DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

&

ENVIRONMENTAL MANAGEMENT PLAN

FOR

Proposed Mooiong Thlusniang Limestone Mine

(ML Area - 26.50 ha)

With Limestone Production Capacity 1.007 Million TPA

At

Village - Chiehruphi, Taluka - Khliehriat,
District - East Jaintia Hills, Meghalaya.

Baseline Study Period- Summer Season (March to May, 2023)

PROJECT PROPONENT

M/s. Meghalaya Cements Limited

Thangskai, P.O. Lumshong,
East Jaintia Hills,
Meghalaya, 793210
E-Mail: vsaraf@topcem.in

EIA CONSULTANT

J.M. EnviroNet Pvt. Ltd.
(Registered EIA Consultant Organization from NABET-QCI)
Certificate No.:NABET/EIA/2326/RA 0308 valid upto 7th August, 2026
Emmar Digital Greens, Tower – B, Unit No. 1517,
Golf Course Ext. Road, Sector – 61, Gurugram (Haryana) – 122 011
E-mail: jmenviron@hotmail.com
NABL Approved Lab: JM EnviroLab Pvt. Ltd.
(Certificate No.:TC-6821)

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ABBREVIATIONS

AAQ	:	Ambient Air Quality
AAQM	:	Ambient Air Quality Monitoring
AAQS	:	Ambient Air Quality Standards
AIS & LUS	:	All India Soil and Land Use Survey
AMSL	:	Above Mean Sea Level
ANFO	:	Ammonium Nitrate Fuel Oil
bgl	:	Below Ground Level
CWC	:	Central Water Commission
CPP	:	Captive Power Plant
CPCB	:	Central Pollution Control Board
CSR	:	Corporate Social Responsibility
CEP	:	Corporate Environment Policy
CWLW	:	Chief Wildlife Warden
CGWA	:	Central Ground Water Authority
DGMS	:	Directorate General Of Mines Safety
DMG	:	Department Of Mines And Geology
DTH	:	Down The Hole
DCF	:	Deputy Conservator Of Forest
DFO	:	District Forest Officer
DMF	:	District Mineral Foundation
EMS	:	Environment Management System
ECO	:	Emergency Coordinating Officer
SEAC	:	State Expert Appraisal Committee
SEIAA	:	State Environment Impact Assessment Authority
EC	:	Environmental Clearance
EIA	:	Environmental Impact Assessment
EMC	:	Environment Management Cell
EMP	:	Environmental Management Plan
ESE	:	East of South East
ENE	:	East of North East
EPA	:	Environmental Protection Act
EPO	:	Emergency planning officer
FMCG	:	Fast Moving Consumer Goods
FPS	:	Fine Particulate Sampler
FCC	:	False Color Composite
Govt.	:	Government
GCP	:	Ground Control Points
GLC	:	Ground Level Concentration
GOI	:	Government Of India
GPS	:	Global Positioning System
GSI	:	Geological Survey Of India
ha	:	Hectare
HEMM	:	Heavy Earth Moving Machinery
HFL	:	Highest Flood Level
HP	:	Horse Power
HOD	:	Head Of Department
IB	:	Inter Burden

IBM	:	Indian Bureau of Mines
IMD	:	India Meteorological Department
IS	:	Indian Standards
ISO	:	International Organization for Standardization
KW	:	Kilo Watt
KLD	:	Kilo Liter Per Day
LULC	:	Land Use Land Cover
ML	:	Mining Lease
MCL	:	Meghalaya Cements Limited
MOEFCC	:	Ministry Of Environment, Forest And Climate Change
M.M.R	:	Metalliferous Mines Regulation
mRL	:	Meter Reduced Level
MSL	:	Mean Sea Level
MSPCB	:	Meghalaya State Pollution Control Board
Mw	:	Moment Magnitude
MW	:	Mega Watt
N	:	North
NH	:	National Highway
NNW	:	North Of North East
NW	:	North West
NAAQS	:	National Ambient Air Quality Standards
NABET	:	National Accreditation Board for Education & Training
NATMO	:	National Atlas & Thematic Mapping Organization
NABL	:	National Accreditation Board for Testing and Calibration Laboratories
NOC	:	No Objection Certificate
NGO	:	Non-Governmental Organization
NONEL		Non-Electric
NRSA	:	National Remote Sensing Agency
NRSC	:	National Remote Sensing Centre
OB	:	Over Burden
OHS	:	Occupational Health and Safety
OSHA	:	Occupational Safety and Health Administration
PFR	:	Pre-Feasibility Report
PCCF	:	Principal Chief Conservator of Forests
pH	:	Potential of Hydrogen
PHCs	:	Public Health Centers
PM	:	Particulate Matter
PPE	:	Personal Protective Equipment
PESO	:	Petroleum and Explosives Safety Organization
PPV	:	Peak Particle Velocity
QCI	:	Quality Council of India
RSPM	:	Respirable Suspended Particulate Matter
ROM	:	Run Of Mine
RCC	:	Reinforced Concrete Cement
RDS	:	Respirable Dust Sampler
SSE	:	South Of South East
SEIAA	:	State Level Impact Assessment Authority
SEAC	:	State Expert Appraisal Committee

SW	:	South West
SC	:	Scheduled Caste
SHE	:	Safety, Health & Environment
SIA	:	Social Impact Assessment
SOI	:	Survey of India
SPCB	:	State Pollution Control Board
SPM	:	Suspended Particulate Matter
ST	:	Scheduled Tribe
STP	:	Sewage Treatment Plant
TDS	:	Total Dissolved Solids
TAMRA	:	Transparency Auction Monitoring And Resource Augmentation
ToR	:	Terms of Reference
TPA	:	Tones Per Annum
TPD	:	Tones Per Day
TW	:	Tube Well
UNFC	:	United Nations Framework Classification
VT	:	Vocational Training
RF	:	Reserve Forest
PF	:	Protected Forest
$\mu g/m^3$	:	Micro gram per meter cube
µm	:	Micro Meter
dia.	:	diameter
CuM	:	Cubic meter
dB	:	Decibel
gm/sec	:	Gram per second
gm/cc	:	Gram per cubic centimeter
hr./day	:	Hour per day
kg	:	Kilogram
Kg/hr.	:	Kilogram per hour
Kg/ha	:	Kilogram per hectare
km	:	Kilometer
m	:	Meter
mg/l	:	Milligram per Liter
mm	:	Millimeter
Sq.km	:	Square Kilometer
t/hr.	:	Tonnes per hour

सत्यमेव जयते

File No: ML/SEAC/SEIAA/PP/EJH/28/2024

Government of India

Ministry of Environment, Forest and Climate Change

(Issued by the State Environment Impact Assessment Authority(SEIAA), MEGHALAYA)

****

Dated **06/02/2025**

To,

VIKASH SARAF
MEGHALAYA CEMENTS LIMITED
BE-77, SALT LAKE CITY, SECTOR-1, KOLKATA-700064 , Thangskai, P.O. Lumshong, East Jaintia Hills, Meghalaya - 793210
vsaraf@topcem.in

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

Sir/Madam,

This is in reference to your application for Grant of Terms of Reference under the provision of the EIA Notification 2006-regarding in respect of project Proposed Moiong Thlushininang Limestone Mine (ML Area – 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village Chiehriphi, Taluka – Khliehriat, District- East Jaintia Hills, Meghalaya by M/s. Meghalaya Cements Ltd.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO24B0000ML5747394N
(ii) File No.	ML/SEAC/SEIAA/PP/EJH/28/2024
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals
(vii) Name of Project	Proposed Moiong Thlushininang Limestone Mine (ML Area – 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village Chiehriphi, Taluka – Khliehriat, District- East Jaintia Hills, Meghalaya by M/s. Meghalaya Cements Ltd..
(viii) Name of Company/Organization	MEGHALAYA CEMENTS LIMITED
(ix) Location of Project (District, State)	EAST JAINTIA HILLS, MEGHALAYA
(x) Issuing Authority	SEIAA
(xii) Applicability of General Conditions	no
(xiii) Applicability of Specific Conditions	no

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

4. The above-mentioned proposal has been considered by State Environment Impact Assessment Authority(SEIAA) Appraisal Committee of SEIAA in the meeting held on 21/01/2025. The minutes of the meeting and all the Application and documents submitted [(viz. Form-1 Part A, Part B, Part C EIA, EMP)] are available on PARIVESH portal which can be accessed by scanning the QR Code above.

5. The brief about configuration of plant/equipment, products and byproducts and salient features of the project along with environment settings, as submitted by the Project proponent in Form-1 (Part A, B and C) are annexed as Annexure (1).

6. The SEIAA, in its meeting held on 21/01/2025, based on information & clarifications provided by the project proponent and after detailed deliberations recommended the proposal for grant of Terms of Reference under the provision of EIA Notification, 2006 and as amended thereof subject to stipulation of specific and general conditions as detailed in Annexure (2).

7. The SEIAA has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the State Expert Appraisal Committee hereby decided to grant Terms of Reference for instant proposal of M/s. VIKASH SARAF under the provisions of EIA Notification, 2006 and as amended thereof.

8. The Ministry reserves the right to stipulate additional conditions, if found necessary.

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

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

Copy To

1. The Principal Chief Conservator of Forests and HoFF Meghalaya, Shillong, for information.

2. The Deputy Director General of Forests (C), Regional Office, N.E.Z, Ministry of Environment, Forests & Climate Change (MoEF&CC), Law-u-sib, Lumbatngen, Sawlad, Near M.T.C. workshop, Shillong- 793 021, for information and necessary action.

3. The Secretary to the Govt. Meghalaya, Forests & Environment Department, Shillong, for information.

4. The Secretary to the Govt. of Meghalaya, Mining & Geology Dept., Shillong for information.

5. The Deputy Commissioner, East Jaiñtia Hills District, Khliehriat for information and necessary action.

6. The Divisional Forest Officer, Jaiñtia Hills (T) Division, Jowai for information and necessary action.

7. The Member Secretary, State Expert Appraisal Committee, Meghalaya for information.

8. The Divisional Mining Officer, Directorate of Mineral Resources, Meghalaya, Jowai for information.

9. The Member Secretary, Meghalaya Pollution Control Board, 'Arden', Lumpyngngad, Shillong – 793 014 for information and necessary action.

Annexure 1

Specific Terms of Reference for (Mining Of Minerals)

1. Specific Additional Conditions

S. No	Terms of Reference
1.1	Site photographs together with photographs and other related details of site visits by resource persons of NABET accredited consultant of project proponent, with their names and profession/designation, together with date(s) of visit, date(s) of data collection including names of instrument/machine actually used in the field, during preparation of EIA report, is to be clearly highlighted in the EIA/EMP report.
1.2	Boundary pillars with the height not less than 2.5 feet above the ground level and 1.5 feet below ground and minimum 8 inches on all face of pillar should be erected.
1.3	GPS coordinates of each pillar should be carved/painted clearly on the pillars with Red colour.

Standard Terms of Reference for (Mining of minerals)

1.

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

S. No	Terms of Reference
	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
1.8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided
1.9	The study rea will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period
1.10	Land use of the study rea delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given
1.11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given
1.12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees
1.13	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished
1.14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated
1.15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given
1.16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted
1.17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlifeand copy furnished

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

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

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

Annexure 2

Details of Products & By-products

Name of the product /By-product	Product / By-product	Quantity	Unit	Mode of Transport / Transmission	Remarks (eg. CAS number)
Limestone	Limestone	1.007	Million TPA	Road	

ToR Compliance

Point wise compliance of ToR Points issued by SEIAA, Meghalaya *vide* file no. ML/SEAC/SEIAA/PP/EJH/28/2024 dated 06.02.2025 for Proposed Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya by M/s. Meghalaya Cements Limited.

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
A.	**SPECIFIC TERMS OF REFERENCE FOR (MINING OF MINERALS)**		
1.	**SPECIFIC ADDITIONAL CONDITIONS**		
1.1	Site photographs together with photographs and other related details of site visits by resource persons of NABET accredited consultant of project proponent, with their names and profession/designation, together with date(s) of visit, date(s) of data collection including names of instrument/machine actually used in the field, during preparation of EIA report, is to be clearly highlighted in the EIA/EMP report.	Site photographs have been given in this Draft EIA/EMP Report. The Baseline monitoring was conducted during Summer Season (March to May, 2023) within 10 km study area. Analysis results of water, air, soil, noise etc. for the project have been analysed from JM EnviroLab MoEF&CC/NABL accredited laboratory (Accreditation certificate is enclosed as Annexure). Details of the same along with instrument used for baseline data collection is given in this Draft EIA/EMP Report.	*Chapter - 2* *Para 2.3.4* *Pg.32* *Chapter - 3* *Para 3.3,* *Pg. 52-54* ***Annexure - 12***
1.2	Boundary pillars with the height not less than 2.5 feet above the ground level and 1.5 feet below ground and minimum 8 inches on all face of pillar should be erected.	Boundary pillars with the height not less than 2.5 feet above the ground level and 1.5 feet below ground and minimum 8 inches on all face of pillar will be erected.	-
1.3	GPS coordinates of each pillar should be carved/painted clearly on the pillars with Red colour.	GPS coordinates of each pillar will be carved/painted clearly on the pillars with Red colour.	-
B.	**STANDARD TERMS OF REFERENCE FOR (MINING OF MINERALS)**		
1.			
1.1	Year-wise production details 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994.	Not Applicable. This is proposed mining project and mine will be operated after obtaining all the statutory clearances from the competent Authority; hence, past production details are not applicable.	-

<table>
<tr><th>S. No.</th><th>ToR Point</th><th>Compliance</th><th>Reference in Draft EIA/EMP</th></tr>
<tr><td>1.2</td><td>A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.</td><td>The Letter of Intent (LOI)/ Grant Order has been issued by Government of Meghalaya, Mines and Geology Department in favor of M/s. Meghalaya Cements Limited vide letter No. MG.28/2023/123 dated 21.12.2023. Copy of the same is enclosed as annexure with this Draft EIA/EMP Report.</td><td>Annexure - 1</td></tr>
<tr><td>1.3</td><td>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.</td><td colspan="2">All documents including Approved Mining Plan and EIA are compatible with one another in terms of mine area, production levels, waste generation & its management and mining technology etc. and all documents are in the name of M/s. Meghalaya Cements Limited.</td></tr>
<tr><td></td><td colspan="3"><table>
<tr><th>S. No.</th><th>Particular</th><th>Description</th><th>Ref. in Approved Mining Plan</th><th>Ref. in Draft EIA/EMP</th></tr>
<tr><td>1.</td><td>Mine Block Area</td><td>26.50 ha</td><td>Chapter 1,
Pg No. 3</td><td>Chapter 1,
Para 1.1,
Pg No. 24</td></tr>
<tr><td>2.</td><td>Production Capacity</td><td>Limestone Production Capacity of 1.007 Million TPA</td><td>Pre-feasibility Report of Approved Mining Plan
Pg No. 132</td><td>Chapter 1,
Para 1.1,
Pg No. 24</td></tr>
<tr><td>3.</td><td>Mining Technology</td><td>Open Cast Mechanized Mining</td><td>Chapter 1,
Pg No. 4</td><td>Chapter 2,
Table 2.12,
Pg No. 44</td></tr>
<tr><td>4.</td><td>Waste Generation & its Management</td><td>Approx 3.09 Million Tonnes of waste will be generated during conceptual stage, which will be used for backfilling excavated area.</td><td>-</td><td>Chapter 2,
Para 2.7.5,
Pg No. 44- 45</td></tr>
</table></td></tr>
<tr><td>1.4</td><td>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).</td><td colspan="2">Geology:
Core Zone: The core area comprises mostly Mine Quarry/ Stone Quarry (50.57 %) and Forest/ Mixed jungle (36.09 %). Rest of the area is covered under Water bodies (10.19 %), Road (1.78 %) and Vegetation and Plantation (1.37 %).
Buffer Zone: The study area comprises mostly Forest/ Mixed jungle (81.46 %) and Vegetation and Plantation (8.72 %) covering up to ~90% of total buffer zone, and rest ~10 % of the study area is covered with Open Scrub/ wasteland</td><td>Chapter 3,
Para 3.4,
Pg No. 54-64</td></tr>
</table>

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
		(4.93 %), Human settlement (0.60%), Roads (0.57 %), Mine Quarry/ Stone Quarry (1.67 %) and Water Bodies (1.07 %). **Ecological Features:** There is no National Park, Biosphere Reserve, Wildlife Corridors, Tiger/Elephant Reserves etc. falling within 10 km radius of the mine block. However, Narpuh Wildlife Sanctuary is situated at (7.27 km in SSE direction). Map showing area with geographical extents, geomorphology and geology of the area, superimposed on Toposheet and & Land use /land cover map of the study area based on high resolution satellite data covered in this Draft EIA/EMP Report.	*Chapter 2, Para 2.3.2, Pg No. 30*
1.5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	**Existing Minerals:** Limestone **Mining History of the Area:** There is no any other mining query within core zone. However, the study area and surroundings fall in the limestone belt and having the mine leases & Cement Plants. Map showing Geomorphology of land form of the area, existing minerals and mining history of the area, same details given in this Draft EIA/EMP Report. **Soil Characteristics:** The soil in the ML Area is fine to medium grained sand. Soil characteristics of the study area have been analysed and given in this Draft EIA/EMP Report. **Streams and Rivers:** No water body is existed at present as the ML area is a natural unbroken land. Nearest water stream is Umso River (~2.0 km in in SW direction) from the lease area. However, nearest water body in study area is Lubha River (~3.0 km in ENE direction), Sonapur River (~7.0 km in SE direction), Seshyampa River (~7.0 km in NW direction) and there are four Nalla's.	*Chapter 2, Para 2.3.2, Pg No.30* *Chapter 3, Table 3.19, Pg No. 85* *Chapter 3, Table 3.1, Pg No. 49-50*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
1.6	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.	The Letter of Intent (LOI)/ Grant Order has been issued by Government of Meghalaya, Mines and Geology Department in favor of M/s. Meghalaya Cements Limited *vide* letter No. MG.28/2023/123 dated 21.12.2023. Copy of the same is enclosed as annexure with this Draft EIA/EMP Report.	***Annexure - 1***
1.7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for 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.	Yes, the company has well laid down Corporate Environment Policy (CEP) adopted by the Board of Directors of M/s. Meghalaya Cements Limited and the same is enclosed as Annexure with this Draft EIA/EMP Report. The hierarchical system or administrative order of the company to deal with the environmental issues has been given in Environmental Policy of the company.	***Annexure - 10*** *Chapter 10, Para 10.3, Pg No. 166-167*
1.8	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Being an opencast mine, occurrence of subsidence is not envisaged. This is a proposed limestone mining project. Blasting study will be carried out during operation phase of mining.	-
1.9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	The study area comprises of 10 km around the mine lease from lease periphery. Details of Waste Generation & its Management is given in this Draft EIA/EMP Report.	*Chapter 2, Para 2.7.5, Pg No. 44-45*
1.10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of	***Core Zone:*** The core area comprises mostly Mine Quarry/ Stone Quarry (50.57 %) and Forest/ Mixed jungle (36.09 %). Rest of the area	*Chapter 3, Para 3.4, Pg No. 54-62*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
	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.	is covered under Water bodies (10.19 %), Road (1.78 %) and Vegetation and Plantation (1.37 %). ***Buffer Zone:*** The study area comprises mostly Forest/ Mixed jungle (81.46 %) and Vegetation and Plantation (8.72 %) covering up to ~90% of total buffer zone, and rest ~10 % of the study area is covered with Open Scrub/ wasteland (4.93 %), Human settlement (0.60%), Roads (0.57 %), Mine Quarry/ Stone Quarry (1.67 %) and Water Bodies (1.07 %). **Ecological Features:** There is no National Park, Biosphere Reserve, Wildlife Corridors, Tiger/Elephant Reserves etc. falling within 10 km radius of the mine block. However, Narpuh Wildlife Sanctuary is situated at (7.27 km in SSE direction. Land use plan of the mine lease area showing preoperational, operational and post operational phases is given in this Draft EIA/EMP Report. Conceptual plan showing impact of change of land use is given in this Draft EIA/EMP Report	*Chapter - 3* *Table - 3.1,* *Pg No.49-50* *Chapter 4,* *Table 4.16,* *Pg No.130* ***Annexure - 8***
1.11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	There will be no overburden dumping outside the lease area and therefore, such issues are not applicable.	-
1.12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest	Company approached DFO, Jowai for authenticated list of flora and fauna along with Approval of Wildlife Conservation Plan. Further, letter received from PCCF and CWLW, Meghalaya to DFO, Jowai *vide* their letter no. FWC/Clearance/20/717 dated 06.06.2023 ***(Annexure - 7)*** stated that, "*I am directed to inform you that a common Regional Conservation Plan for all the mining development activities is being prepared by the Department to minimize and mitigate impacts of development projects on wild animals and their habitat in East Jaintia Hills. Hence, The Approval*	*Chapter - 2* *Table - 2.2,* *Pg. No.33-34* ***Annexure - 7***

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
	Department to assist the Expert Appraisal Committees.	*of NOC or any projects/activities to be undertaken shall be considered by this office only when the Regional Conservation Plan is completed, as per due course."*	
1.13	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	No forest land is involved in the project. Hence, the point is not applicable.	*Chapter - 2 Table - 2.2, Pg. No.33-34*
1.14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	No forest land is involved in the project. Hence, the point is not applicable.	***Annexure - 3***
1.15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No Reserved Forest/ Protected Forest fall in 10 km radius of study area. Hence, not applicable.	-
1.16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Detailed biological study has been carried out. List of flora and fauna has been given in this Draft EIA/EMP Report. Various measures will be undertaken and environment management plan will be implemented to curb pollution of air, noise, water & land environment. Air quality & noise level will be maintained well within the standards prescribed by the MoEF&CC and CPCB. Greenbelt development and plantation will help in creating habitats for local faunal species and to create better environment for various fauna. Activities for creating and developing awareness for nature and wildlife in the nearby villages will also be undertaken.	*Chapter - 3, Para 3.14, Pg No.87-94* *Chapter 4, Para 4.5.7 Pg No. 141 -144*
1.17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/ (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of	There is no National Park, Biosphere Reserve, Wildlife Corridors, Tiger/Elephant Reserves etc. falling within 10 km radius of the mine block. However, Narpuh Wildlife Sanctuary is situated at 7.27 km in SSE direction.	*Chapter - 3 Table - 3.1, Pg No. 49-50*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
	the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.		
1.18	A detailed biological study of the study area [core zone and buffer zone] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. PP shall submit list of Schedule-1 species present in core and buffer zone duly authenticated by CWLW. In case of any Scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest/Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study has been carried out. List of flora and fauna has been given in this Draft EIA/EMP Report. Conservation Plan for schedule - I will be finalised after finalization of regional conservation plan as per directed by the office of PCCF and CWLW, Meghalaya to DFO, Jowai *vide* their letter no. FWC/Clearance/20/717 dated 06.06.2023.	*Chapter - 3, Para 3.14, Pg No. 87-94* ***Annexure - 7***
1.19	Proximity to Areas declared as Critically Polluted or the Project areas likely to come under the Aravali Range, (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.	No Critically Polluted Areas as notified by the Central Pollution Control Board are located within 10 km from the boundary of mining lease. Hence, it is not applicable. As project site is located at East Jaintia Hills, Meghalaya, therefore, it does not come under the purview of Aravalli hill range.	*Chapter 3, Table 3.1, Pg No. 49-50*
1.20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	The Lease area is located in District East Jaintia Hills of State Meghalaya , which is not covered under coastal zone. Therefore, the project area does not come under purview of CRZ notification.	-

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
1.21	R&R Plan /compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State /National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family -wise, should be under taken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectorial 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.	The total mining lease area is 26.50 ha which is falls under private land. No forest land falling under the lease area. R&R study will not be applicable as total 26.50 ha land area under possession of M/s. Meghalaya Cements Limited. Same information is given in this Draft EIA/EMP Report.	*Chapter 7, Para 7.4, Pg No. 162*
1.22	One season (non-monsoon) [i.e. March - May (Summer Season); October - December (post monsoon season); December - February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the predominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	One season (non-monsoon) [i.e. March to May., 2023 (Summer Season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna has been collected and same is given in this Draft EIA/EMP Report. Detailed AAQM data of sampling locations are enclosed as Annexure with this Draft EIA/EMP Report. Site-specific meteorological data has been recorded. The dominant wind direction is from SW direction. Location of the monitoring stations were selected keeping in view the pre-dominant downwind direction and location of the sensitive receptors and also that they represent whole of the study area. One location has been selected in downwind direction at 500 m from the mine boundary. Mineralogical composition of PM10 is given & enclosed with this EIA/EMP Report.	*Chapter 3, Para 3.10 to 3.14, Pg No. 71-87* ***Annexure - 9*** *Chapter 3, Table 3.7, Pg No. 69* *Chapter 3, Para 3.10.3, Pg No.75*
1.23	Air quality modelling should be carried out for prediction of impact of the project on the air	AERMOD view 10.2.1 - Model based on steady state Gaussian Plume Dispersion was used for	*Chapter 4, Para 4.5.1,*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
	quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind rose showing pre-dominant wind direction may also be indicated on the map.	the prediction of incremental value due to proposed mine. Impact prediction has been carried out for total excavation of 1.807 Million TPA. At Normative Stage, total limestone handling will be 5925 TPD whereas at peak stage it will be 7111 TPD. Limestone will be transported to MCL's existing cement plant via internal road of length 1.0 km. Isopleths showing incremental concentration of PM from area source and clearly indicating the air quality contours on a location map indicating the location of the site, location of sensitive receptors and wind roses showing pre-dominant wind direction have been prepared. Detail of same along with details of the model used and input parameters used for modelling is incorporated in this Draft EIA/EMP Report.	*Pg No. 112-113*
1.24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The total water requirement for the proposed project will be 30 KLD which will be sourced from Water tank located near Captive Power plant of the lessee within cement plant. The main source of water is river Wah Chyrtong. Permission of the same has been taken from Department of Irrigation vide NOC No. AID (J)223/2007-2008/ dated 24.03.2008. Copy of the same is enclosed as Annexure with this Draft EIA/EMP Report.	*Chapter 2, Para 2.7.1.1, Pg No.35* ***Annexure - 6***
1.25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	The total water requirement for the proposed project will be 30 KLD which will be sourced from Water tank located near Captive Power plant of the lessee within cement plant. The main source of water is river Wah Chyrtong. Permission of the same has been taken from Department of Irrigation vide NOC No. AID (J)223/2007-2008/ dated 24.03.2008. Copy of	

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
		the same is enclosed as Annexure with this Draft EIA/EMP Report.	
1.26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Details of water conservation measures proposed to be adopted in the Project has been given in this Draft EIA/EMP Report.	*Chapter - 4, Para 4.5.3.4, Pg. No.127-128*
1.27	Impact of the project on the water quality, both surface and ground water, should be assessed and necessary safeguard measures, if any required, should be provided.	Impact on surface water: No water body is existed at present as the ML area is a natural unbroken land. There is no major perennial river or lake & canal is present in and around the proposed mine site Plantation will be developed all along the ML boundary and bench plantation will be done which will also help in minimizing any negative impacts. Impact on Ground water: Elevation of mining lease area is ranging from 717 m AMSL to 765 m AMSL. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table. Hence hydrogeological study is not applicable.	*Chapter 4, Para 4.5.3, Pg No. 125-128*
1.28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working bench will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia shall include details of the aquifers present and impact of mining activities on these aquifers. 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.	Elevation of mining lease area is ranging from 717 m AMSL to 765 m AMSL. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table. Hence hydrogeological study is not applicable.	*Chapter 2, Para 2.9, Pg No. 46-48*
1.29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of	No stream perennial or seasonal present in mining lease area. Same information is given in this Draft EIA/EMP Report.	*Chapter 4, Para 4.5.3.1, Pg No. 125-128*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
	the same on the hydrology should be brought out.		
1.30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	<table><tr><td>Water Table Level</td><td>185 m bgl</td></tr><tr><td>Proposed Depth of Working</td><td>35 bgl (706 mRL)</td></tr><tr><td>Ultimate working depth</td><td>683.7 mRL (57.3 m bgl)</td></tr></table> There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table. Hence hydrogeological study is not applicable.	*Chapter 4, Para 4.5.3.2, Pg No. 127*
1.31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	**Greenbelt:** Greenbelt will be done over an area of 2.47 ha covering 7.5 m periphery of the lease area. Detailed plan for development of greenbelt and plantation with timeline is given in Draft EIA/EMP Report.	*Chapter - 4, Para 4.5.7.4, Pg No.142*
1.32	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project	No Public road will be used for the transportation of limestone from mine to cement plant. Therefore, there will not have any adverse impact on transportation infrastructure in the region.	*Chapter 4, Para 4.5.6, Pg No. 139-140*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
	Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.		
1.33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Onsite shelter and facilities such as first aid room, rest shelter, canteen, drinking water, urinals, lighting arrangements, workshop, fuel stations, communication equipment and office, survey equipment etc. are being/shall be established. Same information is given in this Draft EIA/EMP Report	*Chapter 2, Para 2.4.1, Pg No. 32*
1.34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	At the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha. Same information along with Conceptual Plan and section is given in this Draft EIA/EMP Report.	*Chapter 2, Para 2.8, Pg No. 45* ***Annexure - 8***
1.35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational health will be identified; Preventive health measures will be taken, and is incorporated in this Draft EIA/EMP Report. Under, the guideline of DGMS Pre-placement medical examination and periodical medical examinations will be done and records will be maintained in Form O under Mines Rule 1955 and schedule of health examination of workers will be followed. Proper health records will be maintained.	*Chapter 4, Para 4.5.8, Pg No. 144-151*
1.36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Public health implications of the project and related activities for the population in the impact zone have been evaluated and common prevailing diseases in the area were identified. Anticipated impacts have been assessed and corresponding mitigative measures have been suggested and detailed in the EIA/EMP report.	

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
		Mining will be carried out as per the provisions outlined in mining plan approved by IBM as well as by abiding to the guidelines of DGMS. An implementation of recommended Environmental Management Plan /mitigation measures during the operation of the mine shall control the impacts significantly and will be confined within the mine boundary. Various measures such as Sharp drill bits & wet drilling, Controlled blasting, Water spray on haulage roads will be adopted to control pollution. Regular Ambient air quality monitoring, noise monitoring & water quality analysis will be carried out. Greenbelt will be developed along the 7.5 m width of mine periphery. Efforts will be made to improve the hygiene, sanitation, education and infrastructure of the nearby villagers. First aid centre will be established in the mine block and medical camps will be organized regularly in surrounding area. Same information is given in this Draft EIA/EMP Report	*Chapter 4, Para 4.5.5.4, Pg No. 137-139*
1.37	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent has been given in this Draft EIA/EMP Report.	*Chapter 4, Para 4.5.5.5, Pg No. 138-139*
1.38	Detailed Environmental Management Plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	The total mining lease area is 26.50 ha which is falls under private land. No forest land falling under the lease area. Detailed Environmental Management Plan to mitigate the environmental impacts along with occupational health impacts due to the proposed project and its management plan is incorporated along with impact and mitigation measures on agriculture land is given in this Draft EIA/EMP Report.	*Chapter 4, Para 4.5.4.3, Pg No. 130* *Chapter 4, Para 4.5.8, Pg No. 144-150*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
1.39	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Public hearing is yet to be conducted and same will be carried out as per provisions of EIA Notification, 2006. The company will propose a detailed time bound action plan along with budgetary allocation after conduction of Public Hearing considering issues raised during public hearing on the basis of MoEF&CC, OM dated 30.09.2020 & 20.10.2020 and will be submitted during Final EIA/EMP Report.	*Chapter 8, Para 8.5, Pg No. 163-164*
1.40	Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the Project should be given.	There is no litigation pending against the project in any court. Same information is also given in this Draft EIA/EMP Report.	*Chapter 1, Para 1.2.1 E, Pg No.25*
1.41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	➢ Capital Cost of the Project: Rs. 15 Crores ➢ Capital Cost for EMP: Rs. 1.92 Crore ➢ Recurring Cost for EMP: Rs. 0.46 Crore	*Chapter 10, Para 10.6, Pg No. 168-170*
1.42	A Disaster Management Plan shall be prepared and included in the EIA/EMP Report.	Disaster Management and Risk Assessment Plan has been prepared and incorporated in this Draft EIA/EMP report.	*Chapter 7 Para 7.3, Pg No. 158-162*
1.43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential etc.	The benefits of the Project clearly indicating environmental, social, economic, employment potential, etc. is incorporated in this Draft EIA/EMP Report.	*Chapter 8, Pg No. 163-164*
1.44	**Besides the below mentioned general points are also to be followed:**		
a)	All documents to be properly referenced with index and continuous page numbering.	Complied with	-
b)	Where data are presented in Report especially in tables, the period in which the data were collected and the sources should be indicated.	Complied with	-
c)	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing report should be available during appraisal of the Project.	Analysis results of water, air, soil, noise etc. for the project have been analysed from JM EnviroLab MoEF&CC/NABL accredited laboratory and same has been incorporated in this Draft EIA/EMP Report. Original analysis/testing report will be submitted along with Final EIA/EMP Report.	*Chapter 3, Para 3.10 to 3.14, Pg No. 71-87*

S. No.	ToR Point	Compliance	Reference in Draft EIA/EMP
d)	Where the documents provided are in a language other than English, an English translation should be provided.	Complied with.	-
e)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Questionnaire for environmental appraisal of mining projects will be submitted with Final EIA/EMP report.	-
f)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	Instructions issued by MoEF&CC vide O.M. No. J11013/41/2006-IA. II (I) dated 4th August, 2009, have been followed.	-
g)	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the ToR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the PH process) will entail conducting the PH again with the revised documentation.	Noted and complied with	-
h)	As per the circular no. J-11011/618/2010-IA.II (I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not applicable as this is proposed limestone mining project.	-
i)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Surface plan, Geological plan and sections of the mine area are enclosed with this EIA/EMP Report. No external dumping is involved.	***Annexure - 11***

CHAPTER - 1

INTRODUCTION

1.1 PURPOSE OF THE REPORT

M/s. Meghalaya Cements Limited is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village - Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.

This report has been prepared in reference to the ToR letter issued by State Level Environment Impact Assessment Authority, Meghalaya *vide* file no. ML/SEAC/SEIAA/PP/EJH/28/2024 dated 06.02.2025 in accordance to the EIA Notification - 2006 and amended as on date for carrying out the Environmental Impact Assessment study.

The baseline data for the environmental studies has been collected during Summer Season (March to May, 2023).

The main purpose of this report is to provide a coherent statement after analyzing all significant impact of the proposed project and measures that should be taken to eliminate, reduce and remedy them. It contains essential information for:

- The proponent to implement the proposal in an environmentally and socially responsible way;
- The responsible authority to make an informed decision on the proposal, including the terms and conditions that must be attached to an approval or authorization; and
- Public to understand the proposal and its likely impacts on people and the environment.

1.2 IDENTIFICATION OF THE PROJECT AND PROJECT PROPONENT

1.2.1 IDENTIFICATION OF THE PROJECT

A. PROPOSED PROJECT

M/s. Meghalaya Cements Limited is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village - Chiehruphi, Taluka - Khliehriat, District- East Jaintia Hills, Meghalaya.

B. SCREENING CATEGORY

As per EIA Notification dated 14th September, 2006, as amended from time to time; the project falls under Category "B1" S. No. '1' (Mining of Minerals), Project or Activity '1(a) - (4)'.

C. MINING LEASE STATUS

The Letter of Intent (LOI)/ Grant Order has been issued by Government of Meghalaya, Mines and Geology Department *vide* letter No. MG.28/2023/123 dated 21.12.2023. Copy of the same is enclosed as ***Annexure - 1.***

D. STATUS OF APPROVAL OF MINING PLAN

Mining Plan with Progressive Mine Closure Plan has been approved by Indian Bureau of Mines (IBM), Guwahati *vide* letter no. MCDR-MPCP0CaFI/2/2024-GUH-IBM_RO_GUH, dated 17.10.2024. Copy of approval letter is enclosed as ***Annexure - 2.***

E. STATUS OF PROPOSED PROJECT FOR ENVIRONMENTAL CLEARANCE

The chronology of the project activities undertaken so far with respect to the process of getting Environmental clearance are given in the table below:

Table - 1.1

STATUS OF PROPOSAL FOR ENVIRONMENT CLEARANCE

S. No.	Project Activity	Date/Duration
1.	Baseline monitoring & data collection	Summer Season (March to May, 2023)
2.	Application (for ToR) submitted to SEIAA, Meghalaya	22.02.2024
3.	Essential Details sought by SEIAA, Meghalaya	16.04.2024
4.	Reply of EDS was submitted to SEIAA, Meghalaya	16.04.2024
5.	First Technical Presentation (for ToR approval) held 77th SEAC meeting (Non-Coal Mining)	17.04.2024
6.	Additional Details Sought by SEIAA, Meghalaya	16.05.2024
7.	Reply of ADS was submitted to SEIAA, Meghalaya	22.10.2024
8.	Project reconsidered in 85th SEAC meeting	16.12.2024
9.	ToR Letter issued by SEIAA, Meghalaya	06.02.2025

1.2.2 INTRODUCTION OF THE PROJECT PROPONENT

- M/s. Meghalaya Cement Limited (MCL) owns and operates a cement production line of about 2600 TPD capacity clinker and corresponding cement at Thangskai, Meghalaya. The construction of Meghalaya Cement was started around 2004. In 2006, first clinker and cement were produced. Initially the plant was designed to produce about 900 TPD of clinker and corresponding cement. To enhance the production capacity, MCL initiated a capacity augmentation project in 2009 which was completed in 2010. After capacity augmentation project the clink erization capacity of the plant was increased from 900 TPD to about 2600 TPD. Presently the plant is being operated at about 2600 TPD on continuous basis.
- Proposal for Expansion in cement plant from 2600 TPD to 4500 TPD was submitted MoEFCC, New Delhi *vide* proposal no. IA/ML/IND1/453620/2023 on 15.01.2024. Environment Clearance for the proposed expansion has been granted *vide* letter no. IA-J-11011/275/2022-IA-II (IND-1) dated 08.05.2024.
- M/s MCL has been promoted jointly by Shri. Kailash Ch. Lohia, Shri. Mahendra Agarwal, Shri. Nishant Garodia and Shri. Amit Agarwal.

- Topcem Cement, a product of Meghalaya Cements Ltd, is among the leading cement manufacturers in entire NE India. Product quality, customer satisfaction and timely delivery have been the cornerstone of Topcem's brand identity. The company is currently making a foray into the eastern markets of West Bengal and Bihar with the same commitment to provide superior quality product and customer service.
- Topcem strongly believes in evolving with time and invests heavily in research and development. As a result of its extensive in-house R&D, 9 Topcem Cement successfully launched Topcem Solid Dhalai Cement (SDC) – a superior strength, anti-corrosive and innovative product in the year 2020.
- As a distinguished company and prominent cement manufacturer, Topcem aspires to fulfill its goals in a sustainable manner for all its stakeholders. Specific environmental responsibilities are assigned to trained experts to ensure strict adherence to environmental norms laid down by central and state governments.
- Topcem thrives to deliver innovative products through sustainable practices. It ensures that the esteemed clients of MCL get factory fresh, top-quality cement that offers unmatched strength and extraordinary durability.

1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY, REGION

1.3.1 BRIEF DESCRIPTION OF NATURE, SIZE & LOCATION OF PROJECT

The brief description of the nature, size and location of the project has been given in table below:

Table - 1.2

Brief Description of the Project

S. No.	Particulars	Details
A.	**Nature of the Project**	Proposed Limestone Mining Project
B.	**Size of the Project**	
1.	Mining Lease Area	26.50 ha (Private land)
2.	Proposal	Limestone Production Capacity: 1.007 Million TPA
C.	**Location Details**	
1.	Village	Chiehruphi
2.	Tehsil	Khliehriat
3.	District	East Jaintia Hills
4.	State	Meghalaya
5.	Latitude & Longitude	Latitude: 25° 12' 08.7999" N to 25° 12' 43.80" N Longitude: 92° 23' 19.3283"E to 92°23' 44.7525" E
6.	Toposheet No.	OSM - G46O8/ Toposheet No_83 C/8
7.	Seismic Zone	Zone - V as per IS:1893 (Part-I):2022

Source: *Pre-feasibility Report*

1.3.2 IMPORTANCE OF THE PROJECT TO THE COUNTRY AND REGION

- The proposed mine will prove beneficial in terms of socio-economic development as it will create direct/indirect employment opportunities to locals. Further, the average income level, which is the indicator of socio-economic status of households is expected to increase, which will ultimately result in better standard of living of the local people
- About 135 persons will be employed directly in this mine. It will create employment for local population of the region.
- The mining and associated activities in the mineral bearing areas will bring about gains in gross domestic product, i.e., there is through a minor contribution by the proposed project but will add to the gains in the G.D.P. The applicable royalty, taxes paid by applicant will be paid thereby contributing to the state exchequer.
- Beside the mining activities, plantation will also be done in the mine area which will improve the local environment to a certain extent.
- With respect to the importance of the project to the nation, the cement demand for infrastructure projects such as the dedicated freight corridor, upgraded and new airports and ports, housing and roads, is likely to increase substantially. Keeping this requirement in mind, mining of limestone is necessary for the nation's growth and modernization.

1.4 SCOPE OF THE STUDY

Scope of this study covers all the points given in the Terms of Reference (ToR) issued by the SEIAA, Meghalaya *vide* file no. ML/SEAC/SEIAA/PP/EJH/28/2024 dated 06.02.2025.

The data generated from various studies for EIA/EMP are presented and discussed in following chapters of this report prepared as per Appendix-III of the EIA Notification, 2006.

Chapters	Description
Chapter-1	Introduction
Chapter-2	Project Description
Chapter-3	Description of the Environment
Chapter-4	Anticipated Environmental Impacts and Mitigation Measures
Chapter-5	Analysis of Alternatives (Technology & Site)
Chapter-6	Environmental Monitoring Plan
Chapter-7	Additional Studies
Chapter-8	Project Benefits
Chapter-9	Environment Cost Benefit Analysis
Chapter-10	Environment Management Plan
Chapter-11	Summary & Conclusion
Chapter-12	Disclosure of Consultants Engaged

CHAPTER - 2

PROJECT DESCRIPTION

2.1 TYPE OF THE PROJECT

This is a proposed Limestone mining project situated at Village - Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya. Mining lease area is 26.50 ha, Limestone Production Capacity 1.007 Million TPA at Village - Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.

As per EIA Notification dated 14th September 2006, as amended from time to time; the project falls under Category "B1" S. No. '1' (Mining of Minerals), Project or Activity '1(a) - (4)'.

2.2 NEED FOR THE PROJECT

M/s. Meghalaya Cements Limited has proposed expansion in cement plant from 2600 TPD to 4500 TPD (Cement and Clinkerization) with 10 MW CPP and 9.5 MW WHRS at Village: Thangskai, P.O: Lumshnong, District: Jaintia Hills, State: Meghalaya.

At present, limestone requirement of cement plant is being fulfilled from Khliehjeri limestone mine (4.90 ha) and South Khliehjari Limestone Mine (31.05 ha).

To meet the additional limestone requirement of the cement plant after expansion, company is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village - Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.

2.3 LOCATION OF THE PROJECT

The mine site is located at Village - Chiehriphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.

The maps showing general location, specific location (Mine Lease boundary geology & geomorphology of the mine site has been given on the following pages.

2.3.1 LOCATION MAP (GENERAL AND SPECIFIC)

The map showing general as well as specific location of the project site is as given below-

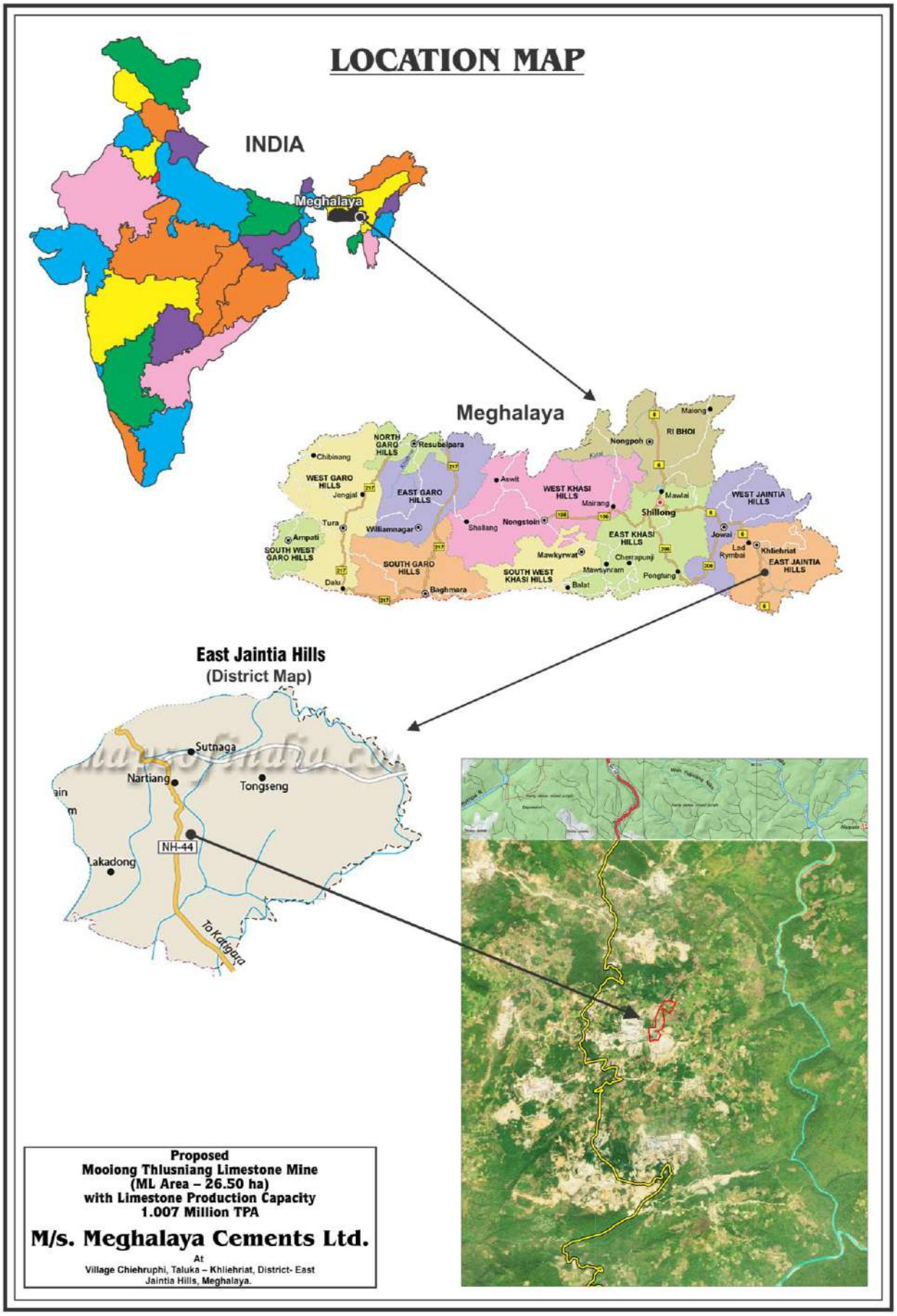


Figure 2.1: Location map (Showing general as well as specific location of the Proposed ML Area)

2.3.2 MAP SHOWING GEOLOGY AND GEOMORPHOLOGY OF THE MINE SITE WITH CORNER CORDINATES

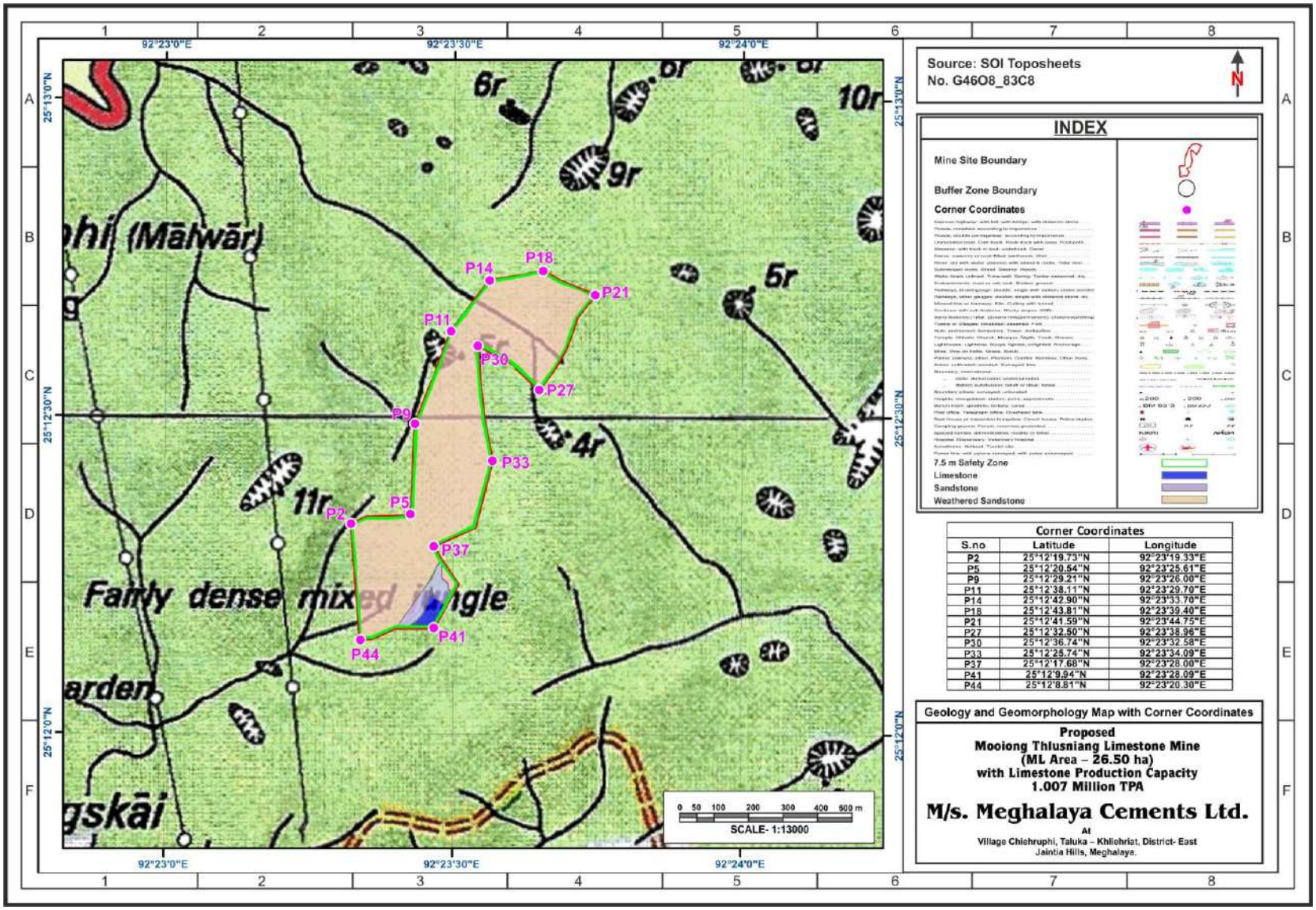


Figure 2.2: Map showing Geology and Geomorphology of the Mine Site with Corner Coordinates

2.3.3 PROJECT SITE LAYOUT

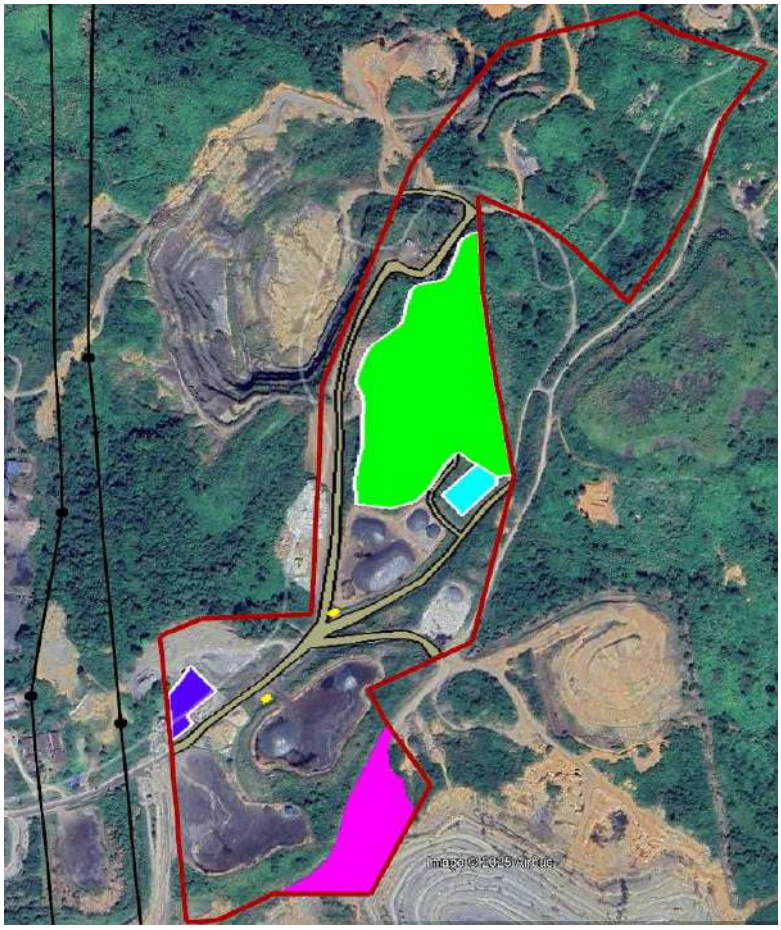
A. Land Details

Total Mining lease area is 26.50 ha, which comprises of only private land. No forest land is falling in the Mining Lease Area. Letter for the same has been obtained from PCCF, Meghalaya vide Memo No MFG.16/50/MCL (Pt)/13985-991 dated 03.01.2018. Copy of the same is enclosed as ***Annexure - 3***. Lease Map is authenticated from Director of Mineral Resources, Meghalaya and the same is enclosed as ***Annexure - 4*** along with this Draft EIA/EMP report.

Salient features of the lease area are given below:

Table – 2.1

Salient Features of Lease Area

S. No.	Particulars	Details
1.	**Road**	Internal Kacha roads are present inside the lease area
2.	**HT Line**	Two Electric transmission lines are passing from North to South towards western side of the ML area. The 1" H.T line and the 2nd H.T. Line are 54.00 m and 141.00 m away from the proposed ML area boundary respectively.
		

	Mine Lease Boundary		**Internal Kacha Road**
	Tailing Pond		**Old Working Pit**
	Old Dump		**Small Crushing Unit**
	Clay Bhatta		**HT Line**

Surface Plan showing all the features of lease area is enclosed as ***Annexure - 5*** with this Draft EIA/EMP Report.

2.3.4 PROPSOED MINE SITE PHOTOGRAPHS


Proposed Mine Site Photographs

2.4 SIZE OR MAGNITUDE OF OPERATION

M/s. Meghalaya Cements Limited is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village - Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya. The Total Cost of the project is Rs. 15 Crores. The estimated capital cost for EMP is Rs. 1.92 Crores and recurring cost is 0.42 Crores/annum.

2.4.1 ASSOCIATED ACTIVITIES/ FACILITIES PROPOSED

This is a proposed limestone mine, however facilities like medical aid Centre, Staff quarters, marketing facilities etc. are being/will be provided by MCL at plant site.

- **Site Services:** This is a new mine to be developed, however all the facilities for operation, labor welfare are already established near cement plant.
- **Mine Office:** Mine office complex will have Manager's office, time office, engineer's office, Mine planning, Rest shelter and quality control cell, stores etc.
- **First Aid Station**: A fully equipped first aid station and First Aid Room is being established and maintained as per Mines Rules 1955.
- **Medical Check Up:** The regular medical checkup & other benefits to the miners pertaining to their health is being/will be provided as per Mines Rules 1955.
- **Drinking water**: Drinking water facility at rest shelter, workshop, office & first aid station etc.
- **Ablution Block**: Urinals & lavatories rest shelter are being/will be provided at the mine office.
- **Workshop:** Fully equipped workshop for maintenance.
- **V T Centre**: A common VT Center is being/will be used for training purposes.

2.5 STATUS OF STATUTORY CLEARANCES, PERMISSIONS, NO OBJECTION CERTIFICATES AND CONSENTS PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION

The mining project will be implemented after getting all the Statutory Clearances, Permissions, No Objection Certificates, consents etc. which is required/necessary for this project under various Acts, Rules and Regulations is as given in table below:

Table - 2.2

Status of Statutory Clearances, Permissions, No Objection Certificates (NOCs) and Consents

S. No.	Particulars	Letter No & Date
A. Statutory Clearances		
1.	Letter of Intent (LOI)/ Grant Order has been issued by Government of Meghalaya, Mines and Geology Department	Letter No MG.28/2023/123, dated 21.12.2023 ***Annexure - 1***
2.	Mining Plan with Progressive Mine Closure Plan has been approved by Indian Bureau of Mines (IBM), Guwahati.	Letter no. MCDR-MPCP0CaFI/2/2024-GUH-IBM_RO_ GUH, dated 17.10.2024. ***Annexure - 2***
B. Permissions		
1.	Permission for extraction of water (The main source of water is river Wah Chyrtong and it fulfils the requirement of Cement plant and Captive Power plant of MCL)	NOC No. AID (J)223/2007-2008/ dated 24.03.2008. ***(Annexure - 6)***
C. No Objection Certificates		
1.	Certificate regarding no Forest Land is falling in Mining lease area has been obtained from PCCF, Meghalaya	vide Memo No MFG.16/50/MCL (Pt)/13985-991 dated 03.01.2018 ***(Annexure - 3)***
2.	Authenticated list of flora & fauna separately for core zone and buffer zone has been obtained from, DFO, Jowai, Meghalaya.	Company approached DFO, Jowai for authenticated list of flora and fauna along with Approval of Wildlife Conservation Plan. Further, letter received from PCCF and CWLW, Meghalaya to DFO, Jowai *vide* their letter no. FWC/Clearance/20/717 dated 06.06.2023 ***(Annexure - 7)*** stated that, "*I am directed to inform you that a common Regional Conservation Plan for all the mining development activities is being prepared by the Department to minimize and mitigate impacts of development projects on wild animals and their habitat in East Jaintia Hills. Hence, The Approval of NOC or any projects/activities to be undertaken shall be considered by this office only when the Regional Conservation Plan is completed, as per due course."*

S. No.	Particulars	Letter No & Date
D. Consents		
1.	Grant of Consent to Establish (CTE)	After grant of EC (Duration as per MSPCB)
2.	Grant of Consent to Operate (CTO)	After grant of CTE (Duration as per MSPCB)

2.6 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION

The mining project will be implemented after getting all the statutory clearances and consents from the respective authorities. Proposed schedule for approval for the mining project is given as below:

2.6.1 PROPOSED SCHEDULE FOR APPROVAL

A. Environment Clearance from SEIAA, Meghalaya

Table - 2.3

Proposed Schedule of Approval

S. No.	Activity description	Cumulative Duration (Months)
1.	Mining plan preparation & approval by IBM	Completed
2.	Environment Clearance from SEIAA, Meghalaya.	
	Application submission to SEIAA, Meghalaya.	Completed
	Grant of ToR	Completed
	Baseline Study Conduction (Summer Season - March to May., 2023)	Completed
	Submission of PH documents to SPCB	March, 2025
	Conducting Public hearing	45 days from documents submission
	Appraisal by SEIAA, Meghalaya.	60 days
	Grant of EC by SEIAA, Meghalaya.	60 days
3.	Grant of Consent to Establish	After grant of EC
4.	Grant of Consent to Operate (CTO)	After grant of CTE

The proposed schedule has been prepared as per EIA Notification, 2006, as amended thereof

Note: Application was submitted to SEIAA, Meghalaya on 22.02.2024 for grant of ToR and ToR was granted on 06.02.2025. Public hearing is yet to be conducted.

B. **CTE and CTO**- After obtaining EC from SEIAA, Meghalaya, CTE and CTO under section 21 of the Air (Prevention and control Act) 1981 and section 25/26 water Prevention and control of pollution Act) 1974 will be obtained from Meghalaya State Pollution Control Board.

2.6.2 IMPLEMENTATION

Implementation of the proposed mining project will be done in accordance with the existing acts and rules applicable on mining operations as well as in accordance with any act/rule/guidelines issued by central or state government time to time. Implementation of the mining project will be done as per Approved Mining Plan and Progressive Mine Closure Plan approved by Indian Bureau of Mines (IBM), Guwahati.

2.7 TECHNOLOGY AND PROJECT DESCRIPTION

2.7.1 PROJECT REQUIREMENTS

The project requirements such as Water, Power, Manpower, Fuel and machinery with source of supply is described in the sections below.

2.7.1.1 WATER REQUIREMENT

The total water requirement for the proposed project will be 30 KLD which will be sourced from Water tank located near Captive Power plant of the lessee within cement plant. The main source of water is river Wah Chyrtong. Permission of the same has been taken from Department of Irrigation *vide* NOC No. AID (J)223/2007-2008/ dated 24.03.2008. Copy of the same is enclosed as ***Annexure - 6*** with this Draft EIA/EMP Report.

Table - 2.4

Water Requirement (KLD)

S. No.	Particulars	Requirement	Source
1.	Drinking & Domestic Use	5	The total water requirement for the proposed project will be 30 KLD which will be sourced from Water tank located near Captive Power plant of the lessee within cement plant. The main source of water is river Wah Chyrtong.
2.	Dust suppression & plantation	15	
3.	Mining & Allied	10	
Total		**30**	

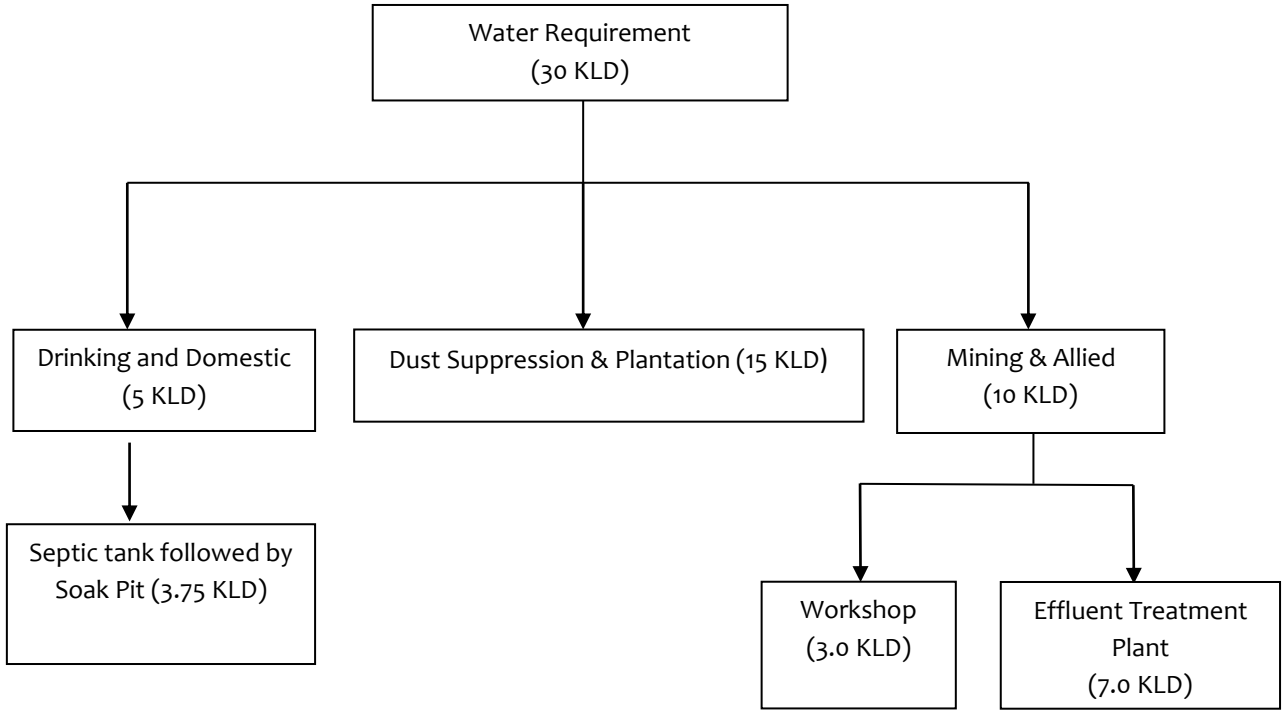


Figure 2.3: Water Balance Diagram

2.7.1.2 POWER REQUIREMENT

The total power requirement for the proposed project will be about 5.5-6.0 MW per month which will be sourced from existing Captive Power Plant.

2.7.1.3 MAN POWER REQUIREMENT

The total manpower required for the proposed mining project will be around 135 persons including Supervisory staff, Skilled, Semi-skilled & Unskilled staff. Preference will be given to local people as per their eligibility and experience.

Table - 2.5

Manpower Requirement

S. No.	Particulars	Total
Managerial Staff		
1.	1st Class Manager	1
2.	2nd Class Manager	2
3.	Geologist	1
4.	Mechanical Engineer	1
Sub Total		**5**
Supervisory Staff		
1.	Foreman	2
2.	Mining Mate	4
3.	Blaster	2
4.	Others	1
Sub Total		**9**
Skilled workers/Operators		
1.	Technician	3
2.	Dumper operator	25
3.	Drill Operator	2
4.	Dozer/grader operator	2
5.	Operator	2
6.	Others	2
Sub Total		**36**
1.	Semi-skilled	18
2.	unskilled workers	37
3.	Others	30
Total Employment		**135**

Source: *Approved Mining Plan with Progressive Mine Closure Plan*

2.7.1.4 FUEL REQUIREMENT

Total fuel requirement (HSD) for the proposed project will be706 KL and will be sourced from nearby fuelling station.

Table - 2.6

Fuel Requirement

Raw Material / Fuel	Quantity (KL per Annum)	Source	Mode of Transport	Distance of Source from Project Site (km)
HSD	706	HP/ BP/ Indian Oil	Road	20

Steps to be taken for reduction of diesel consumption:

- Implementation of proper maintenance plan in line with the OEM recommendations.
- Latest technology energy efficient mining equipment shall be deployed.
- Specialized training programmes will be organized with a view to helping the team to get a better understanding of fuel and lubricants and applying this knowledge to improving fuel and lubrication efficiency in mining operations.
- Changes in energy efficiency over time.
- Periodic benchmarking to measure and identify best-practices within the group companies or across other similar mining units.
- Optimizing the time spent by vehicles during the following instances:
  - Vehicle Travelling while empty
  - Loading & unloading
  - Vehicle Stopped while loaded
  - Vehicle Travelling while loaded
  - Vehicle stopped while empty
- Conducting specific study/ audits through the expert's agencies and others and implement the recommendations of the study.

2.7.1.5 EXTENT OF MECHANIZATION

The following machinery & Equipment's will be required for mining operation:

Table - 2.7

Machinery & Equipment for Mining

S. No.	Equipment	Make	Capacity	Number
1.	Hydraulic Drill machines	Epiroc	15 mtrs/hr	02
2.	Shovel/ Excavator	L&T	1.60-1.80 m^3	02
3.	Shovel/ Excavator	L&T	0.9-1.1 M^3	01
4.	Dumpers	Tata Motors	16 m^3	10
5.	Dozer	D-85	200 HP	01

Source: *Approved Mining Plan with Progressive Mine Closure Plan*

2.7.2 TECHNOLOGY DESCRIPTION

2.7.2.1 GEOLOGY OF THE AREA

Regional Geology

Jaintia Group is divided into five formations- Langpar, Therria /Cherra, Tura, Shella and Kopili formations (Sarmah & Borgohain, 2012; Mallick et al., 1988; Saxena and Tripathi 1982 and Dutta, 1982). It is named after the "Jaintia tribe" of Meghalaya. Jaintia Group un-conformably overlies Khasi Group. Langpar Formation is the lowermost part of the Jaintia group. It is exposed in Therriaghat.

Calcareous shale, sandstone and Limestone are the main components of Langpar formation. It is overlain by Therria Formation (Cherra Stage by Evans, 1932) at Therriaghat and Tura formation at

Tura. Therria formation consists of arkosic sandstone with Limestone, shale and coal whereas Tura Formation is made up of coal bearing poorly sorted sandstone. Both Formations are overlain by Shella Formation.

Shella Formation consists of five members-Lakadong Limestone, Lakadong sandstone, Umlatadoh Limestone, Narpuh sandstone and Prang sandstone (Sarmah & Borgohain, 2012 & Garg et al, 2006). Lakadong

Lakadong Limestone is grey to pink massive crystalline Limestone, highly ferruginous and traversed by calcite veins. It also contains silty shales and partings in upper part. It is exposed at Lakadong plateau. Lakadong sandstone is fine to medium grained ferruginous, well bedded sandstone with clays and coal seams. It is exposed at Jathang hill. Umlatadoh Limestone is grey to pinkish, well bedded highly jointed, hard and compact fossiliferous Limestone. It is exposed at South of Chiehruphi village. Narpuh (Narpuh) sandstone is ferruginous, medium to coarse grained sandstone. Sometimes it also contains pyrite nodules and thin calcareous shaly bands. It is exposed at Narpuh Reserve Forest. Prang sandstone is generally grey to bluish grey and sometimes reddish in colour and breaks in rectangular. It is exposed at Prang River section.

The Palaeogene succession of the Jaintia Hills is characterised by carbonate deposits of platform facies grouped as the Sylhet Limestone Group (Wilson and Metre, 1953; Dasgupta, 1977). Dasgupta (1977) proposed the name "Sylhet Limestone stage" which corresponds to the "Nummulitic series" of Medlicott (1871) and the two main litho units of Wilson and Metre (1953). Though the name Jaintia Group (earlier proposed by Evans, 1932 as the Jaintia series to include these rocks) is also in use (Dutta and Jain, 1980; Saxena and Tripathi, 1982; Murty, 1983, etc.), Dasgupta's (1977) proposal has proved to be quite practicable in the field and is followed in the present work.

Limestones of Lakadong, Umlatdoh& Prang horizons are distinctly & sequentially separated by Narpuh & Lakadong Sandstone.

The rock formation of the area falls under Jaintia series of Eocene Age

Table - 2.8

Regional Stratigraphic Succession of the Area

Formation	Super group/Group	Rock type
Kopili Formation Prang Formation	Narpuh Sandstone	Rich fossiliferous, light to dark grey limestone with large nummulitids (50 m) Arkosic, ferruginous Sandstone (20 m)
Umlatdoh Formation	Umlatdoh Limestone	Hard, massive foraminifer Limestone (40 m)
Lakadong Formation	Lakadong Sandstone	Soft, friable, light coloured sandstone with coaly horizons (12 m)
	Lakadong Limestone	Hard, compact, fossiliferous limestone rich in large foraminifera (100 m)
Therria Formation	Therria Sandstone	Hard, compact, burrowed, coarse to medium grained sandstone (30 m)

Formation	Super group/Group	Rock type
	Therria Hard, Limestone	compact, unbedded limestone (100 m)
Langpar Formation		

Source: *Pre-feasibility report of Approved Mining Plan with Progressive Mine Closure Plan.*

Local Geology

The Palaeogene sequence (Palaeocene-Eocene) of shallow, neritic facies is exposed along the Jowai–Badarpur Road between Jowai (64 km milestone) and Sonapur (140 km milestone) and is represented by the Therria Formation (exposed un-conformably over the Precambrian Shillong Group in the road section near Jowai up to 110 km milestone), the Sylhet Limestone (exposed between 110 km milestone and 131.5 km milestone) and the Kopili Formation (appearing at 132.5 km milestone and extending up to 140 km milestone).

The deposition of the three units of the Sylhet Limestone occurred under shallow neritic environment, corresponding to three distinct sedimentary cycles, which have been dated on the basis of their distinctive foraminiferal assemblages. The upper unit (Prang Formation) has been considered to be late middle Eocene (Nagappa, 1959; Mehrotra and Banerji, 1973; Singh et al. 1986; Jauhri and Agarwal, 2001); however, in the study area it is dated as middle-late Eocene on the basis of presence of Pellatispira in the upper part of the Prang Formation.

Limestone is distributed predominantly in the southern fringe of Meghalaya plateau and falls under the rock formation units of Cretaceous-Tertiary sedimentary rock, which is divided into three groups i.e. the Khasi group, the Jaintia Group and the Garo group.

Structure: Structurally, the limestone deposit is bedded and stratiform, the general strike is north east – south west and dipping 4° towards south.

Local Geological Succession of the Area

Age	Super group/Group	Formation	Rock type
Eocene age	Jaintia Group	Shella Formation	Upper Sylhet Limestone
			Middle Sylhet Limestone

Source: Pre-feasibility report of Approved Mining Plan with Progressive Mine Closure Plan.

Umlatdoh Limestone:

This limestone bed with the intervening calcareous sandstone bed and shaley partings is exposed on Southwestern side of the area. The limestone is bedded, fossiliferous and light grey in colour. The thickness of this limestone was encountered throughout in the boreholes But there is existence of intervening sandstone occurring as pinching encountered in the boreholes. This intervening limestone is of calcareous sandstone and intercalated with shale lamina and is nomenclature as siliceous limestone. Umlatdoh limestone is exposed in the southern side of the area where some of the old working was done during road construction.

Narpuh Sandstone & Shale (Upper Sylhet Sandstone):

The upper Sylhet sandstone is overlain by remnant of shaley sandstone bed with sub soil exposed on the eastern, southern and northern side of the area. The sandstone is fine to medium grained,

occasionally ferruginous in nature and covers a major portion of the exposed map area. Generally, the top portion of this sandstone bed is covered by reddish sub soil. There is a carbonaceous shale parting on the upper part of the sandstone; thickness of this sandstone along with the sub soil at the top as encountered in the boreholes. Narpuh Sandstone is exposed in the southern side of the area where some of the old working was done during road construction

2.7.3 DETAILS OF MINING

2.7.3.1 EXPLORATION CARRIED OUT IN THE AREA

Exploration was carried in the area from 2022 to 2023. As per the project report, a total 2104 m of drilling was done in the area, and spread over 39 bore holes in lease area. The bore holes were put at variable distance on available land in the area at distance ranging 100 m in interval. The boreholes were drilled up to 64 m depth. Details of Exploratory drilling is given in the table below:

S. No.	Year		Exploration Agency	Core Holes	
	From	To		No. of Boreholes Drilled	Total Meters
1.	22/09/2022	07/03/2023	M/s. Meghalaya Cements Limited	39	1898.5

Source: *Approved Mining Plan with Progressive Mine Closure Plan.*

2.7.3.2 EXPLORATION TO BE CARRIED OUT IN THE AREA

S. No.	Year	No. of Borehole	Total Meters	Type Borehole	Grid Interval (m)
1.	Year 1	5	900	Core	200
2.	Year 2	5	900	Core	200
3.	Year 3	3	540	Core	200

Source*: Approved Mining Plan with Progressive Mine Closure Plan.*

Area covered under Exploration

Level of Exploration	Forest Area (in ha)	Non-Forest Area (in ha)	Total area in Ha
G - 1	0.00	26.50	26.50
G - 2	0.00	0.00	0.00
G - 3	0.00	0.00	0.00
G - 4	0.00	0.00	0.00
Area proved as non-mineralized	0.00	0.00	0.00
Area to be explored	0.00	0.00	0.00
Total	0.00	26.50	26.50

Source*: Approved Mining Plan with Progressive Mine Closure Plan*

2.7.3.3 ESTIMATION OF RESERVES

As per Mining Plan, total mineable reserves are 11.76 million tonnes. Details of Geological reserves as per UNFC classification are given in following table.

Table - 2.9
Mineral Resources & Reserves (As on 01.04.2022)

A. Mineral Reserve	UNFC Code	Limestone Quantity in tonnes	Remark
Proved Mineral Reserve (A)	111	0	CaO 41.15 %, MgO 1.53 %
Probable mineral Reserve (A)	121	11768153.65	
	122	0	
Total (A)		**11768153.65**	
B. Remaining Resources			
Feasibility mineral Resource (B)	211	0	CaO 41.93 %, MgO 1.58 %
Prefeasibility mineral resource (B)	221	5234622.73	
	222	0	
Measured mineral resource (B)	331	0	
Indicated mineral resource (B)	332	0	
Inferred mineral resource (B)	333	0	
Reconnaissance mineral resource (B)	334	0	
Total (B)		5234622.73	
Total (A+B) = Reserves (A) + Resources (B)		**17002776.38**	

***Source**: Approved Mining Plan with Progressive Mine Closure Plan.*

2.7.3.3.1 MINEABLE RESERVES AND ANTICIPATED LIFE OF MINE

Mining lease area of 26.50 ha has total geological resources/reserves of 17.00 Million Tonnes, in which total mineable reserves are 11.76 Million Tonnes. Estimated life of mine will be about 13 years (including first 5 years of mining).

Table - 2.10
Reserve Details

S. no.	Description	Reserves (million tonnes)
A.	Net mineable reserves as on 01.04.2022 (121)	11.76
B.	Expected depletion of reserves during plan period	2.83
C.	Reserve available at the end of plan period	8.93
D.	Rate of production per year	1.007 Million TPA
E.	Life of mine at the end of plan period	**8.86 years**
F.	Life of mine including plan period	8.86 + 5 or say **14 years**

***Source**: Approved Mining Plan with Progressive Mine Closure Plan.*

2.7.3.3.2 USE OF MINERAL

Limestone produced from this mine will be used for the manufacturing of cement in the existing cement plant located at Villages: Thangskai, P.O: Lumshnong, District: Jaintia Hills, State: Meghalaya

2.7.4 PROCESS DESCRIPTION

2.7.4.1 PROPOSED METHOD OF MINING

Opencast fully mechanized method of mining will be done. All operations of mining will be done by deployment of Heavy Earth Moving Machineries for deep hole drilling and blasting, excavation, loading & transport. Various mining activities such as drilling, blasting, loading, hauling and transportation will be so conducted as to ensure maximum mineral conservation and minimum environmental degradation.

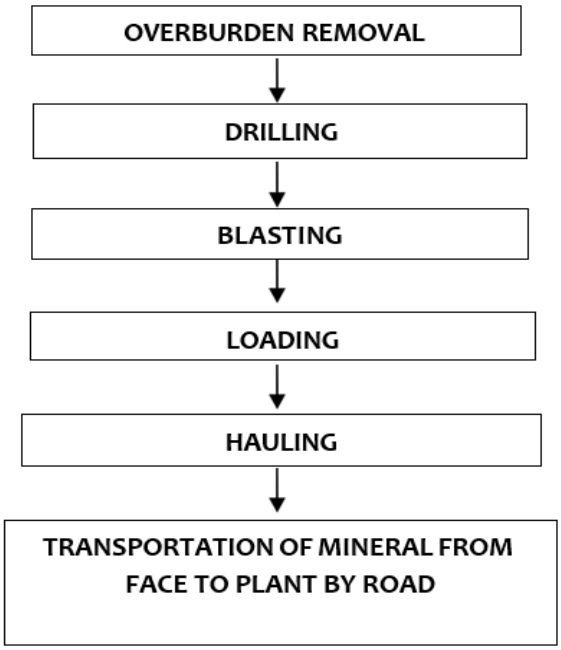


Figure 2.4: Flow chart for mining process

a) Top soil/ OB Removal:

The mine working will involve removal of topsoil/OB. Waste generated will be used for backfilling and Top soil whenever generated throughout the course of mining will be stacked separately and will be simultaneously used in plantation.

b) Drilling:

Drilling is to be carried out by deploying 115 mm dia. drill equipped with in - built arrangement of water sprinkling for dust suppression and separate dust extraction system and this arrangement makes operations practically dust free.

The drill parameter:

- Average Spacing = 3.5 m
- Average Burden = 3.0 m
- Yield per Hole = 173.25 Tonnes
- Average bulk density = 2.50 t/m^3

c) Blasting:

Blasting operations are proposed to be carried out in a controlled manner to minimize fly rock generation for safety of civil structures, machines and nearby habitation under the supervision of Assistant Manager (Mines), well versed with technique to ensure quality and

safety in the work. Due care is taken to keep the ground vibrations and air blast levels to the lowest possible limits to avoid any adverse impacts on the surrounding environment. Ultimate pit slope will be 45 degrees. Various types of explosives such as ANFO, slurry, emulsion etc. will be used for blasting. NONEL detonating fuse is will be used since multi row system of firing will be carried to reduce the ground vibration, noise, fly rock etc. due to blasting.

The details of blast parameters in Mineral ore:

- Yield per hole in ROM zone (m^3) = 63
- Use of rock breaker = 1
- No of rows = 3
- Burden (m) = 3.0 m
- Spacing (m) = 3.5 m
- Charge per hole = 28 Kg
- Depth of hole = 6 m
- Maximum no. of holes blasted in a round = 48
- Average powder factor: 5.62 t/kg

d) Loading & Hauling:

Blasted limestone will be loaded by large size hydraulic excavators with 1.80 m3 bucket capacity into the dumper (capacity 25 tonnes).

e) Transport:

Crushed limestone will be transported to cement plant for further manufacturing of cement by road.

Table - 2.11

Mining Details

S. No.	Particulars	Details
1.	Method of mining	Fully Mechanized Opencast Mining
2.	Total Geological Resources	17.00 Million Tonnes
3.	Total Mineable reserves	11.76 Million Tonnes
4.	Proposed Life of the Mine	~14 years
5.	Bench Height	6 m
6.	Bench Width	6 m (Minimum)
7.	No. of Benches	10
8.	Ultimate Pit Slope	45°
9.	Elevation Range	717 m AMSL to 765 m AMSL
10.	General Ground Level	741 m AMSL
11.	Water Table	185 m bgl
12.	Ultimate Working Depth	683.7 mRL (57.3 m bgl)
13.	Stripping Ratio Mineral: Waste	1:0.42
14.	Number of Working Days	305
15.	Number of shifts per day	1 (8 Hours)

***Source**: Approved Mining Plan with Progressive Mine Closure Plan.*

2.7.4.2 YEAR WISE PRODUCTION & EXCAVATION DETAILS FOR FIRST FIVE YEARS

Year-wise production for first five years has been given in table 2.13.

Table - 2.12

Year-wise Proposed Production Details (Tonnes)

S. No.	Year	Total Handling (t)	Waste Quantity (t)	ROM Quantity (t)	ROM Quantity Saleable Mineral (t)	ROM Quantity Mineral Reject (t)	OB to Ore Ratio (Waste Quantity / ROM Quantity)	Grade Range (%)
1.	I	524407.35	464388.90	60018.45	60018.45	-	7.74	CaO>34%
2.	II	592588.64	504240.38	88348.26	88348.26	-	5.71	CaO>34%
3.	III	1315457.85	487925.83	827532.02	827532.02	-	0.59	CaO>34%
4.	IV	1566772.12	800703.02	766069.10	766069.10	-	1.05	CaO>34%
5.	V	1737472.70	639458.77	1098013.93	1098013.93*	-	0.58	CaO>34%
Total		**5736698.66**	**2896716.90**	**2839981.76**	**2839981.76**	-		

Source: *Approved Mining Plan along with Progressive Mine Closure Plan*

** Total annual production of limestone will never exceed 1.007 Million TPA.*

Bulk density for Limestone = 2.50 t/m³

Bulk density for OB (Sandstone) = 2.51 t/m³

Bulk density for soil = 0.90 t/m³

2.7.5 SOIL & SOLID WASTE MANAGEMENT & GENERATION

2.7.5.1 TOP SOIL GENERATION & MANAGEMENT

Generation of Top Soil and waste during plan period as well as conceptual period is given below:

Table - 2.13 (a)

Generation and Management of Top Soil

S. No	Particulars	Details
A	**During Plan period**	
	Generation and management of Top soil	No top soil will be generated in plan period
B	**During Conceptual Period**	
	Generation and management of Top soil	At conceptual stage, 2.39 million m³ (2.1 Million Tonnes) amount of top soil will be generated and will be used for greenbelt/plantation

Table - 2.13 (b)

Generation and Management of Waste

S. No.	Particulars	Details
A.	**During Plan period**	
	Generation & management	During this Plan period, 1.15 million m³ (2.89 million tonnes) Over burden will be stacked at earmarked place and fully utilized for backfilling. Details are given as per below:

		S. No	**Year**	**Dump Id**	**Proposed area (ha)**	**Height (m)**	**Total Dump Quantity (m^3)**
		1.	Year 1	1	1.90	16	82571
				2	1.03	16	103184
		2.	Year 2	1	1.94	16	67709
				2	1.79	24	133987
		3.	Year 3	1	2.09	24	82831
				2	2.76	32	112339
		4.	Year 4	1	3.01	32	149873
				2	2.93	40	170439
		5.	Year 5	1	3.01	48	103100
				2	2.92	48	152683
		Total			**5.93 (5^{th} Year is total)**		**1158716**
B.	**During Conceptual Period**						
	Generation & management	Approx 3.09 Million Tonnes of waste will be generated during conceptual stage, which will be used for backfilling excavated area.					

2.8 CONCEPTUAL PLAN

At the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha. Conceptual Plan have been enclosed with the Draft EIA/EMP Report as ***Annexure - 8.*** Post Mine Land Use and Reclamation Area (ha) of the mining lease is given in table below:

Table - 2.14

Stage wise land use Pattern (In Ha)

S. No.	**Description**	**Land Use (In Ha)**		
		Plantation/ Re-grassing	**Water Body**	**Total**
1.	Excavation (Voids) Water Reservoir	–	9.734	9.734
	Reclamation (Backfilled)	14.30	–	14.30
	Total Excavation	**14.30**	**9.734**	**24.034**
2.	Green Belt/Plantation	2.47	–	2.47
Total		**16.77**	**9.734**	**26.50**

Table - 2.15

Reclamation in Plan Period

S. No	**Every five-year interval till life of mine**	**Reclaimed area (ha)**	**Rehabilitated Area**
			Greenbelt
1.	1^{st} year	0.50	0.50
2.	2^{nd} year	0.50	0.50
3.	3^{rd} year	0.47	0.47
4.	4^{th} year	0.52	0.52
5.	5^{th} year	0.48	0.48
Total		**2.47**	**2.47**

2.9 DESCRIPTION OF MITIGATION MEASURES

The mitigation measures given in this section are for management of the emissions (particulate or gaseous), waste water & surface run-off and Noise pollution generated from the mining operations to meet the environmental standards and environmental operating conditions.

A. AIR QUALITY MANAGEMENT

Drilling:

- Drilling machines will be equipped with wet drilling arrangements.
- Sharp and wet drill bits of will be used along with dust collection system.
- Drill operators will be provided with protective equipment like dust masks.

Blasting:

- Controlled blasting will be adopted. Slurry/ Emulsion High explosives & ANFO will be used and its optimum use will help in reducing the air pollution.
- Well-designed blasting parameters are proposed to be adopted
- Rock breaker will be used in place of secondary blasting.
- Water sprinkling will be done before blasting.
- Water spray on blasted muck pile before dozing/loading.

Loading & Hauling:

- Dumpers will not be overloaded to avoid any spillage of loaded materials.
- Water Tankers will be provided for water sprinkling on haul roads, loading, unloading and transfer points.
- Operator cabins of major HEMM equipment will be closed to minimize dust exposure to the operators.
- Proper maintenance of the HEMMs & transportation vehicles will be done.
- Vehicular emissions will be kept under norms.
- Personal Protective Equipment like dust masks will be provided to all employees.
- Regular Ambient Air Quality Monitoring will be carried out.
- Greenbelt will be developed around the periphery of the lease area having a total of length and width of 3300 m and 7.5 m respectively. (Total area to be covered under greenbelt will be 2.47 ha)
- Density of plantation would be 1500 trees / ha with a survival rate of more than 70%.

Transportation:

- Prevention of spillage of material will be ensured by engaging covered tippers. Vehicle with valid PUC will be used for transportation.
- Speed Governor will be deployed in Vehicles.
- Company will construct speed breakers & Speed will be maintained on village road.
- Peak hours to be avoided during morning and evening hours. Transportation during night time will be avoided.
- Avenue plantation on either side of the stretch of village road with broad leaved tree sapling will be done and maintenance of same will be carried out.
- Training will be given to all drivers about safe and environment friendly driving.

B. WATER MANAGEMENT

- No stream perennial or seasonal present in mining lease area
- Elevation of mining lease area is ranging from 717 m AMSL to 765m AMSL. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table.
- Retaining wall of 540mx15mx15m long all around the bottom periphery of waste dumps followed by garland drains of 540mx15mx1m shall be constructed during the plan period.
- Besides the garland drains and the retaining walls two settling ponds of 8 m x 8m x 3m size each will be constructed at the end of garland drain of OB dump and soil dump which will accumulate water.
- The garland drains shall be canalized in such a way that the water flows to an area which will be non-ore bearing.
- Regular cleaning of the drain shall be done for easy flow of water.
- Besides the garland drains and the retaining walls, two settling ponds of 10 m x 10m x 2m size each will be constructed at the end of garland drain of OB dump and soil dump, which will accumulate water.
- Waste water from Mine office will be disposed in soak pit via septic tank
- Effective and suitable arrangements for installation of ETP/WTP will be made for treatment of effluents discharged from workshop and Township and for their reuse to reduce the fresh water consumption.
- Periodical monitoring of ground water quality & water level will be carried out.

C. NOISE POLLUTION CONTROL

Drilling

- Sharp drill bits will be used to reduce the noise level due to drilling
- Personal protective equipment will be provided to the operators/workers in high noise area

Blasting

- Controlled blasting with proper spacing burden stemming and optimum charge/delay will be adopted to minimize noise and vibrations.
- Blasting will be carried out during day time only. NONEL delay detonators will be used to minimize ground vibrations, noise & fly rocks.
- Barricading the place of high noise Zone and isolation of noise impact zone.
- Rock breaker will be used to avoid secondary blasting.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- The prime mover's/ diesel engines would be proper designed and has been properly maintained.
- Explosives charge per hole and per delay will be maintained as per DGMS guidelines.
- Vibrations and noise generated by blasting will be monitored regularly.

Transportation

- Adequate silencers in HEMMs will be provided to reduce generation of noise.
- Necessary Personal Protective Equipment will be provided to all Mine employees.

- Proper maintenance of HEMM w.r.t oiling and greasing will be done
- The operator's cabin will be safe guarded with proper enclosures to reduce the noise levels.
- Green Belt will be developed in the 7.5 m barrier zone of proposed mining lease area during plan and conceptual period as plantation minimizes propagation of noise.
- Earmuff/ear plugs will be provided to all employees.
- Periodical monitoring of noise will be done.

2.10 ASSESSMENT OF NEW AND TESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

From the nature and extent of the deposit, the reserves and the quality have been proved with adequate degree of reliability. Therefore, opencast mechanized method is the most feasible method for mining in the proposed mining lease area. Since the mining machineries are rapidly upgrading, project proponent would act fast to adopt more advance equipment and automation for safer, environment friendly mining technology.

CHAPTER - 3

DESCRIPTION OF THE ENVIRONMENT

3.1 INTRODUCTION

To predict and evaluate the impacts of proposed project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the vicinity of the mine lease boundary. An exhaustive attempt has been made in the current chapter to disclose all possible base line status of environmental quality in the vicinity of the project, which further serves as the basis for identification, prediction and evaluation of impacts. To assess the baseline environmental quality of the area, field assessment has been conducted considering following components of the environment, viz. land, air, meteorology, noise, water, soil, biological and socio-economic study. The baseline monitoring has been conducted during the Summer Season (March to May, 2023) in the study area covering an area of 10 km radius from the mine lease boundary.

3.2 STUDY AREA AT A GLANCE

Study Area: The study area is an area of 10 km radius (aerial distance in each direction) from the boundaries of the mine site, also known as buffer zone whereas core zone is the mining lease area.

- **Core Area :** 26.50 Ha.
- **Buffer Area:** 34212.42 Ha.

The major environmental settings of the study area w.r.t. the mining lease are as given in the table below:

Table - 3.1

Environmental Settings of the Area

(with approx. aerial distance from the ML boundary & direction from the centre of ML boundary)

S. No.	Particulars	Distance (Approx.)
1.	Nearest Village	Chiehruphi (1.5 km in WNW in direction)
2.	Nearest School	➢ Chiehruphi Seconadry School (1.5 km in NNW in direction) ➢ Govt. LP school Chiehruphi (1.5 km in WNW in direction)
3.	Nearest Highway	NH - 06 (1.2 km in South-West direction)
4.	Nearest Railway Station	Badarpur Railway Station (38.0 km in South direction)
5.	Nearest Airport	Silchar Airport (57.0 Km in SSE direction)
6.	Nearest Town / City	Khliehriat (16.5 km in North direction)
7.	Wild Life Sanctuary, National Park, Biosphere Reserves within 10 km radius study area	Narpuh Wildlife Sanctuary (7.27 km SSE direction)
8.	Reserve Forests (RF) / Protected Forest (PF) within 10 km radius study area	None

S. No.	Particulars	Distance (Approx.)
9.	Water bodies within 10 km radius study area	➢ Lubha River (3.0 km in ENE direction) ➢ Sonapur River (7.0 km in SE direction) ➢ Seshyampa River (7.0 km in NW direction) In addition to this, four nalas are available in the study area
10.	Critically Polluted Area	Brynihat, Meghalaya (106 km in NW direction)
11.	Seismic Zone	Zone-V as per IS:1893 (Part-I):2002

Source: *Site Visit & Pre-feasibility Report*

The map showing environmental settings within 10 km from the mine site is given on the next page:

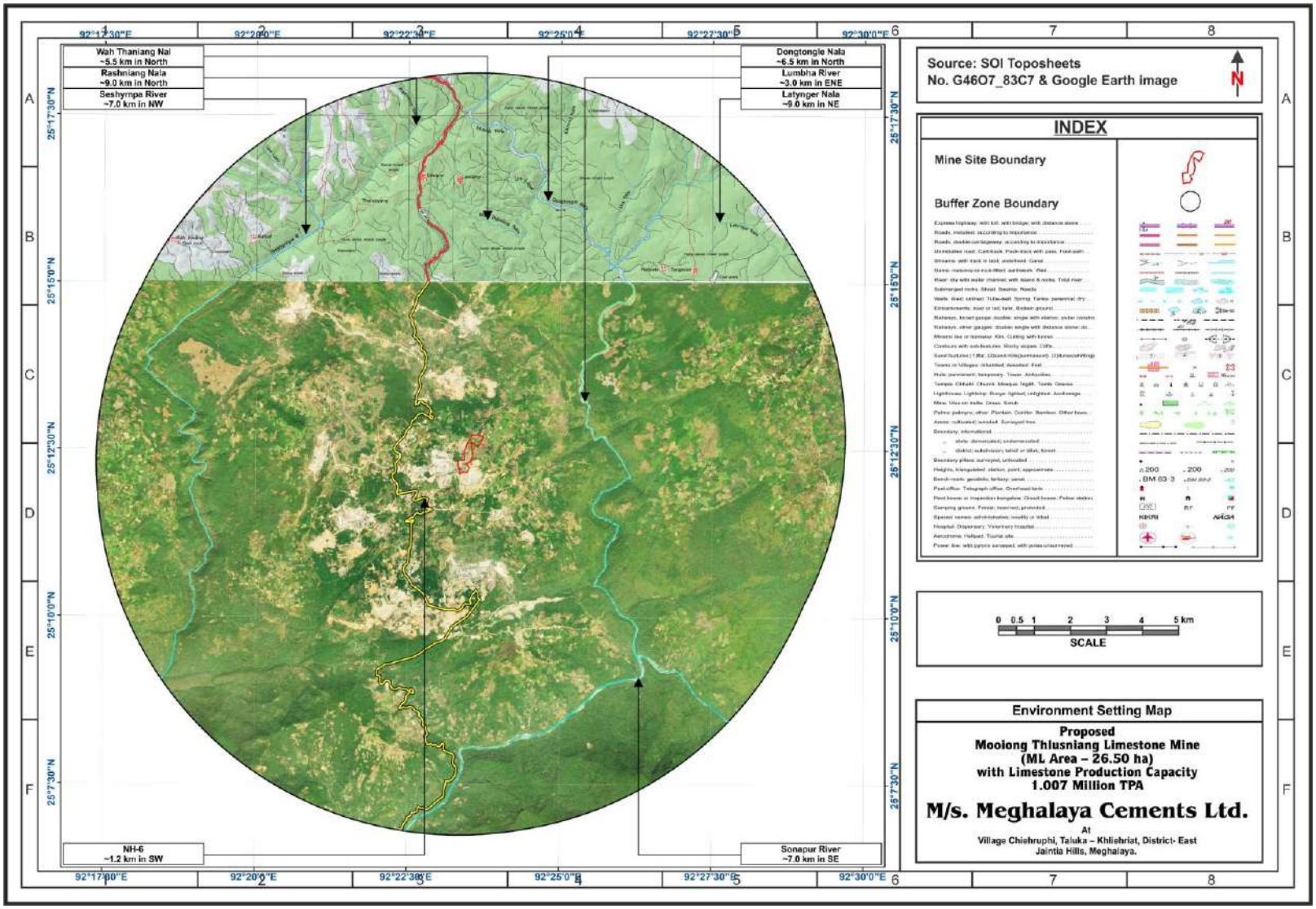


Figure 3.1: Map Showing Environmental Setting

Industries falling in the study area

Operational Indutries were found in 10 km radius of the ML area. However, some industries have been proposed in 10 km radius of the ML area details of which are as follows:

Table - 3.2

Industries falling in the study area

S. No.	Industries/Mines	Approx. Distance *(from Mine Boundary and direction from Centre point of the Mine site)*
1.	South Khliehjari Limestine Mine	200 m in SSE direction
2.	Hill Cement company limited	1.0 Km in NNW direction
3.	Best Cements	1.5 km in SE direction
4.	Star Cement Meghalya Ltd.	3.0 km in South direction
5.	Meghalya Power Ltd	3.0 km in South direction
6.	Star Cement BTS	3.0 km in SSW direction
7.	Dalmia Cement Bharat Limited	3.0 km in WSW direction
8.	Green Valliey Industries (Max Cement Ltd.)	3.0 km in North ditrection
9.	Goldstone (Black Tiger) Cememt	4.0 km in west direction
10	Massar Cememts Pvt. Ltd.	5.0 km in SSE direction
11.	Amrit Cement Ltd	5.5 Km in NW direction

Source: *SOI Toposheet and Field Survey*

3.3 BASELINE DATA COLLECTION

Baseline data was collected by monitoring and surveying of various environmental components/ parameters in the core as well as buffer zone during the study period i.e., Summer Season (March to May, 2023) details of which are given in Table - 3.3.

Sampling, preservation, transportation & storage of samples were carried out by J.M. EnviroLab Pvt. Ltd. under supervision of EC/FAE concerned. Analysis of samples has been carried out by J.M. EnviroLab Pvt. Ltd.

Table - 3.3

Baseline data collection

Summer Season (March to May, 2023)

S. No.	Environmental component	Primary data				Secondary data
		Parameters	Frequency	Monitoring locations	Methodology	
1.	Land	Land use and land cover	Once in a season	Study area	Field survey	Satellite image from NRSC, Hyderabad
		Soil	Once in a season	06	As per IS 2720/USDA	-
2.	Meteorology	Temperature, Relative	Hourly	01	--	IMD book (Climatological

S. No.	Environmental component	Primary data				Secondary data
		Parameters	**Frequency**	**Monitoring locations**	**Methodology**	
		Humidity, Wind Speed, Wind Direction				normals 1991-2020) Past year Rainfall data for Meghalaya district.
3.	Air	PM_{10}, $PM_{2.5}$, SO_2 and NO_2	(24 hourly), twice a week	06	CPCB Guidelines /NAAQS/IS 5182	Monitoring reports of the existing projects
		O_3, Pb, CO, NH_3, C_6H_6, BaP, As, Ni	Once in a season			
4.	Noise	Equivalent noise levels in dB (A)	Once in a season (day & night time)	06	CPCB Guidelines /IS 9989	--
5.	Surface Water	Parameters as per IS 10500:2012	Once in a season	03	IS 10500-2012	--
6.	Ground Water/Drinking water		Once in a season	06		-
7.	Biological Environment	Flora and fauna	Once in a season	Study area	Quadrate method/random sampling	-
8.	Socio - Economic Environment	Socio-Economic status	Once in a season	Study area	Field survey through questionnaire, focused group discussion and random sampling	• Census data, 2011 • List of prevailing diseases from Public Health Centre • List of villages where public health centre are set up • List of schools • Map of Tehsil • Details on socio-economic developmental activities undertaken

3.3.1 INSTRUMENTS USED FOR ENVIRONMENTAL BASELINE DATA COLLECTION

The following instruments were used at the site for environmental baseline data collection work.

1. Respirable Dust Sampler with attachment for gaseous Pollutants, Envirotech APM 460.
2. Fine Particulate Matter (FPS) Sampler APM 550
3. Sound Level Meter Model Envirotech SLM - 100
4. Digital D.O. Meter Model - 831 E (CPCB Kit)
5. Weather Monitoring Station Model Enviro WM 271
6. Water Level Indicator and
7. Global Positioning System (GPS).

Apart from collecting samples of air, water, noise and soil from representative sampling points given in proceeding sections, the data on land use, vegetation and agricultural crops were also collected by the field team through interaction with a large number of local inhabitants of the study area and different Government departments/agencies. This provided an excellent opportunity to the members of the field team for obtaining clear scenario of the existing environment of the study area.

3.4 LAND USE LAND COVER STUDY

As per the Standard ToR point no. 1.10 "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." To comply with the above said ToR point the following process has been adopted:-

- Development of land use & land cover map using land coordinates of the mine lease area.
- Identification and marking of important basic features according to primary and secondary data.
- Evaluation of the impact on existing land use of the mine lease area.
- Suggestive measures for conservation and sustainable use of land.

3.4.1 DATA USED

Current vintage data of Indian Remote Sensing Satellite RESOURCESAT-2A, Sensor-Liss 4 digital FCC (False Color Composite) has been used for preparation of Land use Land cover thematic map of study area. Satellite image has been procured from National Remote Sensing Centre, Hyderabad. Survey of India toposheet as a reference map on 1:50,000 scale has been used for preparation of base layer data like road, rail network and villages for geo-referencing of satellite image.

S. No.	Particulars	Details
1.	Satellite Image	RESOURCESAT-2A
2.	Vintage Date	17th Nov., 2024
3.	Satellite Data Source	NRSC, Hyderabad
4.	SOI Toposheets No	OSM - G46O8/ Toposheet No_83 C/8
5.	Software Used	Earth Resources Data Analysis System (ERDAS) Imagine 9.2

Satellite Image (FCC) for 10 km radius study area is given in Figure - 3.2.

3.4.2 METHODOLOGY

- Preliminary / primary data collection of the study area
    - Satellite data procurement from NRSC, Hyderabad
- Secondary data collection from authorized bodies
    - Survey of India Toposheet (SOI)
    - Cadastral / Khasra map
    - GPS Coordinates of Mine Lease Boundary
    - Mining Maps approved by IBM, Guwahati.
- Processing of satellite data using ERDAS Imagine 9.2 and to prepare the Land use and Land cover maps (e.g. Forest, agriculture, settlements, wasteland, water bodies etc.) by digital image processing (DIP) technique.
    - Geo-Referencing of the Survey of India Toposheet
    - Geo-Referencing of satellite Imagery with the help of Geo-Referenced Toposheets
    - Geo-Referenced Khasara Maps
    - Enhancement of the Satellite Imagery
    - Base Map layer creation (Roads, Railway, Village Names and others Secondary data etc.)
    - Data analysis and Classification using Digital interpretation techniques.
    - Ground truth studies or field Verification.
    - Error fixing / Reclassification
    - Final Map Generation

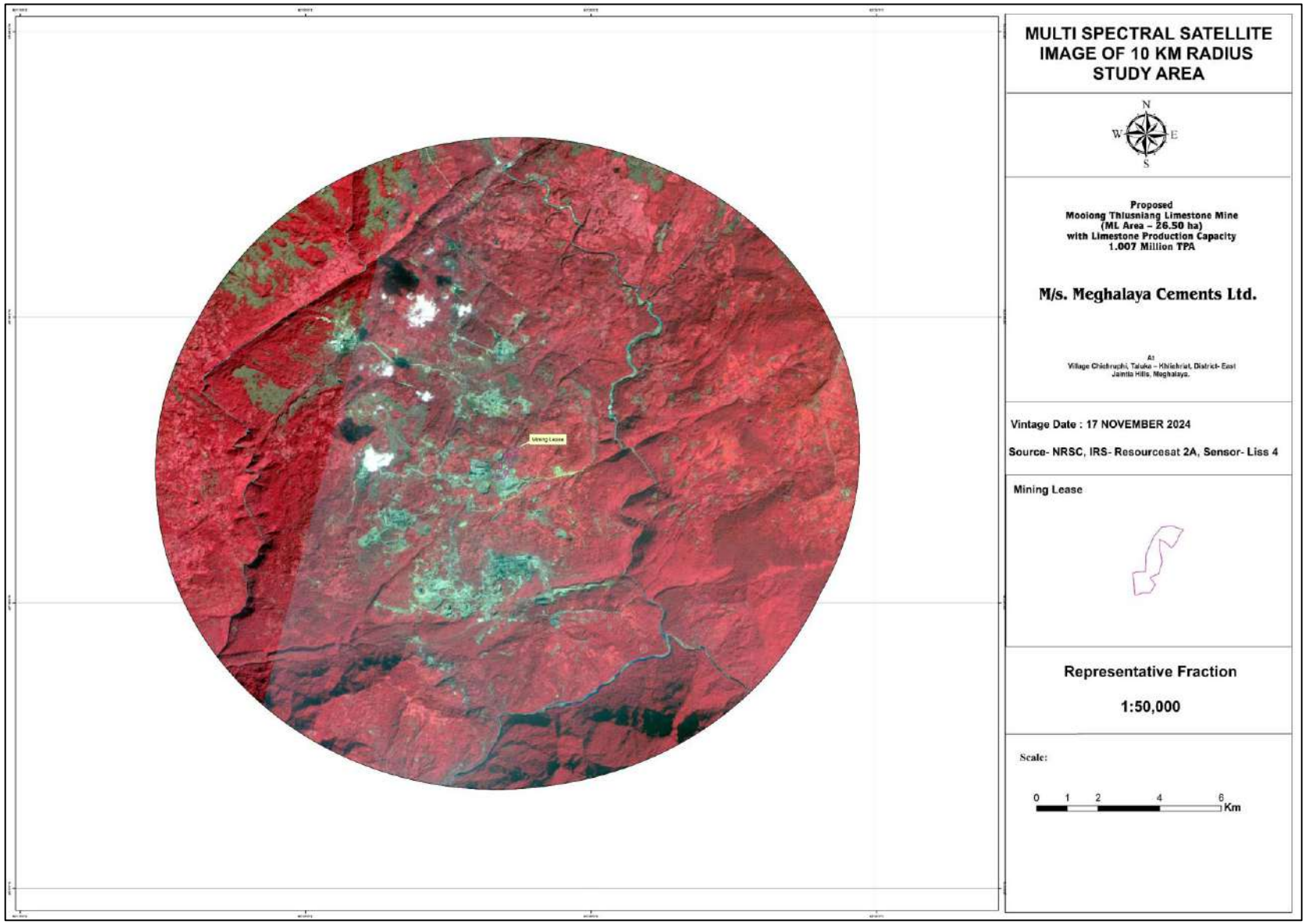


Figure3.2(a): Satellite Image (FCC) for 10 km radius study area

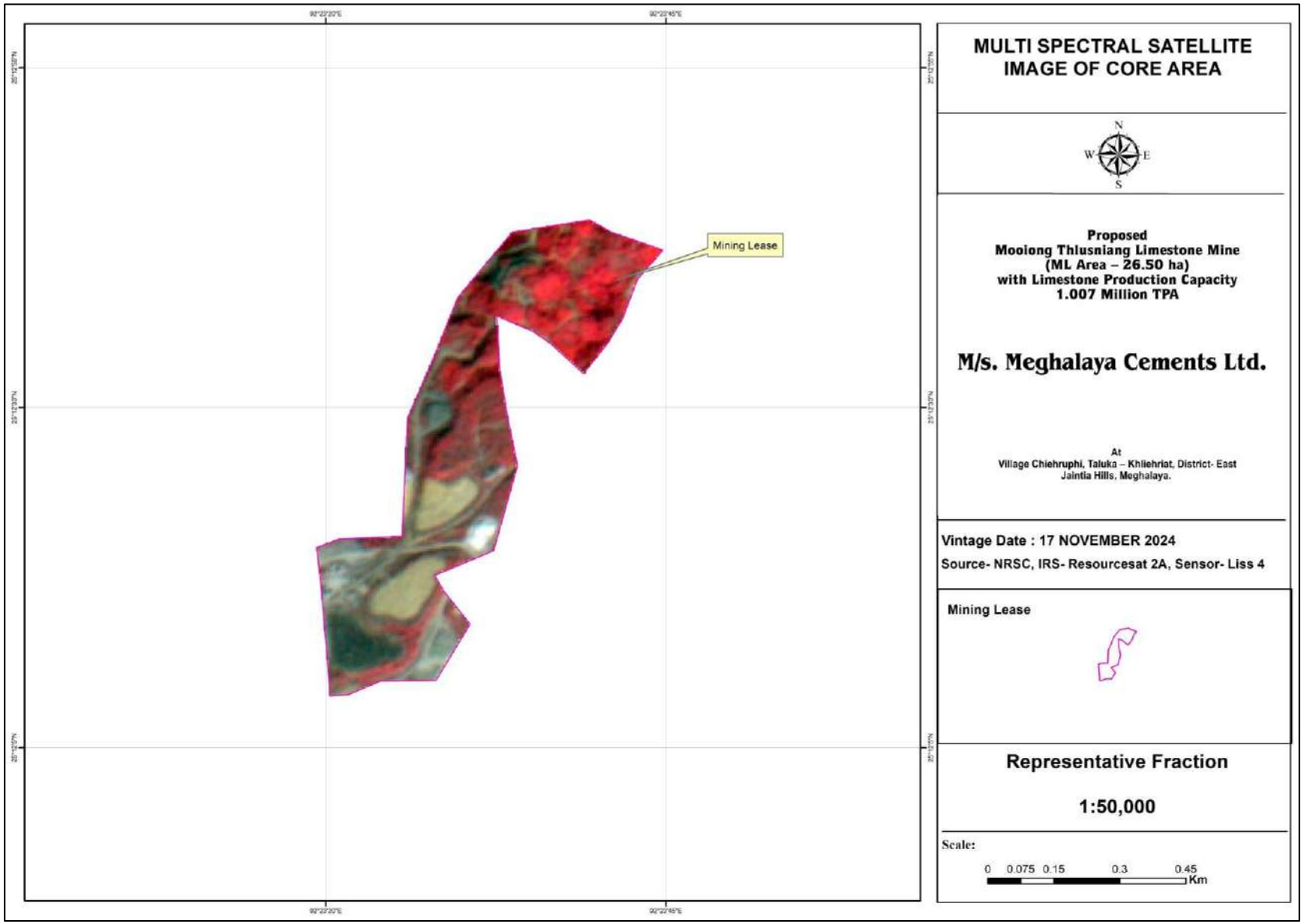


Figure3.2 (b): Satellite Image (FCC) of the core zone (ML Area)

3.4.3 DETAILS OF LAND USE LAND COVER (LULC)

3.4.3.1 Land Use and Land Cover Classes - There are the following LULC Classes:-

Water Bodies, Crop land, Fallow Land, Human Settlement, Industrial Area, Mine Quarry, Scrub Land, Plantation, Railway Line, Road Network, Forest Land, Stony Waste Land, Open Land etc. as per NRSC Guide Line.

Definitions of LULC Classes

(Reference- National Remote Sensing Center Guideline)

Agriculture Land: These are the lands primarily used for farming and for production of food crops, fiber, and other commercial and horticultural crops. It includes land under crops (Irrigated and non-irrigated, Fallow, Plantation etc.)

Crop Land: These are the areas with standing crop as on date of satellite overpass. Cropped areas appear in bright red to red in color with varying shape and size in a contiguous to non-contiguous pattern. Three cropping seasons exist in India viz., Kharif (June/July-September/October), Rabi (November-December-February-march) and Zaid (April-May).

Open Scrub Land: Scrub is a vegetation found in regions with less than 100 cms of rainfall. Therefore it indicates a dry region.

Open Land: It refers to non-built-up land with no, or with insignificant, vegetation cover.

Stony waste Land: A large area usually in arid/semi arid regions where the finer sand/soil has blown away leaving a surface covered with boulders, stones and pebbles.

3.4.3.2 GENERATION AND ANALYSIS OF DATA

- ***Geo-referencing of the Survey of India Toposheet***

  Scanned Survey of India Toposheets were registered in geographic lat/long projection system with the help of ERDAS imagine software and re-project in UTM WGS 84 with respective zone.

- ***Geo-Referencing of the Satellite Imagery***

  Registered Toposheet is used as a reference map for Geo-Referencing of Raw satellite imagery by taking suitable Ground Control Points (GCP) like intersection point of railway, Road network, Canal intersection and some other permanent features.

- ***Enhancement of Satellite Image***

  Satellite data is composed of substantial noise and haze errors due to various environmental factors, which affect the amount of reflectance (information) that can be deciphered. Since mapping of satellite images is based on spectral signatures, it is necessary to normalize the redundant values into near true values. This process of deriving true reflectance values is known as normalization. This enhances interpretability of the satellite image thereby facilitating better identification of land features viewed on satellite imagery. Histogram equalization and radiometric correction has been used for satellite image enhancement.

- ***Base Map Layer Creation***

Base map has been prepared using Survey of India Toposheet as a reference map on 1:50000 scale. In base layer linear and point feature like road, rail, canal, village location and other secondary information have been created in vector data format with the help of ArcGIS Software.

- ***Data Analysis and Classification Using Digital Interpretation Technique***

  Image interpretation is the process of identifying objects or conditions in images and determining their meaning or significance**.** Satellite imageries are composed of array of grid, each grid have a numeric value that is known as digital number. Smallest unit of this grid is known as a pixel that captures reflectance of ground features represented in terms of Digital number, which represent a specific land features.

  Using image classification technique, the satellite data is converted into thematic information map based on the user's knowledge about the ground area.

  Hybrid technique has been used i.e. visual interpretation and digital image processing for identification of different land use and vegetation cover classes based on spectral signature of geographic feature. Spectral signature represents various land use classes.Based on the Interpretation key and Spectral signature,entire satellite imagery is classified in different classes like Water Bodies, Crop land, Fallow Land, Human Settlement, Industrial Area, Mine Quarry, Scrub Land, Plantation, Railway Line, Road Network, Forest Land, Stony Waste Land, Open Land etc.

- ***Ground Data Collection and Verification***

  Ground truth/ field verification is an important component in mapping and its validation exercise. Utmost care and planning is required for collecting ground data and verification. To facilitate a good ground truthing exercise the following steps were followed:

  - Identifying and listing all the doubtful areas for the ground verification and referring all such areas with respect to the toposheet to know their geographical location and accessibility on the ground.
  - Field traverse plan was prepared to cover maximum doubtful areas in the field in such a way that each traverse covers, as many land use and land cover classes as possible, apart from the doubtful areas.
  - Sufficient numbers of points were covered for each Land Use Class as required for quality checking as well as accuracy assessment.

- ***Error Fixing / Reclassification***

  Reclassification of Land Use classes was done on the basis of data collected / verified during ground truthing.

- ***Final Map Generation***

  Final maps are generated for the core area as well as Buffer area. 3 Pixels are Filtered using Clump and Eliminate Process after ensuring to maintain crucial classes of importance. Base map layers are overlaid on the classified raster data and then thematic maps are generated on the layout consisting of Project name, legend, source of data, Index map, scale bar and North arrow.

3.4.4 LAND USE LAND COVER DETAILS OF STUDY AREA

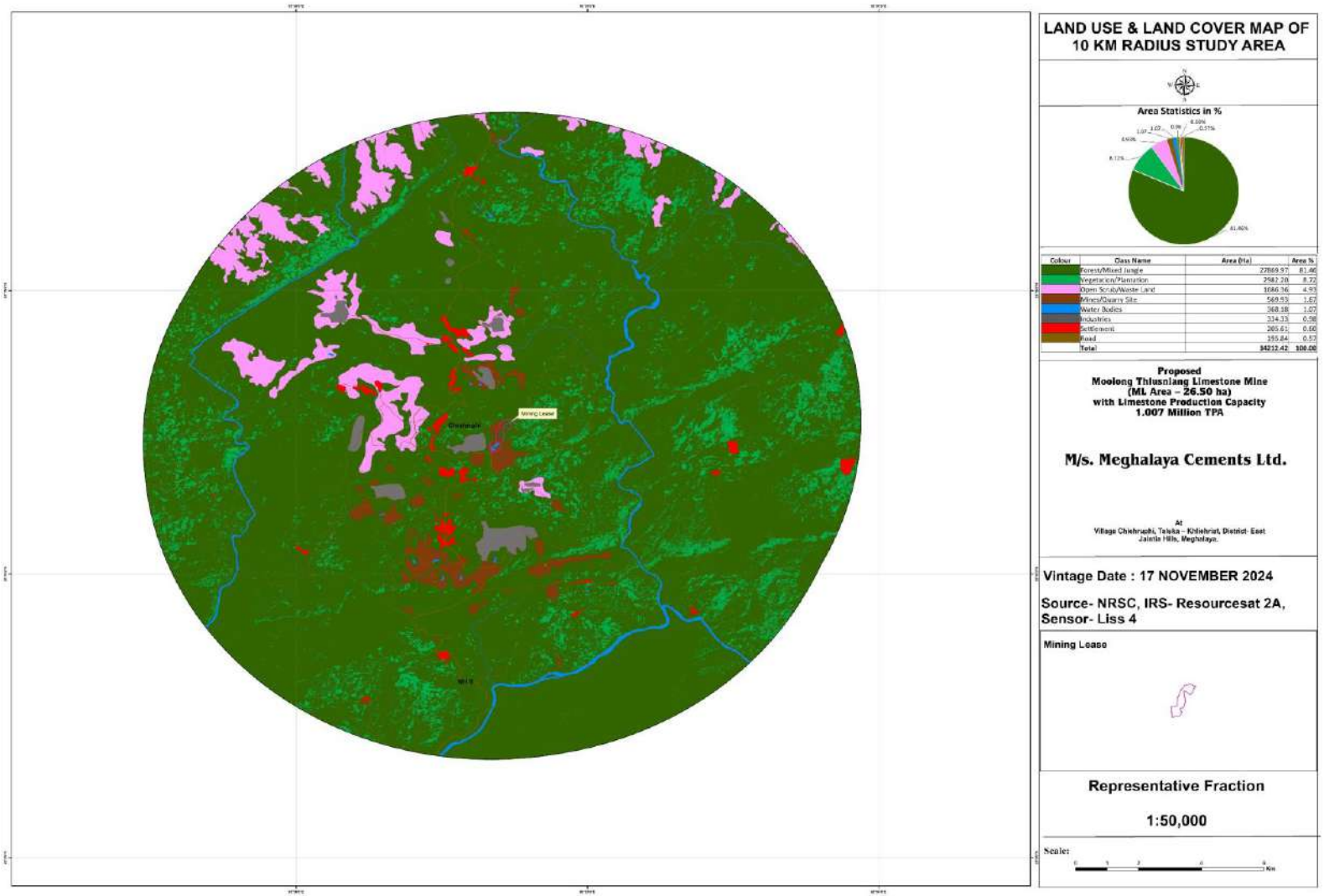


Figure 3.3(a): Land Use Land Cover Map of the Study Area

3.4.5 LAND USE LAND COVER DETAILS OF CORE ZONE

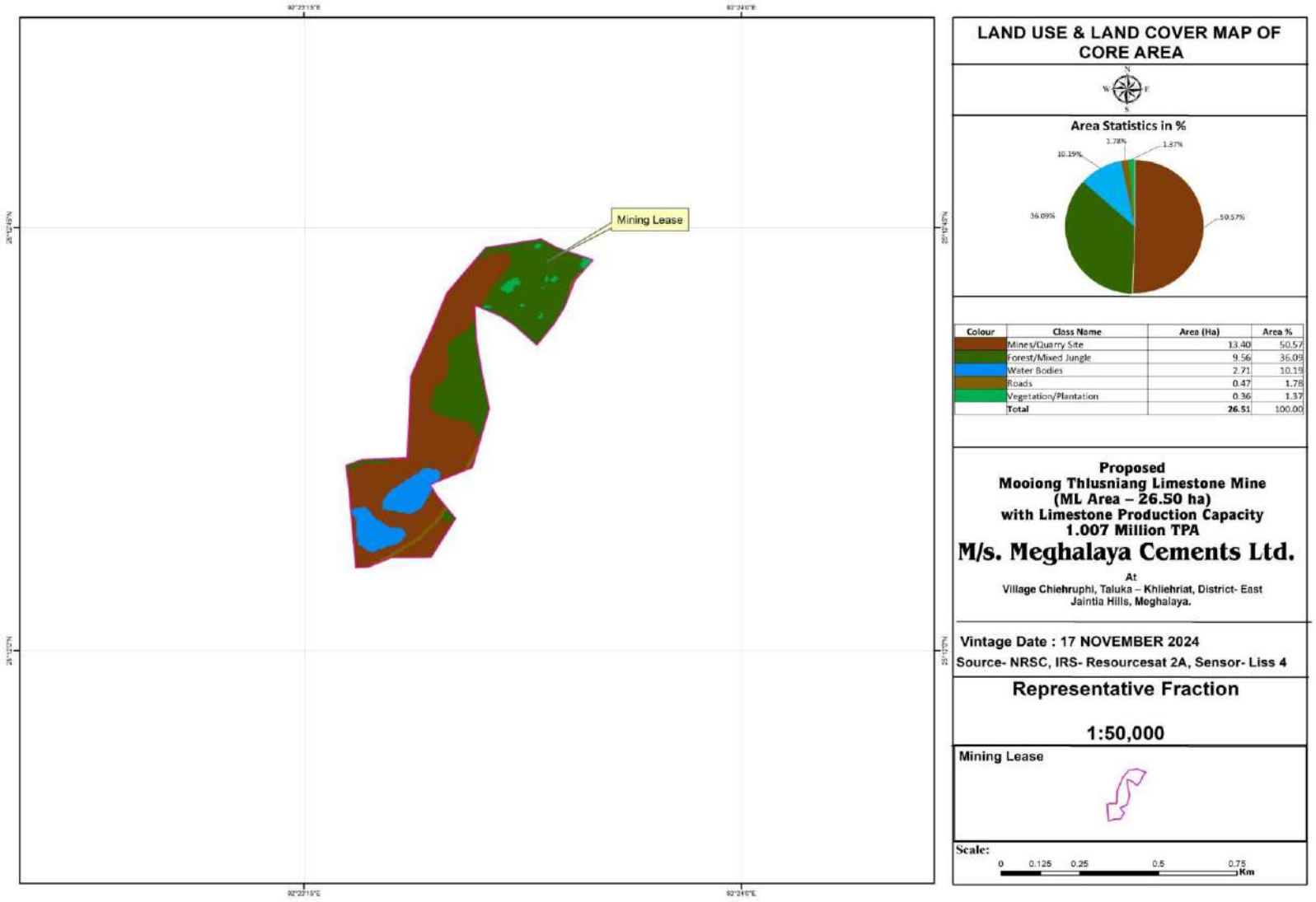


Figure 3.3(b): Land Use Land Cover Map of the core zone (ML Area)

The land use and land cover details of the Study area are given in Table - 3.4

Table - 3.4

Land Use Land Cover Details of Study Area

S. No.	Legend	Core Zone (ML Area)		Study Area (10 km radius)	
		Area (in ha)	Area (in %)	Area (in ha)	Area (in %)
1.	Forest/ Mixed jungle	9.56	36.09	27869.97	81.46
2.	Vegetation and Plantation	0.36	1.37	2982.20	8.72
3.	Open Scrub/ wasteland	-	-	1686.36	4.93
4.	Mine Quarry/ Stone Quarry	13.40	50.57	569.93	1.67
5.	water bodies	2.71	10.19	368.18	1.07
6.	Industries	-	-	334.33	0.98
7.	Settlement	-	-	205.61	0.60
8.	Road	0.47	1.78	195.84	0.57
Total		**26.50**	**100.00**	**34212.42**	**100.00**

Source: *LULC Map for Core and Buffer Zone*

3.4.6 INTERPRETATION OF THE LULC DATA

- **BUFFER ZONE**
  - The study area comprises mostly Forest/ Mixed jungle (81.46 %) and Vegetation and Plantation (8.72 %) covering upto ~90% of total buffer zone, and rest ~10 % of the study area is covered with Open Scrub/ wasteland (4.93 %),Human settlement (0.60%), Roads (0.57 %), Mine Quarry/ Stone Quarry (1.67 %) and Water Bodies (1.07 %).
  - As according to the LULC data the Forest/Mixed jungle is present at an percentage of 81.46 Vegetation and Plantation is 8.72 % covering upto ~90 % of total buffer zone and so it can be termed the habitation/Survival of the people living in the area are dependent on Forest and vegetation.
  - Different preventive measures for the emission which will occur from the mining activity will be taken to prevent the water bodies, Forest and the livelihood present in proximity of the proposed mine site.
  - Small Mine quarries are observed within 10 km radius of the lease area.
- **CORE ZONE**
  - The core area comprises mostly Mine Quarry/ Stone Quarry (50.57 %) and Forest/ Mixed jungle (36.09 %). Rest of the area is covered under Water bodies (10.19 %), Road (1.78 %) and Vegetation and Plantation (1.37 %).
  - Different preventive measures for the emission which will occur from the mining activity will be taken to prevent the water bodies, Forest and the livelihood present in proximity of the proposed mine site.

3.5 SEISMICITY AND FLOOD HAZARD ZONATION OF THE AREA

Many parts of the Indian subcontinent have historically high seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years.

Bureau of Indian Standards [IS - 1893 (Part-1): 2002], has grouped the country into four seismic zones viz. Zone - II, III, IV and V. Of these, Zone - V is the most seismically active region, while Zone - II is the least. The Modified Mercalli Intensity (MMI) scale, which measures the impact of the earthquakes on the surface of the earth, broadly associated with various zones is as follows:

Table - 3.5

Seismic Zones in India

S. No.	Seismic Zone	Risk	Intensity of Earthquake (on Mercalli Intensity Scale)
1.	Zone – V	Very High Risk Zone	IX and above
2.	Zone – IV	High Risk Zone	VIII
3.	Zone – III	Moderate Risk Zone	VII
4.	Zone – II	Low Risk Zone	VIand below

Source: *www.ndma.gov.in/images/guidelines/earthquakes.pdf*

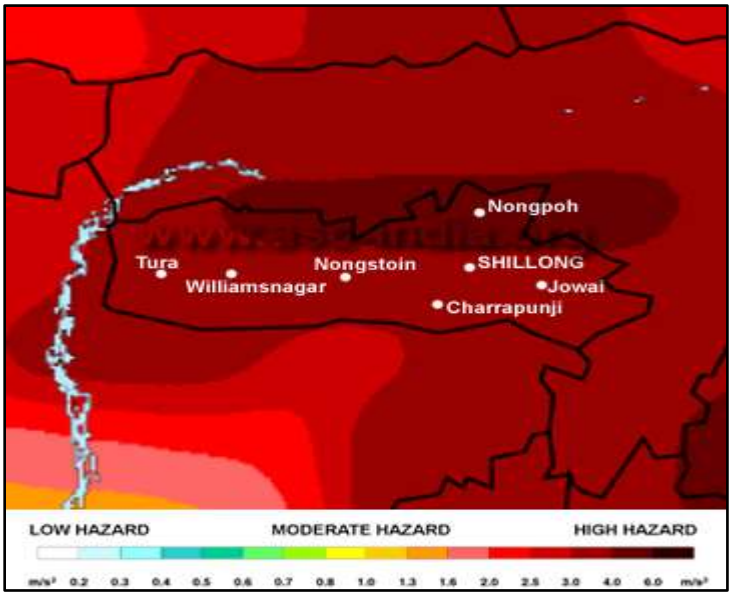


Figure 3.4: GSHAP Hazard map for Meghalaya

Nearly all of the state of Meghalaya, lies on the "Shillong Massif". This is a block-like structure that has not undergone much folding or faulting as compared to the surrounding areas. The main threats to the state come from faults bounding the massif with the surrounding areas. The northern part of the massif has several faults, among the newly identified Oldham Fault that is believed responsible for the 1897 earthquake. The southern boundary is marked by the east-west trending Dauki Fault, along the Bangladesh border. Moderate earthquakes have occurred in this state but the most significant of all was the Great Assam earthquake of 1897. Centred across the state border in Assam, much of Meghalaya was severely jolted especially Shillong.

According to GSHAP data, the state of Meghalaya falls in a region of high to very high seismic hazard. As per the 2002 Bureau of Indian Standards (BIS) map, this state also falls in Zone V. Historically, parts of this state have experienced seismic activity greater than **M**6.0 including an **M**8.1 in 1897. Approximate locations of selected towns and basic political state boundaries are displayed.

Source: *https://asc-india.org/maps/hazard/haz-meghalaya.htm*

1897 Great Shillong Earthquake: This 8.7 magnitude earthquake on June 12, 1897 caused widespread property damage and killed 1,542 people.

1923 Meghalaya earthquake:Another earthquake occurred on the morning of 9th of September 1923. The magnitude (Ms) of this event was 7.1 and is known as 1923 Meghalaya earthquake. Later studies suggested that the epicenter of this earthquake was located towards the southern edge of the Shillong Plateau at latitude 25°25'00"N and longitude 91°00'00"E on the Dauki fault. Very limited information about this earthquake is available. It shook the southern part of Meghalaya, also the north of Meghalaya at Sivasagar and Borjuli in Assam and Nagrakata in West Bengal. In the south the ground shaking was felt across Srimangal, Barisal, Chittagong, Midnapore and Narayanganj. Also heavy damages were reported in Mymensingh in Bangladesh, Cherrapunji and Guwahati in India by CNDM.

1950 Earthquake: This 8.5 magnitude earthquake caused loss of life and property.

2021 Earthquake: A 6.4 magnitude earthquake occurred on April 28, 2021, with its epicenter around 132 km north of Shillong.

The entire North East India lies in the seismically vulnerable zone V as displayed in the seismic zoning map of India. Moreover, the reason is structurally very complex and has experience 2 great earthquake past in 1897 and 1950.

Source: *https://www.iitg.ac.in/abhiak/review_shillong.pdf*

Interpretation: The mine site as well as study area of this project lies in Zone – V of Seismic Zoning Map of India, Bureau of Indian Standards and thus, can be said to be located in an area of Very High Risk Zone hazard by national standards.

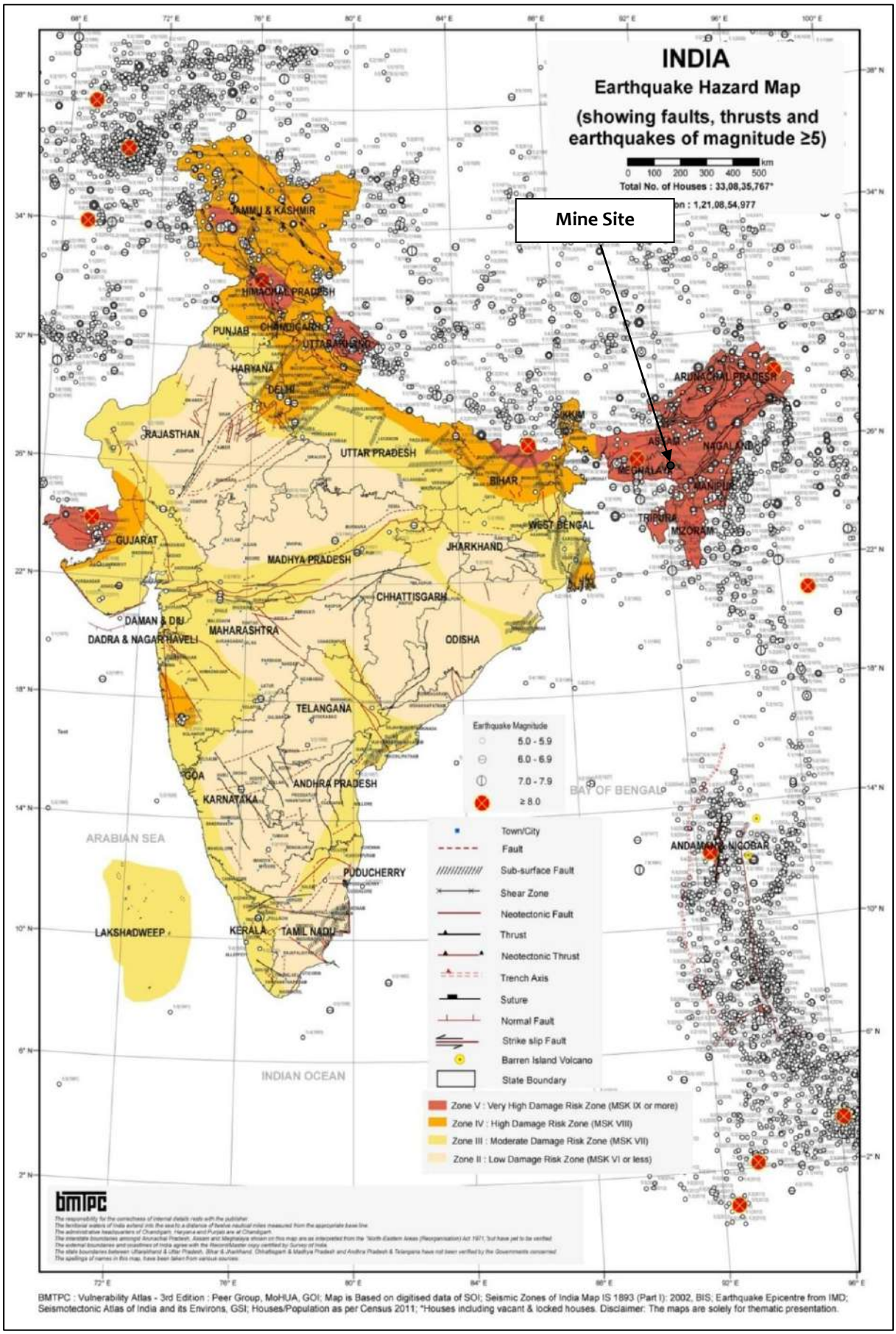
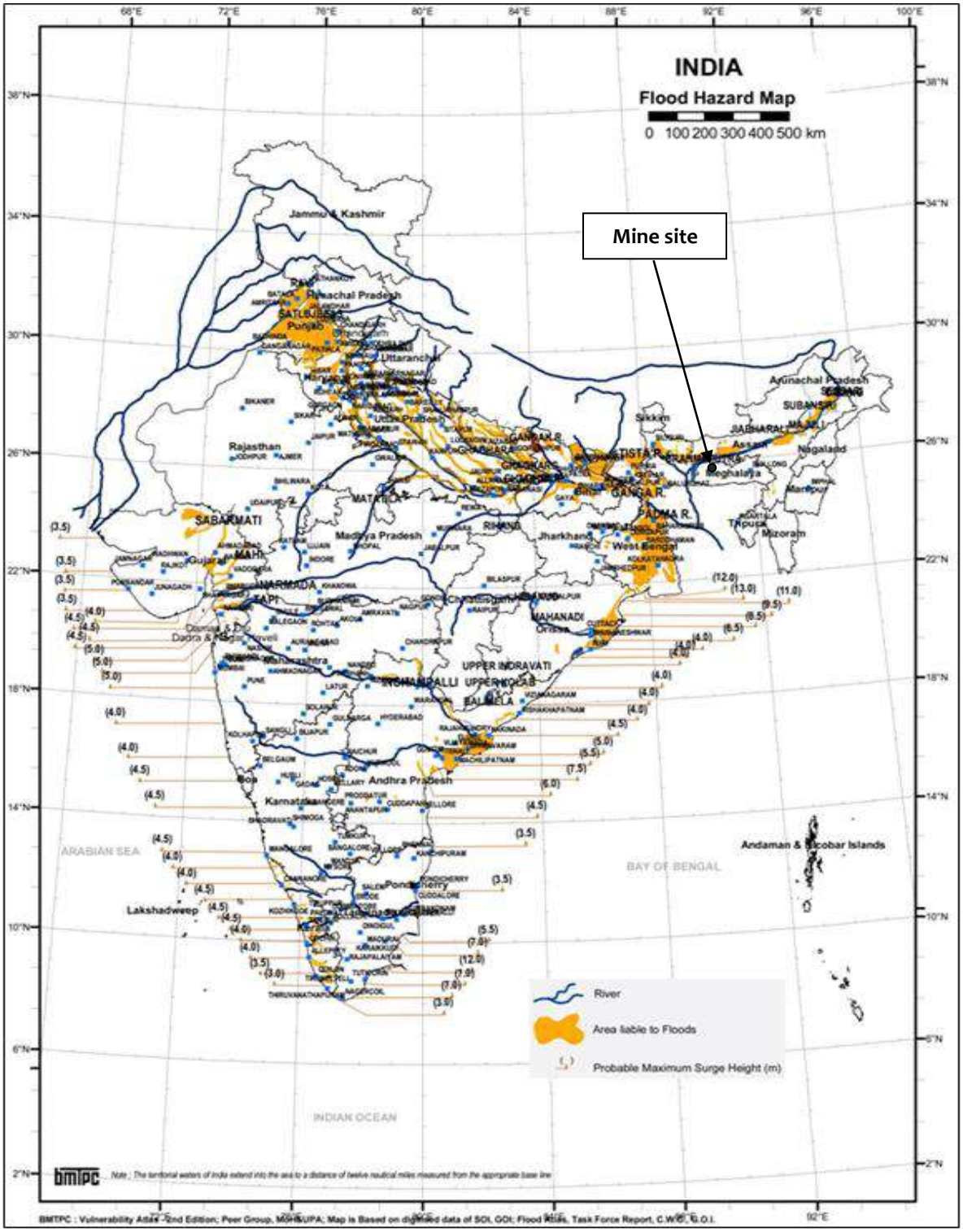


Figure 3.5: Seismic Zone Map showing Mine Site

3.6 FLOOD HAZARD ZONATION OF THE AREA

As per the "Vulnerability Atlas - 2nd Edition; Peer Group, MoH and UPA; based on digitized data of SOI, GOI; Flood Atlas, Task Force Report, C.W.C., GOI" the project site does not fall under "area liable to flood". Flood Hazard Zonation Map of India & Megahalaya showing the mine site is given in Figure - 3.8.



Source: *BMTPC: Vulnerability Atlas-3rd Edition: peer Group, MoHUA, GOI*

Figure 3.6: Flood Hazard Zonation Map showing Mine Site

3.7 TOPOGRAPHY & DRAINAGE PATTERN

Topography

Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) exhibits undulating topography comprising dissected plateau, denudational (remnant after erosion in the geologic past) high and low hills with deep gorges. Undulating topography, dissected by numerous rivers and streams is the characteristic feature of the study area and its adjoining area. The maximum relief in elevation is 50 m. the highest elevation of 765 m AMSL is recorded whereas, the lowest elevation of 715 m AMSL.

The area represents a remnant of ancient plateau of Indian Peninsular shield uplifted to its present height due to tectonic activities in the past and deeply dissected, suggesting several geotectonic and structural deformities that the plateau has undergone. The southern parts form a platform on which Tertiaries were deposited in the post- cretaceous period.

Drainage Pattern

Drainage pattern of the lease area is Dendritic type. No water body is existed at present as the ML area is a natural unbroken land. Nearest water stream is Umso River (~2.0 km in in SW direction) from the lease area.

However nearest water body in study area is Lubha River (~3.0 km in ENE direction), Sonapur River (~7.0 km in SE direction), Seshyampa River (~7.0 km in NW direction) and there are four Nalla's.

CLIMATE AND RAINFALL

Climate - Like the other parts of the state, East Jaintia Hills District has a very pleasant climate. The area experiences a humid subtropical monsoon type climate. The rainy season occurs from mid-May to September while the months of October and November are a bit cold. In the winter months the climate is dry and cold.

The mean minimum temperature ranges from 5.9°C in January to 17.9°C in July, while maximum temperature ranges from 14.9°C in January to 24.1°C in August.

The relative humidity is higher in the evening hours averaging 84% compared to night hours which is averaging 70%. It is observed higher during evening hours as compared to morning.

Rainfall - The monthly rainfall varies from the lowest value of 0.68 mm in Novemeber to 887.54 mm in June. The minimum annual total rainfall was 1787.7 in the year 2014 and maximum was 3638.67 in the year 2017. The average annual rainfall for a period of 10 years (i.e, from 2013 to 2022) was 2718.27 mm.

Table - 3.6

Rainfall Data of East Jaintia Hills District

S. No	Year	Annual Rainfall (mm)
1.	2013	2067.19
2.	2014	1787.7
3.	2015	2557.62
4.	2016	2937.3

S. No	Year	Annual Rainfall (mm)
5.	2017	3638.67
6.	2018	2367.77
7.	2019	2947.85
8.	2020	3506.84
9.	2021	2233.3
10.	2022	3138.49
Average		**2718.27**

Source: *https://power.larc.nasa.gov/*

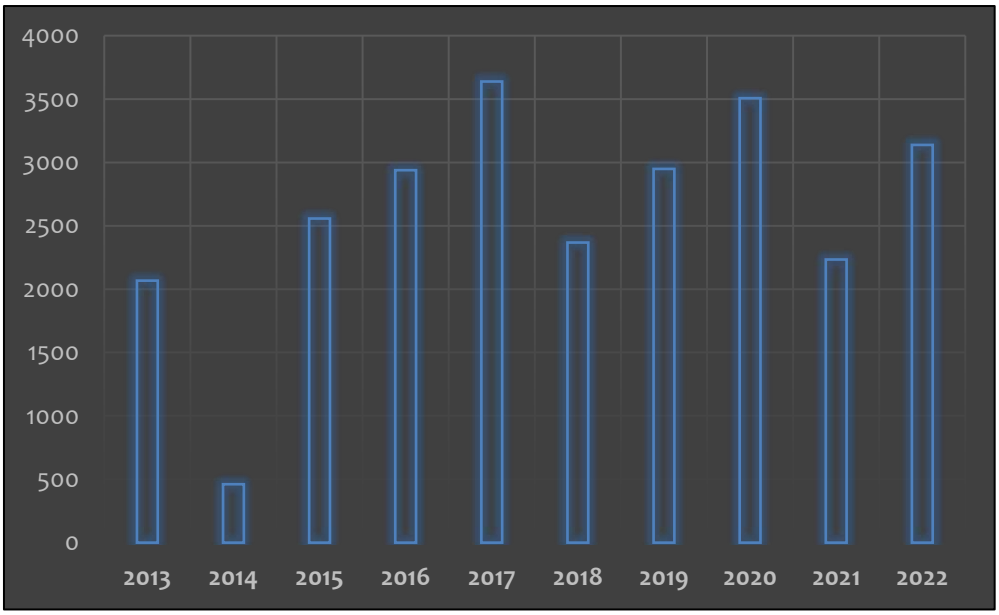


Figure 3.7: Graph showing Trend of average rainfall from 2013 to 2022 in East Jaintia Hills District

3.8 METEOROLOGY

Meteorology plays a vital role in determining the transport and diffusion pattern of air pollutants released into atmosphere.

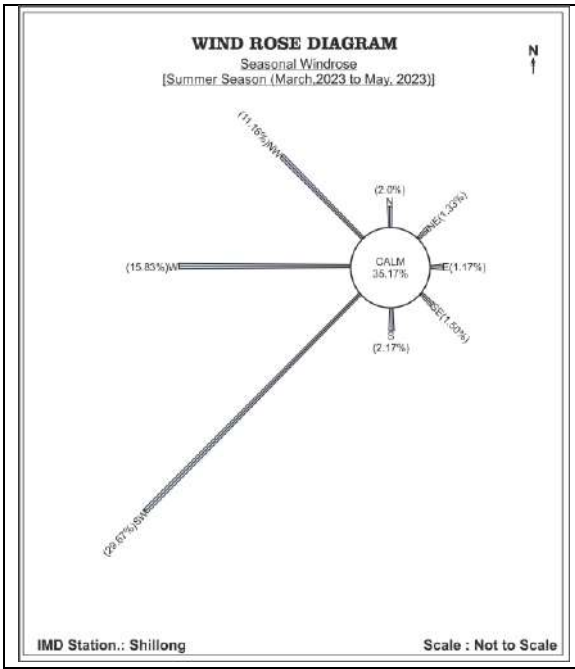
The principal variables include horizontal convective transport (average wind speed and direction), vertical convective transport (atmospheric stability) and topography of the area.

Meteorological characteristics of an area are very much important in assessing possible environmental impacts and in preparing environmental management plan.

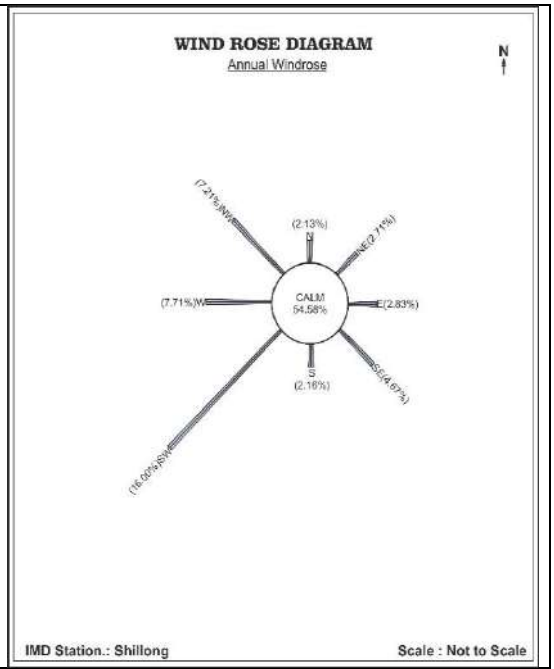
Since meteorological factors show wide fluctuations with time, meaningful interpretation can be drawn only from long-term reliable data. Such source of data is India Meteorological Department (IMD), which maintains a network of meteorological stations at several important locations.

Interpretation - The nearest meteorological station of IMD is at Shillong, which is approx. 66.0 km to the NW of the project area. Based on the IMD Climatological Normals (1991-2020), seasonal pre-dominant wind direction is from South-West. As per data, pre-dominant wind direction throughout the year was observed from South-West, according to which, the locations for

ambient air quality monitoring were selected. Seasonal wind rose prepared based on secondary meteorological datais given as under:



Windrose Diagram - Seasonal (March to May, 2023)



Windrose Diagram Annual

3.9 MICRO-METEOROLOGY AT SITE

Meteorological station was set-up at site to record meteorological parameters like wind speed, Relative Humidity and Temperature etc. during Summer season (March to May, 2023) which has enabled in identifying the influence of meteorology on the air quality of the area. Based on the collected meteorological data, relative percentage frequencies of different wind directions were calculated and plotted as wind rose diagrams. Maximum and minimum temperatures including percentage relative humidity were also recorded simultaneously. It was observed that the predominant wind over all wind patterns for the study period was from South West (SW) direction. Summary of the meteorology at site is given in Table - 3.7.

Table - 3.7

Micro - Meteorology at Site

Study Period: Summer season (March to May, 2023)

Month	Temperature (°C)		Relative Humidity (%)		Wind Speed (m/s.)	
	Max.	Min.	Max.	Min.	Max.	Min.
March 2023	28.50	8.50	98.00	27.50	3.90	0.10
April 2023	32.00	12.50	97.00	22.50	4.50	0.10
May 2023	33.00	16.00	99.50	34.50	4.50	0.05

Source: *Meteorological Station at Site, NASA Power*

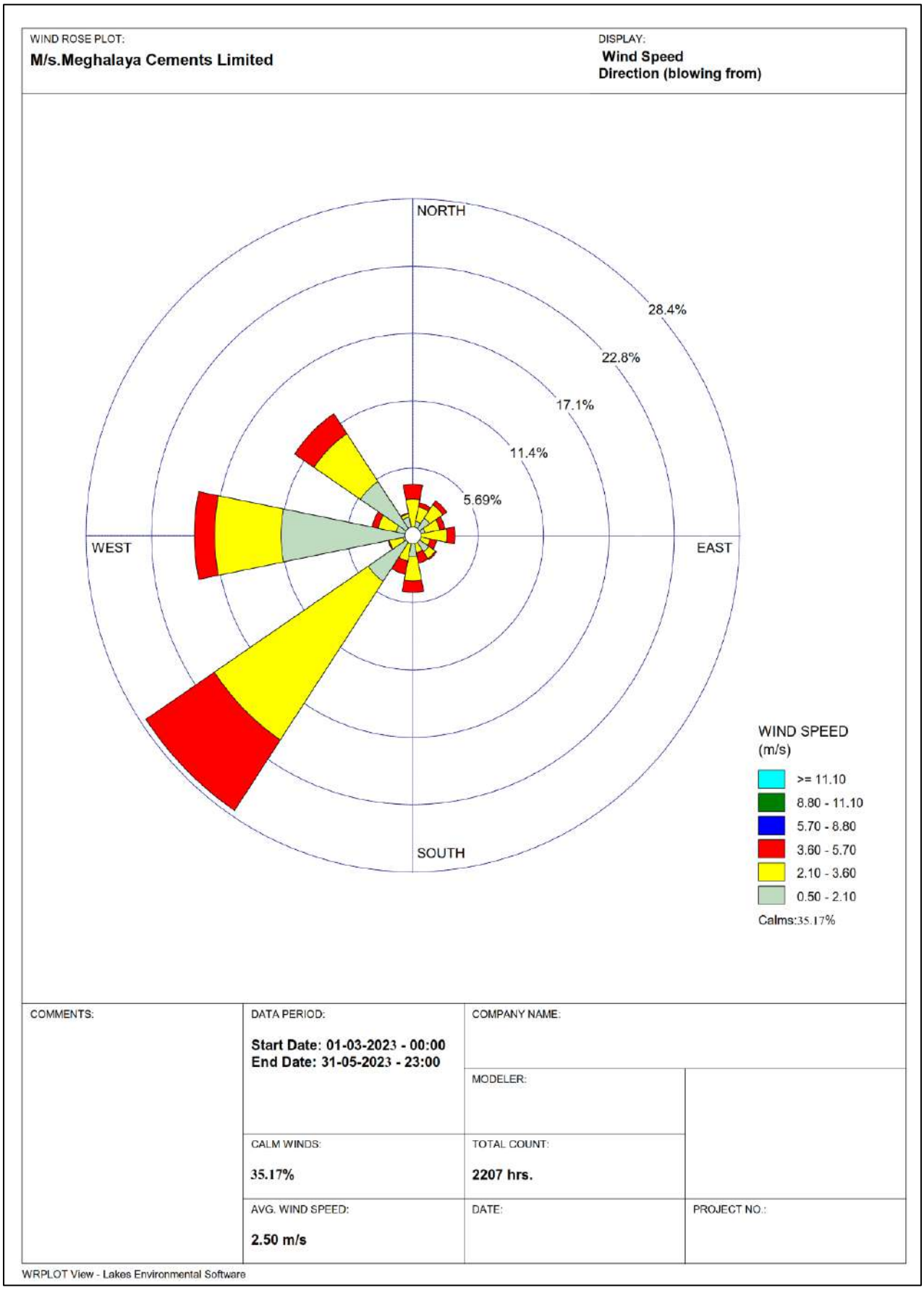


Figure 3.8: Windrose for Baseline season

3.10 AMBIENT AIR ENVIRONMENT

Ambient air quality monitoring has been carried out within the study area to determine the existing baseline concentration of various air pollutants in the ambient air. It helps in providing a data base for predicting impact on the surrounding area due to a this mining activity. It will also be useful in ascertaining the quality of air environment in conformity to standards of the ambient air quality during operation phase of project.

Monitoring Schedule

Air quality monitoring has been carried out at 06 locations for 24 hours for three months. Parameters monitored are:

- Sulphur Dioxide (SO_2)
- Nitrogen dioxide (NO_2)
- Particulate Matter (PM_{10} and $PM_{2.5}$)
- Ozone (O_3)
- Lead (Pb)
- Carbon Monoxide (CO)
- Ammonia (NH_3)
- Benzene (C_6H_6)
- Benzo (a) Pyrene (BaP)
- Arsenic (As)
- Nickel (Ni)

The details of measurement methodology and test procedure are given in Chapter-6 (Environmental Monitoring Programme) of this Draft EIA/EMP Report.

The sources of air pollution in the region are dust rising from unpaved roads, domestic fuel burning, vehicular traffic, industries located near by.

Sampling Locations

Sampling locations were selected for AAQ Monitoring keeping in view the pre-dominant wind direction prevailing in the area based on the previous IMD source.

Monitoring stations selected for Ambient Air Quality Monitoring during the study period are given in below Table:

Table - 3.8

Locations of Ambient Air Quality Monitoring Stations

Station code	Monitoring stations	Tentative distance from ML Boundary & direction from center of Mine Site
SA1	Mine site	Core Zone
SA2	Monitoring Station-1	0.5 m in NE direction
SA3	Monitoring Station-2	1.4 m in NE direction
SA4	Adjacent Mine	0.3 Km in SSE direction
SA5	Near Plant Site	0.6 km in West direction
SA6	Village Chiehruphi	1.6 km in WNW direction

Source: *SOI Toposheet and field Survey*

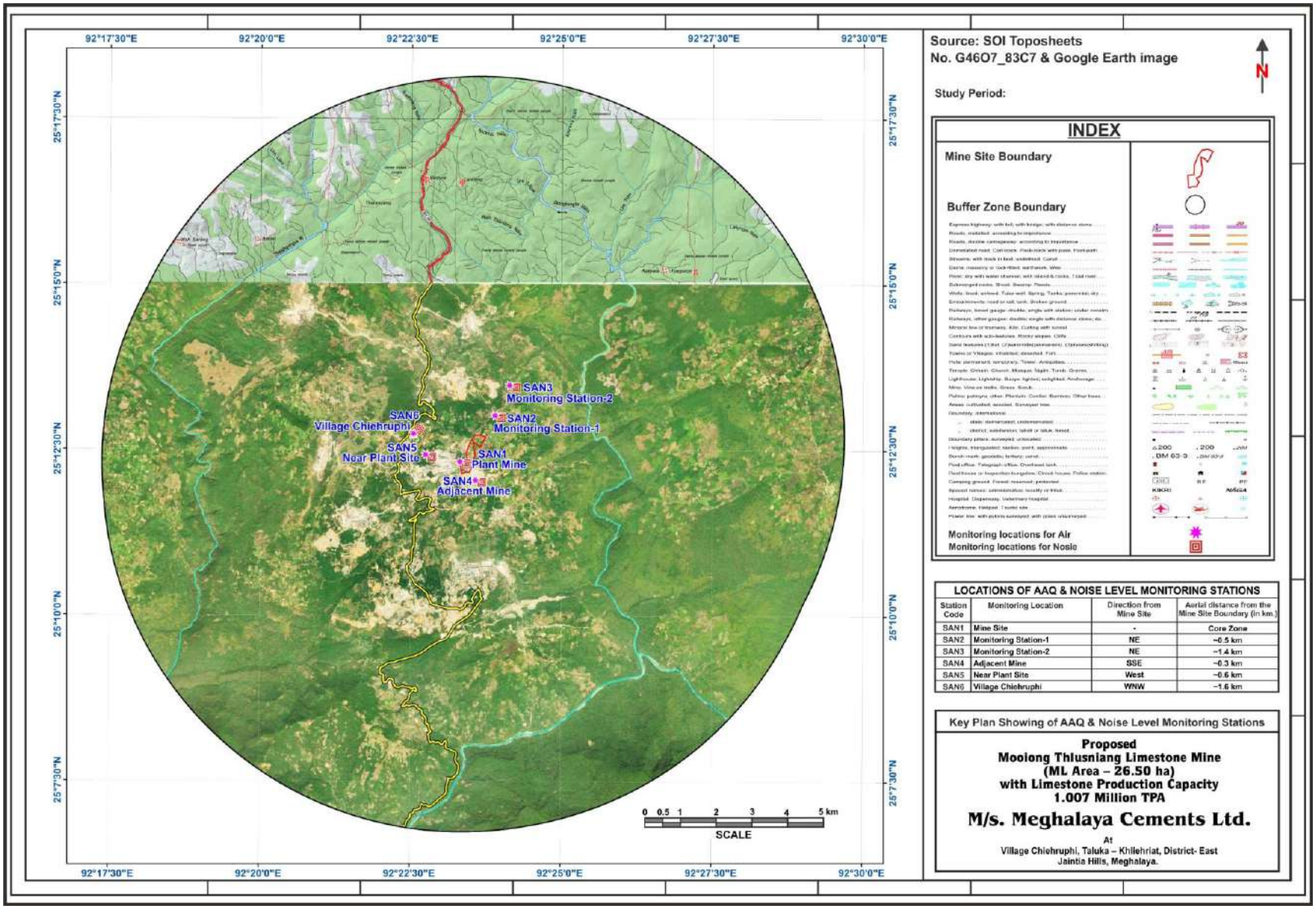


Figure 3.9: Key Plan showing Ambient Air quality monitoring and Noise Level Monitoring Locations

Ambient Air Quality Monitoring

Table - 3.9 shows the maximum and minimum concentration of the air pollutants monitored at different locations (as mentioned in Table - 3.8) during the study period. All the observations of pollutants for each location are detailed in Ambient Air Quality Monitoring Tables enclosed as ***Annexure - 9*** along with this Draft EIA/EMP Report.

Table - 3.9 (a)

Ambient Air Quality Monitoring Results

Study Period: Summer Season (March to May, 2023)

Station code	Monitoring Stations	PM2.5 (µg/m³)		PM10 (µg/m³)		NO2 (µg/m³)		SO2 (µg/m³)		CO (mg/m³)	
		Max.	Min.	Max.	Min	Max.	Min.	Max	Min.	Max.	Min.
SA1	Mine site	42.1	28.5	70.9	55.3	17.3	11.4	9.6	4.8	BDL	BDL
SA2	Monitoring Station-1	30.8	19.7	40.6	28.7	13.8	7.9	BDL	BDL	BDL	BDL
SA3	Monitoring Station-2	36.2	27.8	56.0	40.7	15.7	9.1	8.5	4.6	BDL	BDL
SA4	Adjacent Mine	43.8	35.0	62.9	49.9	17.4	11.8	9.9	4.5	BDL	BDL
SA5	Near Plant Site	46.9	37.6	70.9	57.8	21.9	13.8	10.7	7.0	0.59	0.51
SA6	Village Chiehruphi	38.1	30.4	60.3	43.7	22.5	14.1	11.3	6.0	BDL	BDL
Detection Limit								**4.0**		**0.5**	
NAAQS*(24 hours)		**60**		**100**		**80**		**80**		**4***	

Table - 3.9 (b)

Ambient Air Quality Monitoring Results

Study Period: Summer Season (March to May, 2023)

Station code	Monitoring Stations	Ozone (µg/m³)	Lead (µg/m³)	Ammonia (µg/m³)	Benzene (µg/m³)	Benzo(a)pyrene (ng/m³)	Arsenic (ng/m³)	Nickel (ng/m³)
SA1	Mine site	6.9	BDL	9.1	BDL	BDL	BDL	BDL
SA2	Monitoring Station-1	7.0	BDL	8.5	BDL	BDL	BDL	BDL
SA3	Monitoring Station-2	7.0	BDL	4.0	BDL	BDL	BDL	BDL
SA4	Adjacent Mine	10.9	BDL	14.4	BDL	BDL	BDL	BDL
SA5	Near Plant Site	14.5	BDL	26.9	BDL	BDL	BDL	BDL
SA6	Village Chiehruphi	16.4	BDL	30.5	BDL	BDL	BDL	BDL
Detection Limit		**1.0**	**0.02**	**1.0**	**1.0**	**0.5**	**0.5**	**1.0**
NAAQS*(24 hours)		**180**	**1**	**400**	**5**	**1**	**6**	**20**

Source: *Ambient Air Quality Monitoring Results from JM EnviroLab Pvt. Ltd.*

**NAAQS - National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009*

3.10.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

Table - 3.10 shows the NAAQS prescribed by CPCB.

Table - 3.10

National Ambient Air Quality Standards

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		Method of Measurement
			Industrial Area, Residential Rural and Other Areas	Ecologically Sensitive Area (Notified by Central Govt.)	
(1)	(2)	(3)	(4)	(5)	(6)
1.	Sulphur Dioxide (SO_2), µg/m³	Annual Average * 24 hours **	50 80	20 80	1. Improved West and Gaeke Method. 2. Ultraviolet fluorescence.
2.	Oxides of Nitrogen as NO_2, µg/m³	Annual Average * 24 hours **	40 80	30 80	1. Modified Jacob andHochheiser (Na-Arsenite) Method. 2. Chemiluminescence (Gas phase).
3.	Particulate Matter (size less than 10 µm) or PM_{10}, µg/m³	Annual Average * 24 Hours **	60 100	60 100	1. Gravimetric, 2. TOEM, 3. Beta attenuation.
4.	Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$, µg/m³	Annual Average* 24 Hours **	40 60	40 60	1. Gravimetric, 2. TOEM, 3. Beta attenuation.
5.	Ozone (O_3), µg/m³	8 Hours ** 1 Hours *	100 180	100 180	1. UV Photometric, 2. Chemilminescence, 3. Chemical Method.
6.	Lead (Pb), µg/m³	Annual Average * 24 Hours **	0.50 1.0	0.50 1.0	1. AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper. 2. ED-XRF using Teflon filter.
7.	Carbon Monoxide (CO), mg/m³	8 Hours** 1 Hours	02 04	02 04	Non Depressive Infrared (NDIR) Spectroscopy.
8.	Ammonia (NH_3), µg/m³	Annual Average* 24 hours **	100 400	100 400	1. Chemiluminescence (Gas phase). 2. Indophenol blue method.
9.	Benzene (C_6H_6), µg/m³	Annual Average*	05	05	1. Gas Chromatography based continuous analyzer, 2. Adsorption and Desorption followed by GC analysis.
10.	Benzo (α) Pyrene (BaP)- Particulate Phase only, ng/m³	Annual Average*	01	01	Solvent extraction followed by HPLC'GC analysis.
11.	Arsenic (As), ng/m³	Annual Average*	06	06	AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper.
12.	Nickel (Ni), ng/m³	Annual Average*	20	20	AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper.

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

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

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

3.10.2 INTERPRETATON OF AAQM RESULTS

Ambient Air Quality Monitoring reveals that the concentrations of PM10 and PM2.5 for all the 06 AAQM stations were found between 28.7 to 70.9 µg/m^3 and 19.7 to 46.9 µg/m^3, respectively. All the ranges of pollutants are below the prescribed CPCB standards. (i.e., PM $_{10}$= 100 µg/m^3; PM 2.5= 60 µg/m^3).

As per the gaseous pollutants SO_2 and NO_2 are concerned, the prescribed CPCB limit of 80 µg/m^3 has never surpassed at any station. The concentrations of SO2 and NO2 were found in range of 4.5 to 11.3 µg/m^3 and 7.5 to 22.5 µg/m^3 respectively. All values are well within the prescribed norms.The carbon monoxide is found to be maxium near to plant site (0.59 mg/m^3). CO was Below Detection Limit (BDL) at all other monitoring locations in the study area.

AAQ parameters in the study area have been found well within prescribed norms; though the values were found high near to plant site.

Impact assessment and mitigation measures suggested for the same have been detailed in Chapter 4 of this Draft EIA/EMP Report.

3.10.3 CHEMICAL COMPOSITION FOR RSPM

RSPM is "defined as the component of inhaled Respirable dust small enough to reach the pulmonary or alveolar region of the lung".

Classification of RSPM

Classification	Type of particles	Size of the particles
PM_{10}	Inhalable particles	≤10 µm
$PM_{2.5}$	Fine particles	≤2.5 µm

The composition of particulate matter includes Silica (SiO_2), Calcium (Ca), Magnesium (Mg), Iron (Fe), Aluminium (Al), Sodium (Na) Potassium (K), Manganese (Mn), Chromium (Cr), Nickel (Ni), Zinc (Zn), Copper (Cu), Cobalt (Co), Lead (Pb), Mercury (Hg) & Cadmium (Cd) etc.

3.11 NOISE ENVIRONMENT

Noise is often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work, and disturbs sleep, thus deteriorating quality of human environment.

Source of Noise

There are several sources of noise with in the 10 km radius study area, which contributes to the local noise level of the area. Ambient noise sources in the vicinity of the project include the noise from traffic on road and highways, mining activities, human activities in villages and agricultural fields.

Sampling Schedule

Noise level monitoring was carried out at 06 locations during the day and night time once in the study period.

Sampling Locations: Locations / stations selected for noise level monitoring are given in table - 3.11.

Table - 3.11

Locations of Noise Level Monitoring Stations

Station code	Monitoring stations	Tentative distance (from mining lease boundary) & direction (from centre point)
SN1	Mine site	Core Zone
SN2	Monitoring Station-1	0.5 m in NE direction
SN3	Monitoring Station-2	1.4 m in NE direction
SN4	Adjacent Mine	0.3 Km in SSE direction
SN5	Near Plant Site	0.6 km in West direction
SN6	Village Chiehruphi	1.6 km in WNW direction

Source: *SOI Toposheet and field Survey*

Ambient Noise Level Monitoring

Ambient noise levels monitoring results monitored at different locations (as mentioned in Table - 3.11) during the study period are given in table - 3.12.

Table - 3.12

Ambient Noise Level Monitoring Results

Study Period: Summer Season (March to May, 2023)

Station Code	Monitoring Stations	Noise Levels dB Leq. (A)	
		Day Time (6:00 AM to 10:00 PM)	Night Time (10:00 PM to 6:00 AM)
SN1	Mine site	53.8	43.8
SN2	Monitoring Station-1	47.9	39.8
SN3	Monitoring Station-2	50.4	40.7
SN4	Adjacent Mine	55.3	42.9
SN5	Near Plant Site	56.1	50.7
SN6	Village Chiehruphi	53.3	42.3

Source: *Ambient Noise Level Monitoring Results*

Table - 3.13

CPCB Noise Standards

Area Code	Category of Area	Limits in Leq. dB (A)	
		Day Time (06.00 AM to 10.00 PM)	Night Time (10.00 PM to 6.00 AM)
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Silence Zone	50	40

1. Day Time is from 6.00 AM to 10.00 PM.

2. Night Time is reckoned between 10.00 PM to 6.00 AM.

3. Silence Zone is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.

Note: Mixed categories of areas be declared as one of the four above mentioned categories by the competent Authority and the corresponding standards shall apply

Source: *Central Pollution Control Board Norms*

3.11.1 INTERPRETATON OF NOISE RESULTS

Ambient noise levels were measured at 06 locations in the study area. Noise levels varied from 47.9 to 56.1 Leq dB (A) during day time and from 39.8 to 50.7 Leq dB (A) during night time.

From the above study and discussions, it can be concluded that noise levels in the study area are well within the prescribed limits as prescribed by the CPCB.

Maximum noise levels during day time and during night time were observed near to plant site. Due to expected increase in noise level in mine, there may be impact on nearby habitation. Impact assessment and mitigation measures suggested for the same have been detailed in Chapter - 4 of this Draft EIA/EMP Report.

3.12 WATER ENVIRONMENT

Type of sampling

Grab sampling has been done as single sample collected at a specific spot and at a site over a short period of time, grab samples are taken at a single selected location, depth and time.

Sampling method

Sample were collected manually from various type of sampling location by method described below-

- Surface water resources
- Ground water resources

3.12.1 SURFACE WATER

Surface water sampling was done at following location as per the availability of water.

Table - 3.14

Surface water Quality Monitoring Locations

Study Period: Summer Season (March to May, 2023)

Station Code	Sampling Locations	Tentative distance (from mining lease boundary) and direction (from centre point)
SSW1	Lubha River	3.0 km in NE direction
SSW2	Sonapur River	7.3 km in SE direction
SSW3	Seshympa River	7.5 km in NW direction

Source: *SOI Toposheet and field Survey*

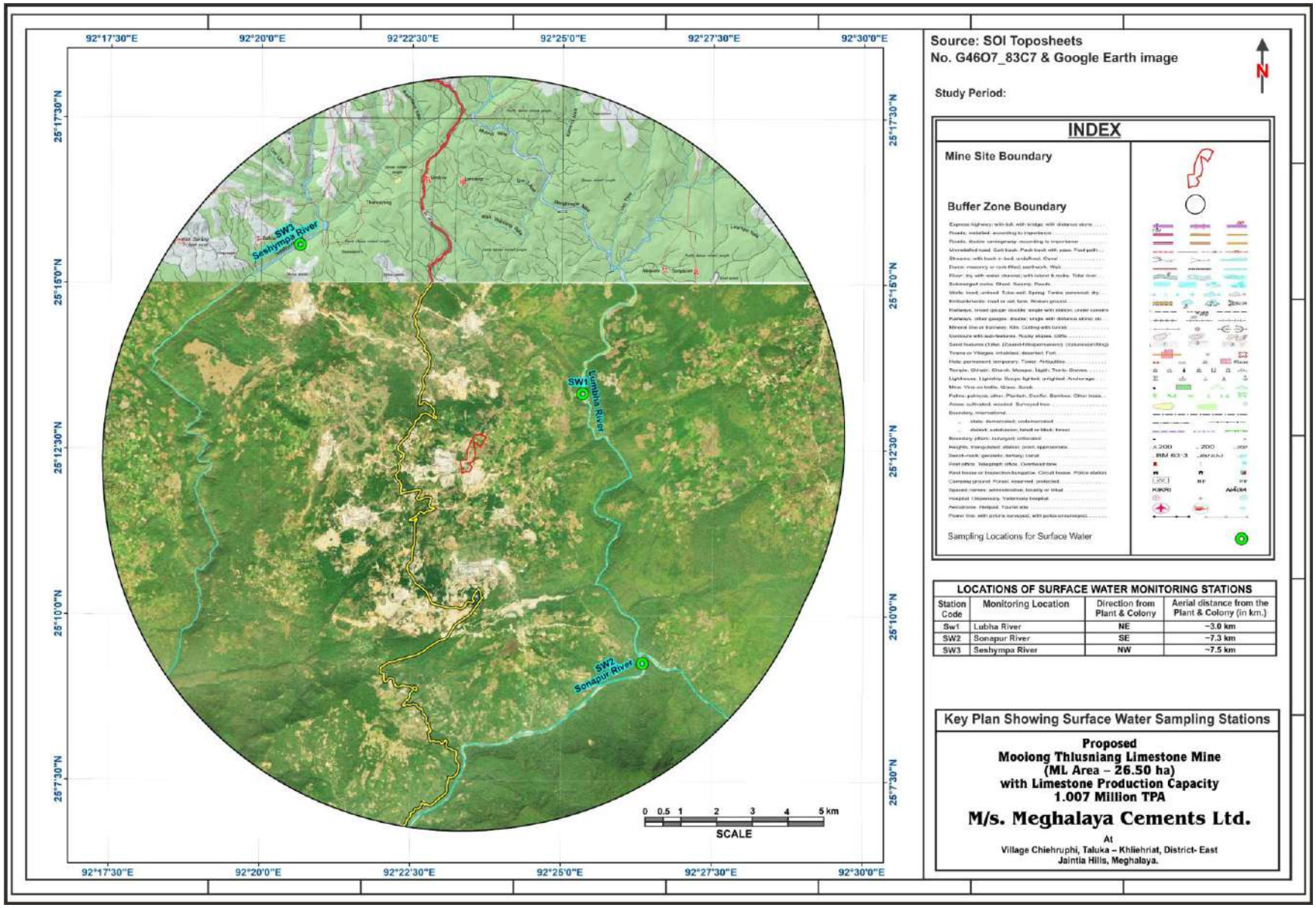


Figure 3.10: Key Plan showing Surface Water Sampling Locations

Table - 3.15

Surface Water Analysis Results

Study Period: Summer Season (March to May, 2023)

S. No.	Parameters	Unit	Sampling Locations		
			Lubha River	Sonapur River	Seshympa River
1.	pH (at 25°C)	--	6.98	7.11	7.06
2.	Colour	Hazen Unit	BDL (DL 1)	13	9
3.	Turbidity	NTU	BDL (DL 1)	BDL (DL 1)	BDL (DL 1)
4.	Odour	--	Agreeable	Agreeable	Agreeable
5.	Total Hardness as $CaCO_3$	mg/l	195.16	105.1	89.4
6.	Calcium as Ca	mg/l	50.10	32.06	26.08
7.	Alkalinity as CaCO3	mg/l	136.0	91.7	76.6
8.	Chloride as Cl	mg/l	50.32	23.52	20.93
9.	Residual free Chlorine	mg/l	BDL (DL 0.20)	BDL (DL 0.20)	BDL (DL 0.20)
10.	Cyanide as CN	mg/l	BDL (DL 0.02)	BDL (DL 0.02)	BDL (DL 0.02)
11.	Magnesium as Mg	mg/l	16.99	6.06	5.88
12.	Total Dissolved Solids	mg/l	292.0	207.0	176.0
13.	Sulphate as SO4	mg/l	35.1	16.56	15.6
14.	Fluoride as F	mg/l	0.29	0.19	0.17
15.	Nitrate as NO3	mg/l	0.77	1.15	0.98
16.	Iron as Fe	mg/l	0.12	0.10	0.08
17.	Aluminium as Al	mg/l	BDL (DL 0.03)	BDL (DL 0.03)	BDL (DL 0.03)
18.	Boron	mg/l	BDL (DL 0.20)	BDL (DL 0.20)	BDL (DL 0.20)
19.	Phenolic Compounds	mg/l	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)
20.	Anionic Detergents as MBAS	mg/l	BDL (DL 0.02)	BDL (DL 0.02)	BDL (DL 0.02)
21.	Hexa Chromium as Cr+6	mg/l	BDL (DL 0.03)	BDL (DL 0.03)	BDL (DL 0.03)
22.	Zinc as Zn	mg/l	0.09	0.23	0.14
23.	Copper as Cu	mg/l	BDL (DL 0.02)	BDL (DL 0.02)	BDL (DL 0.02)
24.	Manganese as Mn	mg/l	BDL (DL 0.01)	BDL (DL 0.01)	BDL (DL 0.01)
25.	Lead as Pb	mg/l	BDL (DL 0.008)	BDL (DL 0.008)	BDL (DL 0.008)
26.	Selenium as Se	mg/l	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)
27.	Arsenic as As	mg/l	BDL (DL 0.002)	BDL (DL 0.002)	BDL (DL 0.002)
28.	Mercury as Hg	mg/l	BDL (DL 0.001)	BDL (DL 0.001)	BDL (DL 0.001)
29.	Phosphate as P04	mg/l	0.03	0.11	0.03
30.	Total Suspended Solid	mg/l	BDL (DL 1.0)	BDL (DL 1.0)	BDL (DL 1.0)
31.	Biochemical Oxygen Demand	mg/l	2.8	4.6	3.1
32.	Chemical Oxygen Demand	mg/l	8.0	14.3	11.2
33.	Sodium as Na	mg/l	22.0	16.0	14.0
34.	Potassium as K	mg/l	3.0	2.0	2.0
35.	Conductivity	µs/cm	458.0	335.0	280.0
36.	Nickel	mg/l	BDL (DL 0.005)	BDL (DL 0.005)	BDL (DL 0.005)
37.	Dissolve Oxygen	mg/l	7.4	7.2	7.4
38.	Total Coliforms	MPN/100 ml	Absent	Absent	Absent

Source: *Surface Water Analysis results from JM EnviroLab Pvt. Ltd.*

BDL – Below Detection Limit, DL- Detection Level

3.12.2 INTERPRETATON OF SURFACE WATER QUALITY RESULTS

- The pH of the surface water samples was observed from 6.98 to 7.11.
- The color was observed at Seshympa and Sonapura River. Turbidity was not detected. The odour was found agreeable at all of the sampling locations.
- The observed value of the surface water quality indicators are: Total Hardness varied from 89.4 to 195.16 mg/l, Alkalinity varied from 76.6 to 136.0 mg/l, Total Dissolved Solids varied from 176.0 to 292.0 mg/l, BOD varied from 2.8 to 4.6 mg/l, COD varied from 8.0 to 14.3 mg/l. The level of DO is varied from 7.2 to 7.4 mg/l.
- The concentration of Chloride, Sulphate, Magnesium, Calcium, Iron, Zinc and Fluoride is found varied from 20.93 to 50.32 mg/l, 15.6 to 35.1 mg/l, 5.88 to 16.99 mg/l, 26.08 to 50.10 mg/l, 0.08 to 0.12 mg/l, 0.09 to 0.23 mg/l, 0.17 to 0.29 mg/l respectively.
- Surface water quality was also analyzed for Aluminum, Boron, Phenolic Compounds, Anionic detergents, Copper, Manganese, Lead, Selenium, Arsenic, Nickel, Mercury, Hexa Chromium etc. and were found below the detection limit.

3.12.3 GROUND WATER QUALITY

Ground water as well as potable water samples were collected from the available water resources around the mine site. The samples were collected and tested from different sites. The quality of ground water was studied by collecting 06 water samples. The water sampling stations from representative borewells. Details of ground water sampling locations and their distance and directions are given in table - 3.16. Ground water analysis results are given in table - 3.17.

Table - 3.16

Ground Water Sampling Locations

Station code	Sampling Locations	Tentative distance (from mining lease boundary) &direction (from centre point)
SGWS1	Mine Site	Core Zone
SGWS2	Village Wahiajer Narpuh	1.2 km in SW direction
SGWS3	Monitoring Station	1.4 km in NE direction
SGWS4	Village Lumshnong	2.7 km in SW direction
SGWS5	Musiang Lamare old	3.7 km in WSW direction
SGWS6	Village Bri Shyrnot	4.9 km in SE direction

Source: *SOI Toposheet and field Survey*

Note: *Groundwater samples were collected from two locations due to the unavailability of water at the remaining locations.*

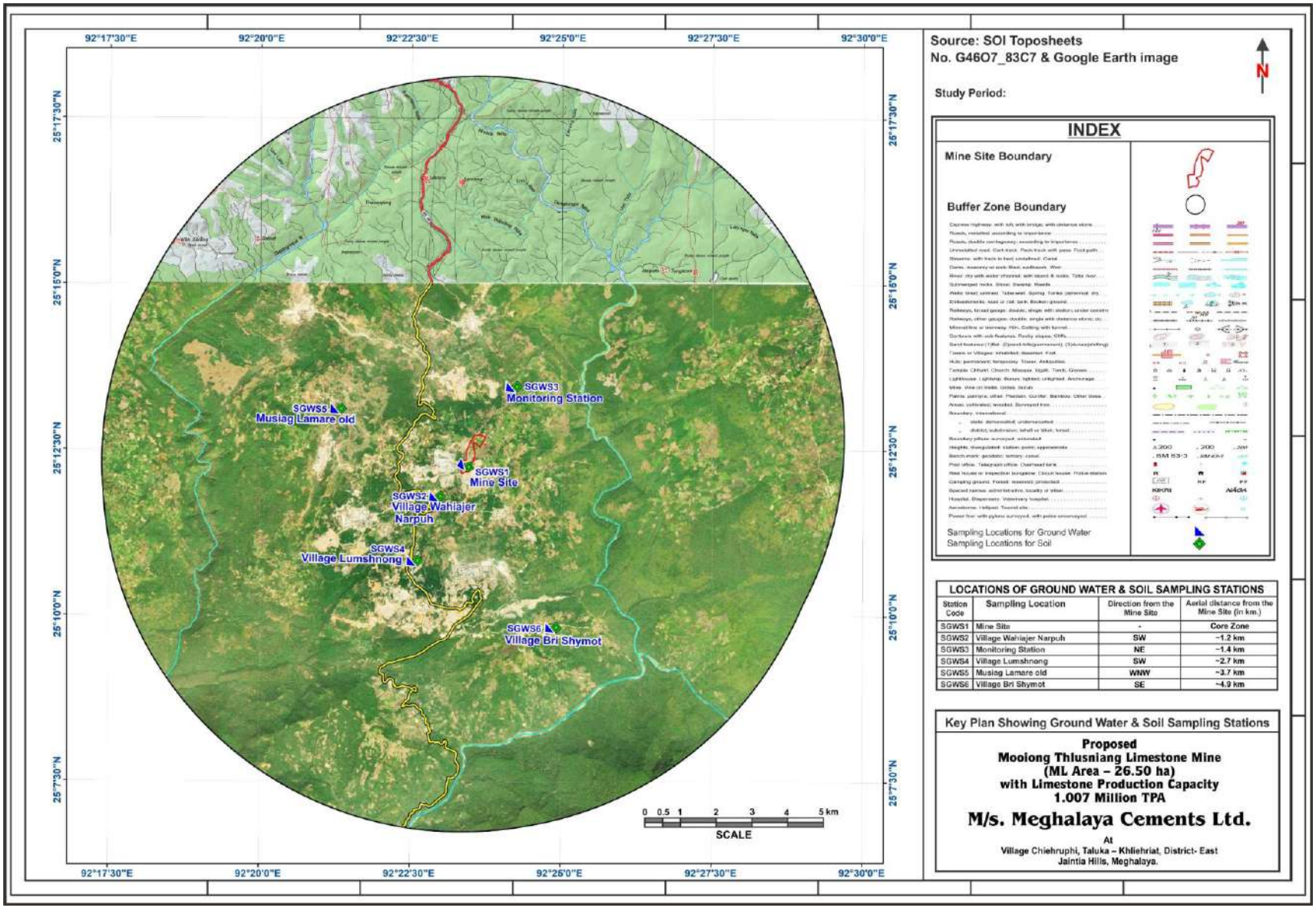


Figure 3.11: Key Plan showing Ground Water and Soil Sampling Locations

Table - 3.17

Ground Water Analysis Results

Study Period: Summer Season (March to May, 2023)

S. No.	Parameters	Unit	Monitoring Station	Village Lumshnong
1.	pH (at 25°C)	-	7.24	6.90
2.	Colour	Hazen Unit	BDL (DL 1.0)	BDL (DL 1.0)
3.	Turbidity	NTU	BDL (DL 1.0)	BDL (DL 1.0)
4.	Odour	-	Agreeable	Agreeable
5.	Taste	-	Agreeable	Agreeable
6.	Total Hardness as CaCO3	mg/l	146.4	124.4
7.	Calcium as Ca	mg/l	42.9	30.2
8.	Alkalinity as CaCO3	mg/l	124.8	101.5
9.	Chloride as Cl	mg/l	30.7	26.42
10.	Cyanide as CN	mg/l	BDL (DL 0.02)	BDL (DL 0.02)
11.	Magnesium as Mg	mg/l	9.51	11.88
12.	Total Dissolved Solids	mg/l	245.0	204.0
13.	Sulphate as SO4	mg/l	20.72	17.6
14.	Fluoride as F	mg/l	0.21	0.16
15.	Nitrate as NO3-N	mg/l	1.98	1.02
16.	Iron as Fe	mg/l	0.18	0.11
17.	Aluminium as Al	mg/l	BDL (DL 0.03)	BDL (DL 0.03)
18.	Boron	mg/l	BDL (DL 0.20)	BDL (DL 0.20)
19.	Phenolic Compounds	mg/l	BDL (DL 0.001)	BDL (DL 0.001)
20.	Anionic Detergents as MBAS	mg/l	BDL (DL 0.02)	BDL (DL 0.02)
21.	Hexa Chromium as Cr+6	mg/l	BDL (DL 0.03)	BDL (DL 0.03)
22.	Chromium as Cr	mg/l	BDL (DL 0.002)	BDL (DL 0.002)
23.	Zinc as Zn	mg/l	0.18	0.09
24.	Copper as Cu	mg/l	BDL (DL 0.02)	BDL (DL 0.02)
25.	Manganese as Mn	mg/l	BDL(DL 0.01)	BDL(DL 0.01)
26.	Cadmium as Cd	mg/l	BDL (DL 0.002)	BDL (DL 0.002)
27.	Lead as Pb	mg/l	BDL (DL 0.008)	BDL (DL 0.008)
28.	Arsenic as As	mg/l	BDL (DL 0.002)	BDL (DL 0.002)
29.	Mercury as Hg	mg/l	BDL (DL 0.001)	BDL (DL 0.001)
30.	Sodium as Na	mg/l	18.0	15.0
31.	Potassium as K	mg/l	3.0	2.0
32.	Phosphate as PO4	mg/l	BDL(DL 0.02)	BDL(DL 0.02)
33.	Nickel	mg/l	BDL(DL 0.005)	BDL(DL 0.005)
34.	Conductivity	µS/cm	396.0	328.0
35.	Total Suspended Solid	mg/l	BDL (DL 1.0)	BDL (DL 1.0)
36.	Total Coliform	MPN/100 ml	Absent	Absent

Source: *Ground Water analysis results from JM EnviroLab Pvt. Ltd.*

BDL - Below Detectable Limit, DL - Detection Level

3.12.4 INTERPRETATON OF GROUND WATER QUALITY RESULTS

The ground water/drinking water samples were collected from two locations. The physico-chemical quality of groundwater was compared with drinking water standard (IS: 10500 - 2012). The pH of the water samples ranged from 6.90 to 7.24 indicating Neutral nature; and maximum pH was recorded at Monitoring station near to star cement. The odour was agreeable at all sampling locations. The values of Total Hardness was 124.4 to 146.4 mg/l and it was within the acceptable limits at all the sampling locations, maximum value were recorded at Monitoring station near to star cement where it was within the acceptable limits. Alkalinity 101.5 to 124.8 mg/l was within the acceptable limits at all locations and it was recorded maximum at Monitoring station near to star cement where it was within the acceptable limits. Chlorides 26.42 to 30.7 mg/l and Total Dissolved Solids 204.0 to 245.0 mg/l were within the acceptable limits.

Nitrate 1.02 to 1.98 mg/l and Iron (0.11 to 0.18 mg/l) which is within acceptable limit. The concentrations of other micro and macro nutrients were at levels higher than the acceptable limit i.e., Calcium (30.2 to 42.9 mg/l) the highest concentration was recorded at Monitoring station near to star cement where the value were within the acceptable limits. Sulphates (17.60 to 20.72 mg/l), Magnesium (9.51 to 11.88 mg/l) values were within the acceptable limits almost at all sampling locations. Fluoride concentration varied from 0.16 to 0.21 mg/l.

Thus, it can be concluded that the groundwater samples were observed to be good and complying to the drinking water standard (IS: 10500-2012).

3.13 SOIL ENVIRONMENT

3.13.1 SOIL QUALITY AND CHARACTERISTICS

The information on soil quality has been arrived by collection and analysis of soil samples from representative locations.

In order to assess the base line characteristics of soil profile of thearea representing project and nearby areas, the samples were analyzed for key and chemical parameters.

The sampling locations were finalized with the following considerations:

- To enable information on baseline characteristics,
- To determine the impact of mining activities on soil characteristics and
- To determine the type of plantation

Representative soil samples were collected from 06 different specified locations within the study area of the mine site. Standard operating procedures were followed for the sampling and analysis of physico-chemical parameters.

Location of soil sampling stations is given in Table - 3.18 and shown in figure no. 3.11

Table - 3.18

Soil Sampling Locations

Study Period: Summer Season (March to May, 2023)

Station code	Sampling Locations	Tentative distance (from mining lease boundary) &direction (from centre point)
SGWS1	Mine Site	Core Zone
SGWS2	Village Wahiajer Narpuh	1.2 km in SW direction
SGWS3	Monitoring Station	1.4 km in NE direction
SGWS4	Village Lumshnong	2.7 km in SW direction
SGWS5	Musiang Lamare old	3.7 km in WSW direction
SGWS6	Village Bri Shyrnot	4.9 km in SE direction

Source: *SOI Toposheet and field survey*

Table - 3.19

Soil Quality Analysis Results

Study Period: Summer Season (March to May, 2023)

S. No.	Parameters	Unit	Mine Site	Village Wahiajer Narpuh	Monitoring Station	Village Lumshnong	Musiang Lamare old	Village Bri Shyrnot
1.	pH (at 25°C) (1:2.5 soil water sus.)	-	7.16	7.03	6.83	7.18	6.91	7.05
2.	Conductivity (1:2 soil water sus)	mS/cm	0.24	0.31	0.41	0.22	0.27	0.31
3.	Soil Texture	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
a)	Sand	%	62.0	65.0	62.0	67.0	65.0	64.0
b)	Silt	%	10.0	8.0	12.0	9.0	7.0	9.0
c)	Clay	%	28.0	27.0	26.0	24.0	28.0	29.0
4.	Colour	-	Reddish Brown	Dark Brownish	Light Brownish	Grayish Black	Dark Brownish	Grayish Black
5.	Water Holding Capacity	%	32.49	33.14	30.64	34.93	34.66	35.03
6.	Porosity	%	43.13	41.96	41.17	45.10	42.35	40.78
7.	Bulk Density	gm/cc	1.45	1.48	1.50	1.40	1.47	1.51
8.	Chloride	mg/kg	361.64	433.54	521.77	359.91	416.42	502.14
9.	Calcium	mg/kg	3078.80	3862.89	3831.95	2851.81	2753.41	2693.43
10.	Sodium	mg/kg	176.07	208.85	154.93	125.19	178.86	153.71
11.	Potassium	kg/hec	219.60	313.75	287.92	249.33	289.92	285.02
12.	Organic Matter	%	0.89	0.99	1.16	1.08	0.86	0.81
13.	Magnesium as Mg	mg/kg	314.00	485.66	338.62	426.68	514.77	390.10
14.	Available Nitrogen as N	kg/hec	234.45	255.39	267.55	294.20	314.49	211.2
15.	Available Phosphorus	kg/hec	8.32	12.09	15.83	17.02	11.63	13.03
16.	Zinc as Zn	mg/kg	19.16	21.42	19.35	24.72	18.60	19.40
17.	Manganese as Mn	mg/kg	245.17	290.64	352.10	385.43	320.19	315.05
18.	Chromium as Cr	mg/kg	BDL(DL 5.0)	BDL(DL 5.0)	BDL(DL 5.0)	BDL(DL 5.0)	BDL(DL 5.0)	BDL (DL 5.0)
19.	Lead as Pb	mg/kg	7.87	8.50	10.65	13.40	10.15	9.21
20.	Cadmium as Cd	mg/kg	BDL(DL 5.0)	BDL(DL 5.0)	BDL(DL 5.0)	BDL(DL 5.0)	BDL(DL 5.0)	BDL (DL 5.0)
21.	Copper as Cu	mg/kg	13.65	14.21	10.74	8.73	7.36	7.32
22.	Organic Carbon	%	0.52	0.57	0.67	0.63	0.75	0.47
23.	SAR Value	-	0.81	0.84	0.64	0.58	0.82	0.73

Source: *Soil Quality Analysis results from JM EnviroLab Pvt. Ltd.*

Table - 3.20

Standard Soil Classification

S. No.	Parameters	Classification
1.	pH	<4.5 extremely acidic 4.51 – 5.0 very strong acidic 5.01 – 5.5 strongly acidic 5.51-6.0 moderately acidic 6.1 - 6.5 slightly acidic 6.51-7.3 Neutral 7.31-7.8 slightly alkaline 7.81-8.5 moderately alkaline 8.51 – 9.0 strongly alkaline >9.0 Very strongly alkaline
2.	Salinity Electrical Conductivity (mho/cm)	Up to 1.0 average 1-2 harmful to germination 2-3 harmful to crops
3.	Nitrogen (kg/ha)	Up to 50 very less 51-100 less 110-150 good 151-300 better >300 sufficient
4.	Phosphorus (kg/ha)	Up to 15 very less 15 – 30 less 31-50 medium 51-65 on average sufficient 66-80 sufficient >80 more than sufficient
5.	Potassium (kg/ha)	0-120 very less 120-180 less 180-240 medium 241-300 average 301-360 better >360 more than sufficient

Source: *Handbook of Agriculture published by Indian Council for Agricultural Research (ICAR).*

3.13.2 INTERPRETATON OF SOIL QUALITY RESULTS

The soil samples were reddish brown, dark brown in colour and Sandy Loam in texture. All soil samples are Neutral to slightly alkaline having pH range from 6.83 to 7.18. Water Holding Capacity (30.64 % to 35.03 %) and Bulk Density (1.40 to 1.51 g/cc) were ideal for the crops. Physical quality of soil samples is good for the plantation.

Organic Matter (0.81 % to 1.16 %) varied a lot which indicates few areas with less nutrients and few with adequate, Nitrogen (211.2 to 314.49 kg/hec) better to sufficient, Phosphorus (8.32 to 17.02 kg/hec) and Potassium (219.60 to 313.75 kg/hec). This indicates that soil fertility is good with nitrogen and potassium sufficient in some soil samples in the study area. Other nutrients were present in the soil samples, namely Calcium (2693.43 to 3862.89 mg/kg), Magnesium (314.00 to 514.77 mg/kg) and Zinc (18.60 to 24.72 mg/kg).

The above discussion indicates that the soils in study area, in general, physical and chemical quality is good and fertile. The soil is suitable for plantation and greenbelt.

3.14 BIOLOGICAL ENVIRONMENT

Biological environment is the environment where the life form can exist. The sum of environments where the life forms exists is called the Biosphere, which comprises of land, water and air. Biological environment includes Habitat (Place where the organism lives) and natural surroundings of all species (living organism species) of the particular area.

Biodiversity is the variety among living organisms and their interaction within ecosystems. Species diversity or biodiversity is a key component to healthy ecosystems. Biodiversity is also the basis of innumerable environmental services that keep us and the natural environment alive - from the provision of clean water and watershed services to the recycling of nutrients and pollination. Biodiversity (Species diversity) is the most characteristic feature of the nature which includes ecological communities (viz.: Animals, Plants & Human species).

The main objective of the present study is to observe, document and evaluate, during primary field survey carried out within 10 km radius impact zone in and around the said ML for Proposed Project and to understand the presence and behaviour of the floral and faunal diversity of the study area with respect to terrestrial and aquatic flora and fauna with special emphasis on Rare, Endangered and Threatened species, as defined in Wildlife (Protection) Amendment Act, 2022, occurring in the study area of M/s. Meghalaya Cement limited.

3.14.1 SCOPE OF WORK

Scope of work for this study includes identification of ecologically sensitive receptors, based on literature survey, field investigations and their mitigation with conservation action plan. The study was carried out in the core as well as buffer zone of the Mine Lease Area. The study was carried out systematically and scientifically using primary and secondary data in order to bring out factual information on the ecological conditions of the mine site and 10 km radius study area.

The study involved assessment of general habitat type, vegetation pattern, preparation of inventory of flora and fauna of terrestrial ecosystem within 10 km radius from the boundary of Mine site. Biological assessment of the site was done to identify ecologically sensitive areas and whether there are any rare, endangered, endemic or threatened (RET) species of flora & fauna in the core area as well its buffer zone to be impacted. The study also designed to suggest suitable mitigation measures if necessary for protection of wildlife habitats and conservation of RET species if any.

3.14.2 OBJECTIVE OF THE STUDY

The Biological study was undertaken with the following objectives:

i. Inventorization of the present status of flora and fauna in the core and buffer zone (10 km radius from core zone).
ii. To carryout primary field survey of flora & fauna and ecologically sensitive natural habitats in the study area.
iii. Assessment of any impacts of the proposed limestone mining activities on natural habitats and species.
iv. Preparation of Wildlife Conservation Plan for Schedule- I Species, recorded if any.

3.14.3 INVENTORIZATION OF FLORA AND FAUNA

a. Floral diversity of the study area

After surveying the core and the buffer areas, a detailed floral inventory has been compiled. List of all plants from the study area was prepared and their habitats were recorded.

List of flora observed in the core zone is as mentioned in the list given below:

Table No. - 3.21 (a)
INVENTORY OF FLORAL DIVERSITY IN THE CORE ZONE OF PROPOSED MINE SITE
Based on Actual Sighting, based on inputs from locals and Perused from Secondary Data

S. No.	Botanical Name	Family	Vernacular Name
	Trees		
1.	*Actinodaphneobovata* (Nees)Blume	Lauraceae	Dieng-lakrao(K)*
2.	*Asplenium phyllitidis* D.Don	Aspleniaceae	Fern
3.	*Bauhinia khasiana* Baker.	Leguminosea	Khasi Bauhinia
4.	*Callicarpaarborea* Roxb.	Verbanaceae	Dein-lakhoit(J)**
5.	*Caryotaurens* L.	Arecaceae	Sman phang (Di)
6.	*Caseria* sp.	Alicaceae	-
7.	*Castanopsis Echinocarpa* Miq.	Fagaceae	Dien-sning(J)
8.	*Castanopsisindica* (Roxb.exLindl.)	Fagaceae	Hingori
9.	*Elaeagnuspyriformis* Hook. f.	Elaeagnaceae	Sashang
10.	*Euryaaccuminata* DC.	Theacea	Dienpyrchin(J)
11.	*Ficushirtasubsp.roxburghii* (King)C.C.Berg	Moraceae	Spunae(J)
12.	*Ficus semicordata* Buch. - Ham. Ex Sm.	Moraceae	Dieng-duit-lasas.
13.	*Utseathomsonii* Hook. f.	Lauraceae	Khilodia
14.	*Macarangasp.*	Euphorbiaceae	Lakhar (j)
15.	*Macropanaxdisperma(Bl.)O.*	Analiaceae	Dieng-ia-rasi
16.	*Ostodespaniculata* Blume	Euphorbaceae	Dein-lashitkhlow(J)
17.	*Persea kingii* Hook f.	Lauraceae	Kosterm
18.	*Phyllanthusglaucus* Wall.	Phyllanthaceae	Samatan(J)
19.	*Quercusserrata* Roxb.	Fagaceae	Hinguri-sirang
20.	*Rhus javanica* (L) Merr.	Fagaceae	Dieng–soh–ma
21.	*Sapindusattentuatelerecta* Wall.	Anarcardiaceae	Dien-sama(J)

S. No.	Botanical Name	Family	Vernacular Name
22.	*Sapium baccatum* Roxb.	Sapindaceae	Esser
23.	*Sapium baccatum* Roxb.	Euphorbiaceae	Dieg-jalongeh(K)
24.	*Solanum torvum* Sw.	Solanaceae	Soh pdok
25.	*Styraxserrulatum* Linn.	Styracaceae	Deing-jalatpai(K)
26.	*Symplocusglomerata* KingexCI.	Symplocaceae	Tiewdiengpeiiong(K)
27.	*Syzygiumcumini* (L.) Skeels.	Myrtaceae	black plum
28.	*Wendlandiatinctoria* (Roxb.) DC.	Rubiaceae	Chamot (J)
Climber			
29.	*Acaciaoxyphylla* GrahamexCraib.	Leguminosae	Mei-suai(K)
30.	*Acaciapennata (*Linn.) Willd.	Leguminosae	Jermai-sheih-lyngkshiah(K)
31.	*Derristhysiflora*	Fabaceae	-
32.	*Desmodiumtrifolium* (L.) DC	Fabaceae	-
33.	*PaederafoetidaL.*	Rubiaceae	Rme-smaait(J)
34.	*PericampyILfslncanus* (Colebr.) Miers.	Menispermacea	-
35.	*Uncariasessilifructus* Roxb.	Rubiaceae	-
Shrubs			
36.	*Artemisia nilagirica* (CI.) Pamp.	Compositae	Nagdona
37.	*Calamus erectus* Roxb.	Arecaceae	tynriew
38.	*Caryoto urens* Linn.	Arecacea	Kwai-cha
39.	*Citrusmaxima* (Blume)Merrr	Rutaceae	Soh-sy.rman(J)
40.	*Desmos longiflorus (Roxb.*) Safford	Annonaceae	Khorjun
41.	*Melastomanepalensis Lodd.*	Melastomaceae	Dien-slidong(J)
42.	*Maesaindica* (Roxb.) Wall.	Myrsinaceae	Dien-pylleindacha(
43.	*Roureaminor* (Gaertn.) Leenh.	Connaraceae	Kirindi wel
44.	*UrenalobataL.*	Malvaceae	Sohbyrthit(J)
Screw pine			
45.	*Pandanusodoratissimus* (Lamk)Linn.	Pandanaceae	Chlain(J)

Source: field survey

List of flora observed in 10 km study area is mentioned in the list given below:

Table No. - 3.21 (b)

INVENTORY OF FLORAL DIVERSITY IN THE BUFFER ZONE OF PROPOSED MINE SITE

Based on Actual Sighting, based on inputs from locals and Perused from Secondary Data

S. No.	Botanical Name	Family	Vernacular Name
TREES			
1.	*Actinodaphne obovata* (Nees) Blume	Lauraceae	Dieng-lakrao (K)*
2.	*Aesculus assamica* Griff.	Sapindaceae	Dieng-dula (K)
3.	*Alchornea tiliifolia* (Benth.) MUll.Arg.	Euphorbiaceae	-
4.	*Asplenium phyllitidis* D. Don.	Asplcniaceae	-
5.	*Bauhinia khasiana* Baker.	Lezurni nosea	-

S. No.	Botanical Name	Family	Vernacular Name
6.	*Callicarpa arborea* Roxb.	Verbanaceae	Dein-lakhoit (J)**
7.	*Caryota urens* L.	Arecaceae	-
8.	*Caseria sp*	Flacourtiaceae	Diengsohlor-maw (K)
9.	*Caryota urens Linn.*	Arecacea	Kwai-cha
10.	*Castanopsis echinocarpa* Mig.	Fagaceae	Dien-sniugt (J)
11.	*Castanopsis indica* (Roxb. Ex Lindl.)	Fagaceae	Amka- asing (Adi)
12.	*Castonopsis purpurella*	Fagaceae	Dein-sohtap (J)
13.	*Castonopsis tribuloides* (Sm.) ADC	Fagacea	Dien sa-ut (J)
14.	*Cinnamornum bejolghotn* (Bucb.-Ham.) Sweet	Lauracea	Dieng-pathi (K)
15.	*Duabanga grandiflora* (DC.) Walp.	Lythraceae	Dieng-bai (K)
16.	*Elaeagnus pyriformis* Hook. f.	Elaeagnaceae	Sashang
17.	*Eurya accuminata* DC.	Theacea	Dienpyrchin(J)
18.	*Ficus hirta subsp. Roxburghii* (King) C.C. Berg	Moraceae	Spunae (J)
19.	*Ficus sernicordata* Buch-Ham, ex Sm.	Moraceae	Dieng-duit-lasas
20.	*Lithocarpus eJegans* (Blume) Hatus. Ex Soepadmo	Fagaceae	Sarangkhlo (J)
21.	*Lithocarpus fenestratus* (Roxb.) Rehder.	Fagaceae	-
22.	*Litsea citrata* Blume	Lauraceae	Soh-sying (J)
23.	*Litsea laeta* Wall. ex Nees.	Lauraceae	Heluka.
24.	*Litsea lancifolia* (Roxb. ex Nees.)	Lauraceae	-
25.	*Litsea rnonopetala* (Roxb.) Pers.	Lauraceae	-
26.	*Litsea thomsonii* Hook. F.	Lauraceae	-
27.	*Macaranga sp.*	Euphorbiaceae	Lakhar (J)
28.	*Macropanax disperma* (Bl.) O.	Analiaceae	Dieng-ia-rasi
29.	*Mallows nepalensis* Moll. Arg.	Euphorbiaceae	Sla-lakhar khian (J)
30	*Melastorna nepalensis* Lodd.	Melastornaceae	Dien-slidongf.l)
31.	*Micromelum integerrirnum (Roxb.) Wight & Arn.*	Rutaceae	Dieng-tyrpej (J)
32.	*Morinda angustifolia* Roxb.	Rubiaceae	Dieng-siroi
33.	*Ostodes paniculata* Blume	Euphorbaceae	Dein-lashilkhlow(J)
34.	*Persea kingii* Hook f.	Lauraceae	-
35.	*PhylJanthus glaucus* Wall.	Euphorbiaceae	Samatan (J)
36.	*Pithecllabium montanurn* Benth.	Mimosaceae	-
37.	*Pterospermum lancifoliurn* Roxb.	Sterculiaceae	Dieng-khol1(K)
38.	*Quercus serrata* Roxb.	Fagaceae	Diengrtiang
39.	*Rhus javanica (L)* Merr.	Anarcardiaceae	Dien-sarna (J)
40	*Sapindus artentuate/erecta* Wall.	Sapindaceae	-
41.	*Sapium baccaturn Roxb.*	Euphorbiaceae	Dieg-jalongeh (K)
42.	*Sarcosperma griffithii* Hook.f. ex C.B.Clarke	Sapotaceae	Dein-pai (K)
43.	*Schirna wallichi* (DC.) Korth.	Theaceae	Shyrngan (1)
44.	*Solanum melongena* Linn.	SoLanaceae	-

S. No.	Botanical Name	Family	Vernacular Name
45.	*Solanum torvurn* Sw	SoLanaceae	Soh-ngang
46.	*Styrax serrulatum Linn.*	Styracaceae	Deing-jalatpai (K)
47.	*Symplocus glornerata* King ex CI.	Symplocaceae	Tiewdiengpeiiong (K)
48.	*Symplocus sp*	Symplocaceae	-
49.	*yzigium formosum* (Wall) Mas	Myrtaceae	Soh-slidong (J)
50.	*Syzigium macrocarpum* (Roxb.) Balak	Myrtaceae	-
51.	*Syzygium curnini* (L) Skeels.	Mynaceae	Jamun
52.	*Syzygiurn tetragonum* (Wt.) Kurz.	Myrtaceae	Dien-sohsyrle (J)
53.	*Trevesia palmate* (Roxb.) Vis	Araliaceae	Dienglakor (K)
54.	*Vernonia volkameriifolia* DC.	Asteraceae	-
55.	*Wendlandia tinctoria* (Roxb.) DC	Rubiaceae	Charnot (1)
	Shrubs		
56.	*Ageratina adenophora* (Sprcng.) R.M.King & H.Rob.	Compositae	Sla-barma(J)
57.	*Ageratina riparia* (Regel) R.M.King & H.Rob	Compositae	Hlo-thar (Mizo)
58.	*Ardisia nerifolia* DC.	Myrsinaccae	-
59.	*Arnorphophallus*	Araceae	Syntiew-phylla
60.	*Artemisia nilagirica* (Cl.) Pamp.	Compositae	Nagdona
61.	*Boehmeria glomerulifera* Mig.	Urticaceac	Diengsohkhar (K)
62.	*Boehmeria macrophylla* D.Don.	Urticaceae	Dieng sohkhra
63.	*Calamus erectus* Roxb.	Arecaceae	tynriew
64.	*Citrus maxima* (Blume)Merrr	Rutaceae	Soh-syrman
65.	*Desmodium trifolium* (L.) DC	Fabaceae	Acaba Pangola
66.	*Desmos longiflorus* (Roxb.) Safford	Annonaceae	Khorjun
67.	*Gourphandra tetrandra* (Wall.) Sleumer	Srernonuraceae	-
68.	*Jasminium*	Oleaceae	tiewKnupmawiang
69.	*Lantana carnara Linn.*	Verbenaceae.	Dieng-sohpang
70.	*Lycopodium paniculatum* Dcsv. Ex Poil'	Lycopodiaceae	Tmain-khla (J)
71.	*Leea alata* Edgew,	Leeaceae	Bon-ou
72.	*Leca indica* (Burm.f.) Merr.	Leeaceae	Riu-khongpieng (K)
73.	*Melastorna nepalensis* Lodd.	Melastornaceae	Dien-slidong (J)
74.	*Maesa indica* (Roxb.) Wall.	Myrsinaceae	Dien-pyllein dacha(J)
75.	*Phlogacanthus thyrsiflorus* (Roxb.) Nees.	Acantheceae	Dieng-soh kajut
76.	*Prinsepia utilis* Royle.	Rosaceae	bhekal
77.	*Phyrnium pubineria Blum*	Marantaceae	Sla-met(K)
78.	*Piuosporum*	Pittosporaceae	-
79.	*Pteris*	Pteridaceae	Tyrkhang (J)
80.	*Rourea minor* (Gaertn.) Leenh.	Connaraceae	-
81.	*Sarcanda glabra* (Thunb.) Nakai.	Chioranthaceae	Tiew-krimas
82.	*Smilax roxburghiana* Wall. Ex A.DC.	Smilaceae	Kolyar Sag

S. No.	Botanical Name	Family	Vernacular Name
83.	*Tabernaemontana diversicata* (Linn) R. Br.	Apocynacea	-
84.	*Triumfetta pilosa* Roth.	Liliaceae	Soh-byrthid (K)
85.	*Urena. lobata* L.	Malvaceae	Sohbyrthit (J)
Climber			
86.	*Acacia oxyphylla* Graham ex. Craib.	Lcguminosae	Mei-suai(K)
87.	*Acacia pennata* (Linn.) Willd.	Leguminosae	Jerrnai-sheih- lyngkshiah (K)
88.	*Beaumontia grandiflora* Wall.	Apocynaceae	Kynroh Krem
89.	*Derris thvsiflora*	Fabaceae	-
90.	*Dioscorea*	Dioscoreaceae	D. alata
91.	*Lypodium hexuosum* (L.) SW	Lygodiaceae	maidenhair creeper.
92.	*Pacdera foetida L*	Rubiaceae	Rme-sma ait(J)
93.	*Pericampylus incanus* (Colebr.) Miers.	Menispermaceaes	-
94.	*Rhaphidophora calophylla*	Araceae	-
95.	*Stemona tuberose* Lour.	Stemonacea	-
96.	*Tetrastigrna obovaturn* (Laws.) Gagnep.	Vitaceae	Soh-sarpung
97.	*Tetrastigma bractatum*	Vitaceae	Monja-mahei
98.	*Uncaria sessilifruotus* Roxb.	Rubiaceae	-
Grass			
99.	*Thysanolaena maxima*	Poaceae	Saro (J)
Screw pine			
100.	*Pandanus odoratissimus* (Lamk) Linn.	Pandanaceae	Chlain (J)
Liana			
101.	*Fissistigma verrucosum* (Hook.I, &Th.) Merr.	Annonaceae	Jyrmi soh-ram khlaw (K)
Fern			
102.	*Asplenium phyllitides* D.Don.	Aspleniaceae	-
103.	*Dicranopteris linearis* \ ar. Alternans Mett.) Holttum	Gleicheniaceae	-

**K= Khasi, **J= Jaintia*

Analysis of Flora

Total of 55 trees, 30 shrubs and herbs, 13 species of climbers and 1 speices of Grass, Screw Pine, Laina and Fern respectively have been recorded in the study area based on primary observation as well as based on secondary data.

b. Faunal diversity of the study area

There is no significant faunal assemblage here from direct and indirect evidences of Wildlife as it has limited scope for holding the wildlife. However, Field observation, interview of local biologists & people. Details of each faunal group are given as below:

Table No. - 3.22 (a)

INVENTORY OF FAUNAL DIVERSITY IN CORE ZONE

Based on Actual Sighting, based on inputs from locals and Perused from Secondary Data

(+) show presence of species and (-) shows: Absence of species

S. No.	Scientific Name	Vernacular Name	Common Name	Schedule Status according to W(P)AA, 2022
Aves				
1.	***Bambusicolafytchiihokinsoni***	**Chyng-Kiar**	**Mountain Bamboo Patridge**	**Schedule I**
2.	*Dicrurus macrocercus*	Larwat	Black drongo	Schedule II
3.	***Lophura leucomelanos***	**SyiarKhloo**	**Khalij pheasant**	**Schedule I**
4.	*Passerdomesticus*	Chyrkia	House Sparrow	Schedule II
5.	*Psarisomusdalhousiae*	Purong	Long-tailed broad bitt	Schedule II
6.	*Pycnonotus cafer*	Riah Blong	Red-vented bulbul	Schedule II
Mammal				
7.	*Cannomysbadius*	Khnae Piahlang	Lesser Bamboo Rat	-
8.	***Callosciurus Erythraeus***	**Rasang**	**Pallas's squirrel**	**Schedule I**
9.	*Herpestesedwardsii*	Mongoose	Indian grey mongoose	Schedule IV
10.	*Rattusrattus*	Khneiung	Black Rat	Schedule IV
11.	*Rhinolopuspearsoni*	Labit	Bat	Schedule II
Amphibian				
12.	*Ranaclamitans*	KhrohRngam	Green frog	-

Source: *Field survey*

Table No. - 3.22 (b)

INVENTORY OF FAUNAL DIVERSITY IN BUFFER ZONE

Based on Actual Sighting, based on inputs from locals and Perused from Secondary Data

(+) show presence of species and (-) shows: Absence of species

S. No.	Scientific Name	Vernacular Name	Common Name	Schedule Status according to W(P)AA, 2022
Aves				
1.	***Bambusicola fytchii hokinsoni***	**Chyng-Kiar**	**Mountain Bamboo Partridge**	**Schedule I**
2.	*Dicrurus macrocercus*	Larwat	Black Drongo	Schedule II
3.	***Ketupa flavipes***	**Dhoh**	**Bubo flavipes**	**Schedule I**
4.	***Lophura leucomelanos***	**Syiar Khloo**	**Khalij pheasant**	**Schedule I**
5.	*Passer domesticus*	Chyrkia	House Sparrow	Schedule II

S. No.	Scientific Name	Vernacular Name	Common Name	Schedule Status according to W(P)AA, 2022
6.	*Psarisomusdalhousiae*	Purong	Long tailed broadbill	Schedule II
7.	*Pycnonotous*	Riah Blong	Red- vented bulbul	Schedule II
8.	*Milvus migrans lineatus*	Khlein	Black Kite (Black-eared)	Schedule II
9.	*Picidae*	Pakra Kaththokra,	Indian woodpecker	Schedule IV
Mammal				
10.	*Cannomys badius*	Khnae Piahlang	Lesser Bamboo Rat	-
11.	***Manis crassicaudata***	**Rbae**	**Indian pangolin**	**Schedule I**
12.	***Collosciurus erythraeus***	**Rasang**	**Pallas's Squirrel**	**Schedule I**
13.	*Herpestes edwardsii*	Mongoose	Indian grey mongoose	Schedule IV
14.	***Ursus thibetanus lanige***	**Dngiem**	***Himalayan black bear***	**Schedule I**
15.	***Hoolock hoolock***	**Hulu**	***Hoolock gibbon***	**Schedule I**
16.	*Indian muntjac*	Skae	barking deer	Schedule IV
17.	*Funambulus palmarum*	Rasang stem kpoh.	*Indian Squirrel*	Schedule II
18.	*Mus booduga*	Khne Lum	little Indian field mouse	Schedule IV
19.	***Panthera pardus***	**Krong**	**Leopard**	**Schedule I**
20.	***Porcupine sp.***	**Ynkhet**	**Quill pig**	**Schedule I**
21.	***Trachypithecus pileatus***	**Chrieh**	**Capped Langur or Leaf Monkey**	**Schedule I**
22.	*Rattusrattus*	Khneiung	Black Rat	Schedule IV
23.	*Rhi nolopuspearsoni*	Labit	Bat	Schedule II
24.	*Suncus murinus griffithi*	Khnae Jit	house shrew	Schedule IV
Amphibian				
25.	***Bufoides meghalayanus***	**Khroh Chyrtob**	**Khasi Hills toad**	**Schedule I**
26.	*Ranaclamitans*	Khroh Rngam	Green frog	-
27.	*Rana danieli*	Khroh	Daniel's frog	-
Reptile				
28.	*Calotes versicolor*	Chieh Cherko	garden lizard	Schedule IV
29.	*Opheodrys vernalis*	Psain Rngam	smooth green snake	-
30.	***Varanus bengalensis***	**Tyrpit**	**Indian monitor**	**Schedule I**
Rodent				
31.	***Hystrix sp.***	**Ynkhet**	**Cape porcupine**	**Schedule I**

Analysis of Fauna

As per the field survey (primary data) and secondary data collection, ***Hystrix sp.*** **(Cape porcupine),** ***Varanus bengalensis*** **(Indian monitor),** ***Bufoides meghalayanus*** **(Khasi Hills toad),** ***Trachypithecus pileatus*** **(Capped Langur or Leaf Monkey),** ***Porcupine sp.*** **(Quill pig),** ***Panthera pardus*** **(Leopard),** ***Hoolock hoolock*** **(*Hoolock gibbon*),** ***Ursus thibetanus lanige*** **(*Himalayan black bear*),** ***Collosciurus erythraeus*** **(Pallas's Squirrel),** ***Manis crassicaudata*** **(Indian pangolin),** ***Lophura leucomelanos*** **(Khalij pheasant),** ***Ketupa flavipes*** **(Bubo flavipes),** ***Bambusicola fytchii hokinsoni*** **(Mountain Bamboo Partridge)** is recorded in the study area during field survey; which comes in Schedule- I fauna according to Wildlife (Protection) Amendment Act, 2022.

3.15 SOCIO-ECONOMIC ENVIRONMENT

3.15.1 INTRODCUTION

An essential part of environmental study is socio-economic environment incorporating various facts related to socio-economic conditions in the area, which deals with the total environment.

Socio economic study includes demographic structure of the area, provision of basic amenities viz., housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature of aesthetic significance such as temples, historical monuments etc. at the baseline level. This helps in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

Socio-economic study of an area provides a good opportunity to assess the socio-economic conditions of an area. This study will possibly estimate the change in living and social standards of the particular area benefitted due to the project. The gross economic production of the area will be increased substantially due to the existence of this project. It can undoubtedly be said that this plant will provide direct and indirect employment and improve the infrastructural facilities and living standards of the area.

The fabrics of socio-economic changes are so complicated that this study would seem to be extremely limited, almost superficial and at time subjective in nature. More thorough and quantified socio-economic study will undoubtedly require vastly longer time and resources, and is, therefore, beyond the scope of the present EIA study. The EIA will give a reasonably clear picture of the socio-economic conditions prevailing in the study area.

3.15.2 OBJECTIVES OF THE STUDY

The objectives of this socio-economic report consist of:

- To conduct socio-economic assessment study in Project Area.
- To know the current socio-economic situation in the region to cover the sub sectors of education, health, sanitation, and water and food security.
- To recommend practical strategic interventions in the sector.
- To help in providing better living standards.
- To provide employment opportunities.

3.15.3 METHODOLOGY

- **Collection of Data**

  Data for this project were collected via a combination of secondary source (i.e., Government department, maps, literature research etc) and primary source (i.e., interviews, field research) in the study area. Data has been collected during the period of Summer season (March to May, 2023).

- **Presentation of Data & Analysis**

  The data collected were presented in a suitable, concise form for further analysis. The collected data were presented in the form of tabular or diagrammatic or graphic form. These tabulated data were interpreted and analyzed with the help of various qualitative techniques and ideographic approaches.

3.15.4 BACKGROUND INFORMATION OF THE AREA

The State of Meghalaya is situated on the north east of India. It extends for about 300 kilometres in length and about 100 kilometres in breadth. It is bounded on the north by Goalpara, Kamrup and Nowgong districts, on the east by Karbi Anglong and North Cachar Hills districts, all of Assam, and on the south and west by Bangladesh.The proposed project is located in the District - East Jaintia Hills in the state of Meghalaya. Table 3.23 shows the socio economic profile of the study area.

Table - 3.23

Socio-Economic Profile of Study Area

Particular	Meghalaya	East Jaintia Hills	Study Area
Area (in sq. kms.)	22429	2040	342.24
No. of Households	548059	66028	1691
Total Population	2966889	395124	9430
Total Male Population	1491832	196285	4785
Total Female Population	1475057	198839	4645
Total Scheduled Tribes Population	2555861	376099	9258
Total Scheduled Castes Population	17355	1317	10
Literacy Rate (%)	74.43	61.64	65.07
Sex Ratio (Females per 1000 Males)	988	1013	971

Source: *Census of India, 2011*

3.15.5 BASELINE DATA & ANALYSIS

The socio-economic study has been conducted on the basis of primary and secondary data available. The study area was categorized on the basis of the distance of the villages from mine site. Primary zone was indentified from 0 to 3 km radius area, Secondary zone in 3 to 7 km, Tertiary zone/outer zone in 7 to 10 km radius area from the mine site. Information were collected

from the data of census 2011 and the secondary information collected from various government departments like health department, agriculture department, IMD etc.

3.15.6 DEMOGRAPHY OF THE STUDY AREA

The population as per 2011 Census records is 9430 (for the 10 km buffer zone). Total no. of household is 716, 613 and 362 respectively, in primary (0 3 km), secondary (3 - 7 km) and outer zone (7 - 10). The Sex ratio is 948, 985 and 989 (females per 1000 males) observed in primary, secondary and outer zone respectively. SC population distribution is 04, 05 and 01 respectively in primary, secondary and outer zone. ST population distribution is 3722, 3470 and 2066 respectively in primary, secondary and outer zone respectively.

Demographic profile of study area is given in the table below:

Table - 3.24

Demographic Profile of study area

S.No.	Name	No. of Household	Total Pop.	Total Male	Total Female	Sex Ratio	M_06	F_06	Total SC Pop.	Total ST Pop.	P_LIT	M_LIT	F_LIT	Male LIT-R	Female LIT-R	Total Working Population	Total Main Worker	Total Marginal Worker	Total Non Worker
0 - 3 km																			
1.	Chieh Ruphi	124	670	329	341	1036	80	80	0	668	343	161	182	168	159	229	111	118	441
2.	Thang Skai	111	635	334	301	901	88	68	3	625	386	204	182	130	119	213	193	20	422
3.	Wahiajer	114	602	297	305	1027	83	76	0	600	214	98	116	199	189	247	147	100	355
4.	Lum Shnong	367	1945	1017	928	912	245	217	1	1829	1170	627	543	390	385	647	544	103	1298
Sub Total		**716**	**3852**	**1977**	**1875**	**948**	**496**	**441**	**4**	**3722**	**2113**	**1090**	**1023**	**887**	**852**	**1336**	**995**	**341**	**2516**
3 - 7 km																			
5.	Umstain	30	165	85	80	941	17	25	0	163	96	56	40	29	40	83	21	62	82
6.	Musiang Lamare (New).	48	264	136	128	941	36	30	0	263	91	39	52	97	76	76	73	3	188
7.	Musiang Lamare (Old)	97	638	332	306	922	95	78	0	636	262	126	136	206	170	194	192	2	444
8.	Bri Shyrnot	42	197	95	102	1074	28	23	0	196	75	36	39	59	63	97	80	17	100
9.	Sialkan	20	114	58	56	966	15	12	0	103	67	41	26	17	30	31	29	2	83
10.	Umlong	69	418	223	195	874	52	47	0	416	140	77	63	146	132	123	121	2	295
11.	Khaddum	58	339	165	174	1055	30	38	0	338	206	105	101	60	73	75	74	1	264
12.	Um Rasiang	42	225	113	112	991	36	33	0	225	68	32	36	81	76	91	4	87	134
13.	Umrasong	33	196	108	88	815	28	25	0	196	115	70	45	38	43	87	73	14	109
14.	Mynkre	65	335	161	174	1081	41	49	5	330	137	64	73	97	101	142	44	98	193
15.	Umlaper	7	41	19	22	1158	5	5	0	41	11	6	5	13	17	18	16	2	23
16.	Nongsning	102	563	266	297	1117	83	88	0	563	318	151	167	115	130	235	231	4	328
Sub Total		**613**	**3495**	**1761**	**1734**	**985**	**466**	**453**	**5**	**3470**	**1586**	**803**	**783**	**958**	**951**	**1252**	**958**	**294**	**2243**
7 -10 km																			
17.	Moullian	95	631	327	304	930	79	71	0	628	459	240	219	87	85	251	228	23	380
18.	Lum Tongseng	24	102	53	49	925	13	8	0	102	24	9	15	44	34	40	40	0	62
19.	Lum Myrli	43	202	103	99	961	21	25	0	196	87	50	37	53	62	58	54	4	144
20.	Dem Lakang	10	45	26	19	731	4	3	0	45	26	14	12	12	7	21	21	0	24
21.	Lad Lakadong	17	86	44	42	955	12	5	0	86	50	24	26	20	16	38	38	0	48
22.	Tongseng	87	486	230	256	1113	79	49	1	480	188	79	109	151	147	129	123	6	357
23.	Um-tyr-a	69	435	215	220	1023	53	51	0	433	56	20	36	195	184	182	178	4	253
24.	Larseng	17	96	49	47	959	11	15	0	96	15	7	8	42	39	43	38	5	53
Sub Total		**362**	**2083**	**1047**	**1036**	**989**	**272**	**227**	**1**	**2066**	**905**	**443**	**462**	**604**	**574**	**762**	**720**	**42**	**1321**
Total		**1691**	**9430**	**4785**	**4645**	**971**	**1234**	**1121**	**10**	**9258**	**4604**	**2336**	**2268**	**2449**	**2377**	**3350**	**2673**	**677**	**6080**

***Source**: Census of India, 2011*

3.15.6.1 POPULATION DISTRIBUTION & SEX RATIO

The population as per 2011 Census records is 9430 (for 10 km radius buffer zone). Table - 3.26 shows demographic profile of study area that total no. of household is 716, 613 and 362 respectively, in primary, secondary and outer zone. Average household size is 5 in the study area. Summary of Demographic Profile of the Study Area is given in the table below:

Table - 3.25

Zone Wise Population distribution of Study Area

Zone	No. of Villages	Total Household	Total Population	Total Male Population	Total Female Population	Sex Ratio
Primary Zone (0 - 3 Km)	4	716	3852	1977	1875	948
Secondary Zone (3 - 7 Km)	12	613	3495	1761	1734	985
Outer Zone (7 - 10 Km)	8	362	2083	1047	1036	989
Study Area (10 Km)	**24**	**1691**	**9430**	**4785**	**4645**	**971**

Source: *Census of India, 2011*

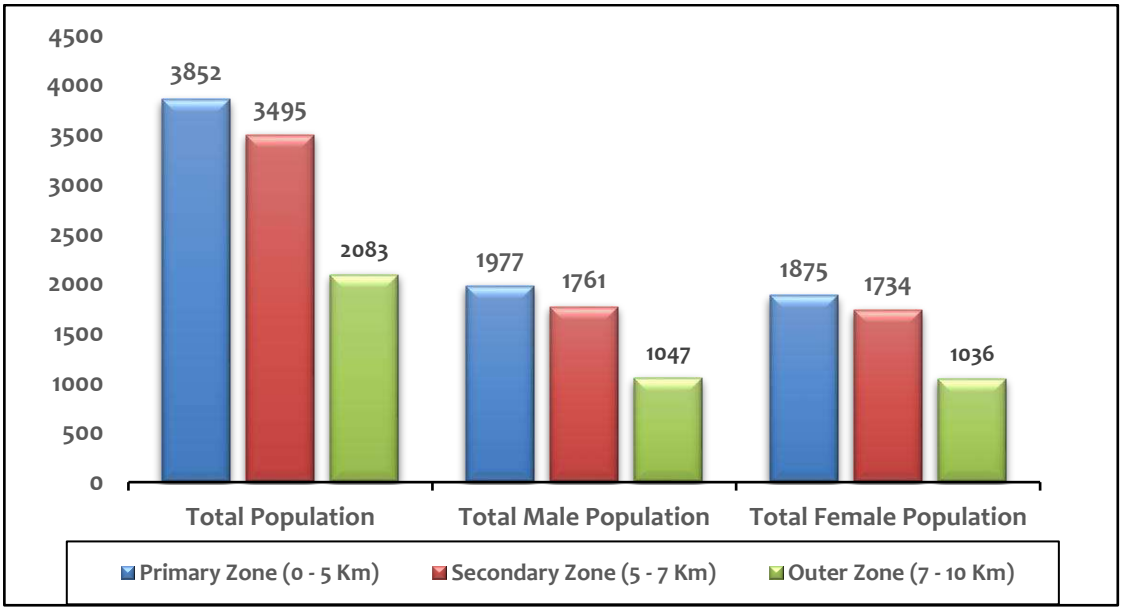


Figure 3.12: Population distribution of the study area

In the study area highest population is at Lum shong which is at a distance of approx. 2.5 km from Mine site in SSW direction. As per the data collected during field survey the population of Lum shong village is recorded as 1945 which is highest among the population of villages of study area.

Census data suggests that the study area is composed of 50.74 % of male and 49.25 % of female population. Which signifies that population of male is higher than females. So it can be an indicative that only awarness programmes are not sufficient to improve the sex ratio in this region a different approach might be implemented such as educating people about the gender equality and sex ratio and by improving the health care facilities to stop female foeticide.

3.15.6.2 VULNERABLE GROUP

While developing an action plan, it is very important to identify the population under the marginalized and vulnerable groups and special attention has to be given towards these groups while making action plans. Data in the observed villages schedule caste (S.C.) population is 10 and Schedule Tribe population is 9258 in study area while 162 of the population has been observed as others. Table 3.26 shows the SC/ST population of the study area:

Table - 3.26

SC/ST Population of the Study Area

Zone	No. of Villages	Total Population	Vulnerable Groups		Non- Vulnerable Groups
			SC Population	ST Population	
Primary Zone (0 - 3 Km)	4	3852	04	3722	126
Secondary Zone (3 - 7 Km)	12	3495	05	3470	20
Outer Zone (7 - 10 Km)	8	2083	01	2066	16
Study Area (10 Km)	**24**	**9430**	**10**	**9258**	**162**

Source: *Census of India, 2011*

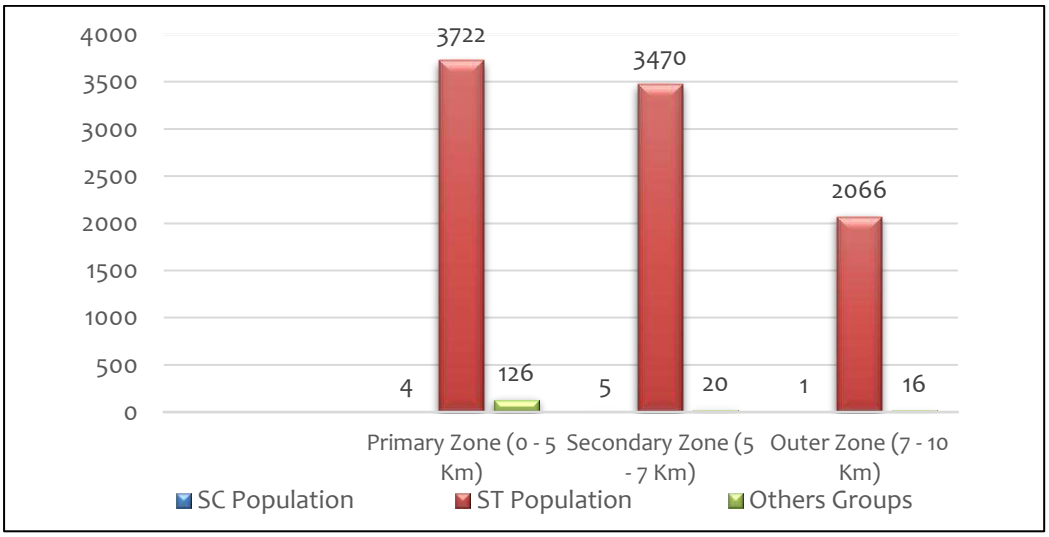


Figure 3.13: Vulnerable groups of study area

3.15.6.3 LITERACY RATE

Literacy Rate is the percentage of people in a region with the ability to read and write. The analysis of the literacy levels is done in the study area. The 10 km radius study area demonstrates a literacy rate of 64.13 % as per census data 2011. The male literacy rate in the study area indicates 64.88 % whereas the female literacy rate, which is an important indicator for social change, is observed to be 65.07 % as per the census data 2011. This wide gap points the need to focus on sociological aspect in the region and enhance further development focusing on education, especially that of girls and women. The distribution of literates and literacy rates in the observed village is given in below table:

Table - 3.27

Literacy rate of inhabitants in the Study Area

Zone	Total Population	Total Literate Population	Male Literacy Rate (%)	Female Literacy Rate (%)	Total Literacy Rate (%)
Primary Zone (0 - 3 Km)	3852	2113	73.60	71.34	72.49
Secondary Zone (3 - 7 Km)	3495	1586	62.01	61.12	61.57
Outer Zone (7 - 10 Km)	2083	905	57.16	57.11	57.13
Study Area (10 Km)	**9430**	**4604**	**64.26**	**63.19**	**63.73**

Source: *Census of India, 2011*

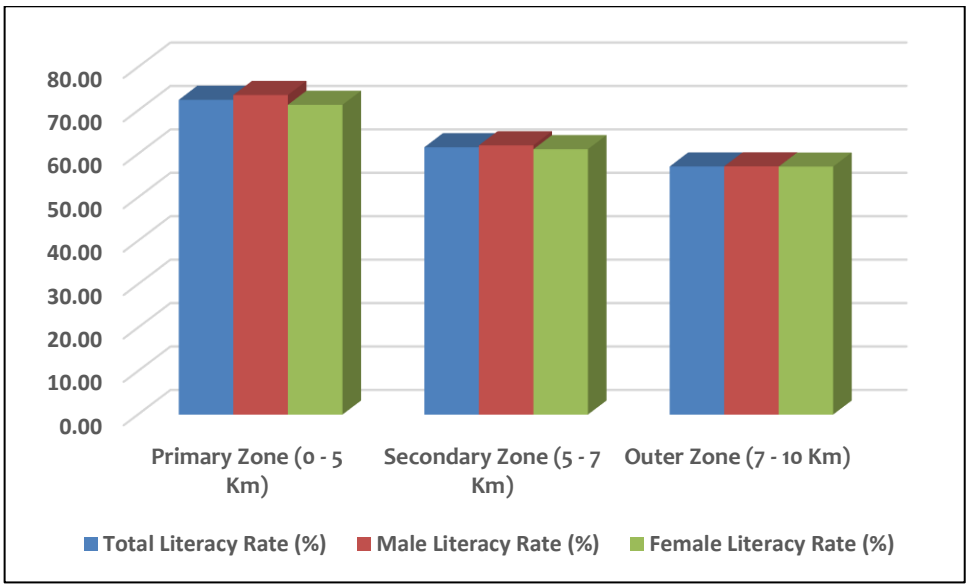


Figure 3.14: Graph showing literacy rate of inhabitants in the study area

The distribution rate amongst male and female varies with wide gap. It is evident from above graph that this variation is just not limited to one zone; it is very much visible along all the three zones specially in outer zone, thereby giving the decision makers an opportunity to form more focused development approach in providing education and uplifting the current scenario in order to improve literacy rate amongst women and bringing women centric empowerment that limits not just to the population, but reflected in literacy rate also.

3.15.6.4 ECONOMIC ACTIVITIES

The economy of an area is defined by the occupational pattern and income level of the people in the area. The occupational structure of residents in the study area is studied with reference to work category. The population is divided occupation wise into three categories, viz., main workers, marginal workers and non-workers. The main workers include cultivators, agricultural laborers, those engaged in household industry and other services. The marginal workers are those engaged in some work for a period of less than 180 days during the reference year. The non-workers include those engaged in unpaid household duties like, students, retired persons, dependents, beggars, vagrants etc. besides institutional inmates or all other non-workers who do not fall under the above categories. Table 3.28 shows the work force of the study area.

Table - 3.28

Work Force of the Study Area

Zone	Total Population	Main Workers	Marginal Worker	Total Workers	Non Worker
Primary Zone (0 - 3 Km)	3852	995	341	1336	2516
Secondary Zone (3 - 7 Km)	3495	958	294	1252	2243
Outer Zone (7 - 10 Km)	2083	720	42	762	1321
Study Area (10 Km)	**9430**	**2673**	**677**	**3350**	**6080**

Source: *Census of India, 2011*

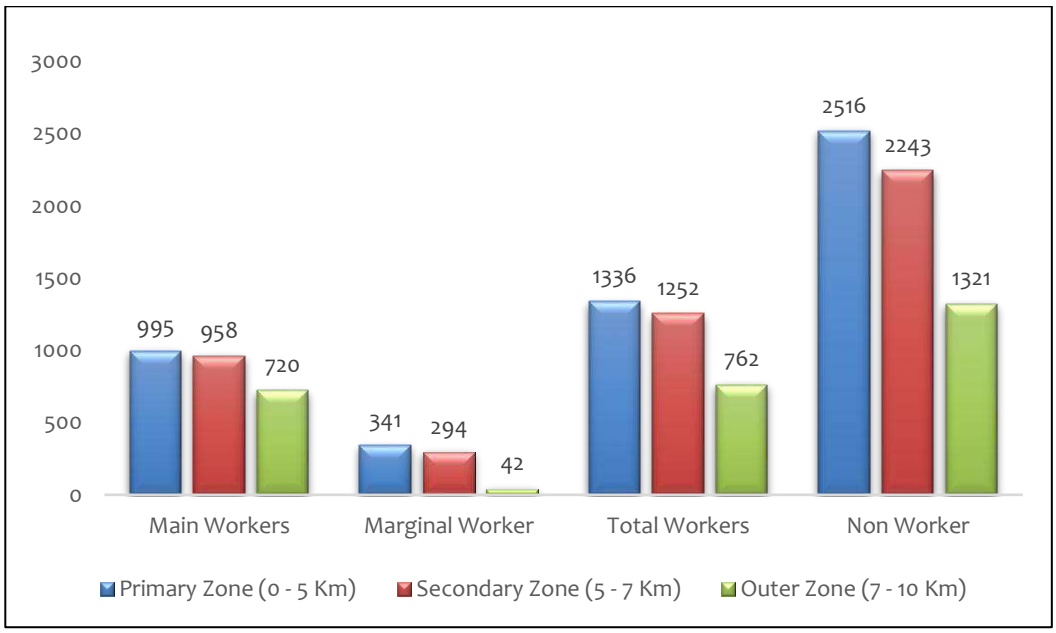


Figure 3.15: Work force in the study area

Total working population and non-working population is 3350 and 6080 respectively in the surveyed villages. As per the analysis of all the villages the ratio of working and non-working population is almost equal. Which is visible in the graph above.

3.15.6.5 EDUCATIONAL FACILITIES

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. Educational methods include storytelling, discussion, teaching, training and directed research.

As per survey, one Government Seconadry School, is at ~1.5 km NNW in direction of the ML area and Govt. LP school Chiehruphi is at 1.5 km in WNW in direction. All basic facilities like Playground, electricity, drinking water, toilets, etc. are available in the school. Government primary school, Govt. Upper Primary School, Govt. Secondary School and Govt. Senior Secondary School are present in majority of the villages of study area whereas Private secondary schools are present only at Lum shong village.

The study area have adequate educational facilities as Lum shong is present in the study area which has around 7 schools, out of which 2 are pre-primary school, 2 are Primary School and 3 are Middle / Secondary Schools.

In the study area, senior secondary schools and secondary schools are few in number.Thus, if one has to pursue further in studies he/she has to go to the nearby town or city.

Table - 3.29

Education facilities in the study area

Zone	No. of Villages	Pre. Primary School	Primary School	Middle School	Secondary School
Primary Zone (0 - 3 Km)	4	5	5	3	1
Secondary Zone (3 - 7 Km)	12	11	11	2	-
Outer Zone (7 - 10 Km)	8	9	7	1	-
Total	**24**	**25**	**22**	**6**	**1**

Source: *Census of India, 2011*

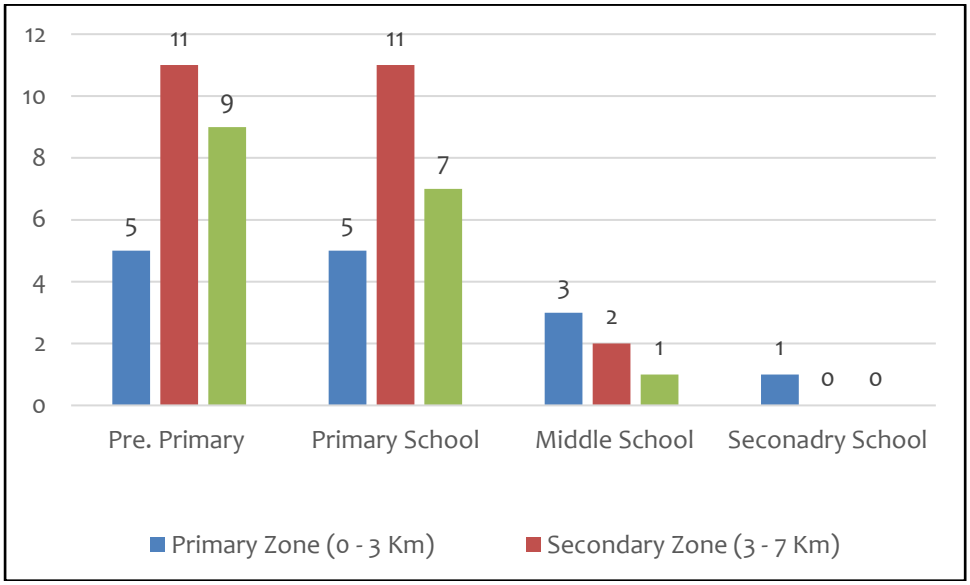


Figure 3.16: Educational facilities distribution

According to the primary survey, Education facilities within the buffer area comprise of Pre-primary, primary, middle, and secondary schools. As observed, all the studied villages have 25 pre-primary, 22 primary schools, 06 middle schools and 01 secondary school schools. Village wise distribution of the educational facilities within the 10 km study area is given in table 3.31.

Table - 3.30

Details of Educational Institutes in the Study Area

S. No.	School Name	Details	
		Student	Teachers
1.	Umdoba LP School, Umdoba	55	02
2.	Thangskai Govt LPS, Thangskai	56	02
3.	Maitchaphrang LPS,Chiehruphi	127	02

S. No.	School Name	Details	
		Student	Teachers
4.	Lily Flower LPS Chiehruphi, Chiehruphi	84	02
5.	Chiehruphi Secondary School, Chiehruphi	58	06
6.	Chiehruphi UPS, Chiehruphi	83	04
7.	Wahiajer Narpuh Govt LPS, Wahiajer Narpuh	72	03
8.	Wahlarung DCLP, Lumshnong	32	02
9.	Little Rose English School, Lumshnong	32	02
10.	Lumshnong main road RCLP, Lumshnong	29	02
11.	Lumshnong Govt LPS, Lumshnong	99	04
12.	Moosiang Lamare Old Govt LPS, Moosiang Lamare (old)	114	02
13.	Moosiang Lamare (new) Govt LPS, Moosiang Lamare (new)	24	01

***Souce**: Field Survey, 2023*

Literacy is the essential demographic aspect of the society and the literacy rate of the study area is 63.13 %. As per the Socio Economic survey conducted, it can be concluded that majority of the schools in the study area are Primary School whereas Senior Sec./ Secondary schools are few in numbers, there is a need to increase the English medium schools and the schools in the study area lacks the internet facilities, computer labs etc.

3.15.6.6 HEALTH FACILITIES

Health is a premier asset of human capital which is an important factor for growth of any economy. It is a source of human welfare. Health and nutrition play a major role for developing a healthy society as it impacts the productivity of a person.There is one primary health centre and one Maternity And Child Welfare Centre present in the Lum Shong Village and There are three primary health sub-centre in chieh Ruphi, Khaddum and Moullian village. Non Government Medical facilities Medicine Shop one is present at chieh Ruphi village and three at Lum Shong village.

Table - 3.31

Health Facilities in the Study Area

S. No.	Details	No. of Facilities
1.	Primary Health Centre	1
2.	Primary Health Sub Centre	3
3.	Maternity and Child Welfare Centre	1
4.	Non Govt. Medical Shops	4

***Source:** Census 2011*

3.15.6.7 WATER FACILITIES

Springs play a major role of water requirement for the people in rural areas. It is found that the location of the spring is mainly restricted to foothills and intermontane valleys. The spring water is of excellent quantity and is suitable for drinking purpose as per BIS standards. As the people in

rural areas are totally dependent on spring, there is an urgent need for scientific approach for proper development and management of this precious resource.

3.15.6.8 TRANSPORTATION

- People in the study area are dependent on road and rail network.
- These villages are directly and indirectly connected with major road and rail links via internal village roads that merge into national highway in the region.
- NH - 6 is the major highway that is passing through the study area.
- Other major road (metalled road) also pass evenly through the study area connecting many other villages in the study area.
- Bus service and auto service are also available in study area.

3.16 CONCLUSION

The environment baseline study was conducted in the project area by both secondary data and primary data collections. Abiotic factors including air, water and soil were studied for the core and buffer zone.

It was found that most of the parameters were within the limits as per the Standards. Similarly, the study for the biotic factors was conducted. It can be concluded that the present environment status of the study area is good enough for the project activity. Adoption of adequate pollution control measures will protect the surrounding environment.

Looking into the socio economic status of the study area it can be concluded that there is still lack of basic amenities in the villages which can be improved by MCL if special emphasis is given to collaboration with Govt. Authorities for betterment of the people in the nearby areas of the Proposed Limestone Mine.

CHAPTER - 4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 INTRODUCTION

The environmental parameters likely to be affected by mining are related to many factors, viz. physical, social, economic, agriculture and aesthetic. Opencast mining involves drilling, blasting, excavation, loading, transportation, unloading etc. After mining, transportation of material from mine face to the crusher located in cement plant will be carried out by dumpers.

The operations may disturb environment of the area in various ways such as removal of mass, change of landscape, flora and fauna of the area, surface drainage and change in air, water and soil quality. While for the purpose of development and economic upliftment of people there is need for establishment of mining industries because the area is rich in mineral resources, but these should be environment friendly. Therefore, it is essential to assess the impacts of mining on different environmental and Socio-economic parameters before starting the mining operations so that abatement measures could be planned in advance for minimizing the impacts wherever feasible.

The likely impacts on different environmental parameters due to the mine site location, possible accidents, mine design, development, operations & final closure of this mining project are discussed below.

4.2 METHODOLOGY OF IMPACT ASSESSMENT

The impact assessment has been undertaken following a systematic process that identifies, predicts and evaluates the impacts the project could have on aspects of the physical, biological, social/ socio-economic and cultural environment, and identifies measures that the project will take to avoid, minimise/reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the impact assessment process comprise of the following:

- ***Impact identification:*** to identify the potential impact of the project on the various environmental parameters.
- ***Impact prediction:*** to determine what could potentially happen to resources/receptors as a consequence of the project and its associated activities.
- ***Impact evaluation:*** to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resources/ receptors.
- ***Impact mitigation:*** to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.

4.3 BASIS OF IMPACT ASSESSMENT

The impact of the proposed project would be assessed on the basis of their characteristics i.e. nature, type, extent, duration, intensity & frequency and its significance.

Characteristics of Impacts

The impact is described in terms of its characteristics such as nature, type etc. Impact characteristics are given in Table - 4.1.

Table - 4.1

Impact Characteristics

Characteristic	Classification	Description
Nature	Positive impact	When impact is considered to represent improvement to baseline or introduce a new positive factor/change.
	Negative impact	When impact is considered to represent adverse change from the baseline or introduce a new undesirable factor/change.
	Neutral	When there is no impact to represent any change from the baseline and not introducing any new factor/change.
Type	Direct impact	Resulting from a direct interaction between a project activity and the receiving environment / receptors.
	Indirect impact	Resulting from other activities that happened as a consequence of the project.
	Cumulative impact	Impacts that act together with other impacts (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as the Project.
Extent	Project Area	When impact due to the project related activities is restricted within the premises of project area i.e. core zone.
	Local	When impact due to the project related activities is restricted within the immediate surroundings i.e. up to 3 km radius.
	Zonal	When impact due to the project related activities is restricted within the study area i.e. up to 10 km radius.
	Regional	When an impact due to the project activity extends within as well as beyond 10 km radius.
Duration	Short - term	When the impact is usually temporary or last for a short time or will have an effect soon rather than in the distant future.
	Long- term	When impact would occur during the development of the project and either takes a long time or lasts a long time or cause a permanent change in the affected receptor/resource.
Intensity	Low	When resulting in slight changes of prevailing baseline conditions and quality of existing physical environment is good. Ecological environment as well as human receptors are not likely to be affected due to the proposed project activity.
	Medium	When resulting in changes of prevailing baseline conditions which are

Characteristic	Classification	Description
		within the benchmark norms and quality of existing physical environment shows some signs of stress. Ecological environment as well as human receptors could be sensitive to change in quality of prevailing baseline condition, but human receptors retain an ability to adapt to change.
	High	When resulting in changes of prevailing baseline conditions which are exceeding the benchmark norms and quality of existing physical environment is already under stress. Ecological environment as well as human receptors would be impacted to the larger extent and the ability of human receptors to adapt to changes would be undermined.
Frequency	Remote (R)	When resulting in remote or one-off chance of an event due to an activity on a receptor/ resource.
	Occasional (O)	When an impact due to an activity is occurring intermittently from time to time on a receptor/resource.
	Periodic (P)	When an impact due to an activity is resulting on periodic basis for a week or a month on a resource/receptor.
	Continuous (C)	When an impact due to an activity is continuously resulting on a resource/receptor.

Significance of Impacts

Impacts are described in terms of 'significance'. Significance is a function of the magnitude & sensitivity / importance of the impact.

Classification of impact significance is given in Table - 4.2.

Table - 4.2

Significance of Impact

Significance	Description
Insignificant	Negligible impact or where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Minor	Where an effect will be experienced, but the impact is well within accepted standards/guidelines with or without mitigation.
Moderate	Where an effect will be experienced and the impact is within accepted standards/guidelines with mitigation.
Major	Impact where an accepted limit or standard may be exceeded or the impact occur to the highly valued/sensitive resource/receptors.

Irreversible and Irretrievable commitments of environmental components

Determining the irreversible and irretrievable commitment of the resources is one of the major stages of impact evaluation, which gives an understanding about the potential impacts that are likely to affect future generations of the area and facilitates for adoption of proper mitigation measure regarding the same.

Table - 4.3

Irreversible and Irretrievable commitments of environmental components

Commitment of resources	Description
Irreversible	Irreversible commitment of resources refers to the impact or loss of the resources that cannot be recovered or reversed. Irreversible is a term that describes the loss of future options. It applies primarily to the impacts of use of nonrenewable resources or to those factors that are renewable only over long periods of time.
Irretrievable	Irretrievable is a term that applies to the loss of production, harvest, or use of natural resources. Irretrievable commitment of resources may be considered as the loss of resources as a result of change (both reversible & irreversible) due to any project activity that cannot be regained or recovered.

4.4 INTERACTION MATRIX

The interaction matrix enables a methodical identification of the potential interactions each project activity may have on the range of resources/receptors within the Area of Influence for the Project.

The interaction matrix for the project activities and likely impacted resources/receptors is presented in Table - 4.4 which covers potential interactions, regardless of probability of occurrence. The matrix consists of a list of resources/ receptors that could be affected against a list of project activities.

Entries in the matrix cells are tick marked to indicate whether:

- An interaction is not reasonably expected (blank);
- The interaction is reasonably possible and may lead to potential impact (tick marked).

Table - 4.4

Interaction Matrix

S. No.	Project Activity / Likely Impacted Resources / Receptors	Land Acquisition				Mine development & Process				Reclamation and Greenbelt/plantation			Miscellaneous		
		Acquiring land	Displacement of households	Displacement of occupation	Rehabilitation & Resettlement of PAFs	Site Clearing within the project area and Leveling of site (removal of vegetation, structures etc.), Storage of soil	Mining Operation (excavation with Drilling, blasting)	Loading and unloading of mined out material	Transportation limestone to existing cement plant through dumpers.	Dump formation (terracing, construction of garland drains & retaining walls)	Reclamation of mined out pits by backfilling	Greenbelt Development and maintaining greenbelt of 7.5 m statutory barrier & along roads. Plantation on backfilled area, upper benches at conceptual stage	Workshop for HEMM maintenance in mine.	Meeting points of workers/ employees i.e. Rest shelter, canteen	Handling of high explosive in magazine & AN storage shed and fuel
A.	**Physical**														
1.	Air					√	√	√	√	√	√	√			√
2.	Noise & / Vibration					√	√	√	√			√	√		√
3.	Land Use					√	√			√	√	√	√		√
4.	Topography						√	√		√	√				
5.	Geology						√			√	√				
6.	Drainage Pattern														
7.	Surface Water													√	
8.	Ground Water														
9.	Soil					√	√	√	√	√	√	√			√
B.	**Biological**														
1.	Flora					√	√	√	√	√	√	√			
2.	Fauna					√	√	√			√	√			
C.	**Social / Socio-Economic**														
1.	Demography	√	√		√										
2.	Physical Displacement		√												
3.	Land Use (w.r.t. Population influx)		√		√										

S. No.	Project Activity / Likely Impacted Resources / Receptors	Land Acquisition				Mine development & Process				Reclamation and Greenbelt/plantation			Miscellaneous		
		Acquiring land	Displacement of households	Displacement of occupation	Rehabilitation & Resettlement of PAFs	Site Clearing within the project area and Leveling of site (removal of vegetation, structures etc.), Storage of soil	Mining Operation (excavation with Drilling, blasting)	Loading and unloading of mined out material	Transportation limestone to existing cement plant through dumpers.	Dump formation (terracing, construction of garland drains & retaining walls)	Reclamation of mined out pits by backfilling	Greenbelt Development and maintaining greenbelt of 7.5 m statutory barrier & along roads. Plantation on backfilled area, upper benches at conceptual stage	Workshop for HEMM maintenance in mine.	Meeting points of workers/ employees i.e. Rest shelter, canteen	Handling of high explosive in magazine & AN storage shed and fuel
4.	Habitation	√	√		√										
5.	Economy & Livelihood	√		√	√	√									
6.	Social & Cultural Structure				√									√	
7.	Infrastructure & Public Services				√	√									
8.	Public Health						√	√				√			
9.	Agriculture	√		√		√	√								
10.	Transport Infrastructure								√						
D.	**Occupational Health**														
1.	Injury					√	√	√							√
2.	Health							√							√
3.	Non - routine risk						√								√
	Legends		Show no interactions is reasonably							√	Show interactions reasonably possible with one of the outcomes may lead to potential impact				

According to the interactions identified between project activities and resource/receptors as described in the above table, it is evident that the following aspects are likely to have impact due to the mining project (Table: 4.5) and therefore, to be considered for Impact Assessment:

Table - 4.5

Likely Impacted Resources / Receptors

S. No.	Likely Impacted Resources / Receptors	
A.	**Physical:**	Air Quality
		Noise Level, ground vibrations
		Water environment (Surface & Ground water)
		Soil Environment
		Land Use
		Geology &Topography
B.	**Biological environment**	Flora
		Fauna
C.	**Socio economic environment**	Habitation & Demography
		Physical Displacement
		Land use (w.r.t. population influx)
		Economy & Livelihood
		Social & Cultural Structure
		Infrastructure & Public Services
		Public Health
		Agriculture
		Transport Infrastructure
D.	**Occupation Health & Safety**	Injury
		Health
		Non-Routine Risk

Source: *Interaction Matrix*

The impacts of mining on various environmental parameters were assessed and are given below:

4.5 ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

The mining activities may disturb environment in various ways such as degradation of land, dust generation, deterioration of water and soil quality, affecting the biological and socio-economic environment of the area. The impacts of mining on various environmental parameters were assessed and are given below:

4.5.1 IMPACT ON AIR QUALITY AND MITIGATION MEASURES

The proposed mining project includes various mining operations involving development of benches, approach roads, excavation and transportation of mineral. These operations result in generation of dust and thereby pose health hazards. However, adequate control measures will be

provided at every stage of operation such as water sprinkling on haul roads to reduce fugitive dust emissions.

4.5.1.1 AIR POLLUTION DUE TO PROPOSED LIMESTONE MINING PROJECT

(i) Gaseous Pollution

Gaseous pollutants (PM_{10}, $PM_{2.5}$, SO_2 and NO_X) are anticipated from blasting operation and movement of Machineries like excavators, loaders, dumpers & other vehicles.

(ii) Particulate Matter

The generation of dust is anticipated from various mining activities like drilling, blasting, excavation, loading, unloading, crushing and transportation and other related activities. The ambient air quality monitored during Summer Season (March to May, 2023) (results discussed in Chapter - 3) shows that the PM concentration in the surrounding villages is within the prescribed limits, which indicates negligible/ no impact on ambient air quality.

4.5.1.2 AMBIENT AIR QUALITY IMPACT PREDICTION MODELING

Impact Prediction is an important part of Environmental Impact Assessment Study. There are various techniques available to predict the impacts. Mathematical Modelling is an established and accepted technique for the same. The ambient air quality impact prediction modelling has been carried out for this proposed limestone mining project of Meghalaya Cements Limited.

This report gives the concentration of Particulate Matter up to a distance of 10 km. The concentrations have been predicted in all directions. Spatial distributions of all the pollutants are also presented in the form of Isopleths. Details of Total Handling are given in the table below:

Table - 4.6

Total handling for Impact Assessment

S. No.	Particular	Million TPA	Normative (305 days)		Peak Stage (+20%)	
			TPD	TPH	TPD	TPH
1.	Limestone	1.007	3302	413	3963	496
2.	Waste	0.8	2623	328	3148	393
Total Excavation		**1.807**	**5925**	**741**	**7111**	**889**

Total proposed material handling of 1.807 million TPA comprises 1.007 million TPA Limestone, 0.8 million TPA Waste.

At Peak Stage (+20%)

In case of shut down/breakdown/major maintenance in crusher production of mine may be suspended temporarily and due this short fall may create in limestone stock in plant side; therefore, to cover up this short fall, considered 20% maximum production as compared to daily production & meanwhile in that period development work - removal of over burden etc. considered at 20% maximum as compared to daily capacity. However, the annual production will remain same i.e., Limestone 1.007 million TPA, 0.8 million TPA waste.

After considering the 20% increase in the limestone production per day will be 3963 tonnes & Others (Waste) will be 3148 tonnes; thus, total handling will be 7111 tonnes/day (At Peak Stage). The same has been considered for air quality modelling.

This report gives the cumulative peak incremental concentration of Particulate Matter up to a distance of 10 km, due to the mining & allied activity. The concentrations have been predicted in all directions covering study period. Spatial distributions of all the pollutants are also presented in the form of Isopleths**.**

4.5.1.2.1 ACTIVITIES INVOLVED IN THE PROJECT:

Opencast mining involves drilling, blasting, excavation, loading/unloading, transportation by road, movement of HEMMs etc.

4.5.1.2.2 EMISSION RATE AS PER MATERIAL HANDLED

The emissions in the present case have been computed using empirical factor given in "Indian Mining and Engineering Journal". The details of emissions computed from mining operations proposed in both the leases are given below:

Table - 4.7

Emission rate as per material handled

S. No.	Activity	Category of Source	Emission Rate		Emission Load	
			Values	Unit	Kg/day	Contribution (Percent)
1.	Drilling	Point	0.805908644	g/s	34.82	3.94
2.	Limestone Loading	Point	0.548918454	g/s	23.71	2.69
3.	Waste loading	Point	0.592976267	g/s	25.62	2.90
4.	Haul Road	Line	0.010513022	g/s/m	454.16	51.43
5.	Limestone Unloading	Point	0.779559151	g/s	33.68	3.81
6.	Waste Unloading	Point	0.58031008	g/s	25.07	2.84
7.	Exposed Pit face	Area	2.61443E-05	g/s/m^2	124.23757	14.06906
8.	Exposed Waste Dump	Area	6.99913E-05	g/s/m^2	161.76391	18.31866
Total SPM Load (kg/day)					**883.06**	**100%**
Uncontrolled (Without EMP)						
SPM Emission (g/s)					20.44	-
SPM Emission Rate (g/s/m^2)					7.71362216E-05	-
PM_{10} Emission Rate @50 % of SPM (g/s)					10.22	-
$PM_{2.5}$ Emission Rate @ 40% of PM_{10} (g/s)					4.09	-
Controlled (With EMP)						
PM_{10} Emission Rate @80 % efficient mitigations measures(g/s)					2.04	-
$PM_{2.5}$ Emission Rate @80 % efficient mitigations measures(g/s)					0.82	-

S. No.	Activity	Emission Rate(gm/sec)	Emission Rate(kg/day)
Uncontrolled without EMP			
SO2 Emission Rate		0.241546624	9.565246
NO2 Emission Rate		0.148331125	5.8739126

4.5.1.2.3 MODELING PROCEDURE

The line source modelling was done by using AERMOD 10.0 - line source model. Deterioration factor and Emission factors for vehicles were collected from report of Automotive Research Association of India (ARAI) and CPCB guidelines.

Meteorological inputs required are hourly wind speed and direction, ambient temperature, stability class and mixing height. The model details are given below.

4.5.1.2.4 METEOROLOGICAL DATA

Data recorded at the weather monitoring station on wind speed, direction, and temperature at one-hour interval for the monitoring period i.e. Summer Season (March to May 2023) has been used as meteorological input.

4.5.1.2.5 AMBIENT AIR QUALITY STANDARDS

Ambient air quality standards promulgated by National Ambient Air Quality Standards for different areas are as follows:

Table - 4.8

Ambient Air Quality Standards

Area	Time Weighted Average	Concentration (µg/m³)			
		PM10	PM2.5	SO2	NO2
Industrial Area, Residential Rural and Other Areas	Annual Average	60	40	50	40
	24 hours	100	60	80	80
Ecologically Sensitive Area (Notified by Central Govt.)	Annual Average	60	40	20	30
	24 hours	100	60	80	80

4.5.1.2.6 PRESENTATION OF RESULTS

In the present case, model simulations have been carried out for mining project and also cumulative for proposed mine and other existing mine nearby to obtain an optimum description of variations in concentration over the site in 10 km radius covering 16 directions.

Table - 4.9 (a)

Predicted incremental concentration due to the proposed mine

Criteria Pollutants	Value at Mine Site (µg/m³)	Predicted incremental GLC (µg/m³)	Total GLC (µg/m³)	Prescribed Standards Value in µg/m³
PM10	70.9	1.52	72.42	100
PM2.5	42.1	0.61	42.71	60
NO_x	17.3	0.81	18.11	80
SO_2	9.6	0.91	10.51	80

The incremental concentrations have been estimated based on mathematical emission data-based modelling. For each time scale i.e., for 24 hrs, the model computes the maximum GLC observed during the period over all the measurement points. In the present case, model simulations have been carried out for proposed mining project and also cumulative for proposed mine and other existing mine nearby to obtain an optimum description of variations in concentration over the site in 10 km radius covering 16 directions.

For PM 10, maximum predicted incremental concentration for proposed Limestone mine is found to be 72.42 µg/m^3 Figure 4.1 (a)

For PM 2.5, maximum predicted incremental concentration for proposed Limestone mine is found to be 42.71 µg/m^3 Figure 4.1 (b)

For SO_2, maximum predicted incremental concentration for proposed Limestone mine is found to be 10.51 µg/m^3 Figure 4.1 (c)

For NO_x, maximum predicted incremental concentration for proposed Limestone mine is found to be 18.11 µg/m^3 Figure 4.1 (d)

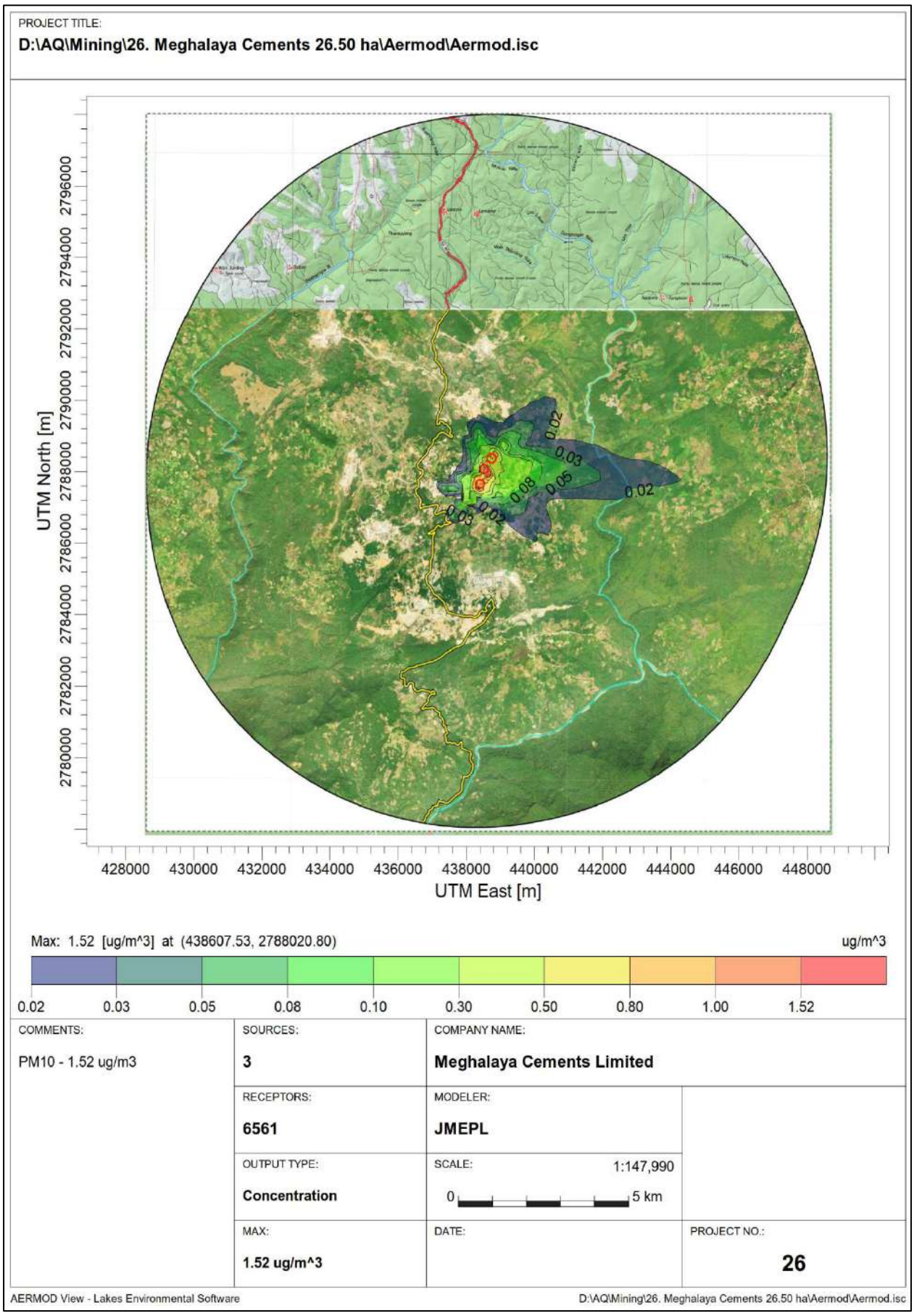


Figure 4.1(a): Isopleth Showing the Predicted Incremental Value of PM10 due to proposed mine

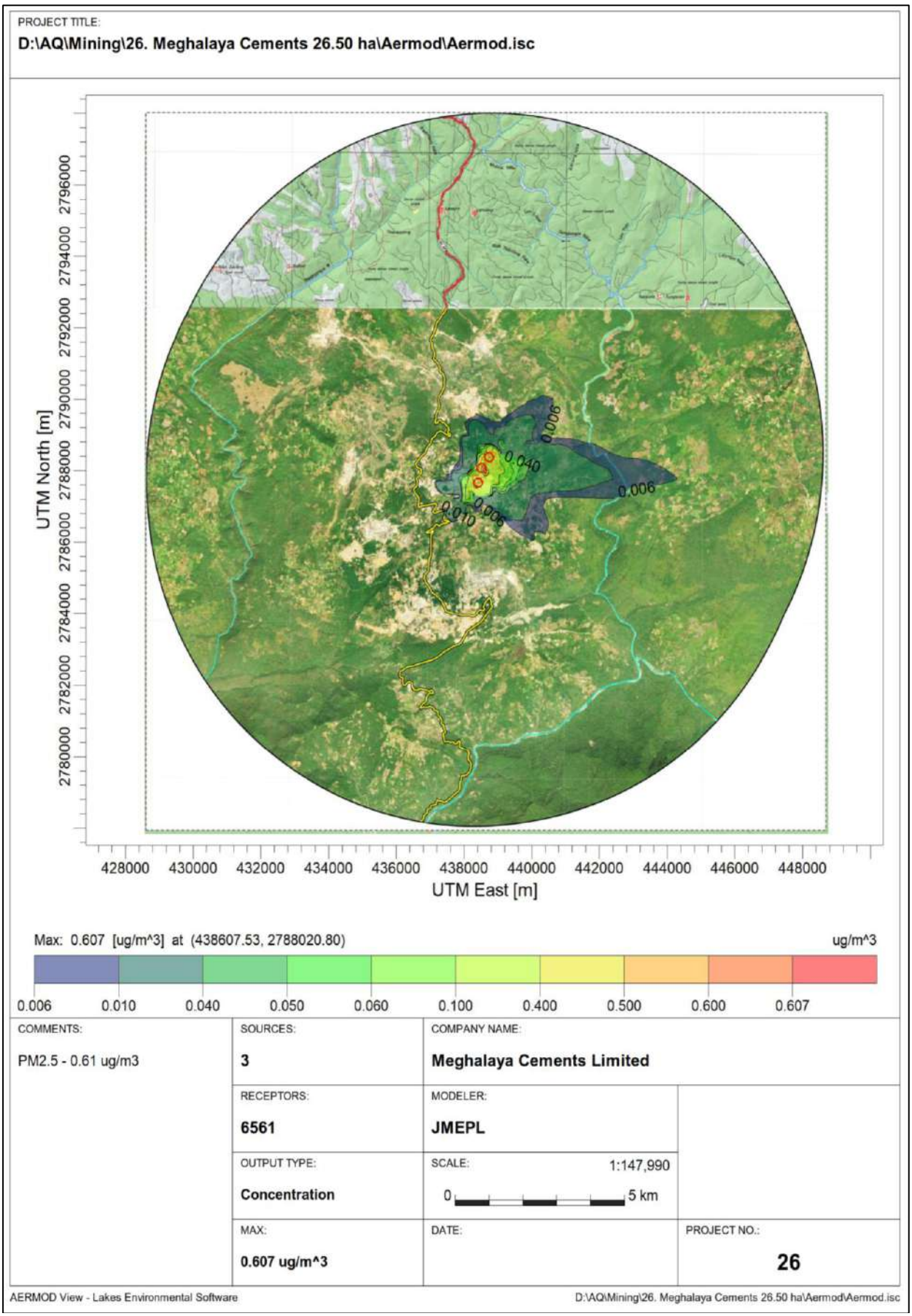


Figure 4.1(b): Isopleth Showing the Predicted Incremental Value of PM2.5 due to proposed mine

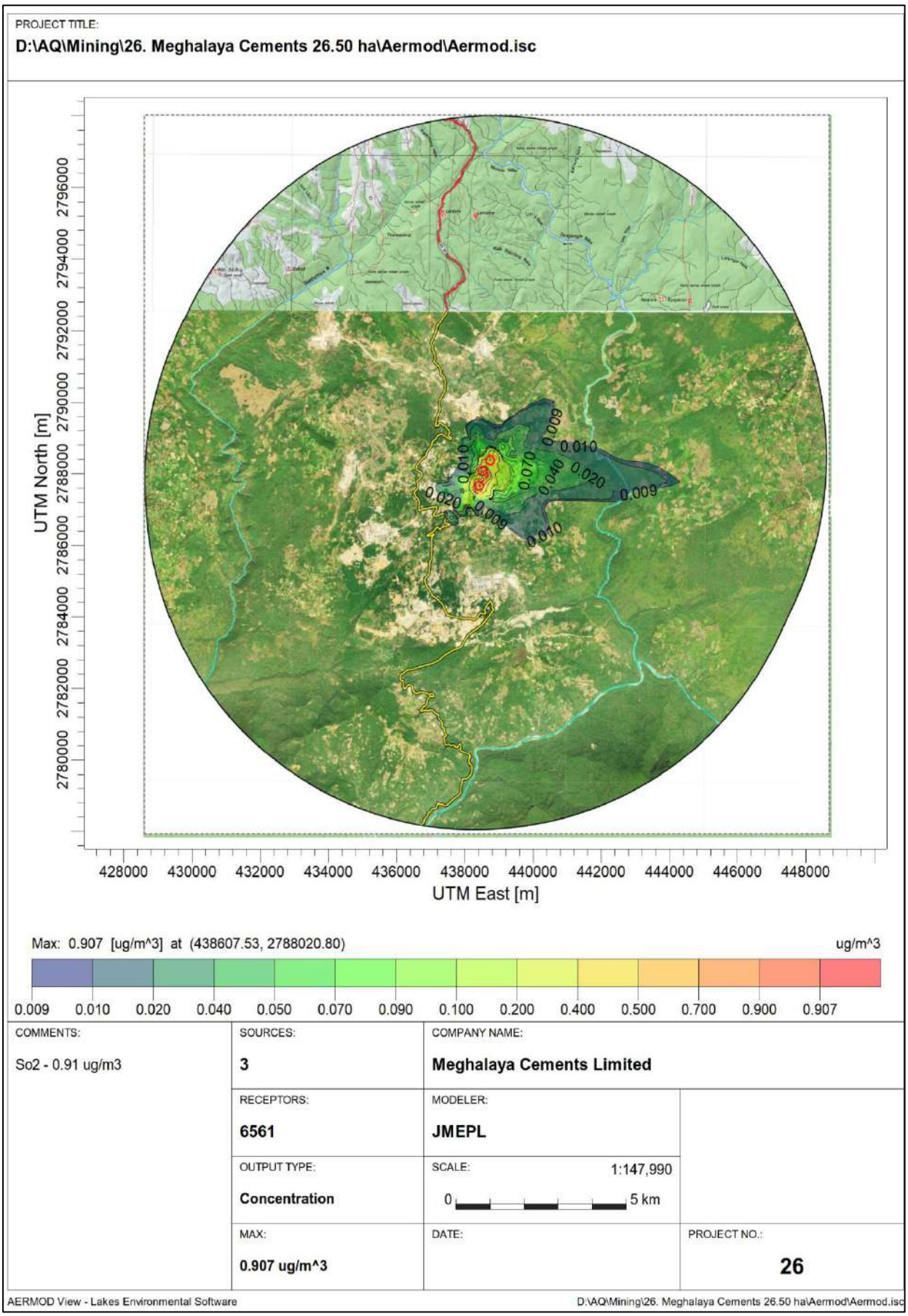


Figure 4.1(c): Isopleth Showing the Predicted Incremental Value of SO_2 due to proposed mine

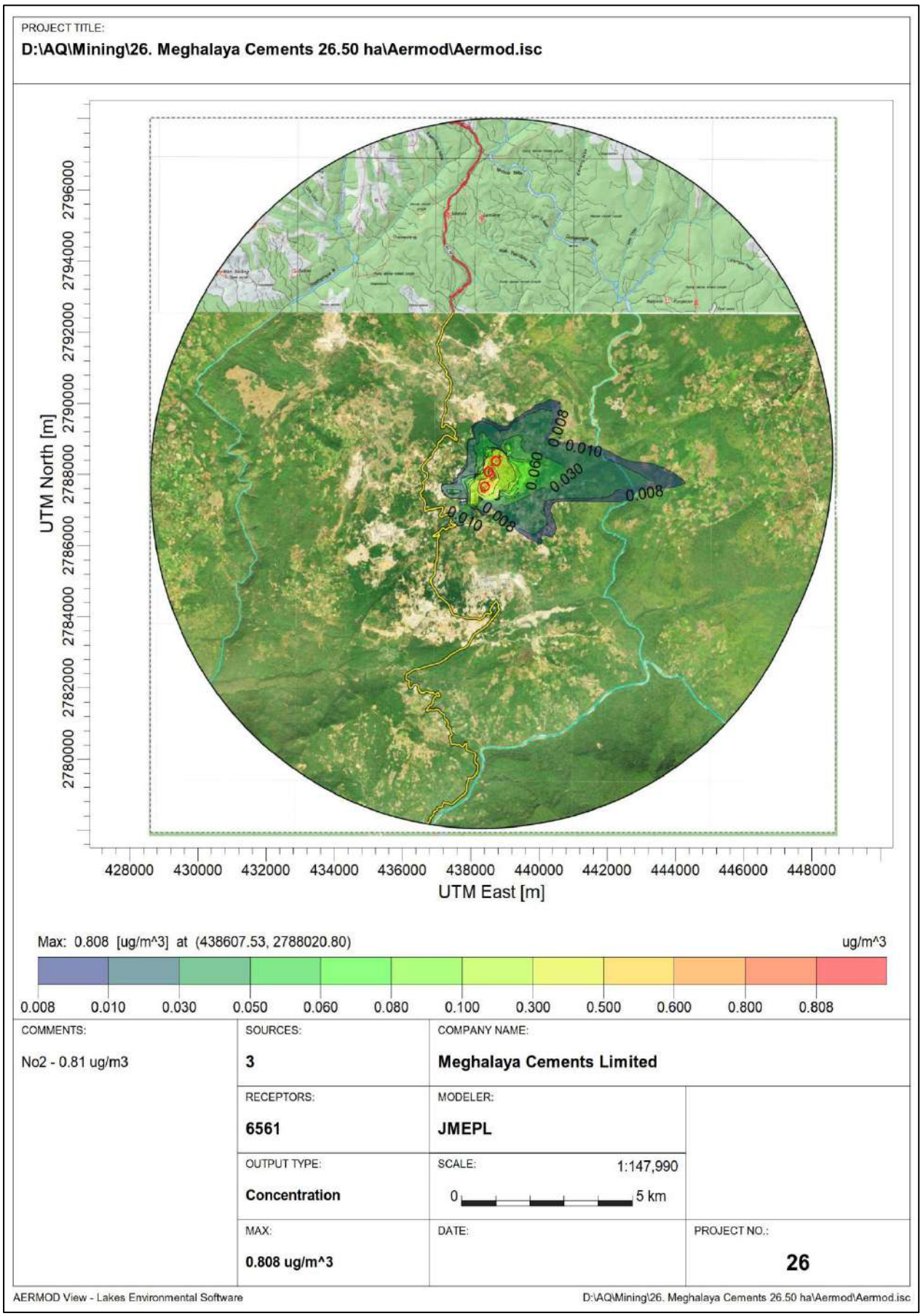


Figure 4.1(d): Isopleth Showing the Predicted Incremental Value of NO2 due to proposed mine

4.5.1.2.7 IMPACT EVALUATION

Ambient Air Quality monitoring results are given in table 3.9 & 3.10, Chapter 3 of this Draft EIA/EMP report. From this it is evident that AAQ results are well within the prescribed norms. Impact evaluation is given in table below.

Table - 4.10

Impact Evaluations for Ambient Air Quality

Impact Evaluation Element	Change in Air Quality Due to The Proposed Limestone Mining Project			
Potential Effect/ Concern	Impact on health of humans and nearby biological/ecological receptors due to line and point sources of air emissions including fugitive dust emissions during limestone mining activities from the proposed Project			
Characteristics of Impacts				
Nature	Positive		***Negative***	Neutral
			√	
Type	***Direct***	Indirect	Cumulative	
	√			
Extent	*Project Area*	*Local*	**Zonal**	Regional
			√	
Duration	Short – term		Long- term	
	√			
Intensity	Low		***Medium***	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	**Continuous (C)**
			√	
Significance of Impact				
Significance	Insignificant	Minor	**Moderate**	Major
			√	

4.5.1.2.8 MITIGATION MEASURES

The following mitigation measures will be adopted to mitigate air pollution generated due to the mining activities:

- Drilling machines will be equipped with sharp and wet drilling arrangements
- Sharp and wet drill bits of will be used along with dust collection system.
- Drill operators will be provided with protective equipment like dust masks.
- Controlled blasting will be adopted.
- Slurry/ Emulsion High explosives & ANFO will be used and its optimum use will help in reducing the air pollution.
- Well-designed blasting parameters are proposed to be adopted
- Rock breaker will be used in place of secondary blasting.
- Water sprinkling will be done before blasting.
- Water spray on blasted muck pile before dozing/loading.

- Water Tankers will be provided for water sprinkling on haul roads, loading, unloading and transfer points.
- Dumpers will not be overloaded to avoid any spillage of loaded materials.
- Operator cabins of major HEMM equipment will be closed to minimize dust exposure to the operators.
- Proper maintenance of the HEMMs & transportation vehicles will be done.
- Vehicular emissions will be kept under norms.
- Personal Protective Equipment like dust masks will be provided to all employees.
- Regular Ambient Air Quality Monitoring will be carried out. Greenbelt will be developed around the periphery of the lease area having a total of length and width of 3300 m and 7.5 m respectively. (Total area to be covered under greenbelt will be 2.47 ha)
- Density of plantation would be 1500 trees / ha with a survival rate of more than 70%.

4.5.2 IMPACT OF NOISE / VIBRATIONS AND MITIGATION MEASURES

4.5.2.1 IMPACT OF NOISE ON WORKING ENVIRONMENT

With the mining operations for mine development, excavation and transportation of limestone, it is imperative that noise levels would increase.

1. Noise Generated due to Drilling, Excavation and Transportation

The drilling operations in the limestone mine will be carried out with drill machines. The noise levels in the working environment will be maintained within the standards prescribed by Central Pollution Control Board. These standards were established with the emphasis on reducing the hearing loss. The permissible limits, as laid down by CPCB, are presented in following table:

Table - 4.11

Permissible Exposure in Case of Continuous Noise (CPCB, Govt. of India)

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

Source: *CPCB Standards*

2. Noise Generated Due to Blasting

Noise generated from blasting is for a short duration and is instantaneous. Noise of blast is site specific and depends on type, quantity of explosives, dimensions of drill holes, degree of compaction of explosive in the blast holes. The noise level tends to decrease significantly with distance.

4.5.2.2 MITIGATION MEASURES TO REDUCE AMBIENT NOISE LEVEL

The following control measures will be adopted to keep the ambient noise levels well below the limits:

- Drilling with sharp drill bits will be used to achieve optimum drilling performance and to reduce noise generation at source will be adopted.
- Personal protective equipment will be provided to the operators/workers in high noise area.
- Controlled blasting with proper spacing burden stemming and optimum charge/delay will be adopted to minimize noise and vibrations.
- Blasting will be carried out during day time only. NONEL delay detonators will be used to minimize ground vibrations, noise & fly rocks.
- Barricading the place of high noise Zone and isolation of noise impact zone.
- Rock breaker will be used to avoid secondary blasting.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- The prime mover's/ diesel engines would be proper designed and has been properly maintained.
- Explosives charge per hole and per delay will be maintained as per DGMS guidelines.
- Vibrations and noise generated by blasting will be monitored regularly.
- Adequate silencers in HEMMs will be provided to reduce generation of noise.
- The operator's cabin will be safe guarded with proper enclosures to reduce the noise levels.
- Development of green belt within 7.5 m lease periphery and plantation in undisturbed area and backfilled area.
- Periodical monitoring of noise will be carried out.

4.5.2.3 IMPACT EVALUATION OF NOISE

Ambient Noise Level monitoring results are given in table 3.13 and 3.14 Chapter 3 of this Draft EIA/EMP report. From this it is evident that results are well within the prescribed norms. Impact evaluation is given in table below.

Table - 4.12

Impact Evaluation for Noise

Impact Evaluation Element	Change of Noise Level due to the Proposed Limestone Mining Project			
Potential Effect/ Concern	Impact on health of humans and biological factors/receptors due to noise generated due to mining activities during day and night time and also on occupational health of the workers exposed to noise.			
Characteristics of Impacts				
Nature	Positive		***Negative***	Neutral
			√	
Type	***Direct***	Indirect	Cumulative	
	√			
Extent	***Project Area***	*Local*	Zonal	Regional
	√			
Duration	**Short – term**		Long- term	
	√			
Intensity	**Low**		*Medium*	High
	√			

Frequency	Remote (R)	Occasional (O)	Periodic (P)	**Continuous (C)**
				√
Significance of Impact				
Significance	Insignificant	Minor	**Moderate**	Major
			√	

4.5.2.4 IMPACT OF VIBRATION DUE TO BLASTING

Ground vibration, fly rock, noise, dust and fumes are the deleterious effects of blasting operation on environment. The explosive energy generates a seismic wave in the ground, which may cause significant damage to structures and disturbance to human occupants.

When an explosive charge is fired inside the blast hole it is converted into hot gases and sound which exert intense pressure on the blast hole walls. High intensity shock waves propagate radially in all directions and cause the rock particles to oscillate. This oscillation is felt as ground vibration. Blasting, in addition to easing the hard strata generates ground vibrations and instantaneous noise. Ground vibration from mine blasting is expressed by amplitude, frequency and duration of blast. The variables, which influence ground vibrations, are controllable and non-controllable. The non-controllable variables include general surface terrain, type and depth of overburden. Similarly, the controllable variables include type of explosives, charge per delay, delay interval, direction of blast progression, burden, spacing, specific charge and coupling ratio.

The oscillation of rock particles is called Particle Velocity and its value is called Peak Particle velocity (PPV), which is measured in millimetres per second. The standards for safe limit of PPV are established by Director General of Mines Safety for safe level criteria through Circular No. 7 dated 29.8.1997. The safe level criteria PPV as mentioned in Circular No. 7 of DGMS are presented below:

Table - 4.13

Permissible Peak Particle Velocity (mm/s)

S. No.	Type of Structure	Dominant Excitation Frequency (Hz)		
		< 8 Hz	8 - 25 Hz	> 25 Hz
A)	Buildings/structures not belonging to the owner			
1.	Domestic houses/structures (Kuccha brick and cement)	5	10	15
2.	Industrial Buildings (RCC and framed structures)	10	20	25
3.	Objects of historical importance and sensitive structure	2	5	10
B)	Buildings belonging to the owner with limited life span			
1.	Domestic houses/structures (Kuccha brick and cement)	10	15	25
2.	Industrial buildings (RCC and framed structures)	15	25	50

Source: DGMS Circular No. 7 dated 29.8.1997

As the distance increases the PPV value is likely to reduce. Following mitigation measures will be adopted to combat the ground vibrations due to blasting:

- Ground vibrations will not affect the structures in the vicinity of ML area as blasting will be done within the standards prescribed by DGMS for controlled blasting.
- Explosive charge per hole and per delay will be maintained as per DGMS guidelines.
- NONEL will be used to control ground vibrations, noise & fly rocks.
- Blasting will be carried out during day time only.

- Blasting study will be done after commencement of mining operation.
- Blast monitoring will be done regularly at least once in a month.

4.5.2.5 IMPACT SIGNIFICANCE OF GROUND VIBRATIONS

Table - 4.14

Impact Evaluation for Ground Vibrations

Impact Evaluation Element	Ground Vibrations due to the proposed limestone mining project			
Potential Effect/ Concern	Impact on buildings and other structures and on the workers involved in the blasting process.			
Characteristics of Impacts				
Nature	Positive		***Negative***	Neutral
			√	
Type	***Direct***	Indirect	Cumulative	
	√			
Extent	***Project Area***	***Local***	Zonal	Regional
	√			
Duration	**Short – term**		Long- term	
	√			
Intensity	Low		***Medium***	High
			√	
Frequency	Remote (R)	Occasional (O)	**Periodic (P)**	Continuous (C)
			√	
Significance of Impact				
Significance	Insignificant	**Minor**	Moderate	Major
		√		

4.5.3 IMPACT ON WATER ENVIRONMENT AND MITIGATION MEASURES

4.5.3.1 IMPACT ON SURFACE WATER AND MITIGATION MEASURES

Core Zone: No water body is existed at present as the ML area is a natural unbroken land. There is no major perennial river or lake & canal is present in and around the proposed mine site Plantation will be developed all along the ML boundary and bench plantation will be done which will also help in minimizing any negative impacts.

Buffer Zone: There are 3 rivers and 4 nala's namely Lubha River (~ 3.0 km in ENE direction), Sonapur River (~ 7.0 km in SE direction), Seshyampa River (~ 7 km in NW direction) and Dongtongle Nala (~6.5 km in North direction), Latynger Nala (~ 9.0 km in NE direction), Wah Thaniang Nala (~5.5 km in North direction), Rashniang Nala (~9.0 km in North direction) exists within the 10 km radius study area. The river is bounded by mountains and landscape on both sides as it is flowing downward Bangladesh. All the major rivers and streams flow towards south. The drainage system of the district is also to an extent controlled by topography. The streams and rivers of the study area flow in the southerly direction and towards the Surma valley in Bangladesh.

Figure 4.2: Map Showing water bodies in the Buffer Zone (10 km radius study area)

The following mitigation measures will be adopted:

- No stream perennial or seasonal present in mining lease area
- Elevation of mining lease area is ranging from 717 m AMSL to 765m AMSL. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is more above the water table
- Retaining wall of 540mx15mx15m long all around the bottom periphery of waste dumps followed by garland drains of 540mx15mx1m shall be constructed during the plan period.
- Besides the garland drains and the retaining walls two settling ponds of 8 m x 8m x 3m size each will be constructed at the end of garland drain of OB dump and soil dump which will accumulate water.
- The garland drains shall be canalized in such a way that the water flows to an area which will be non-ore bearing.
- Regular cleaning of the drain shall be done for easy flow of water.
- Besides the garland drains and the retaining walls, two settling ponds of 10 m x 10m x 2m size each will be constructed at the end of garland drain of OB dump and soil dump, which will accumulate water.

- Waste water from Mine office will be disposed in soak pit via septic tank
- Effective and suitable arrangements for installation of ETP/WTP will be made for treatment of effluents discharged from workshop and Township and for their reuse to reduce the fresh water consumption.
- Periodical monitoring of ground water quality & water level will be carried out.

4.5.3.2 IMPACT ON GROUND WATER AND MITIGATION MEASURES

Ground water pollution by toxic substances: Ground water pollution can take place only if the mining rejects contain toxic substances, which get leached by the precipitation of water and percolate to the ground water table thus polluting it. Any nearby wells or other sources of water can be rendered unfit for drinking and even for industrial use. The mineral limestone and associated rocks do not contain any toxic substance. Therefore, there is no significant impact of mining activities on quality of any source of water and its quality.

Ground water Withdrawal: There is no groundwater withdrawal for the proposed project. The total water requirement for the proposed this mining project will be 30 KLD which will be sourced from Water tank located near the Captive Power plant of the of the lessee within cement plant. The main source of water is the river Wah Chyrtong. Permission of the same has been taken from Department of Irrigation vide NOC No. AID (J)223/2007-2008/ dated 24.03.2008.

Ground water intersection due to Mining activity: Elevation of mining lease area is ranging from 717 m AMSL to 765m AMSL. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table

No waste water will be discharged outside lease boundary. Therefore, no adverse impact on water quality is envisaged due to the proposed mining project.

Positive Impacts: Meghalaya Cements Limited will assist to improve the drinking water facilities in the nearby area under CSR/ Socio Economic Development Program.

4.5.3.3 WATER MANAGEMENT

- Waste water from Mine office will be disposed in soak pit via septic tank
- Regular monitoring of ground water level and its quality will be carried out with in mining lease by establishing a network of existing wells and constructing piezometers.

4.5.3.4 WATER CONSERVATION MEASURES

A. Water recycling

- Waste water from Mine office will be disposed in soak pit via septic tank.

B. Rain Water Harvesting

- Garland drains (Dimensions: (approx. L x W x H= 540mx15mx1m) & Retaining Wall at dump (approx. L x W x H=540mx15mx15m)) & settling tanks will be constructed to arrest surface run-offs. (Construction of garland drain and retaining wall in plan period is shown on the right.)
- At conceptual stage, an area of 9.734 ha will be kept as water logged area.
- Rain water harvesting water sunk at lower part of the excavated pit for storage by natural means on mine pit and it will be facilitating the dust suppression, green belt development, firefighting groups and recharging the subsurface water through voids.
- Details of rainwater harvesting are given in Chapter - 7 of this Draft EIA/ EMP Report.

	Mine Lease Boundary
	Garland Drain
	Retaining Wall
	Water Logged Area

PROTECTIVE SAFETY MEASURES FOR WATER RESERVOIR AT CONCEPTUAL STAGE

- Construction of fencing along the periphery of the reservoir.
- Construction of bund along the periphery of the reservoir.
- Plantation will be done along the periphery of the lease area.
- Safety sign boards will be placed on the bunds.
- Grouting/Filling of joints/fractures on leftover bench slopes using impervious clay.
- Conduct of geo-technical stability studies involving expert agencies.

4.5.3.5 IMPACT EVALUATION

Impact evaluation is given in table below.

Table - 4.15

Impact Evaluations for Water Environment

Impact Evaluation Element	Change in the water environment (quantity as well as quality of Surface and Ground water) due to proposed limestone mining project
Potential Effect/ Concern	Increase in water availability in the area due to development of water reservoir and catch drains in the lease area.
Characteristics of Impacts	

Nature	***Positive***	Negative	Neutral
	√		

4.5.4 IMPACT ON SOIL / LAND USE PATTERN AND MITIGATION MEASURES

4.5.4.1 IMPACT ON SOIL ENVIRONMENT

Nature of Top Soil: During the plan period (first five years) no Top soil will be generated.

Generation & Management of Top Soil

During the plan period (first five years) waste will be generated. About 0.8 million Tonnes of waste will be generated during plan period and at conceptual stage, 2.10 million tonnes of top soil will be generated which will be used in Greenbelt development/ plantation.

Impact & Protective Measures

No major impact on soil of the study area is envisaged due to mining activities, as mining process neither involves any wet mineral beneficiation process or any chemical mineral beneficiation process. Fugitive dust of mining area will mainly be confined within ML area and will not impact soil of buffer zone. Further, dust in mining area is of neutral nature and does not contain toxic elements which may impact soil. Greenbelt area shall be developed in 7.5 m safety barrier all around the ML and this will help to contain fugitive dust within ML area itself.

There will be no discharge of industrial waste water to surrounding areas and hence impact on the soil is not envisaged.

By adopting efficient dust suppression measures, the contamination of dust with soil will be avoided. Following measures will be taken to reduce the impact of mining on adjacent land with reference to run off, soil erosion and loss of top soil:

Run Off

- Garland drain having siltation pits will be provided at the toe of the dumps, to channelize the runoff water from dumps into the water reservoir (i.e. mined out pits).
- To control the surface run-offs, Retaining Wall around waste dump will be constructed.
- To arrest the silt and sediment flow, the retaining wall of length 540 m and Garland Drain of length 540 m is proposed.

Soil Erosion

- The increased green cover will substantially prevent soil erosion.
- Greenbelt will be done over an area of 2.47 ha covering 7.5 m periphery of the lease area.

4.5.4.2 LANDSCAPE AND LAND USE PATTERN

Land use pattern of the mining lease area during pre-operational, operational and post-operational phases have been given in Table 4.16:

Table - 4.16

Stage Wise Land Use and Reclamation Area (Ha)

S. No.	Type of land use	At present	At the end of Plan Period	Conceptual Period (End of life of mine)
1.	Excavated Area	1.18*	9.71	24.034
2.	OB Dump	3.72	9.64	-
3.	Topsoil storage	-	-	-
4.	Greenbelt on virgin land	-	2.47	2.47
5.	Roads	1.28	0.97	-
6.	Mineral Separation Plant	0.23	-	-
7.	Tailing Ponds	0.01		
8.	Others to Specify	0.19		
9.	Undisturbed area	19.89	3.71	-
Total		**26.50**	**26.50**	**26.50**

**1.18 ha area is covered by old mined out pit having dimension as 165*65*18.*

Source: *Approved Mining Plan with Progressive Mine Closure Plan*

4.5.4.3 RECLAMATION PLAN FOR LAND

- At the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha.
- Mining will be done in one pit. Pit wise excavation and reclamation plan is given below respectively:

Table - 4.17 (a)

Pit wise Excavation Plan

S. No	Every five-year interval till life of mine	Pit No	Max. Depth (RL)	Excavated Area (Ha)
1.	1st year	Pit 1	712	2.68
2.	2nd year	Pit 1	712	4.07
3.	3rd year	Pit 1	706	5.35
4.	4th year	Pit 1	712	7.63
5.	5th year	Pit 1	706	9.71
Total				**9.71 (Cumulative Area is the Total Area)**

Table - 4.17 (b)

Reclamation Plan

S. No	Every five-year interval till life of mine	Reclaimed area Greenbelt (ha)	Rehabilitated Area
			Greenbelt
1.	1st year	0.50	0.50
2.	2nd year	0.50	0.50
3.	3rd year	0.47	0.47
4.	4th year	0.52	0.52
5.	5th year	0.48	0.48
Total		**2.47**	**2.47**

4.5.4.4 IMPACTS ON LAND USE PATTERN

A. Impacts on Core Zone:

a. Impact on Land use:

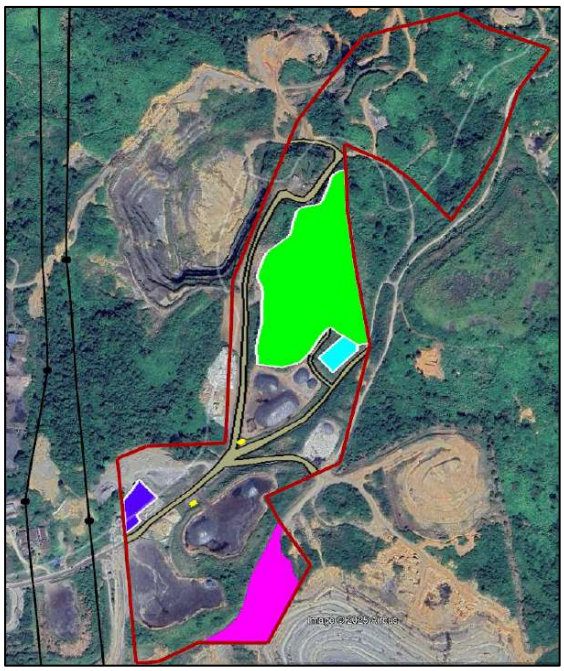
- Total mine lease area is 26.50 ha and total lease is a private land.
- This is a proposed limestone mining project. The land use of the lease area will alter due to mining activities such as formation of pits, temporary dumps, greenbelt, water reservoir etc.
- At the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha.
- Conceptual plan showing impact on land use of core zone is given as ***Annexure - 8*** with this Draft EIA/ EMP Report.

b. Impact on Village roads/ Cart Tracks and mitigation measures:

- One National Highway (NH-06) is located at 2.6 km in SW direction. NH - 06 (Jowai - Badarpur National Highway) is at a distance of 0.6 km in west direction.
- Internal Kacha roads are present inside the lease area

c. Impact on Electric Lines (HT & LT)

- Two Electric transmission lines are passing from North to South towards western side of the ML area. The 1" H.T line and the 2nd H.T. Line are 54.00 m and 141.00 m away from the proposed ML area boundary respectively.



	Mine Lease Boundary		Internal Kacha Road
	Tailing Pond		Old Working Pit
	Old Dump		Small Crushing Unit
	Clay Bhatta		HT Line

Figure 4.3: Map showing site features of the proposed ML Area

B. Impacts on Buffer Zone

The study area mainly comprises of Forest/ Mixed jungle (81.46%), Vegetation/ Plantation (8.72 %), Open Scrub/ wasteland (4.93%), settlement (0.60%), Roads (0.57%), Mine Quarry/ Stone Quarry (1.67%), Surface Water bodies (1.07%). There will be no change in land use of buffer zone due to proposed mining activity.

Mining activity will be confined to the mineralized zone and proper pollution control measures will be adopted to restrict the pollution load within the active zone in order to prevent any negative impact on nearby areas. Adequate measures will be taken to control the pollutants within active mine area.

a. Impact on water bodies:

- There are perennial surface water bodies within the 10 km radius study area. Four nala's are also present in the study area. The nearest water body is Lumbha River (3.0 km in ENE Direction). Other water bodies are more than 5 km from the ML area.
- Increase in suspended solids due to soil run-off during heavy precipitation due to loosen soil.
- Water quality like turbidity may be change due to direct run off.

Mitigative measures to protect water bodies

- No erosion wash off will be directly allowed to go to the Natural System as it will be arrested by Garland drains and Retaining walls.
- Regular Surface Water Quality Monitoring will be carried out.

b. Impact on nearby agricultural land:

There is a less part of Agriculture fields exists in study area. To reduce the impact on nearby agriculture fields due to mining, following mitigation measures will be taken:

- Mining activity will be confined to the mineralized zone and pollution control measures will be adopted to restrict the pollution load within the active zone in order to prevent any negative impact on nearby areas.
- Mine lease periphery having an area of 2.47 ha will be developed as greenbelt. It will act as bio-filter and will help to control and confine the emission within ML boundary.
- Awareness for new methodologies of agricultural practices viz. mixed farming, crop rotation and agricultural cropping pattern suitable for the study area will also be carried out under CSR to increase the agricultural productivity of the study.
- Rainwater harvesting practices will be encouraged which will lead to ground water recharge and ultimately increased productivity in the study area.
- Water sprinkling will be done regularly on approach roads & haul roads.
- Under CSR program water from the water reservoir will be made available to the farmers as and when required.
- At the conceptual stage, 9.734 ha area will be converted into water logged area. Surplus water after fulfil the requirement of mine can be supplied to farmers for their agriculture purpose.
- Rainwater harvesting practices will be encouraged which will lead to ground water recharge and ultimately increased productivity in the study area.

- Awareness for new methodologies of agricultural practices viz. mixed farming, crop rotation and agricultural cropping pattern suitable for the study area will also be carried out under EMP to increase the agricultural productivity of the study area.

c. Impact on Forest Land:

- The process of mining clears large areas of forest, which leads to deforestation
- This destroys natural habitats for a variety of plant and animal species, leading to a loss of biodiversity.
- Mining disrupts resources, affecting both local communities and broader environmental health.
- Dust generated due to mining activities can settle on surrounding vegetation, affecting plant growth and damaging forest ecosystems.

Recommendations

To reduce the impact on forest land due to mining, following mitigation measures will be taken:

- Afforestation will be done in mined areas can help restore some of the ecosystem functions.
- Sustainable Mining Practices will be used.
- Proper post-mining land rehabilitation strategies will be used to stabilize the land, restore vegetation, and reduce long-term damage.
- Mine lease periphery having an area of 2.47 ha will be developed as greenbelt. It will act as bio-filter and will help to control and confine the emission within ML boundary.

d. Impact on nearby habitation and roads:

- **Habitation:** The nearby habitation might get affected due to the mining operation. Inside the major source of pollution is loading, unloading and blasting inside the ML and the major source of pollution outside the mine lease is Transportation. Considering the same the nearest habitation is Chiehruphi village.
- Major pollution due to the mining activities will be confined in the boundary of the ML area. Greenbelt will be developed in 7.5m (2.47) as a barrier and plantation will be done in the ML area near habitation area.
- **Impact on road:** Limestone from this proposed mine will be transported to the interlinked cement plant via road and no public road will be used for the same.
- Plantation will be developed alongside the approach road on whole patch of road which will be used for transportation of limestone.
- Detailed study of transportation has been done and mitigation measures have been given in section 4.5.6.

Recommendations

The following practices will be carried out to increase the productivity of the study area:

- Thick Greenbelt will be developed along the mine periphery covering an area of 2.47 ha.
- Company will also promote modern irrigation techniques to improve crop yield and to grow optimal crop varieties in its area of impact.

- Regular water sprinkling will be carried out on mining face and during loading dumpers and on haul roads to suppress dust.
- Further, in case transportation by road, dumpers will be covered with tarpaulin or will have covers having hydraulic arrangement for closing so that spillage free transportation is there.
- Additionally, the vehicles will be restricted to speed limitation.
- Machinery shall be maintained in good condition for reduced Noise levels. Scheduled maintenance of machines shall be carried out through AMC.
- Regular Ambient air quality monitoring, Dust and Noise Monitoring shall be conducted.
- Awareness for new methodologies of the agricultural practices viz. mixed farming, crop rotation and agricultural cropping pattern.
- Awareness & training programmes will be organized.
- Rainwater harvesting practices will be encouraged which will lead to ground water recharge and ultimately increased productivity in the study area.

4.5.4.5 IMPACT SIGNIFICANCE

Impact significance is given in table below.

Table - 4.18

Impact Evaluation to determine the Significance (Land use - during operation phase)

Impact Evaluation Element	Change in the land use due to mine development & operation			
Potential Effect/ Concern	Change in the land use of core zone from forest land, vegetation and plantation, waste land to mining activities (during operation) due to limestone mine development & operation activities			
Characteristics of Impacts				
Nature	Positive		***Negative***	Neutral
			√	
Type	***Direct***	Indirect	Cumulative	
	√			
Extent	***Project Area***	***Local***	Zonal	Regional
	√			
Duration	Short – term		Long- term	
			√	
Intensity	Low		***Medium***	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√

Significance of Impact				
Significance	Insignificant	Minor	**Moderate**	Major
			√	

Change in land use due to the mining activity at the conceptual stage will be positive as the land use of the lease area will be converted from forest land, vegetation and plantation, waste land to water reservoir, plantation area, public use area (at conceptual stage) due to limestone mine development & operation activities.

4.5.5 SOCIO-ECONOMIC ENVIRONMENT

The potential impact on socio-economic environment due to this mining project is given in following heads.

4.5.5.1 POSITIVE IMPACTS

Employment:

Direct and indirect employment opportunities will be generated during mining operation and other allied activities. Employment generated by MCL will provide a safe working environment for workers. Preference for employment will be given to locals based on need, eligibility and qualification.

Community Skill Development:

The local community will be benefitted from the training programmes that will be instituted by MCL to enable the community labor force to work for their livelihood/Self-growth. This training will improve their skill sets that will not only benefit MCL but also the community at large during and after the project life.

Improved Standard of Living:

Employment opportunities created by the project and skill development activities carried out under CSR, will increase income of local community and therefore improve the overall standard of living in the area.

Improved Water Supply:

Supply of drinking water for the community by MCL will improve the health standards and living conditions in the villages. Water logged area of area 9.734 ha at the conceptual stage will improve the surface/ground water availability in the area.

Economic Exposure and Development:

Implementation of the project will make opportunities for sustainable livelihood, better infrastructure facilities and services available to the people. This will expose and introduce the local population to factors of economic development including the banking system, financial services and credit and investment schemes.

Impact on Civic Amenities

The impact of the proposed limestone project on the civic amenities will be positive. With improved transportation facilities, educational facilities and other recreational facilities etc. there will be improvement in civic amenities. The communication facilities will also improve in the area.

4.5.5.2 ADVERSE SOCIAL IMPACTS

Health Impacts:

The project may trigger negative health impacts through increased dust, creation of breeding grounds for disease vectors, population influx which might introduce new diseases in the area and pressure on sanitation facilities.

Noise and Vibration:

The process of mining will entail drilling, blasting, excavation, and transportation. These activities generate noise and vibration. The impact of noise and vibration from the epicenter of these activities could have effects on the population living around these areas. The excessive vibration could lead to collapse of the structures.

Livelihood Change

Due to the labor intensity of the mining sector, the project will attract the more able-bodied persons from the community which in turn will lead to low labor availability in other sectors of the economy including agricultural, labor-intensive jobs etc.

Population Growth

This project will not have any substantial impact on the population growth. The proposed limestone project will generate employment opportunities for the people of nearby villages and rehabilitated families rendering positive impact on the area on the whole.

4.5.5.3 MITIGATION MEASURES

Mitigating Health Impacts:

As mentioned in 4.2.1, the incremental GLCs for various air pollutants will be restricted within the mining lease area and the impacts will be negligible on the nearby villages. Nevertheless, awareness programmes on health hazards will be conducted to create awareness amongst the employees as well as the local population. MCL will consider Health facilities under its CSR activities.

Health Care Facilities

Proper health care facilities will be provided to the employees of limestone mine along with their families. The medical facilities in form of primary medical camps will also be extended to local people in the nearby areas under CSR activities.

Managing Loss of Livelihood and Income:

To cushion the local population against impacts of mine closure, adequate advance intimation will be given to employees and contractors to allow them to seek alternative opportunities. Skills development programmes will also be undertaken by MCL to ensure sustainable livelihood for people of the nearby areas. It will be appropriate to mention that the Meghalaya contains number of limestone deposits which will give sufficient opportunities in Mining field itself after closure of this project.

4.5.5.4 IMPACT ON HUMAN SETTLEMENT

Mining lease area for proposed project is 26.50 ha, located at Villages: Chiehruphi, Taluka- Khliehriat, District- East Jaintia Hills, Meghalaya. Nearest habitation of Village Chiehruphi at 1.5 km WNW the lease area. Details of preventive measures to be adopted are given below:

Protection Plan for Nearby Habitation

To protect the nearby habitation from blasting and dust pollution, following measures will be taken into consideration during mining:

- Thick plantation will be done between the area falling in village habitation and mining pit.
- Mining will be carried out as per the provisions outlined in mining plan approved by Indian Bureau of Mines (IBM) as well as by abiding to the guidelines of DGMS.
- Controlled blasting will be done during day time only and optimum use of explosive energy will be made.
- Well-designed blasting parameters are proposed to be adopted.
- Explosives charge per hole and per delay will be maintained as per DGMS guidelines.
- Blasting will be done in a week and maximum holes will be blasted in one round.
- NONEL will be used to control ground vibrations, noise & fly rocks.
- All measures will be adopted to control fugitive dust emission during mining operation and to ensure no impact on nearby habitats.
- Green belt of 7.5 m width will be developed along the boundary of this barrier.

Mitigative measures for the nearby habitation in compliance of Ministry's O.M. No. Z-11013/57/2014- IA. II (M) dated 29.10.2014:

1) Best Mining Practices shall be adopted for the given mining conditions.
2) Adequate number of check dams, retaining walls/structures. garland drains and settling ponds will be provided in the mining area to arrest the wash-off with rain water in catchment area.
3) A provision for regular monitoring of water table in open dug wells located in village shall be incorporated to ascertain the impact of mining over ground water table.
4) MCL will ensure that the biological clock of the villagers is not disturbed by orienting the flood lights/ masks away from the village and keeping the noise levels within the prescribed limits for day and night hours so that it does not affect the health in villages located close to mining operations.
5) For conducting blasting for mining operations, proper vibration studies shall be carried out well before approaching such habitats or other buildings to evaluate the zone of influence and impact of blasting on the neighborhood. Within 500 meters of such sites vulnerable to blasting vibrations, avoidance of use of explosives and adoptions of alternative means for mineral extraction shall be practiced wherever practicable.
6) Provision of monitoring of each blast shall be made so that the impact of blasting on nearby habitation and dwelling units could be ascertained.
7) No mining operations shall be carried out within 50 meters of public works such as public roads and buildings or inhabited sites except with the prior permission from the Competent Authority.

8) Main haulage road in the mine shall be provided with permanent water sprinklers and other roads shall be regularly wetted with water tankers fitted with sprinklers.
9) It shall be ensured that the productivity of agricultural crops is not affected due to mining operations. Crop liability Insurance Policy for 5 km impact zone from the boundary of mine lease area shall be taken as a precaution to compensate for any crop loss.
10) No road movement shall be undertaken in existing village road network without appropriately increasing the carrying capacity of such roads.

Figure 4.4: Map showing nearby habitation around the Lease Area

4.5.5.5 PUBLIC HEALTH IMPLICATIONS

Common diseases in the region are Diarrhoea, Viral fever, Typhoid, Dermatitis, Urinary tract infections, Cataract, malaria, Gastrointestinal diseases etc. Such type of diseases is not related to the project and allied activities of the project. However, Proper Preventive/control measures will be taken by the company to reduce the impact of mining activities on public health and to improve the public health of the area so that adequate treatment can be given.

Following is some of the significant points for consideration under public health:

- As per the data, pre-dominant wind direction throughout year was observed from South West to North East direction. Habitation of Village Chiehruphi falls at WNW boundary of the project site.
- Chiehruphi village is at an approx. distance of 1.5 km from the proposed ML area.

- Greenbelt will be developed in 2.47 ha on 7.5 m lease periphery.
- Efforts will be made under improve the hygiene, sanitation, education and infrastructure of the nearby villagers under CSR activities, as per the requirement.
- All the employees when inducted will be medically examined. Further, they will also be medically examined at periodical interval.

4.5.5.6 IMPACT EVALUATION

Impact significance is given in table below:

Table - 4.19

Impact Evaluation to determine the Significance (Socio economic Environment)

Impact Evaluation Element	Impact on socio economics due to the proposed mining project			
Potential Effect/ Concern	No Human Settlement likes, Villages, residential Cottages, Houses or any kind of human habitation are present in the core zone. In 10 km study area human settlements are located in the villages.			
Characteristics of Impacts				
Nature	Positive		***Negative***	Neutral
				√
Type	***Direct***	Indirect	Cumulative	
	√			
Extent	***Project Area***	*Local*	Zonal	Regional
	√			
Duration	Short – term		Long- term	
			√	
Intensity	Low		***Medium***	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
				√
Significance of Impact				
Significance	Insignificant	Minor	**Moderate**	Major
			√	

4.5.6 IMPACT ON LOCAL TRANSPORT INFRASTRUCTURE

- Total limestone handling in the mine will be 3302 TPD. Blasted limestone will be loaded by large size hydraulic excavators into dumpers for onward dispatch to crusher (situated in cement plant) via road of length 1 km. From crusher the crushed limestone will be transported to cement plant via covered belt conveyor.
- No Public road will be used for the transportation of limestone from mine to cement plant. Therefore, there will not have any adverse impact on transportation infrastructure in the region.

Figure 4.5: Map showing transportation from Proposed Mine lease to Existing Cement Plant

4.5.6.1 MEASURES FOR TRANSPORTATION

Necessary mitigation measures will be adopted. The same are given as under:

- Limestone transportation to the crusher via dumpers through mine haul roads without any use of the public roads.
- Regular water sprinkling on mine haul roads during transportation and also at transfer points.
- Vehicles with PUC Certificate are being/will be used.
- Overloading is avoided both in mine and for cement evacuation.
- Un- necessary blowing of horn are being/will be avoided.
- The speed of heavy duty vehicles are being/will be kept low on the adjacent village road and also near to the densely populated areas
- Proper maintenance, oiling and greasing of vehicles is being/will be done.
- Greenbelt and Plantation along ML boundary, roads, dump and infra-structure facilities.

4.5.6.2 IMPACT EVALUATION

Table - 4.20

Impact Evaluations for Transportation Infrastructure

Impact Evaluation Element	No Change in traffic density due to transportation of material as no public road will be used			
Potential Effect/ Concern	There will be no load on existing transport infrastructure as no public road will be used for the transportation			
Characteristics of Impacts				
Nature	Positive		***Negative***	Neutral
				√
Type	***Direct***	Indirect	Cumulative	

			√	
Extent	*Project Area*	*Local*	**Zonal**	Regional
	√	√	√	√
Duration	**Short - term**		Long- term	
	√			
Intensity	**Low**		*Medium*	High
	√			
Frequency	Remote (R)	Occasional (O)	Periodic (P)	**Continuous (C)**
				√
Significance of Impact				
Significance	Insignificant	Minor	**Moderate**	Major
	√			

4.5.7 IMPACT ON BIOLOGICAL ENVIRONMENT

Habitat loss, degradation, and fragmentation are important causes of known species-population extinctions. The main cause of degradation and depletion of forests and wildlife are the human activity (anthropogenic pressure). Population explosion, over exploitation of forest resources, urbanization, unscientific management, encroachment of forest land, illicit felling, lack of regeneration of forests and outdated laws are major factors responsible for the degradation and depletion of forests. Details are given in the follow up points.

4.5.7.1 IMPACT ON FLORA

No adverse impact is envisaged on the existing flora, as there is no deforestation by mining operation. There are no dense plantation patches within the ML area. There are herbs and shrubs and few scattered trees within ML area. Mining will involve removal of vegetation prior to soil dozing and excavation of mineral. ML area has some crops and a few trees but no scheduled species. Plantation will be developed in the lease area as per plantation programme. These activities help to improve the floral cover of the area. The greenbelt and plantation development will eventually attract micro fauna, birds etc. in the area.

Assistance will be taken from local forest department in selection of species of plants so that green coverage could improve very fast. The varieties would include those plants, which are suitable to the area.

4.5.7.2 IMPACT ON FAUNA

There is no Reserve Forests (RF) / Protected Forest (PF), National Park, Biosphere Reserves and Tiger/Elephant Reserves within 10 km radius study area. Narpuh Wildlife Sanctuary is present at distance 7.27 km from mine lease area. Therefore, mining will not cause any adverse impact on wildlife.

However, as per the biological survey **13 Schedule - I** species have been recorded in the study area.

4.5.7.3 MEASURES TO MINIMIZE ANY NEGATIVE IMPACT ON FAUNA

The following measures will be adopted to minimize the impact of mining on faunal environment of the area.

- Regional Conservation Plan whenever finalized will be implemented for protection of the schedule - I species.
- Measures will be taken and environment management plan will be implemented to curb pollution of air, water, land and noise environment.
- Greenbelt/ plantation will be developed in 2.47 ha. till conceptual stage along the periphery and inside the ML area. Further, development and plantation help in creating habitats for local faunal species and to create better environment for various fauna.
- Creating and developing awareness for nature and wildlife in the nearby villages.

4.5.7.4 MEASURES FOR IMPROVING BIOLOGICAL ENVIRONMENT & FOREST

Greenbelt development programme has been designed for preventing the soil erosion, improving the greenery and aesthetic beauty of the area. Plantation will be done in consultation of DFO. While selection of species, care will be taken so as the developed greenbelt/plantation will remain useful for habitations. Greenbelt development and plantation is necessary:

- Groundcovers reduce runoff velocity and filter out suspended soil particles during storms
- Shrub and tree roots provide a restraining web that increases soil cohesion and stabilizes soil,
- Provide stabilization to slopes of the waste dumps,
- Landscaping and providing shelter,
- Improvement in aesthetic environment of site,
- Air purification by generation of oxygen
- Allowing PM to settle on the leaves and to attenuate noise generated by movement of vehicles and other machinery.
- Live plant foliage reduces the impact of rainfall and increase the absorptive capacity of the soil.

4.5.7.5 GENERAL GUIDELINES FOR GREEN BELT DEVELOPMENT

i. Native plant species will be planted in consultation with DFO.
ii. Trees growing up to 5 m or more in height with large canopy cover & leaf area will be planted around the installation.
iii. Plantation of trees will be done along in safety barriers inside mine lease.
iv. Since tree trunks are normally devoid of foliage (up to 3 m), it is appropriate to have shrubbery in form of such trees to give coverage to trunk portion of these trees.
v. Fast growing trees with thick perennial foliage will be grown, as it takes many years for trees to grow to their full height.
vi. In order to facilitate the proper growth of vegetation, limited measures involving preparation of seedbed with suitable number of fertilizers and treatment with mulches will be taken. The topsoil will be used for green belt development / plantation.

Vegetation covers in and around the mine workings generally helps in:

- Control of dust.
- Reducing noise.

- Stabilizing erodible slopes to minimize pollution.
- Ground water re-charging
- Enhancement of aesthetic value.

For re-vegetation, the plants and saplings suitable for the existing soils and site conditions will be considered. It is recommended to plant fast growing local species, which can adapt to the local climate. MCL will raise plantation all along the lease periphery, backfilled area etc.

The following characteristics have been taken into consideration while selecting plant species for green belt development and tree plantation.

I. Local, indigenous and drought resistant species.
II. Fast growing and tall trees.
III. Perennial and evergreen.
IV. Thick canopy cover.
V. Stratified layers of Plantation to prevent lateral pollution dispersion.
VI. The trees will be selected so as to maintain regional ecological balance and to conform to soil and hydrological conditions.
VII. Plantation will be done as per CPCB guidelines for greenbelt development and Plantation.

- At the end of life of mine, Total Greenbelt development/ Plantation will be in 2.47 ha of the mine lease area.

4.5.7.6 SPECIES SELECTION FOR PLANTATION/GREEN BELT DEVELOPMENT

The plants and saplings suitable for the existing soil and site conditions will be considered. Preference will be given for fast growing local plant species, which can adapt to the local climate. Indigenous & fruit bearing species will be planted by MCL in consultation with local forest department.

4.5.7.7 GREEN BELT DEVELOPMENT PLAN

Greenbelt Development on the periphery and Plantation in the ML area is given as below:

Table - 4.21

Action Plan for Greenbelt Development on the periphery of the ML Area

S. No.	Year as per planning	Green Belt Location (s)	Area to be Covered under greenbelt (Ha)	No. of Saplings (Nos.)	Cost in (Lakhs)
1.	1st Year	Safety Zone	0.50	640	2.56
2.	2nd year	Safety Zone	0.50	615	2.46
3.	3rd year	Safety Zone	0.47	600	2.40
4.	4th year	Safety Zone	0.52	610	2.44
5.	5th year	Safety Zone	0.48	610	2.44
Total			**2.47**	**3075**	**12.30**

About INR 12.30 Lakhs as capital cost have been earmarked for Greenbelt along Boundary 7.5 Meter safety zone and Plantation in the ML area for the entire life of mine. The budget includes the cost of Saplings, watering facilities, Labour Charge, Organic manure, Bio-fertilizers, Maintenance, fencing etc. which may vary in due course of time.

4.5.7.8 IMPACT EVALUATION

Table - 4.22

Impact Evaluation for Biological Resources

Impact Evaluation Element	Change in the biological resources of the area due to mine development & operation and generation of emissions			
Potential Effect/ Concern	Loss of habitat, Impact on health of biological receptors due to area and line sources of air emissions including fugitive dust emissions during limestone mine development & operation activities			
Characteristics of Impacts				
Nature	Positive		***Negative***	Neutral
			√	
Type	***Direct***	Indirect	Cumulative	
	√			
Extent	***Project Area***	*Local*	Zonal	Regional
	√			
Duration	Short – term		**Long- term**	
			√	
Intensity	**Low**		*Medium*	High
	√			
Frequency	Remote (R)	Occasional (O)	Periodic (P)	**Continuous (C)**
				√
Significance of Impact				
Significance	**Insignificant**	Minor	Moderate	Major
	√			

4.5.8 OCCUPATIONAL HEALTH AND SAFETY

Occupational health and safety (OH&S) are a multidisciplinary field concerned with the safety, health and welfare of people at work. The goal of occupational safety and health programs includes fostering a safe and healthy work environment. OHS may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment.

Occupational Health & Safety is based on the following three aspects: -

- Hazard identification
- Risk assessment
- Determination of applicable controls

A Hazard Identification and Risk Assessment (HIRA) is a systematic way to identify and analyze hazards to determine their scope, impact and the vulnerability of the built environment to such hazards and its purpose is to ensure that there is a formal process for hazard identification, risk assessment and control to effectively manage hazards that may occur within the workplaces. Details regarding occupational health hazards as well as mitigation measures have been discussed as under:

4.5.8.1 OCCUPATIONAL HEALTH AND RELATED DISEASE

The following table depicts the potential effects due to limestone mining.

S. No.	Effect	Symptoms	First Aid Measures
1.	Eyes	Contact can cause irritation of eyes.	Immediately flushing of eyes with generous amounts of water. Pulling back of eyelid while flushing to ensure that all limestone dust has been washed out. Seeking medical attention promptly if the initial flushing of the eyes does not remove the irritant. No rubbing of eyes.
2.	Skin	Contact can cause mild irritation of skin.	Brushing off or removing as much dry limestone as possible. Washing of exposed area with large amounts of water.
3.	Ingestion	In large amounts, this material may cause gastrointestinal irritation or blockage	No inducing of vomiting. Seeking medical attention immediately. Not taking anything by mouth unless medical personnel instruct to do.
4.	Inhalation	It can cause mild irritation of the respiratory system. Long-term exposure may cause permanent damage. Limestone is not listed by Mine Safety and Health Administration, OSHA, or International Agency for Research on Cancer as a carcinogen. However, it may contain trace amounts of crystalline silica in the form of quartz or cristobalite, which has been classified by IARC as a Group I carcinogen to humans when inhaled. Inhalation of silica can also cause a chronic lung disorder, silicosis.	Moving victim to fresh air. Seeking medical attention.

4.5.8.2 IMPLEMENTATION OF OCCUPATIONAL HEALTH AND SAFETY MEASURES

Occupational Health and Safety measures result in improving the conditions under which workers are employed. It improves not only their physical efficiency but also provides protection to their life. MCL will adopt the following safety measures:

- Continuous monitoring for compliance of SOPs.
- Pit Safety Committee will be formed and recommendations given by committee will be implemented.
- Suitable measures for publicity and propaganda for safety and occupational health will be implemented like posters, safety films, etc.,

- Safety clauses in contract order
- To depute dedicated safety team
- Medical exam for fitness before employment as per standards in Form P-1 of Mines Rules 1955.
- Periodical medical examination as per Mines Rule 1955- will be done every 5 years as per standards laid down in Form P.
- The persons working in dusty environment will be examined every year as per the DGMS circular No. 01 of 21.01.2010.
- All employees will undergo medical examination as per the recommendation of 10th National conference of safety in mines.
- Besides that, to avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced.
- Provision of rest shelters for mine workers with amenities like drinking water etc.
- Training of employees for use of safety appliances and first aid in vocational training center.
- Removal of unsafe conditions and prevention of unsafe acts
- Detailed analysis of each and every incident
- Periodic inspection by internal and external safety experts
- Celebrations of various safety events for awareness
- An effective and clearly audible means of giving warning, in case of fire, to every person are provided at the site. A free passage–way giving access to each means of escape in case of fire will be maintained for the use of all workers.
- Regular maintenance and testing of all equipment as per manufacturers' guidelines.
- Close surveillance of the factors in working environment and work practices which may affect environment and worker's health.
- Working of mine will be done as per approved mining plan and environmental plans.
- **Implementation of comprehensive Hearing Conservation Programs.** The hearing conservation program requires employers to monitor noise exposure levels in a way that accurately identifies employees exposed to noise at or above 85 decibels (dB) averaged over 8 working hours, or an 8-hour time-weighted average (TWA). Employers must monitor all employees whose noise exposure is equivalent to or greater than a noise exposure received in 8 hours where the noise level is constantly 85 dB. Project specific Hearing Conservation Plan to be prepared covering the aspects of monitoring, testing, evaluation and protection of noise.
- All safety measures will be taken which includes the use of safety appliances such as:
  - ✓ Suitable Dust Mask for protection from dust Ear Muffs
  - ✓ Safety Helmets
  - ✓ Reflective jackets
  - ✓ Safety Belts
  - ✓ Leather Hand Gloves
  - ✓ Safety Shoes
  - ✓ Knee guard
  - ✓ Safety Goggles etc.
- Availability of Medical facilities and First Aid Room equipped with first aid boxers.

- Conduction of internal audits and evaluation of legal compliance.

4.5.8.3 PRE-PLACEMENT & PERIODICAL MEDICAL EXAMINATION SCHEDULE

Ideally, the pre-employment medical examination (also referred to as a pre-placement examination) strives to place and maintain employees in an occupational environment adapted to their physiological and psychological capacities. The goal of the pre-employment examination is to determine whether an individual is fit to perform his or her job without risk to himself or others. This is also conceptualized within the practice of occupational medicine - it is assumed that the examiner is required to have detailed knowledge of both working and health conditions.

Parameters to be monitored:

New employees when taken are thoroughly medically examined under initial medical examination and thereafter during continuation of employment; the periodic medical examination will be done suggested by DGMS. The medical examination includes the following parameters -

- Height, weight, body mass index (BMI)
- Cardiovascular examination (heart check, blood pressure, pulse)
- Full musculoskeletal examination including comprehensive range of movement.
- Central nervous system examination.
- Examination for hernia and other abdominal abnormalities
- Urine examination for diabetes or kidney / bladder disorders
- Respiratory examination
- Vision assessment including color blindness
- Medical fitness to work in mines
- Medical examination of drivers
- Drug and alcohol testing
- Spirometry - (Lung Function Test)
- Audiometry (Hearing Test)
- Urine testing
- Vision tests, color vision
- ECG
- CXR (Chest Radiograph)
- Blood glucose
- Strength and mobility screening

Further, Regular Awareness campaign amongst staff/ working about AIDS/ Dengue/Malaria will be done, Ambulance and First Aid facility will be provided.

The medical records of the employees will be maintained. Under initial induction, the workers will be given training related to all safety and health aspects pertaining to their vocation and thereafter, special training courses/ awareness Programme for Malaria eradication, STDs and health effects on exposure to mineral dust will be organized regularly for employed persons as well as for nearby villagers. Refresher training will also be arranged as per statutes.

Table - 4.23

Schedule of Occupational Health & Survey

S. No.	Activity relating to Occupational Health Survey as per ILO / DGMS guidelines	**Frequency** (as applicable)	Implementing Agency
1.	➢ Framing of Mine specific Health & safety Policy as per Mines Act and Rules. ➢ Awareness regarding policy with strict enforcement. ➢ Inclusion of Policy's details in Tender documents ➢ Periodic Review of Policy	Awareness – Once in 3 months Review – Once in a year	Top Management, Mine's Manager and Procurement Cell
2.	➢ Adoption of ILO/ ISO 45001 based Health & Safety management system and proper formulation and implementation of the same in totality. ➢ Allocation of necessary resources for implementation of the control measures identified by the risk assessment process.	Risk assessment – quarterly Review of risks and resource allocation - once in a year	Initial gap analysis and implementation by an external expert agency and subsequent routine system maintenance by In-house team
3.	Necessary training of all employees of Mines shall be organized with the help of experts for optimal adoption of health & safety management system.	Once in a year	External expert agencies and in-house team
4.	Suitable clauses shall be included in tender document stating how the risk arising to men and material from the mining operations to be done by the contractors.	-	Mine's Manager & Procurement Cell
5.	It will be ensured that contractors are familiar with the relevant parts of the statutes, health and safety management system and are provided with such information prior to commencing work.	Regular activity	Mine's Manager & Procurement Cell
6.	All persons deployed in mine must undergo vocational training	Once in 3 years	Internal/ External faculties
7.	Biometric system of check-in & check-out system of attendance associated with suitable software shall be introduced in the mine for time management.	-	Mine's manager & HR Dept.
8.	The persons working in dusty environment will be examined for Pneumoconiosis/ Silicosis as per the DGMS circular No. 01 of 21.01.2010.	every year	Qualified Medical Officer trained in Occupational Health
9.	Implementation of project specific comprehensive Hearing Conservation Program covering the aspects of monitoring, testing, evaluation and protection of noise.	-	External /Internal medical experts

S. No.	Activity relating to Occupational Health Survey as per ILO / DGMS guidelines	**Frequency** (as applicable)	Implementing Agency
10.	Medical Examination of employees/ workmen - All regular employees working in the mine will undergo medical examination as per the recommendation of 10th National conference of safety in mines.		
a)	Pre-employment medical examination with a view to place and maintain employees in an occupational environment adapted to their physiological and psychological capacities so to perform his or her job without risk to himself or others.	Prior to joining	Qualified Medical Officer trained in Occupational Health
b)	Medical examination of employees engaged in driving/ HEMM operation jobs shall be tested for eye refraction test	at least once in a year	
c)	Employees exposed to ionizing radiation shall be tested for blood count**.**	at least once in a year	
d)	Routine stool test for persons engaged in handling of food and stemming preparation with sputum for AFB (Acid Fast Bacilli)	at least once in a year	
e)	➢ New employees when taken are thoroughly medically examined under initial medical examination and thereafter during continuation of employment. ➢ The periodic medical examination will be done as per guidelines of DGMS ➢ The medical records of the employees will be maintained. ➢ Under initial vocational training, the workers will be given training related to all safety and health aspects pertaining to their vocation.	Periodical Medical examination: ➢ Age of workers < 45 years: After every 5 years ➢ Age of workers > 45 years: After every 3 years	Qualified Medical Officers trained in Occupational Health
11.	Necessary facilities for monitoring the environmental parameters in respect of dust (Particulate Matter) and Gaseous emissions shall be provided at mines and regular monitoring shall be carried out at specified intervals	Twice in a week at 3 locations	Environment Manager / 3rd party approved agencies
12.	Noise mapping of various workplaces in the mine premises based on the various machines being used in concerned mines along with personal noise dosimetry of individual workmen exposed to noise level above 85 dB(A). {Regulation 182 of MMR, 1961 under the Mines Act, 1952.}	Noise dosimetry – once in six months	Through National Institute of Miners' Health (NIMH)
13.	Monitoring and measurement of workplace noise levels	Once in a day	In-house

S. No.	Activity relating to Occupational Health Survey as per ILO / DGMS guidelines	**Frequency** (as applicable)	Implementing Agency
14.	Vibration studies of various mining machineries before their introduction in mining operation as per ISO 2631:1997 (Part 1) Standards. (DGMS circular no. Cir. Tech. 18/1975 Vibration limits 7.1 and 7.2)	Once in a year	Through National Institute of Miners' Health (NIMH)
15.	Portability test of drinking water supplied to the mine employees irrespective of its source.	Quarterly as per IS:10500 – 2012	NABL accredited lab
16.	Monitoring and measurement of workplace dust conc. by means of real time dust monitors (Regulation 124 of MMR 1961)	➢ Static monitoring - once in six months (if the conc. exceeds 50% or 75% of the allowable limits, the frequency will be once in 3 months and once in a month respectively ➢ Measurements shall also be carried on immediately upon the commissioning of any plant, equipment or machinery or upon the introduction or alteration of any new work practice that is likely to bring about any substantial change in the level of airborne respirable dust.	Once in a year by NIMH and routine monitoring by in-house trained person or through 3rd party accredited agency
17.	Operator's Seat in the Vehicle/HEMMs TO be ergonomically designed for driver's comfort and ergonomically assessment of all latest machines before their introduction into mining operation as per ISO standards.	Once in a year for existing fleet	Through National Institute of Miners' Health (NIMH)

Frequency of Medical Examination as per Norms

a. Pre-Placement Medical examination: Prior to joining

b. Periodical Medical examination:

- Age of workers < 45 years: After every 5 years
- Age of workers > 45 years: After every 3 years

Frequency of Medical Examination

a. Pre-Placement Medical examination: Prior to joining

b. Periodical Medical examination:

- Age of workers < 45 years: Every year
- Age of workers > 45 years: every year
- Along with the Surveillance of Silicosis every year.

Budget for implementation of Occupational Health & safety measures & medical examination has been given in the following table:

Table - 4.24

Occupational Health & safety Budget

S. No.	Activities	Annual Budget amount (Rs)
1.	Occupational Health & safety & PPE's	500000
Total		500000

***Source**: Approved Mining Plan with Progressive Mine Closure Plan.*

4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF ENVIRONMENTAL COMPONENTS

Irreversible commitment of environmental components for the proposed mining project will include Land use, topography, geology, soil, human settlement, agriculture for mine lease area. There will be no irretrievable commitment of environmental components for the said project.

4.7 CONCLUSION

As discussed above, it is safe to say that the project will not cause any significant impact on the environment of the area, as adequate preventive measures will be adopted to contain various pollutants generated due to the proposed project within permissible limits. Development of Plantation around the mining lease boundary will minimize the environment pollution and improve the aesthetic beauty. Further the development of water reservoir and afforestation will remain useful for local community.

CHAPTER - 5

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 GENERAL

Analysis of alternative site helps in selection of best possible site for the project. On one hand it helps to estimate the closeness to the existing infrastructure and on other hand it also helps to minimize the impact of project on environment.

5.2 ANALYSIS OF SITE

The minerals are site specific and they are mined where they are situated. The area i.e. mine site is found suitable once existence of mineral is proved in accordance of the Mineral (Evidence of Mineral Contents) Rules - 2015. The proposed mine lease area is explored by M/s Meghalaya Cements Limited and the evidence of limestone and associated mineral contents have been proved. The Letter of Intent (LOI)/ Grant Order has been issued by Mines and Geology Department, Government of Meghalaya, in favor of M/s Meghalaya Cements Limited *vide* letter No MG.28/2023/123 dated 21.12.2023.

5.3 ANALYSIS OF TECHNOLOGY

Mining will be done by Opencast fully mechanized method. All operations of mining will be done by deployment of Heavy Earth Moving Machineries for deep hole drilling, excavation, loading & transport. Various mining activities such as drilling, blasting, loading, hauling, crushing and transportation will be so conducted as to ensure maximum mineral conservation and minimum environmental degradation.

5.4 CONCLUSION

In case of Mining projects alternate site selection is not necessary as the mining is site specific and the area in which mining will be carried out has been adequately proved for presence of mineral. The deposit is also having good infrastructural facilities for access and development. The mineral mined at this mine will be used for the manufacture of cement. Mining will be done as per approved Mining Plan along with Progressive Mine Closure Plan by Indian Bureau of Mines (IBM) Guwahati.

CHAPTER - 6

ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Post Project Monitoring is an essential part to check the impact of project related activity. Hence monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:

- Status of Pollution within the mine site and in its vicinity.
- To generate data for predictive or corrective purpose in respect of pollution.
- To examine the efficiency of pollution control system adopted at the site.
- To assess environmental impacts.

Monitoring will be carried out at the site as per the norms prescribed by CPCB.

Environmental Monitoring Programme will be conducted for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by SEIAA, Meghalaya & Consent to Operate issued by Meghalaya State Pollution Control Board (MSPCB).

Six monthly compliance reports will be submitted every year to all concerned regulatory departments mentioned in granted EC. Quarterly compliance Report for conditions stipulated in Consent to Operate will be submitted to MSPCB on regular basis.

6.2 FORMATION OF ENVIRONMENTAL MANAGEMENT CELL (EMC)

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. M/s. Meghalaya Cements Ltd. (MCL) have a full-fledged Environmental Management Cell (EMC) for environmental monitoring and control. The EMC team take care of pollution monitoring aspects and implementation of pollution control measures.

A group of qualified and efficient engineers with technicians are deputed for maintenance, up keeping and monitoring the pollution control equipment, to keep them in working mode at the best of their efficiencies. The Organizational structure of EMC is given in Chapter - 10 of this Draft EIA/ EMP Report.

6.2.1 RESPONSIBILITIES OF EMC

The responsibilities of the EMC include the following:

- Environmental monitoring of the core and buffer zone and evaluation of results.
- Procurement and commissioning of Pollution Control/Monitoring Equipment.
- Specification and regulation of maintenance schedules for pollution control equipment.
- Ensuring that prescribed standards are maintained.
- Ensuring optimum water usage and ensuring greenbelt development/plantation & its maintenance.
- Carry out proactive environmental studies and observe all precautions necessary to avert disasters and emergencies in the mining observations as well as nearby areas.
- Ensuring that the waste handling and disposal is carried out as per prescribed conditions

- Conducting regular training programmes on various environmental requirements especially sustainable development, climate change, environmental monitoring etc. Reporting of compliances and non - compliances (if any) to management and other stakeholders.

6.3 MEASUREMENT METHODOLOGIES

6.3.1 INSTRUMENTS TO BE USED

The following instruments will be used for data collection work in the monitoring schedule:

1. Respirable Dust Sampler (RDS)
2. Fine Particulate Smapler (FPS)
3. Sound Level Meter (SLM)
4. Meteorological Station
5. Water level indicator/Piezometer digital water level recorder
6. Global Positioning System (GPS)
7. Blastmate / minimate for blast monitoring operation
8. pH meter

6.3.2 MONITORING PROGRAMME

The post project Monitoring includes details of any major/ minor impact in the core zone and area within buffer zone for the following parameters: -

- Micro-Meteorological data
- Ambient Air Quality Monitoring
- Water quality and Level monitoring
- Noise Level Monitoring
- Ground Vibration Monitoring
- Medical check-up of the employees

6.3.2.1 MONITORING SCHEDULE

Details of Environmental Monitoring schedule, which will be undertaken for various environmental components, are detailed below:

Table - 6.1

Post Project Monitoring

S. No.	Description	Frequency of Monitoring
1.	Micro - Meteorological Data	Hourly
2.	Ambient Air Quality Monitoring	Twice a month and Online CAAQMS
3.	Ground Water Quality & Level Monitoring	Quarterly
4.	Surface Water Quality Monitoring	Quarterly
5.	Noise Level Monitoring	Monthly
6.	Ground Vibration Monitoring	On every blast
7.	Medical Checkup of employees	3 to 5 Year Interval ➢ Age of workers <45 years: After every 5 years ➢ Age of workers >45 years: After every 3 years

6.3.3 METHODOLOGY ADOPTED

Post project monitoring will be carried out as per conditions stipulated in Environmental Clearance Letter issued by SEIAA, Meghalaya, Consent issued by MSPCB as well as according to CPCB guidelines. The mine site is considered as core zone and the area lying within 10 km radius from the mine site is considered as the buffer zone where some impacts may be observed on physical and biological environment. In the Buffer zone slight impact may be observed and that too is occasional. The following table is showing details of Post Project Monitoring programme:

Table - 6.2

POST PROJECT MONITORING PROGRAMME

Attributes	Sampling		Measurement Method	Test Procedure
	Network	Frequency		
A. Air Environment				
Meteorological • Wind speed • Wind direction • Dry bulb temperature • Wet bulb temperature • Relative humidity • Rainfall	Minimum 1 at project site	Regularly by Weather Monitoring Station	Mechanical/automatic weather station	-
Pollutants PM_{10}	3 Locations in Core Zone, 2 Locations in Buffer Zone	As per Revised National Ambient Air Quality Standards (NAAQS) vide MoEF circular, dated 16.11.2009	Gravimetric method	-
$PM_{2.5}$			Gravimetric method	-
SO_2			Improved West and Gaeke Method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).
NO_2			Jacob & Hochheiser modified (NaOH-$NaAsO_2$) Method	Absorption in dill NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nepthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
B. Water Environment				

Attributes	Sampling		Measurement Method	Test Procedure
	Network	Frequency		
pH, Turbidity, Color, Odour, Taste, TDS, Total Hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Sulphate, Nitrates, Alkalinity, Iron, Copper, Manganese, Mercury, Cadmium, Selenium, Arsenic, Cyanide, Lead, Zinc, Chromium, Aluminum, Boron, Phenolic compounds	1 Location in Core Zone, 2 Locations in Buffer Zone	Quarterly	As per IS: 10500 – 2012	Samples for water quality should be collected and analyzed as per: IS: 2488 (Part 1-5) methods for sampling and testing of Industrial effluents Standard methods for examination of water and wastewater analysis published by American Public Health Association.
C. Noise				
Noise levels at Day & night time/ Work zone	4 locations in the study area (Core zone and buffer zone)	Monthly	As per CPCB norms / As per circular no. Tech. 18 of 1975 and 5 of 1990	As per CPCB norms / As per DGMS norms
D. Vibration				
Vibration monitoring on every blast	1 location in the study area (core zone and buffer zone)	On every blast	As per DGMS Record	

6.3.4 LOCATIONS OF MONITORING STATIONS

The location of the AAQM monitoring stations will be selected on the basis of prevailing micro – meteorological conditions of the area like; Wind Direction & Wind Speed, Relative Humidity, Temperature. AAQM stations will be selected to assess the ambient air quality of the area. Noise level is also to be measured in core area as well as study area. Water & Soil monitoring locations will be decided on the basis of general slope of the area & drainage pattern. All location will be finalized after consultation with MSPCB & CGWB.

Table - 6.3

Locations of Monitoring Stations

S. No.	Description	Location
1.	Ambient Air Quality	Mine Lease Boundary
2.	Water Level & Quality	Nearby Ground water and Surface Water sources
3.	Noise Level Monitoring	4 (core zone and buffer zone)
4.	Soil Quality Monitoring	4 (core zone and buffer zone)
5.	Vibration Monitoring	Within Mining Lease Area

6.3.5 DATA ANALYSIS

Monitoring data analysis will be done as per CPCB guidelines by laboratory approved under EPA 1986 & will be submitted to concerned authority (specified in Environment Clearance Letter issued by SEIAA, Meghalaya & Consent issued by MSPCB) on regular basis.

6.3.6 REPORTING SCHEDULE

Environmental Monitoring Program (EMP) will be designed considering conditions stipulated in the Environmental Clearance issued by the SEIAA, Meghalaya & Consent to Establish and Operate by Meghalaya State Pollution Control Board.

Six monthly compliance reports will be submitted to the concerned regulatory authorities. Quarterly compliance Report for conditions stipulated in Consent to Operate will be submitted to Meghalaya State Pollution Control Board on regular basis.

6.3.7 CORRECTIVE AND PREVENTIVE ACTION PLAN FOR NON – COMPLIANCE / NON-CONFORMANCES

The company has a well laid down process for identification & prevention of non- Conformances. In the eventuality of any non-compliance/ Non conformances, it is addressed on priority through mid - course corrective action plan along with appropriate recording & reporting to Stake holders in line with the Company Policy duly adopted by the board.

6.4 DETAILED BUDGET

The budget proposed for this Limestone Mining Project is as follows:

- Capital Cost of the Project: Rs. 15 Crores /-
- Capital Cost for EMP: Rs. 1.92 Crore/-
- Recurring Cost for EMP: Rs. 0.46 Crore per annum /-

CHAPTER - 7

ADDITIONAL STUDIES

7.0 INTRODUCTION

As per EIA Notification dated 14th September, 2006, as amended thereof, State Level Environment Impact Assessment Authority (SEIAA), Meghalaya has issued Terms of Reference (ToRs) for the preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP) *vide* file no. ML/SEAC/SEIAA/PP/EJH/28/2024 dated 06.02.2025.

The following Additional Studies were carried out in reference to the Terms of Reference:

- Public Hearing
- Hydro-geological Study
- Risk Assessment & Disaster Management Plan
- Resettlement & Rehabilitation

7.1 PUBLIC HEARING

Public Hearing is yet to be conducted for this project.

7.2 HYDRO - GEOLOGICAL STUDY

- M/s. Meghalaya Cements Limited is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village - Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.
- Total water requirement for the proposed mining project will be about 30 KLD which will be sourced from Water tank located near the Captive Power plant of the of the lessee within cement plant. The main source of water is the river Wah Chyrtong. Permission of the same has been taken from Department of Irrigation vide NOC No. AID (J)223/2007-2008/ dated 24.03.2008. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table. Hence hydrogeological study is not applicable.

7.3 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

The objective of on-site Disaster Management, Plan for the captive mine is to be in a state of perpetual readiness through mining and development to immediately control arid 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 to life and property is minimized.

Lessee has documented procedure for Emergency Preparedness & Responses. The emergency situations arising out of the situations as defined in the clause shall be addressed in the document.

The Salient features are elaborated as below: -

1. Emergency Response Centre
2. Communication System

3. Action on the site
4. Facilities Available at site
5. Medical treatment for injured personnel.

7.3.1 EMERGENCY RESPONSE ORGANIZATION

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

Table - 7.1

Emergency Response Organization

Person	Responsibility
Mines Manager	Site Controller
Shift In charge / Section In Charge	Accident Controller/ Communication Officer
Employee who gives the first information about the incident/ accident	Primary Controller
P & A Department (HOD)	Liaison Officer
Environment	EMC

7.3.2 KEY PERSONNEL AND THEIR RESPONSIBILITY

A. Site Controller

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

- To prepare a full proof plan for control of accident like, landslides, control subsidence, flood and other natural calamities.
- To inform statutory bodies of the State and Central Govt.
- 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 service required for removing/ control of danger.
- To ensure that all necessary personnel assemble at assembly point.
- Make arrangements for medical treatment to the personnel injured seriously.

B. Accident controller/ Mines Manager

- Mock rehearsal of management plan prepared for accident.
- To withdraw men/ machines from the affected area with pointy for safety of personnel, minimize damage to the machines, environment and loss of material.
- To act as an accident controller to all the later arrived.
- To make a report based on the facts and figure and submit to site controller.
- To provide first aid treatment and communicate to the shift in charge.

C. 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 carry out all instructions given by Accident Controller.
- To provide first aid treatment and communicate to the Shift in charge.

7.3.3 OFF-SITE EMERGENCY PLANNING

7.3.3.1 INTRODUCTION

The off-site emergency plan is an integral part of any hazard control system. It would be based on those accidents identified by the works management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans should, therefore, complement each other. The key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with the works management or with the local authority.

Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. As with the on-site plan, an emergency control center will be required within which the emergency coordinating officer can operate. An early decision will be required in many cases on the advice to be given to people living "within range" of the accident – in particular whether they will be evacuated or told to go indoors. Consideration of evacuation may include the following factors:

rs:

a. In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically.

b. But if the fire escalates it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people would be advised to stay indoors and shield themselves from the fire while measures are taken by those outside to douse fire.

7.3.3.2 ASPECTS TO BE INCLUDED IN AN OFF-SITE EMERGENCY PLAN

Some of the aspects to be included in off-site emergency plan are as follows:

a) Organization

Details of command structure, warning systems, implementation procedures, emergency control centers, name and appointments of incident controller, site main controller, their deputies and other key personnel.

b) Communications

Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

c) Special Emergency Equipment

Details of availability and location of heavy lifting gear, bulldozers, specified fire-fighting equipment, fireboats.

d) Voluntary Organizations

Details of organizers, telephone numbers, resources, etc.

e) Meteorological information

Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts will be made.

f) Humanitarian Arrangements

Transport, evacuation centers, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

g) Public Information

Arrangements for: -

(i) Dealing with the media-press office

(ii) Informing relatives, etc.

h) Assessment

Arrangements for: -

(i) Collecting information on the causes of the emergency

(ii) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

7.3.3.3 ROLES OF MAJOR HAZARD MANAGEMENTS

Where the local authority has the organization to formulate the plan, the role of management in off-site emergency planning will be to establish liaison with those preparing the plans and to provide information appropriate to such plans. This will include a description of possible on-site accidents with potential for off-site harm, together with their consequences and an indication of the relative likelihood of the accidents. Advice should be provided by works managements to all the outside organizations which may become involved in handling the emergency off-site and which will need previously to have familiarized themselves with some of the technical aspects of the works activities, e.g. emergency services, medical departments, etc.

7.3.3.4 ROLE OF THE EMERGENCY COORDINATING OFFICER

The various emergency services are coordinated by an Emergency Coordinating Officer (ECO) who is likely to be a senior police officer but, depending on the circumstances, could be a senior fire officer. The ECO is closely connected with the site main controller. Again, depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control may pass to a senior local authority administrator or even an administrator appointed by the Central or State Government.

ROLE OF THE LOCAL AUTHORITY

In some places the duty to prepare the off-site plan lies with the local authorities. They have appointed an emergency planning officer (EPO) to carry out all this duty as part of the EPO's roles in preparing for a whole range of different emergencies within the local authority area. The EPO is need to obtain the information to provide the basis for the plan.

Rehearsals for off-site plans are important for the same reasons as on-site plans and is being/will need to be organized by the EPO.

ROLE OF THE POLICE

The police normally assume the overall control of an emergency, with a senior officer designated as emergency coordinating officer. Formal duties of the police during an emergency include

protecting life and property and controlling traffic movements. The functions include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties and informing relatives of dead or injured.

ROLE OF THE FIRE AUTHORITIES

The control of a fire is normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer also have a similar responsibility for other events. Fire authorities having major hazard works in their area is familiarize themselves with the location on site of all stores of flammable materials, water and foam supply points and fire-fighting equipment.

ROLE OF THE HEALTH AUTHORITIES

Health authorities, including doctors, surgeons, hospitals, ambulances and so on, have a vital part to play following a major accident and they form an integral part of any emergency plan. For major fires, injuries are the result of the effects of thermal radiation to a varying degree and the knowledge and experience to handle this in all, but extreme, cases may be generally available in most hospitals.

ROLES OF THE GOVERNMENT SAFETY AUTHORITY

The Inspectors of Director General of Mines Safety may want to satisfy themselves that the organization responsible for including the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. In the event of an accident, local arrangements regarding the role of the factory inspector is applied. In the aftermath, factory inspectors may wish to ensure that the affected areas are rehabilitated safely.

7.3.4 CARE AND MAINTENANCE DURING TEMPORARY DISCONTINUANCE

When the mine will be temporarily discontinued due to any unforeseen circumstances, the following care and maintenance will be carried out.

- Notice of temporary discontinuance of work in mine will be given to the Controller General, Controller of Mines and the Regional Controller of Mines, IBM, DGMS & DMG, State Govt. officials under Rule 24 of MCDR 1988 and Reg. 6 of MMR 1961 respectively.
- All mining machineries will be shifted to a safe place. Entrance to the mines or part of the mines to be discontinued will be fenced off as per DGMS Circular and security Guards will be posted for the safety and to restrict any unauthorized entry to the area.
- Competent persons will inspect the area regularly.
- Air, water and other environmental monitoring will be carried out.
- Watering on plantation will be done on a regular basis. All rules and regulations will be followed in case of any temporary discontinuance of mine.

7.4 RESETTLEMENT & REHABILITATION

The total mining lease area is 26.50 ha which falls under private land. No forest land is falling under the lease area. R&R study will not be applicable as total 26.50 ha land area under possession of MCL.

CHAPTER - 8

PROJECT BENEFITS

8.1 INTRODUCTION

M/s. Meghalaya Cements Limited is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.

MCL believes in holistic socioeconomic development of the local community is the need of the hour. It truly believes that a company's prosperity is linked with that of its neighboring communities.

8.2 PROJECT BENEFITS

Project benefits are attributed in various ways as under:

1) Environment
2) Social
3) Employment
4) Economic

The company is conscious of its obligations to society at large and will contribute in overall socio-economic development of the area in the coming years by increasing its efforts for overall development of the study area.

As per ToR Point benefits of the project clearly indicate environmental, social, economic, employment potential etc., are summarized below:

8.3 ENVIRONMENTAL BENEFITS

- At the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha. Periphery of mining lease area is estimated as 3.2 km. Area of 7.5 m lease periphery under greenbelt is estimated 2.47 ha (3.2 km x 7.5 m).

8.4 EMPLOYMENT BENEFITS

The total man power requirement for the proposed project will be 135 persons. Unskilled /semi-skilled manpower will be sourced from the local area and skilled manpower will be sourced from outside. Preference is will be given to the locals as per their eligibility.

In addition to this, the project is will lead to numerous indirect employment opportunities as well.

8.5 SOCIAL BENEFITS

The Company will organize skill development training, vocational training, entrepreneur development programmes for the locals including women members and will provide advice for starting suitable small-scale industry. MCL will encourage entrepreneurship amongst locals or their qualified family members by awarding services, contracts for activities such as canteens,

vehicle hiring, maintenance of gardens, office services and cleanliness, courier services, and material supplies to the villages falling within the ML area and/impact zone of the ML area under CER plan.

With the implementation of the Proposed Mining Project. it is envisaged that the Employment need of the people of the area will be fulfilled to a greater extent.

PROPSOED PLAN FOR SOCIO ECONOMIC DEVELOPMENT

As per the MoEF&CC OM F. No. 22-65/2017-IA.III dated 30.09.2020, it is directed that commitments made by the project proponent to address the concerns rose during the public consultation and prescribe specific condition(s) in physical terms while recommending the proposal, for grant of prior environment clearance instead of allocation of funds under Corporate Environment Responsibility (CER). Hence Company will allocate the budget as per the issues raise during the public hearing and will spend the budget under EMP.

8.6 ECONOMIC BENEFITS

The proposed project will contribute additional revenue to the State and Central Govt. in the form of royalty, cess and other taxes etc.

The mine shall be contributing around Rs. 15.05 Crores every year to the State and Central Govt. exchequer by way of mining revenue (Royalty, DMF, NMET etc.). These benefits are given below:

Table - 8.1

Economic Benefits of the Project

S. No.	Description	Revenue generation Crores/ Annum
1.	Royalty @ Rs 80/- Per Ton (Present/ prevailing Rate)	8.05
2.	District Mineral Foundation (@10% of Royalty)	0.80
3.	National Mineral Exploration Trust (@2% of Royalty)	0.16
4.	Cees @ Rs 60/- Per Ton	6.04
Revenue generation per year (@ 1.007 million TPA)		**15.05**

8.7 CONCLUSION

The proposed project will generate a fair amount of direct and indirect employment in the study area. The local economy will receive a boost due to employees spending and services generated by the company.

The overall effect will improve the buying power of employees and thus a higher standard of living viz. better education, improved health and sanitation facilities, housing etc. This is envisaged as a major positive benefit, which will ultimately lead to the sustainable development of the region.

CHAPTER - 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th September, 2006, the Chapter on the 'Environmental Cost Benefit Analysis' is applicable only if the same is recommended at the Scoping stage.

As per the ToR points issued by, SEIAA, Meghalaya *vide* file no. ML/SEAC/SEIAA/PP/EJH/28/2024 dated 06.02.2025 in favor of M/s. Meghalaya Cements Limited; for the proposed mining project activity, the 'Environmental Cost Benefit Analysis' is not required.

CHAPTER - 10

ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION

The environmental management plan (EMP) is required to minimize adverse environmental impacts by implementing suggest management system (EMS) is a dynamic, continuous process initiated by management and involving communication between the Project Proponent, its workers, and the local communities directly affected by the project. Drawing on the elements of the established business management process of "plan, implement, check and Act (Management review)" the system entails the thorough assessment of potential environmental, social impacts and risks from the projects. EMS provides order and consistency for mitigating and managing these on an ongoing basis.

Good practises of EMP will be ensured to keep all the environmental parameters of the project w.r.t. quality of Air, Water, soil and noise level, Socio economic improvement, standards, biological diversity of the area within statutory limits and sustainable manner.

10.2 ELEMENTS OF EMP

EMP includes four major elements: -

1. **Planning**: This includes identification of environmental impacts, legal requirement, commitments and policies, setting environmental objectives and environment, health, safety and social compliance requirements;
2. **Implementation**: This comprises of resources available for the project, accountability of employees, contractors and documentation of measures to be taken;
3. **Checking**: Measurement & Evaluation: This includes regular inspection, audits, monitoring corrective actions and record keeping; and
4. **Management Review**: Actions are taken to continually improve the environment, health, safety, and social performance of the organization.

The following Policy & programs have been developed to ensure proper implementation of EMP for the proposed mining project:

- Formulating Corporate Environment Policy (CEP)
- Formation of Environment Management Cell (EMC)
- Greenbelt Development /Plantation Programme
- Occupational Health and Safety
- Budgeting of Environmental Mitigation measures

10.3 CORPORATE ENVIRONMENT POLICY

The importance of environmental management has been recognized by M/s. Meghalaya Cements Ltd. (MCL) management very early and company has taken necessary steps to identify environmental aspects and mitigate those aspects which generate pollution at the sites, respond to impacts of its own population and also in the peripheral areas.

Corporate Environment Policy (CEP) has been formulated and adopted by the Board of Directors of Meghalaya Cements Ltd. to provide a framework to become an environmentally sustainable company. The hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions etc. has been given in the Corporate Environmental Policy of the company. Corporate Environmental Policy is enclosed as ***Annexure - 10*** along with this Draft EIA/EMP Report.

10.4 FORMATION OF ENVIRONMENTAL MANAGEMENT CELL (EMC)

In order to maintain the environmental quality, regular inspections, audits and monitoring of various environmental components is necessary. M/s. Meghalaya Cements Limited(MCL) have a full-fledged Environmental Management Cell (EMC) for environmental monitoring and control. The EMC team is responsible for pollution monitoring aspects and implementation of control measures as discussed in Chapter 2 and 4 of this Draft EIA/EMP Report.

A group of qualified and efficient engineers with technicians are deputed for maintenance, up keeping and monitoring the pollution control equipment, to keep them in working mode at the best of their efficiencies. The Organizational structure of EMC is given below:

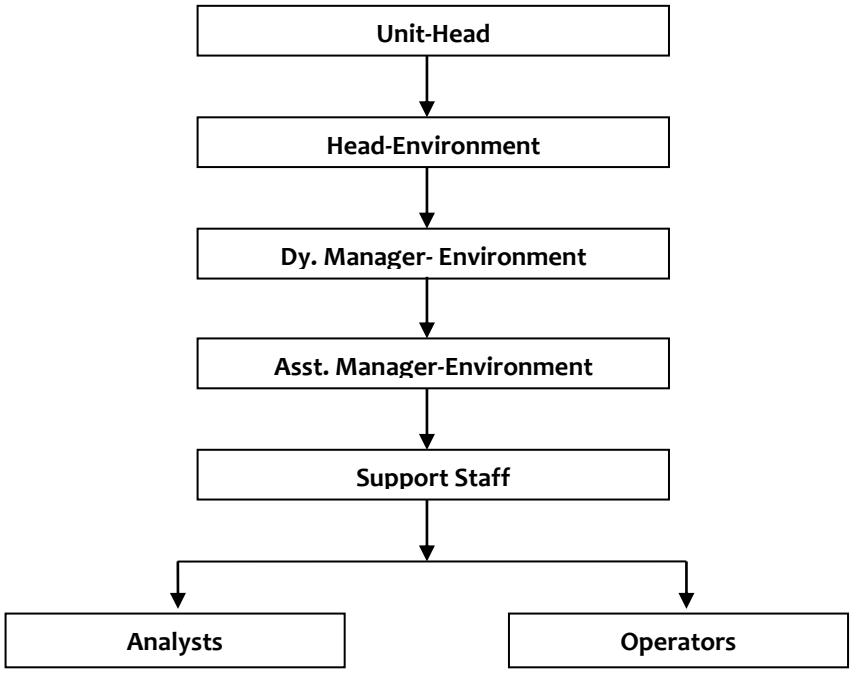


Figure 10.1: Structure of EMC

The unit has established, implemented and maintained Environment Management System for ensuring that its requirements at all locations within the organization are met. The roles and responsibilities of various personnel, who manage, perform and verify the activities having effect on environment/ OH & S have been fixed by the Top Management.

Unit head also ensures that environmental policy of the organization is implemented and EMS work is done as per planned procedures. He makes communication with all board of directors of the organisation on all issues related to EMS.

Core Committee consist of all department/plant head to review the implementation of EMS system to regular interval and advice EMS coordinator and respective section in charge for taking corrective action.

EMS Coordinator is responsible for all the activities and fulfilment of requirements of Environment Management system.

10.4.1 RESPONSIBILITIES OF EMC

The EMC oversees and implement the various functions to ensure that environmental status of the area remains well within the statutory standard of MOEF&CC and MSPCB. The responsibilities of the EMC include the following:

- Environmental Monitoring
- Procurement and commissioning of Pollution Control and Monitoring Equipment
- Specification and regulation of maintenance schedules for pollution control equipment.
- Ensuring that prescribed standards and norms are maintained.
- Ensuring optimum water usage.
- Implementation of the mitigation measures suggested in EIA/EMP Report.
- Ensuring development of greenbelt and plantation & its maintenance.

10.5 PERSONS RESPONSIBLE FOR IMPLEMENTATION OF EMP

Details of persons responsible for implementation of EMP along with their role/responsibilities are given in table below:

Table - 10.1

Persons responsible for implementation of EMP

S. No	Designation	Roles & Responsibility	Qualification	Number of persons
1.	Manager (Environment)	Monitor, take actions & guide Mines Management to maintain all legally prescribed Environmental conditions, Development of Green belt, Plantation activities. Water Harvesting & Management. Maintain Legal Records of DGMS & IBM	Post Graduate in Environment Science	01
2.	Geologist	Mining geologists work in all aspects of the mining industry, from exploration, to mine design, to evaluating ore quality, and to assisting in minimizing the impact of mining on the local environment.	Post Graduate in Geology	01
3.	Ass Manager	To Assist the Manager (Environment) to comply all Legal requirements related to Environment.	Post Graduate in Environment Science	01

10.6 DETAILED BUDGET FOR EMP

The budget proposed for implementation of the pollution control & impact mitigation measures as suggested for this Proposed Project is given as under:

Table - 10.2

Breakup of Proposed EMP Budget (In Crores)

S. No.	Particulars	Capital Cost (in Crores)	Recurring Cost per annum (in Crores)
1.	Air Quality Monitoring and Management	1.35	0.33
2.	Water Quality Monitoring and Management	0.12	0.03
3.	Noise Pollution Control	0.10	0.025
4.	Environmental Monitoring & Management	0.20	0.05
5.	Greenbelt and plantation	0.15	0.03
	Total	**1.92**	**0.46**

Detailed break up is given below:

Table - 10.3

Detailed Break - up of EMP (in lakhs)

S. No.	Activities	Capital Cost	Recurring Cost
A.	**Air Quality Monitoring and Management**		
Mitigative Measures			
1.	Permanent water sprinkling arrangements for main haulage road	20	5
2.	Two water tanker for water sprinkling in other roads and mining areas/activities.	20	5
3.	Operation & Maintenance of Motor Grader & Soil Compactor for haul road maintenance	10	2
4.	Two No. of mist Cannon at mine site for suppression of dust. (2 nos. of mist cannon @ 10 Lakh each)	20	5
Monitoring			
1.	CAAQMS Stations	40	10
2.	Ambient Air Quality Monitoring Stations at Mine Site	20	3
3.	Fugitive dust emission monitoring	4	2.5
4.	Personal Dust Monitoring	1	0.5
	Sub Total A.	**135**	**33**
B.	**Water Quality Monitoring and Management**		
Mitigative Measures			
1.	Garland Drain around waste dump (L X W X H= 540*15*1)	3	1
2.	Retaining Wall around waste dump (L X W X H = 540*15*15)	4	1
Monitoring			
1.	Installation of 3 Piezometers along the periphery in the premises	3	0.5
2.	Ground water quality analysis	2	0.5
	Sub Total B.	**12**	**3**
C.	**Noise and Vibration Monitoring and Management**		
1	Peak Particle Velocity Monitoring for nearest habitation	4	1
2	Ambient Noise Monitoring	3	0.5

S. No.	Activities	Capital Cost	Recurring Cost
3	Work Place Noise Level Monitoring	1	0.25
4	Personal Noise Monitoring	1	0.25
5	Providing Ear muffs/plus to workers working in high noise area	1	0.5
Sub Total C.		**10**	**2.5**
D.	**Environmental Monitoring & Management**	**20**	**5**
E.	**Greenbelt and plantation**	**15**	**3**
GRAND TOTAL (A+B+C+D)		**192**	**46**

CHAPTER - 11

SUMMARY & CONCLUSION

11.1 INTRODUCTION

M/s. Meghalaya Cements Limited is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village - Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.

As per EIA Notification dated 14th September, 2006, as amended from time to time; the project falls under Category "B1" S. No. '1' (Mining of Minerals), Project or Activity '1(a) - (4)'.

11.2 JUSTIFICATION FOR THE PROJECT

- M/s. Meghalaya Cement Limited (MCL) owns and operates a cement production line of about 2600 TPD capacity clinker and corresponding cement at Thangskai, Meghalaya. The construction of Meghalaya Cement was started around 2004. In 2006, first clinker and cement were produced. Initially the plant was designed to produce about 900 TPD of clinker and corresponding cement. To enhance the production capacity, MCL initiated a capacity augmentation project in 2009 which was completed in 2010. After capacity augmentation project the clink erization capacity of the plant was increased from 900 TPD to about 2600 TPD. Presently the plant is being operated at about 2600 TPD on continuous basis.
- At present, limestone requirement of cement plant is being fulfilled from Moiong Block -1 limestone mine (4.80 ha) and South Khliehjari Limestone Mine (31.05 ha).
- Proposal for Expansion in cement plant from 2600 TPD to 4500 TPD was submitted MoEFCC, New Delhi vide proposal no. IA/ML/IND1/453620/2023 on 15.01.2024. Environment Clearance for the proposed expansion has been granted vide letter no. IA-J-11011/275/2022-IA-II (IND-1) dated 08.05.2024.
- To meet the additional limestone requirement of the cement plant, company is proposing Mooiong Thlusniang Limestone Mine (ML Area - 26.50 ha) with Limestone Production Capacity 1.007 Million TPA at Village Chiehruphi, Taluka - Khliehriat, District - East Jaintia Hills, Meghalaya.
- The proponent to implement the proposal in an environmentally and socially responsible way;
- There is no National Park, Biosphere Reserve, Wildlife Corridors, Tiger/Elephant Reserves etc. falling within 10 km radius of the mine block. However, Narpuh Wildlife Sanctuary is situated at (7.27 km in SSE direction).
- The proposed project will generate direct & indirect employment opportunities in the mine. Preference will be given to the local people based on their skill and educational qualification.

11.3 PROJECT DETAILS

Table - 11.1

Project Details

S. No.	Particulars	Details
A.	**Nature of project**	Proposed Opencast Limestone Mining
B.	**Size of project**	
1.	Area	26.50 ha (Private land)
2.	Proposal	Limestone Production Capacity: 1.007 Million TPA
C	**Project Location**	
1.	Village	Chiehruphi
2.	Tehsil	Khliehriat
3.	District	East Jaintia Hills
4.	State	Meghalaya
5.	Latitude & Longitude	Latitude: 25° 12' 08.7999" N to 25° 12' 43.80" N Longitude: 92° 23' 19.3283"E to 92°23' 44.7525" E
6.	Toposheet No.	OSM - G46O8/ Toposheet No_83 C/8
D	**Environmental Settings** *(Approx. Aerial Distance from boundary and Direction from Centre of ML area)*	
1.	Nearest Village	Chiehruphi (1.5 km in WNW in direction)
2.	Nearest School	➢ Chiehruphi Secondary School (1.5 km in NNW in direction) ➢ Govt. LP school Chiehruphi (1.5 km in WNW in direction)
3.	Nearest Highway	NH - 06 (1.2 km in South-West direction)
4.	Nearest Railway Station	Badarpur Railway Station (38.0 km in South direction)
5.	Nearest Airport	Silchar Airport, (57.0 Km in SSE direction)
6.	Nearest City/ Town	Khliehriat (16.5 km in North direction)
7.	Wild Life Sanctuary, National Park, Biosphere Reserves within 10 km radius study area	Narpuh Wildlife Sanctuary (7.27 km SSE direction)
8.	Reserve Forests (RF) / Protected Forest (PF) within 10 km radius study area	None
9.	Water bodies within 10 km radius study area	➢ Lubha River (3.0 km in ENE direction) ➢ Sonapur River (7.0 km in SE direction) ➢ Seshyampa River (7.0 km in NW direction) In addition to this, four nalla's are available in the study area
10.	Critically Polluted Area	Brynihat, Meghalaya (106 km in NW direction)
11.	Seismic Zone	Zone - V as per IS:1893 (Part-I): 2002
E.	**Total Water requirement**	30 KLD
F	**Cost Details**	
1.	Total Project Cost	Rs. 15 Crores
2.	Cost for EMP	Capital Cost for EMP: Rs. 1.92 Crore/- Recurring Cost for EMP: Rs. 0.46 Crore per annum /-

Source: *Pre- Feasibility Report*

11.4 MINING DETAILS

Table - 11.2

Mining details

S. No.	Particulars	Details
1.	Method of mining	Fully Mechanized Opencast Mining
2.	Total Geological Resources	17.00 Million Tonnes
3.	Total Mineable reserves	11.76 Million Tonnes
4.	Proposed Life of the Mine	~14 years
5.	Bench Height	6 m
6.	Bench Width	6 m
7.	No. of Benches	10
8.	Ultimate Pit Slope	45°
9.	Elevation Range	717 m AMSL to 765 m AMSL
10.	General Ground Level	741 m AMSL
11.	Water Table	185 m bgl
12.	Ultimate Working Depth	683.7 mRL (57.3 m bgl)
13.	Stripping Ratio Waste: Mineral (cum: cum.)	1:0.42
14.	Number of Working Days	305
15.	Number of shifts per day	1 (8 Hours)

Source: *Approved Review of Mining Plan with Progressive Mine Closure Plan*

11.5 DESCRIPTION OF THE ENVIRONMENT

Baseline study of the study area was conducted during Summer Season (March to May, 2023).

Ambient Air Quality: The concentrations of PM10 and PM2.5 for all the 06 AAQM stations were found between 28.7 to 70.9 µg/m^3 and 19.7 to 46.9 µg/m^3, respectively. The concentrations of SO2 and NO2 were found in range of 4.5 to 11.3 µg/m^3 and 7.5 to 22.5 µg/m^3 respectively. CO was Below Detection Limit (BDL) at all other monitoring locations in the study area. Considering the maximum value of the pollutants, it can be concluded that noise levels in the study area are well within the prescribed limits as prescribed in the NAAQMS.

Ambient Noise Levels: Ambient noise levels were monitored at 06 locations around the Mine site in the study area. Noise levels vary from 47.9 to 56.1 Leq dB (A) during day time and from 39.8 to 50.7 Leq dB (A) during night time. Considering the maximum noise levels, it can be concluded that noise levels in the study area are well within the prescribed limits as prescribed by the CPCB.

Surface Water Quality: The Surface water was sampled at 03 locations, shows that pH varies from 6.98 to 7.11, turbidity was BDL in the study area. Total Hardness varies from 89.4 to 195.16 mg/l mg/l, Alkalinity varied from 76.6 to 136.0mg/l, Total Dissolved Solids varied from 176.0 to 292.0 mg/l, BOD varied from 2.8 to 4.6 mg/l, COD varied from 8.0 to 14.3 mg/l. The level of DO is varied from 7.2 to 7.4 mg/l. The concentration of Chloride, Sulphate, Magnesium, Calcium, Iron, Zinc and Fluoride is found varied from 20.93 to 50.32 mg/l, 15.6 to 35.1 mg/l, 5.88 to 16.99 mg/l, 26.08 to 50.10 mg/l, 0.08 to 0.12 mg/l, 0.09 to 0.23 mg/l, 0.17 to 0.29 mg/l respectively.

Ground Water Quality: The ground was sampled at 02 locations, shows that pH varies from 6.90 to 7.24, Total Hardness varies from 124.4 to 146.4 mg/l & Total Dissolved Solids varies from 204.0 to 245.0 mg/l, Chloride from 26.42 to 30.7 mg/l, Sulphate varies from 17.60 to 20.72 mg/l, Calcium from 30.2 to 42.9 mg/l, Magnesium varies from 9.51 to 11.88 mg/l. Thus, it can be concluded that the groundwater samples were observed to be good and complying to the drinking water standard (IS: 10500-2012).

Soil Quality: Soil was sampled at 06 locations and the analysis result for soil shows that soil is neutral to slightly alkaline in nature as pH value varies from 6.83 to 7.18. Collected soil samples were reddish brown, dark brown in colour and Sandy Loam in texture. The concentration of organic matter ranges from 0.81 % to 1.16 %, Nitrogen is found to be in better amount as it ranges from 211.2 to 314.49 kg/hec and Phosphorous is medium as it varies from 8.32 to 17.02 kg/hec, whereas the Potassium is found to be ranging from 219.60 to 313.75 kg/hec.

11.6 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

- **AIR ENVIRONMENT**

Impact:

The key air emissions from the mining activities (drilling, blasting, loading, haulage and transportation) are Particulate Matter, Oxides of Nitrogen (NO_2) and Sulphur dioxide (SO_2). Gaseous emissions generated from HEMM & transportation of vehicles.

Mitigation Measures:

- Proper mitigation measures will be taken like controlled blasting, water sprinkling before drilling, blasting & during transport activities and development of greenbelt/ plantation area to control fugitive emissions. Slurry/ Emulsion High explosives & ANFO will be used and its optimum use will help in reducing the air pollution. Better maintenance of equipment also helps to reduce such emissions. Regular Ambient Air Quality Monitoring will be carried out. Greenbelt will be developed around the periphery of the lease area having a total of length and width of 3300 m and 7.5 m respectively. (Total area to be covered under greenbelt will be 2.47 ha).

- **WATER ENVIRONMENT**

Surface Water

There are 3 rivers and 4 nala's namely Lubha River (~ 3.0 km in ENE direction), Sonapur River (~ 7.0 km in SE direction), Seshyampa River (~ 7.0 km in NW direction) and Dongtongle Nala (~ 6.5 km in North direction), Latynger Nala (~ 9.0 km in NE direction), Wah Thaniang Nala (~5.5 km in North direction), Rashniang Nala (~9.0 km in North direction) exists within the 10 km radius study area. The river is bounded by mountains and landscape on both sides as it is flowing downward Bangladesh. All the major rivers and streams flow towards south. The mineral limestone and associated rocks do not contain any toxic substance. Therefore, there is no significant impact of mining activities on quality of surface and ground water.

Ground Water

Elevation of mining lease area is ranging from 717 m AMSL to 765m AMSL. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table. No waste water will be

discharged outside lease boundary. Therefore, no adverse impact on water quality is envisaged due to the proposed mining project.

- **NOISE & VIBRATION**

Due to Mining Activities

Major noise generating sources of the mining activity are drilling, blasting and HEMM movement used for transportation of limestone.

All DGMS guidelines will be followed to reduce the impact of blasting on the nearest habitation. HEMMs equipped with acoustic cabins will be provided for the operators. Controlled blasting techniques through proper blast design and explosive selection will be used to reduce the vibrations to a greater extent. Hydraulic rock breaker will be used in place of secondary blasting. PPEs like earplugs/ earmuffs will be provided to mine workers. HEMMs equipped with acoustic cabins will be provided for the operators. Proper maintenance, oiling and greasing of HEMMs will be done. Development of green belt/ plantation along the mining lease boundary and mining activity help in reducing noise level.

- **Land Environment**

Impact:

The land use of the mine area will be altered from government land/ private land to mining area including pits, temporary dumps, greenbelt, reservoir etc. but will not have any significant effect on the surface features of the surrounding areas.

Mitigation Measures:

As per approved mining plan, at the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha.

Greenbelt: Area of 7.5 m lease periphery is estimated 2.47 ha under greenbelt.

- **Solid Waste**

Top Soil: No top soil will be generated in plan period. At conceptual stage, 2.39 million m^3 (2.1 Million Tonnes) amount of top soil will be generated and will be used for greenbelt/plantation

Waste (OB): During Plan period, 1.15 million m^3 (2.89 million tonnes) Over burden will be stacked at earmarked place and fully utilized for backfilling. Approx 3.09 Million Tonnes of waste will be generated during conceptual stage, which will be used for backfilling excavated area.

11.7 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

As per EIA Notification dated 14th September, 2006, the Chapter on the 'Environmental Cost Benefit Analysis' is applicable only if the same is recommended at the Scoping stage. As per the ToR points issued by, SEIAA, Meghalaya *vide* file no. ML/SEAC/SEIAA/PP/EJH/28/2024 dated 06.02.2025 in favor of M/s. Meghalaya Cements Limited; for the proposed mining project activity, the 'Environmental Cost Benefit Analysis' is not required.

11.8 POST PROJECT ENVIRONMENTAL MONITORING PROGRAMME

The details of the post project monitoring are given in the table below:

S. No.	Description	Frequency of Monitoring
1.	Micro - Meteorological Data	Hourly
2.	Ambient Air Quality Monitoring	Twice a month and Online CAAQMS
3.	Ground Water Quality & Level Monitoring	Quarterly
4.	Surface Water Quality Monitoring	Quarterly
5.	Noise Level Monitoring	Monthly
6.	Ground Vibration Monitoring	On every blast
7.	Medical Checkup of employees	3 to 5 Year Interval ➢ Age of workers <45 years: After every 5 years ➢ Age of workers >45 years: After every 3 years

11.9 RECLAMATION PLAN FOR LAND USE

At the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha.

11.10 ADDITIONAL STUDIES

Additional Studies i.e. Hydro-Geological Study, Biological Study Report, Rehabilitation and Resettlement Plan, Land use Land Cover maps by Satellite Imagery, Socio-economic Study, Wildlife Conservation Plan, Mineralogical and Chemical Composition Study, Cumulative Impact Assessment, Langelier's Saturation Index study for water quality are covered with this Draft EIA/ EMP Report as per the Terms of Reference granted by SEIAA.

11.11 HYDRO GEOLOGY STUDY

The total water requirement for the proposed project will be 30 KLD which will be sourced from Water tank located near Captive Power plant of the lessee within cement plant. The main source of water is river Wah Chyrtong. Permission of the same has been taken from Department of Irrigation vide NOC No. AID (J)223/2007-2008/ dated 24.03.2008.

Elevation of mining lease area is ranging from 717 m AMSL to 765m AMSL. There will be no water table intersection by mining activities at any stage of mining operations as ground water is encountered at 185 m bgl and mining is above the water table. No waste water will be discharged outside lease boundary. Therefore, no adverse impact on water quality is envisaged due to the proposed mining project.

11.12 BIOLOGICAL ENVIRONMENT

Flora Diversity: Total of 55 trees, 30 shrubs and herbs, 13 species of climbers and 1 species of Grass, Screw Pine, Laina and Fern respectively have been recorded in the study area based on primary observation as well as based on secondary data.

Fauna Diversity: As per the field survey (primary data) and secondary data collection, ***Hystrix sp.*** **(Cape porcupine),** ***Varanus bengalensis*** **(Indian monitor),** ***Bufoides meghalayanus*** **(Khasi Hills toad),** ***Trachypithecus pileatus*** **(Capped Langur or Leaf Monkey),** ***Porcupine sp.*** **(Quill pig),** ***Panthera pardus*** **(Leopard),** ***Hoolock hoolock*** **(*Hoolock gibbon*),** ***Ursus thibetanus lanige*** **(*Himalayan black bear*),** ***Collosciurus erythraeus*** **(Pallas's Squirrel),** ***Manis crassicaudata*** **(Indian pangolin),** ***Lophura***

***leucomelanos* (Khalij pheasant)*, Ketupa flavipes* (Bubo flavipes)*, Bambusicola fytchii hokinsoni* (Mountain Bamboo Partridge)** is recorded in the study area during field survey; which comes in Schedule - I fauna according to Wildlife (Protection) Amendment Act, 2022.

11.13 REHABILITATION AND RESETTLEMENT

The Resettlement & Rehabilitation Plan has been aimed to address the rights and privileges of local people, ensures good share of jobs in the projects and facilitate comprehensive socio-economic development of the area.

The total mining lease area is 26.50 ha which falls under private land. No forest land is falling under the lease area. R&R study will not be applicable as total 26.50 ha land area under possession of MCL.

11.14 PROJECT BENEFITS

Employment: the total man power requirement for the proposed project will be 135 persons. Unskilled/ semi-skilled manpower will be sourced from the local area and skilled manpower will be sourced from outside. Preference is will be given to the locals as per their eligibility. In addition to this, the project is will lead to numerous indirect employment opportunities as well.

Social Benefits: The mining activity will generate revenue in the form of contribution of additional revenue to state exchequer as notified by Indian Bureau of Mines time to time, beside this, Royalty and other taxes would be additional benefit, particularly in the form of contribution to the District Mineral Foundation (DMF). DMF will be utilized by local administration for the development of socio-economic infrastructure and wellbeing of the local population. The various activities proposed through CSR and Enterprise Social Commitment would help in upgradation of basic infrastructure, amenities.

Environmental Benefits: At the conceptual stage, the total excavated area will be 24.034 ha. Out of which, 5.35 ha will be covered under backfilling of OB (hard sandstone), 8.95 ha will be covered under backfilling of weathered sandstone backfilling and 9.734 ha of the area will be covered as water logged area. Greenbelt on 7.5 m periphery will be done covering an area of 2.47 ha.

Economic Benefits: The proposed project will contribute additional revenue to the State and Central Govt. in the form of royalty, cess and other taxes etc. It is estimated that the project will generate revenue of 15.05 Crores/Annum with the production of 1.007 Million TPA Limestone.

11.15 CONCLUSION

The proposed project will prove beneficial to the local people as direct and indirect employment opportunity will be generated. There will be increase in revenue generation to the government by way of government taxes etc. Further improvement in infrastructure will take place like education, roads, availability of drinking water, medical facilities in adjacent villages. There will be no significant pollution of air, water, soil and noise. Regular monitoring of all the components of environment will be done and mitigation measures will be adopted. Increased social welfare measures taken by the company will bring overall development in the near-by villages.

CHAPTER - 12

DISCLOSURE OF CONSULTANTS ENGAGED

12.1 DISCLOSURE OF CONSULTANTS ENGAGED

This EIA/EMP Report has been prepared by J.M. EnviroNet Pvt. Ltd. (JMEPL). JMEPL is one of the companies of JM Group, was established in the year 1993. 'JM' in the name of the Company is derived from the name of 'Lord Shiva' - the Temple of "Jharkhand Mahadev" (JM). The Temple is located at Queens Road, Vaishali Nagar, Jaipur.

The Registered office of JMEPL is Jaipur Centre, 403, 4th Floor, B2 Bye Pass, Tonk Road, Jaipur, 302018 (Rajasthan) India. Its Delhi-NCR Corporate office is at Emmar Digital Greens, Tower – B, Unit No. 1517, Golf Course Ext. Road, Sector – 61, Gurugram, Haryana – 122011.

J.M. EnviroNet Pvt. Ltd. is accredited with ISO-9001: 2015 for EIA Division. EIA Division is also approved by National Accreditation Board for Education & Training (NABET) formerly NRBPT (Quality Council of India), Certificate no. NABET/EIA/2326/RA 0308, dated 29th Nov., 2023 which is valid up to 07.08.2026.

J.M. EnviroNet Pvt. Ltd. is listed at serial no. "126" of the List of Accredited EIA Consultant Organization displayed on MoEFCC website (*eia.nabet.qci.org.in/Accredited_EIA_Consultant.aspx),* updated on 20th Feb., 2025.

JMEPL is offering Environmental Consultancy Services in various sectors viz Industrial Projects / Chemical Industries / Cement Plants / Thermal Power Plants / Mining Projects/ Coal Washery Projects/ Real Estate Projects / Distilleries / Steel Plants/Chemical Fertilizers/Mineral Beneficiation plants etc.

In the Mining sector, JMEPL have covered mines of minerals viz. Limestone, Bauxite, Chromite, Coal, Zinc Ore, Copper ore, Gypsum, Soapstone, Iron & Manganese ore, Clay, Silica Sand, Marble, Khanda, Gitti, boulders, Feldspar, Quartz, lignite, magnesite and minor mineral etc.

JMEPL has a highly qualified team of EIA Coordinators & Functional Area Experts (FAE). As Faculty Heads of the EIA Division, Company has Retd. General Managers of the Reputed Cement Companies, Ex-Head EIA Division of big Business Group, STP & ETP Designing Experts, Retd. Mining & Geology Experts with vast experience in their respective fields.

JM Group's business is spread over 22 States viz.:- Andhra Pradesh, Kerala, Gujarat, Maharashtra, Orissa, Tamil Nadu, Goa, Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Assam, West Bengal, Karnataka, Jharkhand, Bihar & Uttarakhand.

The JM Group has its own Environmental Laboratory at Gurgaon (Haryana) approved under EPA (Environment Protection Act) by the Ministry of Environment & Forests, Govt. of India, New Delhi and by the National Accreditation Board for Testing and Calibration Laboratories, Govt. of India (NABL accredited Laboratory: - TC-6821).

Besides this, MoEF and NABL approved Environmental Laboratory of JM Group is also providing Analytical Laboratory Services of various elements and environmental parameters.

Annual monitoring as per MoEF/CPCB/SPCB guidelines, Risk Assessment and Disaster Management Plan, Rain Water Harvesting Plan, Preparation of Environmental Statement Reports (Environmental Clearance Compliance Conditions), Preparation & Approval of Modified Mining Plan from IBM etc. are amongst the various other consultancy services offered by the Company.

GOVERNMENT OF MEGHALAYA
MINING AND GEOLOGY DEPARTMENT
*****

24/1/24

No.MG.28/2023/123 Dated Shillong, the 21st December, 2023

ORDER

M/s Meghalaya Cements Limited, Thangskai Village, P.O. Lumshnong, East Jaintia Hills District being the land owner has submitted an application for authorizing grant of a Mining Lease for Limestone over an area of 26.50 hectares of land at Chiehruphi Village, Khliehriat C & RD Block, East Jaintia Hills District in favour of M/s Meghalaya Cements Limited, Thangskai Village, P.O. Lumshnong, East Jaintia Hills District under the provisions of Chapter IX of the Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016;

AND WHEREAS, the applicant has furnished land document to confirm that mineral rights vest in the applicant and applicant is the owner of the land in respect of which the Mining Lease is proposed to be granted;

AND WHEREAS, the applicant has also furnished extract from Joint Inspection Team declaring that the proposed land of 26.50 Ha (i.e. 18.61 ha + 9.68 ha.) as non-forest land.

AND WHEREAS, the maps of the proposed land for Mining Lease for an area of 26.50 Ha have been authenticated and verified by the concerned officers of the Directorate of Mineral Resources;

AND WHEREAS, the Chapter IX of the Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 provides the procedure for obtaining Prospecting Licence or Mining Lease in respect of land in which the minerals vest in a person other than the Government;

The said area was granted+ Prospecting Licences in pursuant of the authorization order (1) No.MG.49/2021/88, dated 16th May 2022 for an area of 18.61 Ha and (2) No.MG/45/2022/6, dated 29th November, 2022 for an area of 9.68 Ha issued by Mining & Geology Department, Government of Meghalaya & Prospecting Licences was executed on 09th February, 2023 for the area of 18.61 Ha and on dated 09th February, 2023 for the area of 9.68 Ha in between M/s Meghalaya Cements Ltd. (Grantor) & M/s Meghalaya Cements Ltd. (Licensee). M/s Meghalaya Cements Limited had carried out prospecting operations & submitted the Geological Report to State Government. Thus provisions of section 5(2)(a) of The Mines & Minerals (Development & Regulation) Act, 1957 have been satisfied that: ***(2). No mining lease shall be granted by the State Government unless it is satisfied that- (a) there is evidence to show the existence of mineral contents in the area for which the application for a mining lease has been made in accordance with such parameters as may be prescribed for this purpose by the Central Government.***

Land owner namely M/s Meghalaya Cements Limited subsequently submitted application for mining lease on 31.03.2023 along with Geological Report and applied for authorization for grant of Mining Lease under rule 27(1) of Chapter IX of the Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 in favour of M/s Meghalaya Cements Limited. The State Government on scrutiny of land documents has found that

applicant is a bona fide land owner of the land in respect of Mining Lease proposed to be granted. M/s Meghalaya Cements Limited to whom the Mining Lease is proposed to be granted has also conducted prospecting operations & already established mineral reserves/resources in the area and submitted the Geological Report.

NOW therefore, the Government of Meghalaya in exercise of power conferred under sub-rule (3) of Rule 27 of the Minerals (Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016, upon satisfying of the bona fides of the applicant, hereby authorize M/s Meghalaya Cements Limited, Thangskai Village, P.O. Lumshnong, East Jaintia Hills District being the land owner (hereinafter referred to as "Grantor") to grant Mining Lease in favour of M/s Meghalaya Cements Limited, Thangskai Village, P.O. Lumshnong, East Jaintia Hills District (hereinafter referred to as "Lessee") for Limestone over an area of 26.50 hectares of land at Chiehruphi Village, Khliehriat C & RD Block, East Jaintia Hills District, Meghalaya subject to compliance of following conditions, namely: -

1. Submission of Mining Plan by Meghalaya Cements Limited as Lessee duly approved by IBM.
2. Certificate of Consent to Establish and Operate from Meghalaya State Pollution Control board (MSPCB).
3. To ensure the conditions with respect to a Mining Plan specified in clause (b) of sub-section (2) of section 5 be complied with.
4. Provide the State Government with a security deposit of the value of rupees five lakhs per hectare, as security for ensuring compliance with the Mine Closure Plan.

ON satisfying the above conditions, Mining Lease Deed in Form-D can be executed by Grantor/Lessor in favour of Lessee. A certified copy of Mining Lease shall be submitted to State Government within three months of execution of Mining Lease Deed in duplicate.

Map of the area is enclosed.

(E. Kharmalki, IAS)
Secretary to the Govt. of Meghalaya
Mining & Geology Department

Memo.No.MG.28/2023/123-A Dated Shillong, the 21st December, 2023

Copy forwarded to: -

1. The Principal Chief Conservator of Forests & HoFF, Meghalaya, Shillong for information.
2. The Director of Mineral Resources, Meghalaya, Shillong for information and necessary action.
3. The Deputy Commissioner, East Jaintia Hills District, Khliehriat for information.
4. The Controller General, Indian Bureau of Mines, Nagpur-440001, Maharashtra.
5. The Regional Controller of Mines, Indian Bureau of Mines (IBM), Guwahati-781021
6. The Director General of Mines Safety, Government of India, Ministry of Labour & Employment, Dhanbad-826001, Jharkhand
7. M/s Meghalaya Cements Limited, Village Thangskai, P.O. Lumshnong, East Jaintia Hills District (Grantor/Lessor) for compliance of the Order.
8. M/s Meghalaya Cements Limited, Village Thangskai, P.O. Lumshnong, East Jaintia Hills District (Lessee) for compliance of the Order.

By order etc.

Secretary to the Govt. of Meghalaya
Mining & Geology Department

By e-mail

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

No. MCDR-MPCP0CaFl/2/2024-GUH-IBM_RO_GUH Dt : 17/10/2024

Shri/M/s. MEGHALAYA CEMENTS LIMITED ,
ADMIN OFFICE MCL CAMPUS MCL THANGSKAI LUMSHNONG NH-06 KHLIEHRIAT

Mooiong Thlusniang Limestone Deposit (PB151)

Sub : Approval of Mining Plan (MP) in respect of your Mooiong Thlusniang Limestone Deposit-(PB151) of M/s Meghalaya Cements Limited over an area of 26.50 Ha. for Limestone Mineral, situated at Chiehruphi Village, Lumshnong Taluka, Khliehriat, East Jaintia Hills District of Meghalaya State.

Ref : (i) Your Mining Plan submission on 18/07/2024 through Mining Plan Approval System (MPAS) Portal. (DDO Approval Date: 29/07/2024).
(ii) This office scrutiny comments issued on 07/09/2024 through MPAS Portal.
(iii) Your submission of final Mining Plan after attending scrutiny points on draft Mining Plan through MPAS Portal on 02/10/2024.

Sir,

In exercise of the powers conferred by clause (b) of sub-section (2) of section 5 of the Mines & Minerals (Development & Regulation) Act, 1957 read with Government of India Order No.S.O.445(E) dated 28.04.1987and S.O. 1857(E) dated 18th May, 2016; I hereby approve the above said Mining Plan along with Progressive Mine Closure Plan (PMCP) for a period of period of 5 years from the date of execution of the mining lease in respect of Mooiong Thlusniang Limestone Deposit (26.50 Ha)-PB151 for Limestone Mineral. This approval is subject to the following conditions:

1. That the Mining Plan is approved without prejudice to any other laws applicable to the mine / area from time to time whether made by the Central Government, State Government or any other authority.
2. That this approval of the Mining Plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines & Minerals (Development & Regulation) Act, 1957 or the Mineral Concession Rules, 1960 or any other laws including Forest (Conservation) Act, 1980, Environment (Protection) Act, 1986 and the rules made there under.
3. That the Review of Mining Plan is approved without prejudice to any other order or direction from any court of competent jurisdiction.
4. The provisions of the Mines Act, 1952 and Rules and Regulations made thereunder including submission of notices of opening, appointment of manager and other statutory officials as required by the Mines Act, 1952 shall be complied with.
5. If anything is found to be concealed as required by the Mines Act in the contents of the mining plan and the proposal for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.
6. The execution of mining plan shall be subjected to vacations of prohibitory orders / notices, if any.
7. This approval for proposed mining operation and associated activities is restricted to the mining lease area for a period of 5 financial years from the date of execution of the mining lease. The mining lease area is as shown on the statutory plans by the Lessee/QP and Indian Bureau of Mines has not undertaken any survey verification of mining lease boundary on the ground.
8. Your attention is invited to the Supreme Court interim order in W.P. (C) No. 202 dated 12.12.1996 for compliance. The approval of above saidMining Plan is therefore, issued without prejudice to and is subject to the said directions of the Supreme Court as applicable.
9. This department does not undertake any responsibility regarding correctness of the boundaries of the lease area shown on the ground.
10. At any stage, if it is observed that the information furnished in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.
11. The approval of Review of Mining Plan is subject to the compliance of CCOM's Circular No. 2/2010 regarding submission of Geo-referenced Cadastral Map showing disposition of the lease area certified by competent authority of State Government within 6 months from the date of recognition of the agency by the State Government to undertake such survey.
12. The approval of the above said Mining Plan with PMCP is subject to condition that you shall maintain boundary pillars as indicated in Rule 12 (v)of Minerals(Other than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016.
13. Next Review of Mining Plan shall become due 180 before the expiry of five years period for which this MP is approved.
14. This Mining Plan is approved for Category-A Mechanized Mine.
15. The applicant shall establish the GW table in the applied Mining Lease area by second year of the plan period. The applicant shall obtain applicable NOC from Central Ground Water Board/Central Ground Water Authority.

16. The applicant shall submit copy of mining lease deed within a month from the date of execution.
17. The validity period of the financial assurance shall be renewed before the expiry of the same and should be submitted to the Department of Geology and Mining-Govt. of Meghalaya with copy to this office. Performance surety is not applicable to your mine.
18. The applicant shall comply with all the affidavits submitted as annexure.

Yours faithfully,

Encl: Digital copy of Approved Mining Plan with Text, Annexures, Plates.

(Sandeep Kumar Singh)

Regional Controller of Mines

Copy forwarded for information to

Mooiong Thlusniang Limestone Deposit (PB151)

Sri Abdul Motin Barbhuiya (Qualified Person),

Meghalaya Cements Limited,

Thangskai, Lumshnong,

East Jainita Hills, Meghalaya.

motin_barbhuiya@rediffmail.com

(Sandeep Kumar Singh)

Regional Controller of Mines

Not on first two copies:
Copy forwarded for kind information to:

1) The Director, Directorate of Mineral Resources, Government of Meghalaya.
2) The Controller of Mines (East Zone), Indian Bureau of Mines, Kolkata.
3) The Director of Mines Safety, Guwahati Region, Guwahati.
4) Mine File.

(Sandeep Kumar Singh)

Regional Controller of Mines

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF
THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS : MEGHALAYA
& HEAD OF FOREST FORCE

Dated Shillong, the_____ January 2018.

CERTIFICATE

TO WHOM IT MAY CONCERN

In pursuance to the "Guidelines to be followed in future cases" prescribed in the orders of the Hon'ble Supreme Court dated 6th July, 2011 in the Lafarge Umiam Mining Private Limited Cases, a Joint Inspection Team-II (JIT), consisting of representatives of the North Eastern Regional Office, Ministry of Environment, Forest & Climate Change, Shillong and the State Forest Department, Meghalaya, Shillong, had made joint-assessment of land-use status of the Blocks of land under M/s Meghalaya Cements Ltd. (MCL).

As identified by the Joint Inspection Team-II (JIT) and on due acceptance by the State Government and MoEF, the Block(s) with the following details are hereby adjudged as "Non-Forest".

Details of the Block(s):

	Name of the Blocks		Non-Forest Area
1.	Block 1 – Plant Area	:	29.76 ha.
2.	Block 2 – SK Mines Area	:	31.05 ha.
3.	Block 3 – SK ML Area	:	18.61 ha.
4.	Block 5 – Thlusni Moiong Area	:	9.68 ha.
5.	Block 6 – Umdaki Tonsang PL Area	:	2.42 ha.
6.	Green Belt Area	:	53.65 ha.

Sd/-
Principal Chief Conservator of Forests & HoFF
Meghalaya : Shillong

Sylvan House, Lower Lachumiere
Shillong 793001
Phone: 91 364 2220414
Fax: 91 364 2504068

Memo No. MFG.16/50/MCL (Pt) / 13785-791 Dated Shillong, the 3rd January 2018.

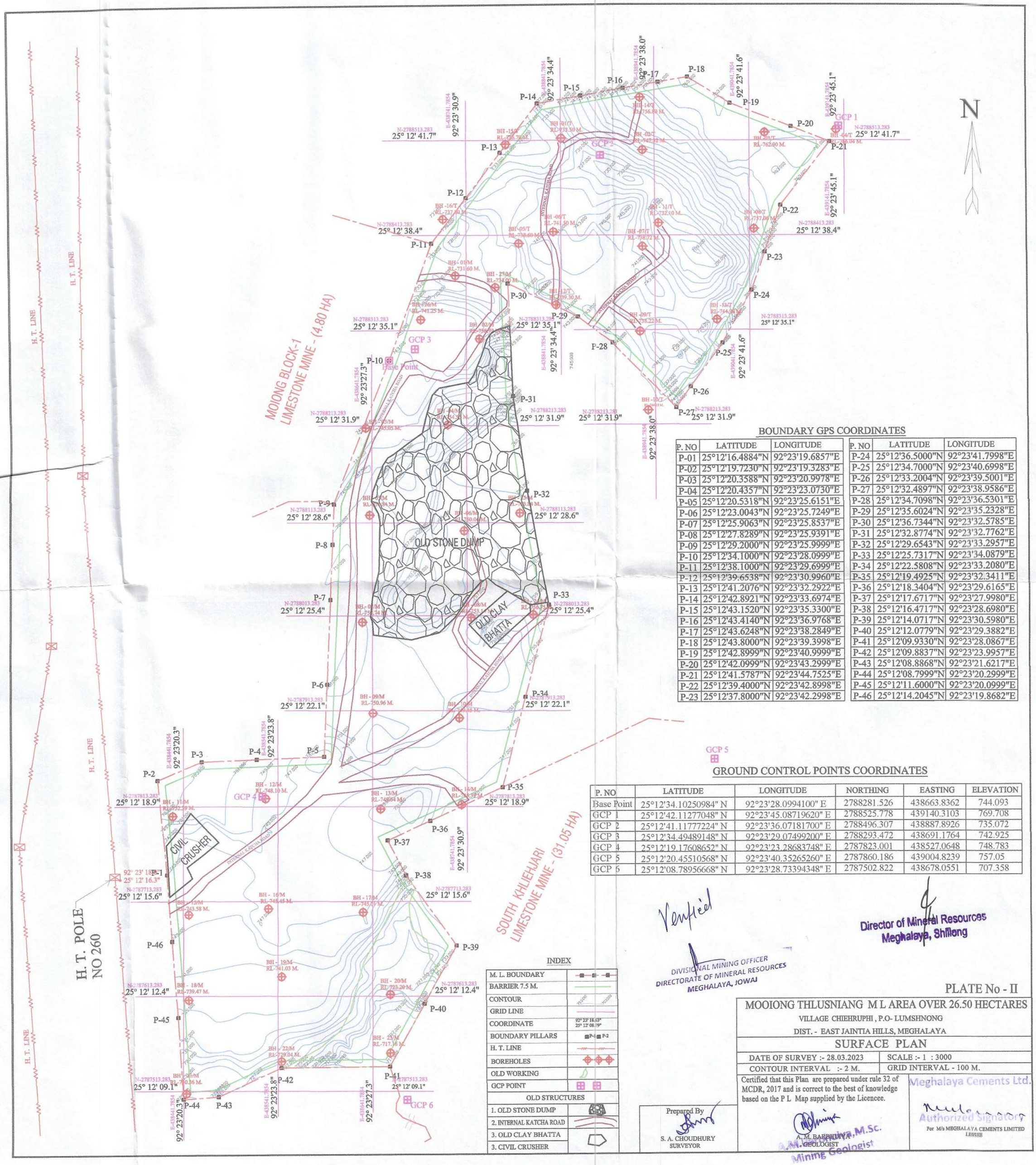
Copy to:

1. The Principal Secretary to the Govt. of Meghalaya, Department of Forests & Environment, Meghalaya, Shillong.
2. The Principal Secretary to the Govt. of Meghalaya, Industries Department, Meghalaya, Shillong.
3. The Principal Secretary to the Govt. of Meghalaya, Mining & Geology Department, Meghalaya, Shillong.
4. The Inspector General of (FC Act), Government of India, Ministry of Environment, Forest & Climate Change, Paryavaran Bhawan, CGO Complex, Lodhi Road, New Delhi – 110003.
5. The Additional Principal Chief Conservator of Forests (C), Government of India, Ministry of Environment, Forest & Climate Change, North Eastern Regional Office, Law-U-Sib, Lumbatngen, Near MTC Workshop, Shillong – 793021.
6. The Secretary to the Jaintia Hills Autonomous District Council, Jowai.
7. M/s Meghalaya Cements Ltd. (Topcem Cement), Thangskai Village, P.O Khliehriat, Jaintia Hills District for information.

for Principal Chief Conservator of Forests & HoFF
Meghalaya : Shillong

OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS & HOFF MEGHALAYA SHILLONG

Sylvan House, Lower Lachumiere
Shillong 793001
Phone: 91 364 2220414
Fax: 91 364 2504068



BOUNDARY GPS COORDINATES

P. NO	LATITUDE	LONGITUDE
P-01	25°12'16.4884"N	92°23'19.6857"E
P-02	25°12'19.7230"N	92°23'19.3283"E
P-03	25°12'20.3588"N	92°23'20.9978"E
P-04	25°12'20.4357"N	92°23'23.0730"E
P-05	25°12'20.5318"N	92°23'25.6151"E
P-06	25°12'23.0043"N	92°23'25.7249"E
P-07	25°12'25.9063"N	92°23'25.8537"E
P-08	25°12'27.8289"N	92°23'25.9391"E
P-09	25°12'29.2000"N	92°23'25.9999"E
P-10	25°12'34.1000"N	92°23'28.0999"E
P-11	25°12'38.1000"N	92°23'29.6999"E
P-12	25°12'39.6538"N	92°23'30.9960"E
P-13	25°12'41.2076"N	92°23'32.2922"E
P-14	25°12'42.8921"N	92°23'33.6974"E
P-15	25°12'43.1520"N	92°23'35.3300"E
P-16	25°12'43.4140"N	92°23'36.9768"E
P-17	25°12'43.6248"N	92°23'38.2849"E
P-18	25°12'43.8000"N	92°23'39.3998"E
P-19	25°12'42.8999"N	92°23'40.9999"E
P-20	25°12'42.0999"N	92°23'43.2999"E
P-21	25°12'41.5787"N	92°23'44.7525"E
P-22	25°12'39.4000"N	92°23'42.8998"E
P-23	25°12'37.8000"N	92°23'42.2998"E

P. NO	LATITUDE	LONGITUDE
P-24	25°12'36.5000"N	92°23'41.7998"E
P-25	25°12'34.7000"N	92°23'40.6998"E
P-26	25°12'33.2004"N	92°23'39.5001"E
P-27	25°12'32.4897"N	92°23'38.9586"E
P-28	25°12'34.7098"N	92°23'36.5301"E
P-29	25°12'35.6024"N	92°23'35.2328"E
P-30	25°12'36.7344"N	92°23'32.5785"E
P-31	25°12'32.8774"N	92°23'32.7762"E
P-32	25°12'29.6543"N	92°23'33.2957"E
P-33	25°12'25.7317"N	92°23'34.0879"E
P-34	25°12'22.5808"N	92°23'33.2080"E
P-35	25°12'19.4925"N	92°23'32.3411"E
P-36	25°12'18.3404"N	92°23'29.6165"E
P-37	25°12'17.6717"N	92°23'27.9980"E
P-38	25°12'16.4717"N	92°23'28.6980"E
P-39	25°12'14.0717"N	92°23'30.5980"E
P-40	25°12'12.0779"N	92°23'29.3882"E
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P-43	25°12'08.8868"N	92°23'21.6217"E
P-44	25°12'08.7999"N	92°23'20.2999"E
P-45	25°12'11.6000"N	92°23'20.0999"E
P-46	25°12'14.2045"N	92°23'19.8682"E

GROUND CONTROL POINTS COORDINATES

P. NO	LATITUDE	LONGITUDE	NORTHING	EASTING	ELEVATION
Base Point	25°12'34.10250984" N	92°23'28.0994100" E	2788281.526	438663.8362	744.093
GCP 1	25°12'42.11277048" N	92°23'45.08719620" E	2788525.778	439140.3103	769.708
GCP 2	25°12'41.11777224" N	92°23'36.07181700" E	2788496.307	438887.8926	735.072
GCP 3	25°12'34.49489148" N	92°23'29.07499200" E	2788293.472	438691.1764	742.925
GCP 4	25°12'19.17608652" N	92°23'23.28683748" E	2787823.001	438527.0648	748.783
GCP 5	25°12'20.45510568" N	92°23'40.35265260" E	2787860.186	439004.8239	757.05
GCP 6	25°12'08.78956668" N	92°23'28.73394348" E	2787502.822	438678.0551	707.358

Verified

DIVISIONAL MINING OFFICER
DIRECTORATE OF MINERAL RESOURCES
MEGHALAYA, JOWAI

Director of Mineral Resources
Meghalaya, Shillong

INDEX

M. L. BOUNDARY	
BARRIER 7.5 M.	
CONTOUR	
GRID LINE	
COORDINATE	92° 23' 18.03" 25° 12' 08.79"
BOUNDARY PILLARS	P-1 P-2
H. T. LINE	
BOREHOLES	
OLD WORKING	
GCP POINT	
OLD STRUCTURES	
1. OLD STONE DUMP	
2. INTERNAL KATCHA ROAD	
3. OLD CLAY BHATTA	
3. CIVIL CRUSHER	

PLATE No - II

MOOIONG THLUSNIANG M L AREA OVER 26.50 HECTARES

VILLAGE CHIEHRUPHI , P.O- LUMSHNONG
DIST. - EAST JAINTIA HILLS, MEGHALAYA

SURFACE PLAN

DATE OF SURVEY :- 28.03.2023	SCALE :- 1 : 3000
CONTOUR INTERVAL :- 2 M.	GRID INTERVAL - 100 M.

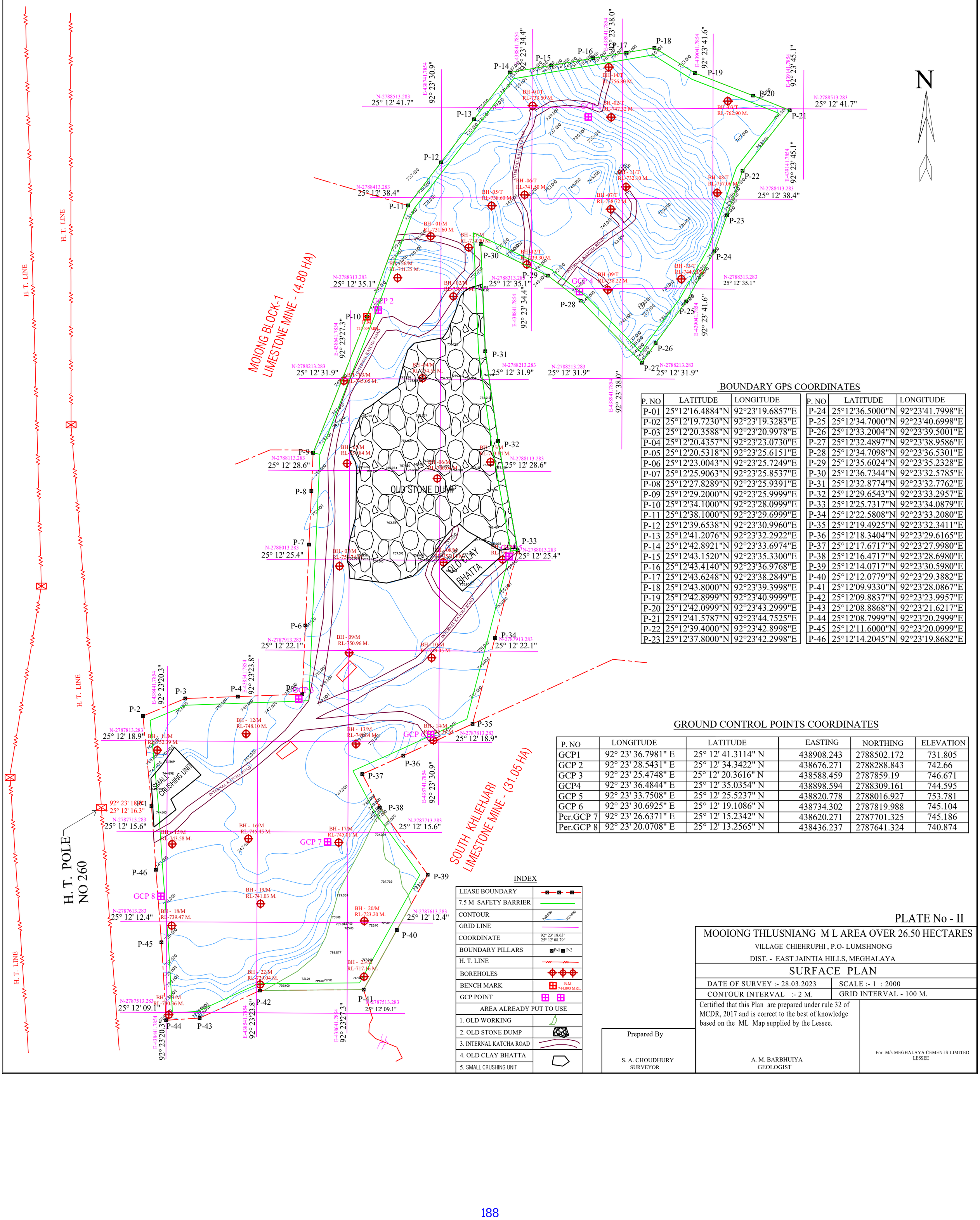
Certified that this Plan are prepared under rule 32 of MCDR, 2017 and is correct to the best of knowledge based on the P L Map supplied by the Licencee.

A. M. BARBHUIYA, M.Sc.
GEOLOGIST
Mining Geologist

Prepared By
S. A. CHOUDHURY
SURVEYOR

Meghalaya Cements Ltd.
Authorized Signatory
For M/s MEGHALAYA CEMENTS LIMITED
LESSEE

Annexure 5_Surface Plan



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P. NO	LATITUDE	LONGITUDE
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P-45	25°12'11.6000"N	92°23'20.0999"E
P-46	25°12'14.2045"N	92°23'19.8682"E

GROUND CONTROL POINTS COORDINATES

P. NO	LONGITUDE	LATITUDE	EASTING	NORTHING	ELEVATION
GCP1	92° 23' 36.7981" E	25° 12' 41.3114" N	438908.243	2788502.172	731.805
GCP 2	92° 23' 28.5431" E	25° 12' 34.3422" N	438676.271	2788288.843	742.66
GCP 3	92° 23' 25.4748" E	25° 12' 20.3616" N	438588.459	2787859.19	746.671
GCP4	92° 23' 36.4844" E	25° 12' 35.0354" N	438898.594	2788309.161	744.595
GCP 5	92° 23' 33.7508" E	25° 12' 25.5237" N	438820.778	2788016.927	753.781
GCP 6	92° 23' 30.6925" E	25° 12' 19.1086" N	438734.302	2787819.988	745.104
Per.GCP 7	92° 23' 26.6371" E	25° 12' 15.2342" N	438620.271	2787701.325	745.186
Per.GCP 8	92° 23' 20.0708" E	25° 12' 13.2565" N	438436.237	2787641.324	740.874

INDEX

LEASE BOUNDARY	
7.5 M SAFETY BARRIER	
CONTOUR	703.000 / 703.000
GRID LINE	
COORDINATE	92° 23' 18.63" 25° 12' 08.79"
BOUNDARY PILLARS	P-1 P-2
H. T. LINE	
BOREHOLES	
BENCH MARK	B.M. 744.093 MRL
GCP POINT	
AREA ALREADY PUT TO USE	
1. OLD WORKING	
2. OLD STONE DUMP	
3. INTERNAL KATCHA ROAD	
4. OLD CLAY BHATTA	
5. SMALL CRUSHING UNIT	

PLATE No - II

MOOIONG THLUSNIANG M L AREA OVER 26.50 HECTARES

VILLAGE CHIEHRUPHI , P.O- LUMSHNONG

DIST. - EAST JAINTIA HILLS, MEGHALAYA

SURFACE PLAN

DATE OF SURVEY :- 28.03.2023	SCALE :- 1 : 2000
CONTOUR INTERVAL :- 2 M.	GRID INTERVAL - 100 M.

Certified that this Plan are prepared under rule 32 of MCDR, 2017 and is correct to the best of knowledge based on the ML Map supplied by the Lessee.

Prepared By

S. A. CHOUDHURY
SURVEYOR

A. M. BARBHUIYA
GEOLOGIST

For M/s MEGHALAYA CEMENTS LIMITED
LESSEE

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF IRRIGATION
OFFICE OF THE EXECUTIVE ENGINEER (IRRIGATION)
JAINTIA HILLS DIVISION, JOWAI

No.AID(J)223/2007-2008/ Dated Jowai,the 24th March 2008.

NO OBJECTION CERTIFICATE.

The Executive Engineer Irrigation Jaintia Hills Jowai after due consideration of all formalities relating to the issue of N.O.C. to Meghalaya Cement Limited for drawal of water from the River Chynryntong – Umparti near Thangskai village for its Cement Plant with its Captive Power Plant at Thangskai village, subject to approval by the Meghalaya State Pollution Board, Shillong, N.O.C. issued by District Administration of Jaintia Hills District, Jaintia Hills Autonomous District Council, Jowai, Durbar Elaka Narpuh, Durbar Shnong Thangskai, Narpuh, the undersigned is pleased to grant this NO OBJECTION CERTIFICATE to the Meghalaya Cement Limited for the drawal of water from Chynryntong – Umparti River to the proposed Cement Plant and Captive Power Plant of Meghalaya Cement Limited at Thangskai village subject to the following condition:-

1. The Company will not claim any right over the river nor shall refrain any other agency from utilizing the water from Chynryntong-Umparti River as and when required.

2. The Company is to draw only the required quantity of water of 0.04 Cumecs and extra requirement should be obtained prior permission from the undersigned before drawal of the water form Chynryntong – Umparti River.

3. To prevent pollution of river/streams, the company is to ensure that no liquid effluent should flow from the factory to any stream or river by construction of Treatment plants/ soak pits.

4. The company should pay royalty/Cess as and when required as per the rule and regulation laid by the Government.

5. Regular monitoring as to the observance of the terms and condition to be done by the representative of the Department and the company on half yearly basis.

Cont.... P/2

6. The company should obtained No Objection Certificate for setting up plant from the Jaintia Hills Autonomous District Council including Trading Licence.

7. The company must follow the above terms and condition otherwise the legal action should be taken against the company.

Shri.K.D. Phawa
Executive Engineer(Irrigation)
Jaintia Hills Division, Jowai

Memo.No.AID(J)223/2007-2008/ 4456 Dated Jowai,the 24th March 2008.

Copy:

1. The Deputy Commissioner,Jaintia Hills District,Jowai – for favour of information.
2. The Chief Engineer(Irri), Meghalaya,Shillong – for favour of information as per technical approval vide letter no Agri/IRRI-1308/
3. The Superintending Engineer(I) Meghalaya, Shillong Circle for favour of information.
4. Shri. Gopal Sharma, Authorised Signatory of Meghalaya Cement Ltd. Thangskai for favour of information.

Shri.K.D. Phawa
Executive Engineer(Irrigation)
Jaintia Hills Division, Jowai

Annexure 7_Letter from PCCF

GOVERNMENT OF MEGHALAYA
OFFICE OF
THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS, BIODIVERSITY & WILDLIFE,
CHIEF WILDLIFE WARDEN, MEGHALAYA.

8/6/23

No. FWC/Clearance/20 / 717 Dated Shillong, the 6th June 2023

To,

The Divisional Forest Officer,
Jaintia Hills Wildlife Division, Jowai.

Sub: Authentication of flora and fauna list within 10 km radius and core zone.

Ref: No. MWL/JH/299/Mining Plan/2022-23/148 dated 09-05-2023.

Madam,

With reference to the above, I am directed to inform you that a common Regional Conservation Plan for all mining development activities is being prepared by the Department to minimise and mitigate impacts of development projects on wild animals and their habitat in East Jaintia Hills. Hence, the approval for NOC or any projects/ activities to be undertaken shall be considered by this office only when the Regional Conservation Plan is completed, as per due course. You are therefore, requested to communicate to the User Agency as above.

This is for your kind information and necessary action.

Yours faithfully,

Deputy Conservator of Forest,
Wildlife, Shillong.

RECEIPT
Regd No. 152
Date 8/6/2023
Rept. From

Sylvan House,
Lower Lachumiere Shillong 793001

Mob: 9436099145
e-mail: dcf_wildlife@yahoo.com

Received
15/06/2023

GOVERNMENT OF MEGHALAYA
OFFICE OF THE DIVISIONAL FOREST OFFICER JAINTIA HILLS WILDLIFE DIVISION:::::::::: JOWAI.

No.MWL/JH/299/MiningPlan/2022-23/263 **Dated Jowai, the 12th June, 2023.**

From: - The Divisional Forest Officer,
Jaintia Hills Wildlife Division,
Jowai.

To: The Authorised Signatory
M/S Meghalaya Cement Limited

16/6/23

Sub: Authentication of flora and fauna list within 10 Km radius and core zone.

Ref: - Letter No.FWC/ Clearance/20/717 Dt. 6th June, 2023.

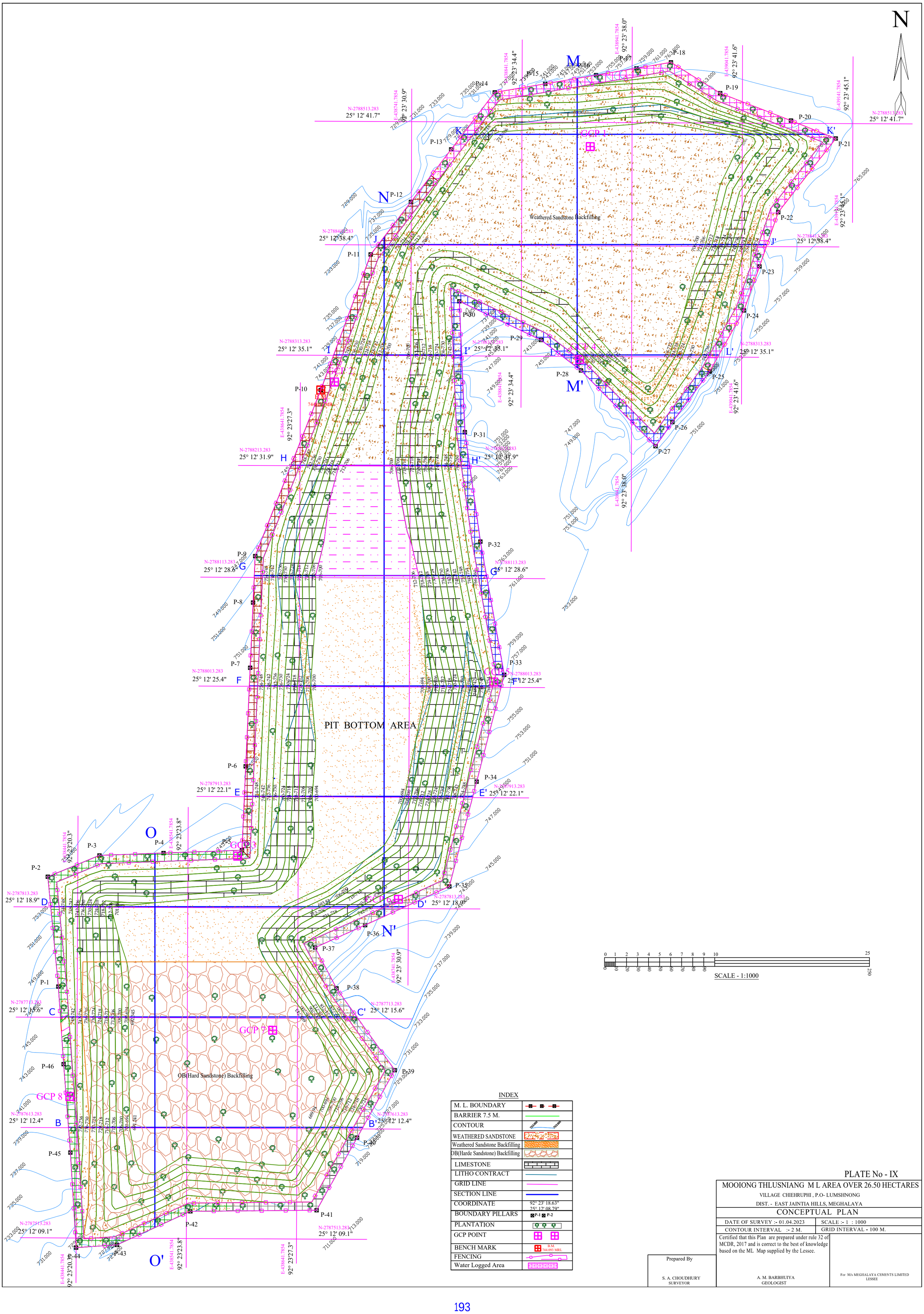
Sir,

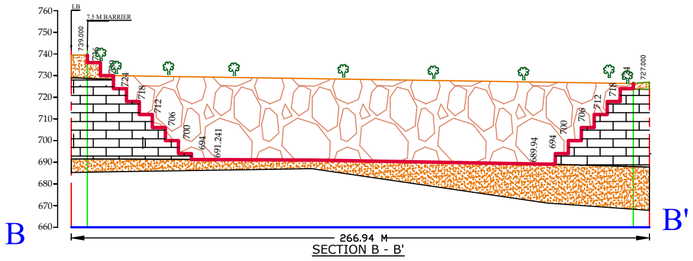
With reference to the subject cited above, I am enclosing herewith a copy Letter No under reference for your kind information and necessary action.

Enclosed :- As stated above.

Divisional Forest Officer,
Jaintia Hills Wildlife Division,
Jowai.

Annexure 8_Conceptual Plan and Sections





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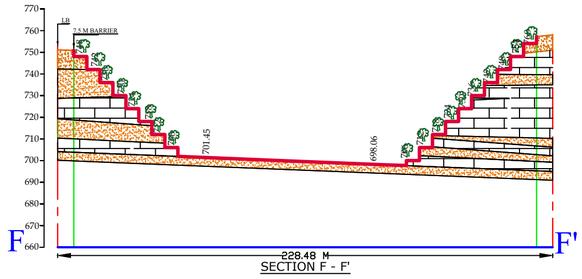

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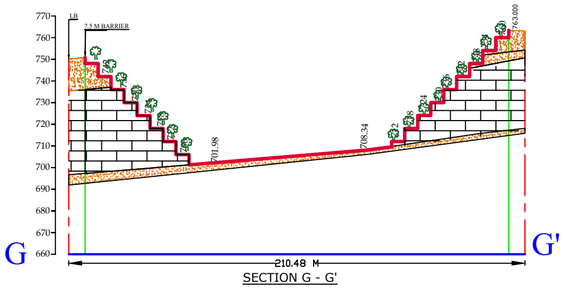

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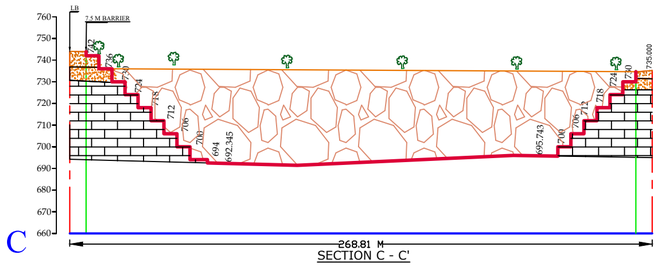

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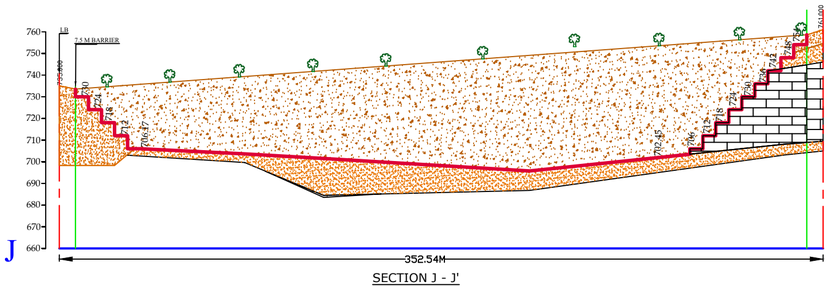

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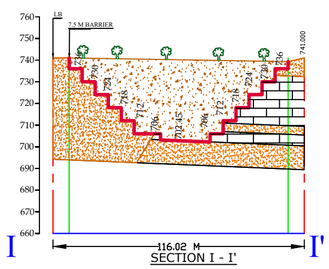

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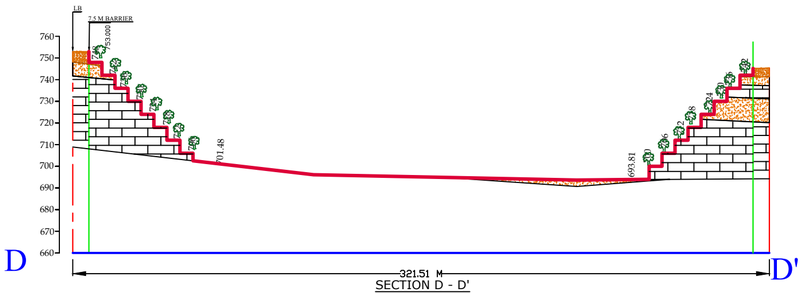

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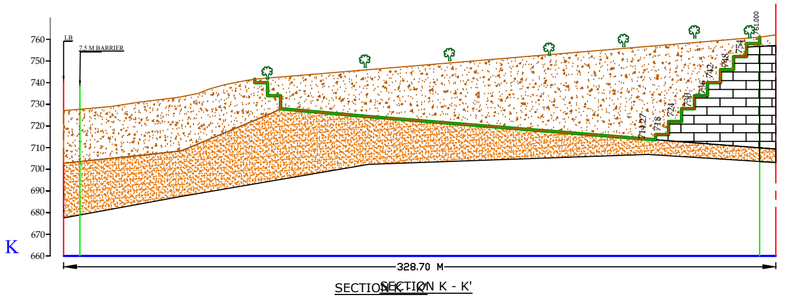

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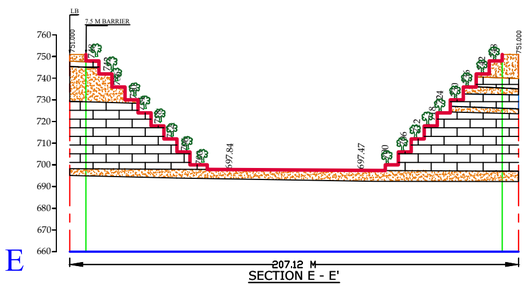
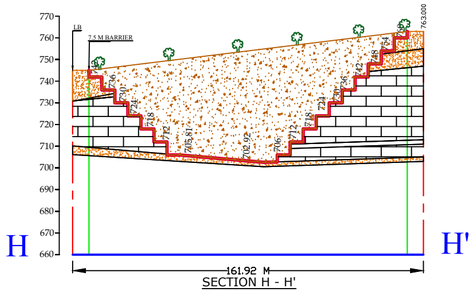


SECTION E - E'



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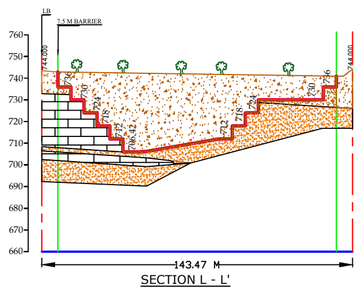

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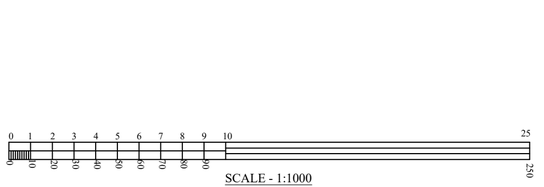
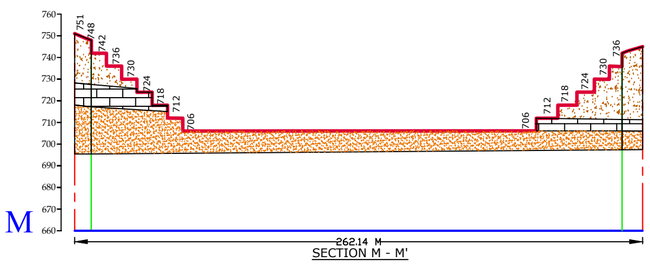
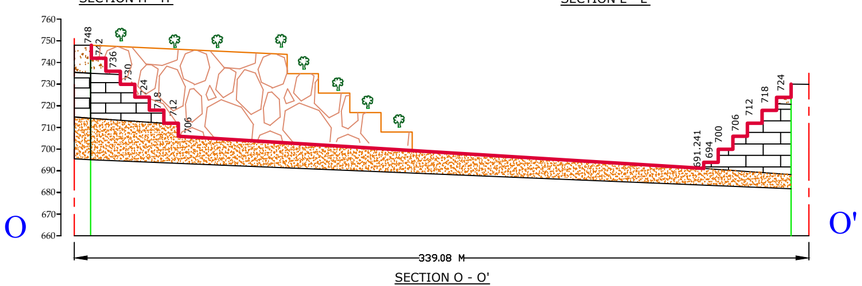




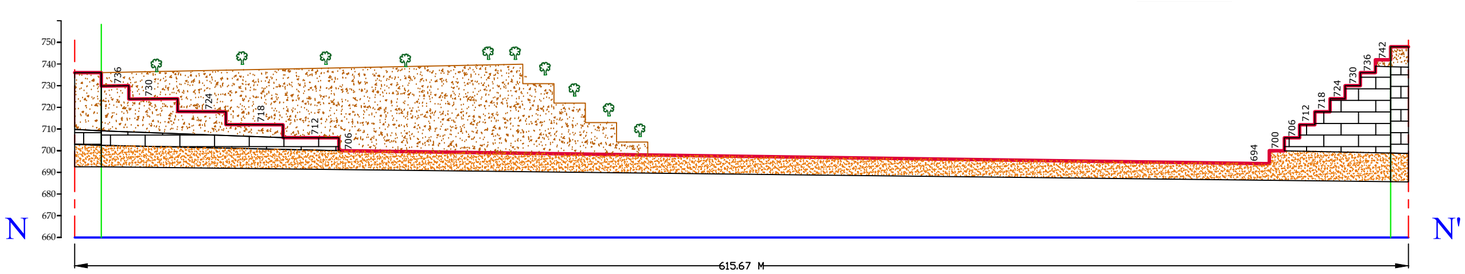
SECTION M - M'



SECTION O - O'

INDEX

LEASE BOUNDARY	
7.5 M. SAFETY BARRIER	
WEATHERED SANDSTONE	
SANDSTONE	
LIMESTONE	
PLANTATION	
ULTIMATE PIT LIMIT	



SECTION N - N'

PLATE No -X

MOOIONG THLUSNIANG M L AREA OVER 26.50 HECTARES

VILLAGE CHIEHRUPHI , P.O- LUMSHNONG

DIST. - EAST JAINTIA HILLS, MEGHALAYA

CONCEPTUAL SECTIONS

DATE OF SURVEY :- 28.03.2023 | SCALE :- 1 : 1000

Certified that this sections are correct to the best of my knowledge.

Prepared By

S. A. CHOUDHURY
SURVEYOR

A. M. BARBHUIYA
GEOLOGIST

For M/s MEGHALAYA CEMENTS LIMITED
LESSEE

Annexure 9_Detailed AAQM Tables

DETAILED AMBIENT AIR QUALITY TABLES
SUMMER SEASON (MARCH TO MAY, 2023)

Location: SA1 Mine Site									
Date	CLOCKHOURS								
	00–08		08–16		16-24		24 HOURS	24 HOURS	08 HOURS
	SO2	NOx	SO2	NOx	SO2	NOx	PM10	PM2.5	CO
01.03.2023	7.49	14.10	8.58	15.79	7.89	14.50	69.34	38.41	BDL
02.03.2023	8.47	14.94	9.54	16.24	9.07	15.54	58.90	33.50	BDL
08.03.2023	7.55	14.12	8.99	15.82	8.05	14.62	66.70	37.60	BDL
09.03.2023	8.46	14.93	9.04	16.14	8.86	15.33	68.74	38.17	BDL
15.03.2023	4.80	11.40	8.25	13.20	5.50	12.10	69.54	38.42	BDL
16.03.2023	8.48	15.14	9.55	16.43	8.78	15.44	68.70	37.67	BDL
22.03.2023	6.29	13.27	8.56	15.76	6.29	13.27	68.84	38.26	BDL
23.03.2023	8.56	15.76	9.59	17.10	8.96	16.16	69.94	38.44	BDL
29.03.2023	7.54	14.11	8.59	15.81	7.74	14.31	68.94	38.36	BDL
30.03.2023	8.51	15.75	9.58	16.60	8.91	16.15	59.90	34.30	BDL
05.04.2023	6.25	13.22	8.51	15.75	6.55	13.52	68.84	39.44	BDL
06.04.2023	8.45	14.73	9.03	15.84	9.05	15.33	68.74	38.17	BDL
12.04.2023	6.29	13.27	8.56	15.76	6.79	13.77	69.22	40.84	BDL
13.04.2023	8.48	15.14	9.55	16.43	9.08	15.74	69.34	38.41	BDL
19.04.2023	6.21	13.21	8.50	15.74	6.51	13.51	70.12	40.95	BDL
20.04.2023	8.25	14.72	9.02	15.83	8.45	14.92	68.75	38.25	BDL
26.04.2023	8.56	15.76	9.59	17.10	8.76	15.96	70.90	41.10	BDL
27.04.2023	7.49	14.10	8.58	15.79	7.89	14.50	69.94	38.44	BDL
03.05.2023	8.46	14.93	9.04	16.14	8.96	15.43	70.02	40.85	BDL
04.05.2023	7.29	14.07	8.57	15.77	7.49	14.27	63.80	34.80	BDL
10.05.2023	8.57	15.77	9.60	17.30	8.87	16.17	55.30	28.50	BDL
11.05.2023	7.55	14.12	8.99	15.82	8.05	14.62	68.94	38.36	BDL
17.05.2023	6.21	13.21	8.50	15.74	6.51	13.51	69.14	40.24	BDL
18.05.2023	8.48	15.14	9.55	16.43	8.78	15.44	58.00	30.00	BDL
24.05.2023	7.54	14.11	8.59	15.81	7.84	14.41	70.02	40.85	BDL
25.05.2023	8.51	15.75	9.58	16.60	8.81	16.05	64.90	35.60	BDL

	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO
	(Unit µg/m³)				(mg/m3)
Max.	17.30	9.60	70.90	41.10	BDL
Min.	11.40	4.80	55.30	28.50	BDL
95%tile	16.60	9.58	70.10	40.93	BDL
98%tile	17.10	9.59	70.51	41.03	BDL

DETAILED AMBIENT AIR QUALITY TABLES
SUMMER SEASON (MARCH TO MAY, 2023)

Location: SA2 Monitoring Station - 01									
Date	CLOCKHOURS								
	00–08		08–16		16-24		24 HOURS	24 HOURS	08 HOURS
	SO2	NOx	SO2	NOx	SO2	NOx	PM10	PM2.5	CO
01.03.2023	BDL	10.60	BDL	12.29	BDL	11.00	39.44	28.11	BDL
02.03.2023	BDL	11.44	BDL	12.74	BDL	12.04	30.40	21.90	BDL
08.03.2023	BDL	10.62	BDL	12.32	BDL	11.12	36.10	27.20	BDL
09.03.2023	BDL	11.43	BDL	12.64	BDL	11.83	38.44	27.87	BDL
15.03.2023	BDL	7.90	BDL	9.70	BDL	8.60	39.64	28.12	BDL
16.03.2023	BDL	11.64	BDL	12.93	BDL	11.94	38.40	27.27	BDL
22.03.2023	BDL	9.77	BDL	12.26	BDL	9.77	38.54	27.96	BDL
23.03.2023	BDL	12.26	BDL	13.60	BDL	12.66	40.04	28.14	BDL
29.03.2023	BDL	10.61	BDL	12.31	BDL	10.81	39.04	28.06	BDL
30.03.2023	BDL	12.25	BDL	13.10	BDL	12.65	31.70	22.70	BDL
05.04.2023	BDL	9.72	BDL	12.25	BDL	10.02	38.54	29.14	BDL
06.04.2023	BDL	11.23	BDL	12.34	BDL	11.83	38.44	27.87	BDL
12.04.2023	BDL	9.77	BDL	12.26	BDL	10.27	38.92	30.54	BDL
13.04.2023	BDL	11.64	BDL	12.93	BDL	12.24	39.44	28.11	BDL
19.04.2023	BDL	9.71	BDL	12.24	BDL	10.01	39.82	30.65	BDL
20.04.2023	BDL	11.22	BDL	12.33	BDL	11.42	38.45	27.95	BDL
26.04.2023	BDL	12.26	BDL	13.60	BDL	12.46	40.60	30.80	BDL
27.04.2023	BDL	10.60	BDL	12.29	BDL	11.00	40.04	28.14	BDL
03.05.2023	BDL	11.43	BDL	12.64	BDL	11.93	39.72	30.55	BDL
04.05.2023	BDL	10.57	BDL	12.27	BDL	10.77	33.10	24.10	BDL
10.05.2023	BDL	12.27	BDL	13.80	BDL	12.67	28.70	19.70	BDL
11.05.2023	BDL	10.62	BDL	12.32	BDL	11.12	39.04	28.06	BDL
17.05.2023	BDL	9.71	BDL	12.24	BDL	10.01	38.84	29.94	BDL
18.05.2023	BDL	11.64	BDL	12.93	BDL	11.94	29.50	21.40	BDL
24.05.2023	BDL	10.61	BDL	12.31	BDL	10.91	39.72	30.55	BDL
25.05.2023	BDL	12.25	BDL	13.10	BDL	12.55	34.40	24.90	BDL

	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO
	(Unit µg/m³)				(mg/m3)
Max.	13.80	BDL	40.60	30.80	BDL
Min.	7.90	BDL	28.70	19.70	BDL
95%tile	13.10	BDL	40.04	30.63	BDL
98%tile	13.60	BDL	40.32	30.73	BDL

DETAILED AMBIENT AIR QUALITY TABLES
SUMMER SEASON (MARCH TO MAY, 2023)

Location: SA3 Monitoring Station-2									
Date	CLOCKHOURS								
	00–08		08–16		16-24		24 HOURS	24 HOURS	08 HOURS
	SO_2	NOx	SO_2	NOx	SO_2	NOx	PM10	PM2.5	CO
03.03.2023	6.39	11.80	7.48	14.19	6.79	12.20	54.84	33.51	BDL
04.03.2023	7.37	12.84	8.44	14.64	7.97	13.44	42.40	28.40	BDL
10.03.2023	6.45	11.82	7.89	14.22	6.95	12.32	51.30	32.60	BDL
11.03.2023	7.36	12.83	7.94	14.54	7.76	13.23	53.84	33.27	BDL
17.03.2023	4.60	9.10	7.15	10.90	5.30	9.80	55.04	33.52	BDL
18.03.2023	7.38	13.44	8.45	14.83	7.68	13.74	53.80	32.67	BDL
24.03.2023	5.69	10.97	7.46	14.16	5.69	10.97	53.94	33.36	BDL
25.03.2023	7.46	14.16	8.49	15.50	7.86	14.56	55.44	33.54	BDL
01.04.2023	6.44	11.81	7.49	14.21	6.64	12.01	54.44	33.46	BDL
02.04.2023	7.41	14.15	8.48	15.00	7.81	14.55	44.90	28.60	BDL
07.04.2023	5.68	10.92	7.41	14.15	5.98	11.22	53.94	34.54	BDL
08.04.2023	7.35	12.63	7.93	14.24	7.95	13.23	53.84	33.27	BDL
14.04.2023	5.69	10.97	7.46	14.16	6.19	11.47	54.32	35.94	BDL
15.04.2023	7.38	13.44	8.45	14.83	7.98	14.04	54.84	33.51	BDL
21.04.2023	5.61	10.91	7.40	14.14	5.91	11.21	55.22	36.05	BDL
22. 04.2023	7.15	12.62	7.92	14.23	7.35	12.82	53.85	33.35	BDL
28.04.2023	7.46	14.16	8.49	15.50	7.66	14.36	56.00	36.20	BDL
29.04.2023	6.39	11.80	7.48	14.19	6.79	12.20	55.44	33.54	BDL
04.05.2023	7.36	12.83	7.94	14.54	7.86	13.33	55.12	35.95	BDL
05.05.2023	6.19	11.77	7.47	14.17	6.39	11.97	47.20	29.50	BDL
11.05.2023	7.47	14.17	8.50	15.70	7.77	14.57	40.70	27.80	BDL
12.05.2023	6.45	11.82	7.89	14.22	6.95	12.32	54.44	33.46	BDL
18.05.2023	5.61	10.91	7.40	14.14	5.91	11.21	54.24	35.34	BDL
19.05.2023	7.38	13.44	8.45	14.83	7.68	13.74	41.50	28.00	BDL
25.05.2023	6.44	11.81	7.49	14.21	6.74	12.11	55.12	35.95	BDL
26.05.2023	7.41	14.15	8.48	15.00	7.71	14.45	49.60	30.30	BDL

	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO
	(Unit µg/m³)				(mg/m3)
Max.	15.70	8.50	56.00	36.20	BDL
Min.	9.10	4.60	40.70	27.80	BDL
95%tile	15.00	8.48	55.44	36.03	BDL
98%tile	15.50	8.49	55.72	36.13	BDL

DETAILED AMBIENT AIR QUALITY TABLES
SUMMER SEASON (MARCH TO MAY, 2023)

Location: SA4 Adjacent Mine									
Date	CLOCKHOURS								
	00–08		08–16		16-24		24 HOURS	24 HOURS	08 HOURS
	SO2	NOx	SO2	NOx	SO2	NOx	PM10	PM2.5	CO
03.03.2023	7.79	13.50	8.88	15.89	8.19	13.90	61.74	41.11	BDL
04.03.2023	8.77	14.54	9.84	16.34	9.37	15.14	51.00	35.80	BDL
10.03.2023	7.85	13.52	9.29	15.92	8.35	14.02	58.20	40.20	BDL
11.03.2023	8.76	14.53	9.34	16.24	9.16	14.93	60.74	40.87	BDL
17.03.2023	4.50	11.80	8.55	12.60	5.20	12.50	61.94	41.12	BDL
18.03.2023	8.78	15.14	9.85	16.53	9.08	15.44	60.70	40.27	BDL
24.03.2023	6.09	12.67	8.86	15.86	6.09	12.67	60.84	40.96	BDL
25.03.2023	8.86	15.86	9.89	17.20	9.26	16.26	62.34	41.14	BDL
01.04.2023	7.84	13.51	8.89	15.91	8.04	13.71	61.34	41.06	BDL
02.04.2023	8.81	15.85	9.88	16.70	9.21	16.25	53.00	36.00	BDL
07.04.2023	6.08	12.62	8.81	15.85	6.38	12.92	60.84	42.14	BDL
08.04.2023	8.75	14.33	9.33	15.94	9.35	14.93	60.74	40.87	BDL
14.04.2023	6.09	12.67	8.86	15.86	6.59	13.17	61.22	43.54	BDL
15.04.2023	8.78	15.14	9.85	16.53	9.38	15.74	61.74	41.11	BDL
21.04.2023	6.01	12.61	8.80	15.84	6.31	12.91	62.12	43.65	BDL
22. 04.2023	8.55	14.32	9.32	15.93	8.75	14.52	60.75	40.95	BDL
28.04.2023	8.86	15.86	9.89	17.20	9.06	16.06	62.90	43.80	BDL
29.04.2023	7.79	13.50	8.88	15.89	8.19	13.90	62.34	41.14	BDL
04.05.2023	8.76	14.53	9.34	16.24	9.26	15.03	62.02	43.55	BDL
05.05.2023	6.99	13.47	8.87	15.87	7.19	13.67	54.10	37.10	BDL
11.05.2023	8.87	15.87	9.90	17.40	9.17	16.27	49.90	35.00	BDL
12.05.2023	7.85	13.52	9.29	15.92	8.35	14.02	61.34	41.06	BDL
18.05.2023	6.01	12.61	8.80	15.84	6.31	12.91	61.14	42.94	BDL
19.05.2023	8.78	15.14	9.85	16.53	9.08	15.44	50.40	35.20	BDL
25.05.2023	7.84	13.51	8.89	15.91	8.14	13.81	62.02	43.55	BDL
26.05.2023	8.81	15.85	9.88	16.70	9.11	16.15	56.50	37.90	BDL

	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO
	(Unit µg/m³)				(mg/m3)
Max.	17.40	9.90	62.90	43.80	BDL
Min.	11.80	4.50	49.90	35.00	BDL
95%tile	16.70	9.88	62.34	43.63	BDL
98%tile	17.20	9.89	62.62	43.73	BDL

DETAILED AMBIENT AIR QUALITY TABLES
SUMMER SEASON (MARCH TO MAY, 2023)

Location: SA5 Near Plant Site									
Date	CLOCKHOURS								
	00–08		08–16		16-24		24 HOURS	24 HOURS	08 HOURS
	SO2	NOx	SO2	NOx	SO2	NOx	PM10	PM2.5	CO
11.03.2023	8.89	17.70	9.68	20.39	9.29	18.10	69.74	44.21	0.55
12.03.2023	9.57	19.04	10.64	20.84	10.17	19.64	58.90	38.90	0.54
18.03.2023	8.95	17.72	1.0.09	20.42	9.45	18.22	66.20	43.30	0.56
19.03.2023	9.56	19.03	10.14	20.74	9.96	19.43	68.74	43.97	0.54
25.03.2023	7.00	13.80	9.35	15.30	7.70	14.50	69.94	44.22	0.54
26.03.2023	9.58	19.64	10.65	21.03	9.88	19.94	68.70	43.37	0.55
01.04.2023	8.09	16.87	9.66	20.36	8.09	16.87	68.84	44.06	0.58
02.04.2023	9.66	20.36	10.69	21.70	10.06	20.76	70.34	44.24	0.51
08.04.2023	8.94	17.71	9.69	20.41	9.14	17.91	69.34	44.16	0.58
09.04.2023	9.61	20.35	10.68	21.20	10.01	20.75	60.90	39.10	0.55
15.04.2023	8.08	16.81	9.61	20.35	8.38	17.11	68.84	45.24	0.55
16.04.2023	9.55	18.53	10.13	20.44	10.15	19.13	68.74	43.97	0.58
22.04.2023	8.09	16.87	9.66	20.36	8.59	17.37	69.22	46.64	0.58
23.04.2023	9.58	19.64	10.65	21.03	10.18	20.24	69.74	44.21	0.54
29.04.2023	8.01	15.31	9.60	20.34	8.31	15.61	70.12	46.75	0.55
30.04.2023	9.35	18.52	10.12	20.43	9.55	18.72	68.75	44.05	0.59
06.05.2023	9.66	20.36	10.69	21.70	9.86	20.56	70.90	46.90	0.55
07.05.2023	8.89	17.70	9.68	20.39	9.29	18.10	70.34	44.24	0.57
13.05.2023	9.56	19.03	10.14	20.74	10.06	19.53	70.02	46.65	0.55
14.05.2023	8.69	17.67	9.67	20.37	8.89	17.87	62.10	40.20	0.54
20.05.2023	9.67	20.37	10.70	21.90	9.97	20.77	57.80	37.60	0.54
21.05.2023	8.95	17.72	10.09	20.42	9.45	18.22	69.34	44.16	0.52
27.05.2023	8.01	15.31	9.60	20.34	8.31	15.61	69.14	46.04	0.58
28.05.2023	9.58	19.64	10.65	21.03	9.88	19.94	58.30	38.10	0.57
30.05.2023	8.94	17.71	9.69	20.41	9.24	18.01	70.02	46.65	0.53
31.05.2023	9.61	20.35	10.68	21.20	9.91	20.65	64.50	41.00	0.52

	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO
	(Unit µg/m³)				(mg/m3)
Max.	21.90	10.70	70.90	46.90	0.59
Min.	13.80	7.00	57.80	37.60	0.51
95%tile	21.20	10.68	70.34	46.73	0.58
98%tile	21.70	10.69	70.62	46.83	0.59

DETAILED AMBIENT AIR QUALITY TABLES
SUMMER SEASON (MARCH TO MAY, 2023)

Location: SA6 Village Chiehruphi									
Date	CLOCKHOURS								
	00–08		08–16		16-24		24 HOURS	24 HOURS	08 HOURS
	SO2	NOx	SO2	NOx	SO2	NOx	PM10	PM2.5	CO
11.03.2023	8.89	18.00	10.28	20.99	9.29	18.40	59.54	35.41	BDL
12.03.2023	10.17	19.64	11.24	21.44	10.77	20.24	46.30	31.80	BDL
18.03.2023	8.95	18.02	10.69	21.02	9.45	18.52	55.60	34.50	BDL
19.03.2023	10.16	19.63	10.74	21.34	10.56	20.03	58.14	35.17	BDL
25.03.2023	6.00	14.10	9.35	15.60	6.70	14.80	59.74	35.42	BDL
26.03.2023	10.18	20.24	11.25	21.63	10.48	20.54	58.10	34.57	BDL
01.04.2023	7.59	17.17	10.26	20.96	7.59	17.17	58.24	35.26	BDL
02.04.2023	10.26	20.96	11.29	22.30	10.66	21.36	60.14	35.44	BDL
08.04.2023	8.94	18.01	10.29	21.01	9.14	18.21	58.74	35.36	BDL
09.04.2023	10.21	20.95	11.28	21.80	10.61	21.35	48.80	31.90	BDL
15.04.2023	7.58	17.11	10.21	20.95	7.88	17.41	58.24	36.44	BDL
16.04.2023	10.15	18.83	10.73	21.04	10.75	19.43	58.14	35.17	BDL
22.04.2023	7.59	17.17	10.26	20.96	8.09	17.67	58.62	37.84	BDL
23.04.2023	10.18	20.24	11.25	21.63	10.78	20.84	59.54	35.41	BDL
29.04.2023	7.51	15.61	10.20	20.94	7.81	15.91	59.52	37.95	BDL
30.04.2023	9.35	18.82	10.72	21.03	9.55	19.02	58.15	35.25	BDL
06.05.2023	10.26	20.96	11.29	22.30	10.46	21.16	60.30	38.10	BDL
07.05.2023	8.89	18.00	10.28	20.99	9.29	18.40	60.14	35.44	BDL
13.05.2023	10.16	19.63	10.74	21.34	10.66	20.13	59.42	37.85	BDL
14.05.2023	8.39	17.97	10.27	20.97	8.59	18.17	51.30	32.30	BDL
20.05.2023	10.27	20.97	11.30	22.50	10.57	21.37	43.70	30.40	BDL
21.05.2023	8.95	18.02	10.69	21.02	9.45	18.52	58.74	35.36	BDL
27.05.2023	7.51	15.61	10.20	20.94	7.81	15.91	58.54	37.24	BDL
28.05.2023	10.18	20.24	11.25	21.63	10.48	20.54	44.50	31.00	BDL
30.05.2023	8.94	18.01	10.29	21.01	9.24	18.31	59.42	37.85	BDL
31.05.2023	10.21	20.95	11.28	21.80	10.51	21.25	53.70	32.70	BDL

	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO
	(Unit µg/m³)				(mg/m3)
Max.	22.50	11.30	60.30	38.10	BDL
Min.	14.10	6.00	43.70	30.40	BDL
95%tile	21.80	11.28	60.14	37.93	BDL
98%tile	22.30	11.29	60.22	38.03	BDL

MEGHALAYA CEMENTS LIMITED

CIN- U26942ML2003PLC007125

TOPCEM CEMENT
Mazbooti ka bharosa...hamesha

CORPORATE ENVIRONMENTAL POLICY

- At MCL, environmental responsibilities are highly venerated. MCL strives to reduce the environmental impact of its activities by adopting sustainable practices and the latest available technology.
- MCL stringently monitors every activity to ensure compliance with applicable safety rules, standards and regulations. Strategies are in place for the optimal usage of natural resources to reduce carbon footprint and impact on the rich biodiversity of the region.
- MCL is and will follow all the legislations related to environment, factory operation, pollution control, water withdrawal, etc. and it follows standard operating process to bring into focus about any infringement/ deviation/ violation of the environmental law and to ensure regulatory compliance.
- MCL utilizes the best available technology to enhance energy efficiency, conscious usage of resources and recycling of industrial waste. Participate in strategic discussions about environmental issues.
- The hierarchy of reporting and management of non compliance are and shall be followed.

Date: 1st DEC 2022

Chairman

ISO 9001:2000 & ISO 14001:2004 CERTIFIED COMPANY

Sales & Marketing Office :
Mega Plaza, 4th Floor,Christian Basti
G.S. Road, Guwahati - 781 005
Tel. : 0361 2345421/22/23, Fax : 0361 2345419
E-mail : guwahati@topcem.in
Web : www.topcem.in

Kolkata :
BE-77, Salt Lake City
Sector-1, Kolkata - 700 064
Tel. : 033 2334 0666 / 0004
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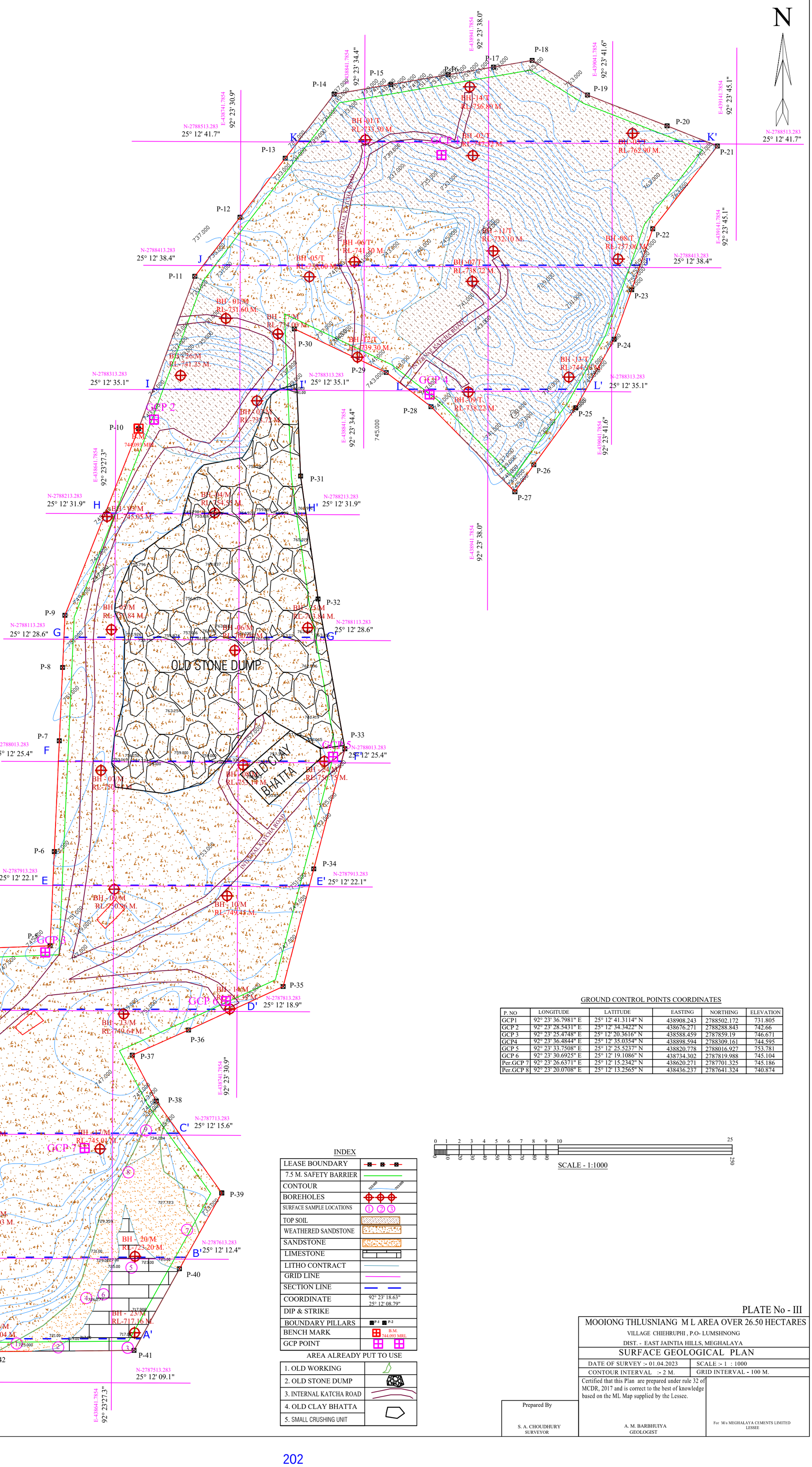
E-mail : kolkata@topcem.in

Registered Office :
Village: Thangskai, P.O. & P.S. Lumshnong
District : East Jaintia Hills, Meghalaya, PIN: 793210
Tel. : 03655 278324 / 363 / 364
Fax : 03655 278327
E-mail : meghalaya@topcem.in

Annexure 11_Surface Geological Plan and Section



GROUND CONTROL POINTS COORDINATES

P. NO	LONGITUDE	LATITUDE	EASTING	NORTHING	ELEVATION
GCP1	92° 23' 36.7981" E	25° 12' 41.3114" N	438908.243	2788502.172	731.805
GCP 2	92° 23' 28.5431" E	25° 12' 34.3422" N	438676.271	2788288.843	742.66
GCP 3	92° 23' 25.4748" E	25° 12' 20.3616" N	438588.459	2787859.19	746.671
GCP4	92° 23' 36.4844" E	25° 12' 35.0354" N	438898.594	2788309.161	744.595
GCP 5	92° 23' 33.7508" E	25° 12' 25.5237" N	438820.778	2788016.927	753.781
GCP 6	92° 23' 30.6925" E	25° 12' 19.1086" N	438734.302	2787819.988	745.104
Per.GCP 7	92° 23' 26.6371" E	25° 12' 15.2342" N	438620.271	2787701.325	745.186
Per.GCP 8	92° 23' 20.0708" E	25° 12' 13.2565" N	438436.237	2787641.324	740.874

INDEX

LEASE BOUNDARY	
7.5 M. SAFETY BARRIER	
CONTOUR	
BOREHOLES	
SURFACE SAMPLE LOCATIONS	① ② ③
TOP SOIL	
WEATHERED SANDSTONE	
SANDSTONE	
LIMESTONE	
LITHO CONTRACT	
GRID LINE	
SECTION LINE	
COORDINATE	92° 23' 18.63" 25° 12' 08.79"
DIP & STRIKE	
BOUNDARY PILLARS	P-1 P-2
BENCH MARK	B.M. 744.093 MRL
GCP POINT	

AREA ALREADY PUT TO USE

1. OLD WORKING	
2. OLD STONE DUMP	
3. INTERNAL KATCHA ROAD	
4. OLD CLAY BHATTA	
5. SMALL CRUSHING UNIT	

0 1 2 3 4 5 6 7 8 9 10 25
0 10 20 30 40 50 60 70 80 90 250

SCALE - 1:1000

PLATE No - III

MOOIONG THLUSNIANG M L AREA OVER 26.50 HECTARES
VILLAGE CHIEHRUPHI , P.O- LUMSHNONG
DIST. - EAST JAINTIA HILLS, MEGHALAYA

SURFACE GEOLOGICAL PLAN

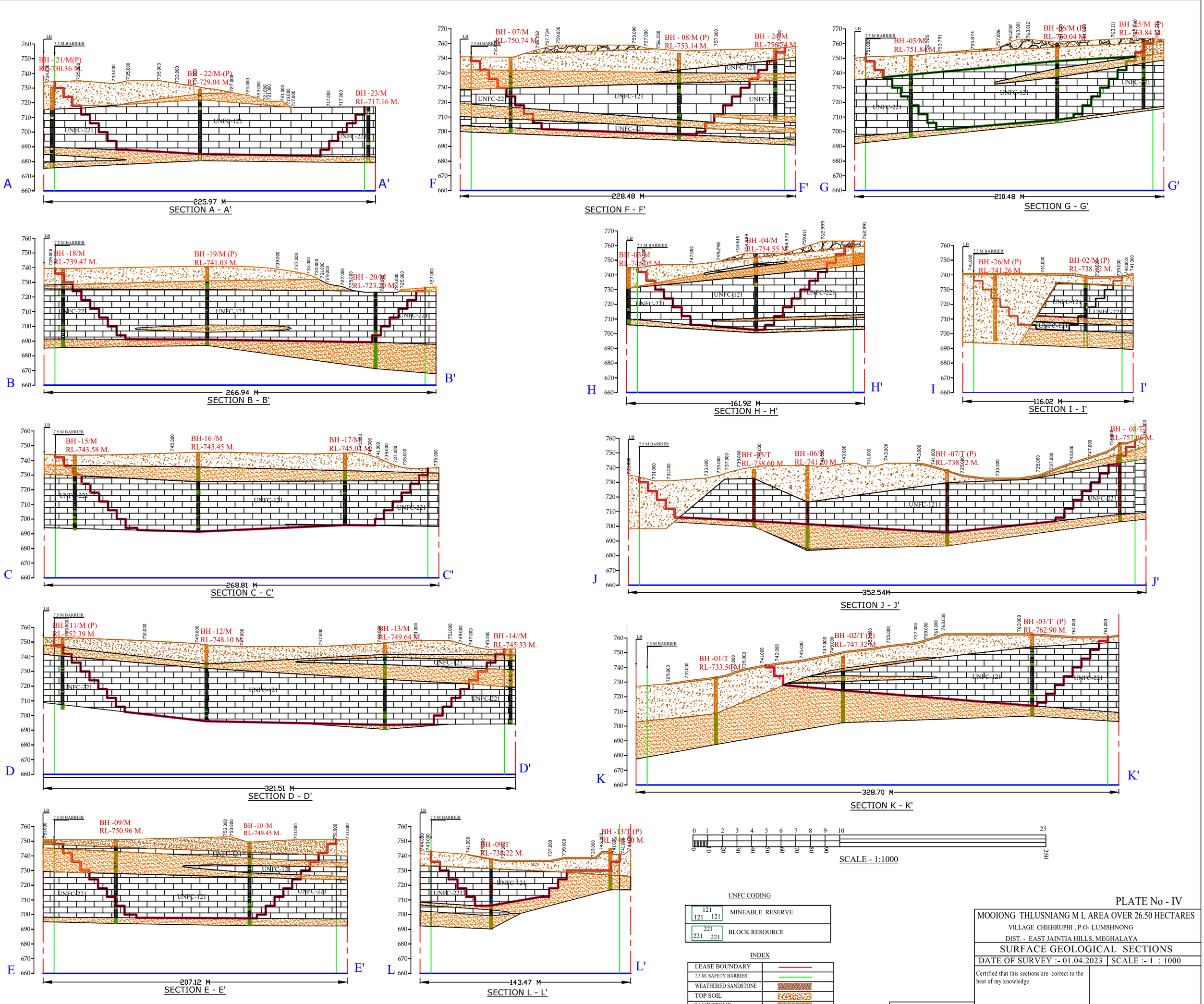
DATE OF SURVEY :- 01.04.2023 | SCALE :- 1 : 1000
CONTOUR INTERVAL :- 2 M. | GRID INTERVAL - 100 M.

Certified that this Plan are prepared under rule 32 of MCDR, 2017 and is correct to the best of knowledge based on the ML Map supplied by the Lessee.

Prepared By
S. A. CHOUDHURY
SURVEYOR

A. M. BARBHUIYA
GEOLOGIST

For M/s MEGHALAYA CEMENTS LIMITED
LESSEE


BH - 21/M(P) RL-730.36 M.
BH - 22/M-(P) RL-729.04 M.
BH -23/M RL-717.16 M.
UNFC-121
UNFC-221
A
A'
225.97 M
SECTION A - A'
BH - 07/M RL-750.74 M.
BH - 08/M (P) RL-753.14 M.
BH - 24/M RL-756.74 M.
UNFC-121
UNFC-221
F
F'
228.48 M
SECTION F - F'
BH -05/M RL-751.84 M.
BH -06/M (P) RL-760.04 M.
BH -25/M (P) RL-763.84 M.
G
G'
210.48 M
SECTION G - G'
BH -18/M RL-739.47 M.
BH -19/M (P) RL-741.03 M.
BH - 20/M RL-723.20 M.
B
B'
266.94 M
SECTION B - B'
BH -03/M RL-745.05 M.
BH -04/M RL-754.55 M.
H
H'
161.92 M
SECTION H - H'
BH -26/M (P) RL-741.26 M.
BH-02/M (P) RL-738.92 M.
I
I'
116.02 M
SECTION I - I'
BH -15/M RL-743.58 M.
BH-16 /M RL-745.45 M.
BH -17/M RL-745.07 M.
C
C'
268.81 M
SECTION C - C'
BH -05/T RL-738.60 M.
BH -06/T RL-741.50 M.
BH -07/T (P) RL-738.92 M.
BH - 08/T RL-757.06 M.
J
J'
352.54M
SECTION J - J'
BH 11/M (P) RL-752.39 M.
BH -12/M RL-748.10 M.
BH -13/M RL-749.64 M.
BH -14//M RL-745.33 M.
D
D'
321.51 M
SECTION D - D'
BH -01/T RL-733.50 M.
BH -02/T (P) RL-747.32 M.
BH -03/T (P) RL-762.90 M.
K
K'
328.70 M
SECTION K - K'
BH -09/M RL-750.96 M.
BH -10 /M RL-749.45 M.
E
E'
207.12 M
SECTION E - E'
BH -09/T RL-738.22 M.
BH -13/T (P) RL-748.20 M.
L
L'
143.47 M
SECTION L - L'
0 1 2 3 4 5 6 7 8 9 10 25
0 20 40 60 80 100 120 140 160 180 200 250
SCALE - 1:1000
UNFC CODING
121 121 121 MINEABLE RESERVE
221 221 221 BLOCK RESOURCE
INDEX
LEASE BOUNDARY
7.5 M. SAFETY BARRIER
WEATHERED SANDSTONE
TOP SOIL
SANDSTONE
LIMESTONE
ULTIMATE PIT LIMIT
PLATE No - IV
MOOIONG THLUSNIANG M L AREA OVER 26.50 HECTARES
VILLAGE CHIEHRUPHI , P.O- LUMSHNONG
DIST. - EAST JAINTIA HILLS, MEGHALAYA
SURFACE GEOLOGICAL SECTIONS
DATE OF SURVEY :- 01.04.2023
SCALE :- 1 : 1000
Certified that this sections are correct to the best of my knowledge.
Prepared By
S. A. CHOUDHURY
SURVEYOR
A. M. BARBHUIYA
GEOLOGIST
For M/s MEGHALAYA CEMENTS LIMITED

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

J.M. ENVIRO LAB 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

424, GROUND FLOOR, UDYOG VIHAR PHASE-IV, GURUGRAM, HARYANA, INDIA

in the field of

TESTING

Certificate Number: TC-6821

Issue Date: 24/05/2023 **Valid Until:** 23/05/2025

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 : J.M. ENVIRO LAB PRIVATE LIMITED

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer