE, OUR LIABILITY UNDER THIS GUARANTEE IS LIMITED TO INR 1,000,000.00
THE GUARANTEE SHALL REMAIN IN FORCE UNTIL 31-03-2024. UNLESS A DEMAND OR CLAIM UNDER THE GUARANTEE IS MADE ON OUR BANK IN WRITING ON OR BEFORE 31-03-2024 ALL YOURS RIGHTS UNDER THE SAID GUARANTEE BE FORFEITED AND WE SHALL BE RELIEVED AND DISCHARGED FROM ALL LIABILITIES THEREUNDER.


AUTHORISED SIGNATORY

 दीपक शर्मा
DEEPAK SHARMA
S-14416



AUTHORISED SIGNATORY

Nov 2, 2018 11:53 AM

